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Responsible Fishery Management (RFM)



US Pacific Hake/Whiting Fishery

Full Assessment Report

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Fishery client:	Pacific Whiting Conservation Cooperative
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Foreword

The Responsible Fisheries Management (RFM) Standard is composed of Conformance Criteria based on the 1995 FAO Code of Conduct for Responsible Fisheries and the FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Marine Capture Fisheries adopted in 2005 and amended/extended in 2009. The Standard also includes full reference to the 2011 FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Inland Fisheries which in turn are now supported by a suite of guidelines and support documents published by the UN FAO. Further information on the RFM program may be found online at <https://rfmcertification.org>.

1. Contents

Contents

Foreword	2
1. Contents	3
List of Figures	6
List of Tables	7
Glossary of Abbreviations.....	8
2. Executive Summary	9
Assessment Team Details	9
Applicable Program Documents.....	10
3. Certificate Holder Applicant Details	10
4. Units of Assessment and Certification	12
Units of Assessment	12
5. Background to the Fishery	12
5.1 Species Biology and stock status.....	12
Stock Assessment Activities	15
Historic Biomass and Removals in the Fishery	18
Reference points and harvest control rules	22
Ecosystem considerations.....	26
Management of Pacific hake and precautionary approach	26
Fishery data.....	27
Non-target species data.....	29
5.2 Fishery Location and Methods.....	33
Area of Fishery Operation	33
Fishing Methods	34
5.3 Fishery Management History and Organization	37
International Management.....	37
U.S. Domestic Management.....	40
5.4 Management Measures and Regulations.....	49
Management Measures.....	49
Regulations	54
Other Management Issues.....	60
5.5 Economic Value of the Fishery.....	62
6. Assessment Process.....	62
6.1 Scoring.....	62
Evaluation Parameters.....	62
Numerical Scoring based on Evaluation Parameters	63
Confidence Ratings and Non-conformances	64
Overall Assessment Scoring	64
6.2 Consultation Meetings	64
7. Summary of Assessment Outcomes	66
7.1 Assessment Outcomes by Clause.....	66
7.2 Certification Recommendation.....	70
Following this Assessment, the Assessment Team recommends that the applicant fishery:	70
7.3 Certification Determination.....	70
8. Assessment Outcomes.....	71
8.1 Topics that will trigger immediate assessment failure	71
8.2 Section A: The Fisheries Management System	72
Fundamental Clause 1. Structured and legally mandated management system	72
Supporting Clause 1.2	77

Supporting Clause 1.2.1.....	78
Supporting Clause 1.3.....	80
Supporting Clause 1.3.1.....	82
Supporting Clause 1.4.....	85
Supporting Clause 1.4.1.....	86
Supporting Clause 1.5.....	87
Supporting Clause 1.6.....	89
Supporting Clause 1.6.1.....	90
Supporting Clause 1.7.....	91
Supporting Clause 1.8.....	95
Fundamental Clause 2. Coastal area management frameworks.....	97
Supporting Clause 2.1.....	97
References.....	100
Supporting Clause 2.1.1.....	100
Supporting Clause 2.1.2.....	102
Supporting Clause 2.2.....	105
National Fish Habitat Action Plan (NFHAP) Coastal Assessment.....	106
National Fish Habitat Action Plan (NFHAP) Coastal Assessment.....	106
Supporting Clause 2.3.....	106
Supporting Clause 2.4.....	109
Supporting Clause 2.5.....	110
Supporting Clause 2.6.....	112
Supporting Clause 2.7.....	114
Fundamental Clause 3. Management objectives and plan.....	117
Supporting Clause 3.1.....	117
Supporting Clause 3.1.1.....	120
Supporting Clause 3.1.2.....	122
Supporting Clause 3.1.3.....	124
Supporting Clause 3.2.....	127
Supporting Clause 3.2.1.....	127
Supporting Clause 3.2.2.....	129
Supporting Clause 3.2.3.....	130
Supporting Clause 3.2.4.....	132
8.3 Section B: Science & Stock Assessment Activities, and the Precautionary Approach.....	180
Fundamental Clause 4. Fishery data.....	180
Supporting Clause 4.1.....	180
Supporting Clause 4.1.1.....	184
Supporting Clause 4.1.2.....	186
Supporting Clause 4.2.....	188
Supporting Clause 4.2.1.....	190
Supporting Clause 4.3.....	191
Supporting Clause 4.4.....	192
Supporting Clause 4.5.....	193
Supporting Clause 4.6.....	195
Supporting Clause 4.7.....	197
Supporting Clause 4.8.....	198
Supporting Clause 4.9.....	199
Supporting Clause 4.10.....	200
Supporting Clause 4.11.....	201
Fundamental Clause 5. Stock assessment.....	202
Supporting Clause 5.1.....	202
Supporting Clause 5.1.1.....	205
Supporting Clause 5.1.2.....	206
Supporting Clause 5.2.....	208

Supporting Clause 5.3	210
Supporting Clause 5.4	211
Supporting Clause 5.5	212
Fundamental Clause 6. Biological reference points and harvest control rule	213
Supporting Clause 6.1	213
Supporting Clause 6.2	215
Supporting Clause 6.3	218
Supporting Clause 6.4	220
Supporting Clause 6.5	223
Fundamental Clause 7. Precautionary approach	225
Supporting Clause 7.1	225
Supporting Clause 7.1.1	228
Supporting Clause 7.1.2	231
Supporting Clause 7.2	233
8.4 Section C: Management Measures, Implementation, Monitoring, and Control	234
Fundamental Clause 8. Management measures	234
Supporting Clause 8.1	234
Supporting Clause 8.1.1	237
Supporting Clause 8.1.2	238
Supporting Clause 8.2	241
Supporting Clause 8.3	242
Supporting Clause 8.4	244
Supporting Clause 8.4.1	247
Supporting Clause 8.5	203
Fundamental Clause 9. Appropriate standards of fishers' competence	220
Supporting Clause 9.1	220
Supporting Clause 9.2	223
Supporting Clause 9.3	224
Fundamental Clause 10. Effective legal and administrative framework	226
Supporting Clause 10.1	226
Supporting Clause 10.2	229
Supporting Clause 10.3	230
Supporting Clause 10.3.1	231
Supporting Clause 10.4	232
Supporting Clause 10.4.1	233
Fundamental Clause 11. Framework for Sanctions	233
Supporting Clause 11.1	233
Supporting Clause 11.2	235
Supporting Clause 11.3	237
Supporting Clause 11.4	238
8.5 Section D: Serious Impacts of the Fishery on the Ecosystem	239
Fundamental Clause 12. Impacts of the fishery on the ecosystem	239
Supporting Clause 12.1	239
Supporting Clause 12.2	240
Supporting Clause 12.2.1	240
Supporting Clause 12.2.2	242
Supporting Clause 12.2.3	244
Supporting Clause 12.2.4	245
Supporting Clause 12.2.5	249
Supporting Clause 12.2.6	249
Supporting Clause 12.2.7	251
Supporting Clause 12.2.8	248
Supporting Clause 12.2.9	249
Supporting Clause 12.2.10	251

Supporting Clause 12.2.11	253
Supporting Clause 12.3	254
Supporting Clause 12.4	256
Supporting Clause 12.5	256
Supporting Clause 12.6	258
Supporting Clause 12.7	259
9. Non-conformances and Corrective Actions	260
10. References	261
11. Appendices	277
Appendix 1: Peer Reviewer Reports and Team Responses	277
Peer Reviewer 1	277
Peer Reviewer 2	284
Summary and Recommendations	284
Full Summary of Comments	284

List of Figures

Figure 1 - Functional growth form assumed in the hake model (Source: Helser et al. 2008).	15
Figure 2 - Total Pacific hake catch used in the assessment by sector, 1966–2020. U.S. tribal catches are included in the sectors where they are represented. CP is catcher-processor and MS is mothership (Source: Johnson et al. 2021).	16
Figure 3 - Acoustic survey biomass indices (millions of tons). Approximate 95% confidence intervals are based on sampling variability (intervals without squid/hake apportionment uncertainty in 2009 are displayed in black) (Source: Johnson et al. 2021).	17
Figure 4 - Median of the posterior distribution for beginning of the year female spawning biomass (B_t in year t) through 2021 (solid line) with 95% posterior credibility intervals (shaded area). The solid circle with a 95% posterior credibility interval is the estimated unfished equilibrium biomass (Source: Johnson et al. 2021).	19
Figure 5 - Median (solid line) of the posterior distribution for relative spawning biomass (B_t/B_0) through 2021 with 95% posterior credibility intervals (shaded area). Dashed horizontal lines show 10%, 40% and 100% levels (Source: Johnson et al. 2021).	19
Figure 6 - Medians (solid circles) and means (\times) of the posterior distribution for recruitment (billions of age-0) with 95% posterior credibility intervals (blue lines). The median of the posterior distribution for mean unfished equilibrium recruitment (R_0) is shown as the horizontal dashed line with a 95% posterior credibility interval shaded between the dotted lines (Source: Johnson et al. 2021).	20
Figure 7 - Trend in median relative fishing intensity (relative to the SPR management target) through 2020 with 95% posterior credibility intervals. The management target defined in the Joint U.S.-Canada Agreement for Pacific hake is shown as a horizontal line at 1.0 (Source: Johnson et al. 2021).	21
Figure 8 - Estimated historical path of median relative spawning biomass in year t and corresponding median relative fishing intensity in year $t-1$. Labels show the start year, end year and year of highest relative fishing intensity; labels correspond to year t (i.e., year of the relative spawning biomass). Gray bars span the 95% credibility intervals for 2021 relative spawning biomass (horizontal) and 2020 relative fishing intensity (vertical; Source: Johnson et al. 2021).	22
Figure 9 - Graphical representation of the probabilities related to spawning biomass, relative fishing intensity, and the 2022 default harvest policy catch for alternative 2021 catch options (explained in Table 4) as listed in Table 5. The symbols indicate points that were computed directly from model output and lines interpolate between the points (Source: Johnson et al. 2021).	25
Figure 10 - Graphical representation of the probabilities related to spawning biomass, relative fishing intensity, and the 2023 default harvest policy catch for alternative 2022 catch options (including associated 2021 catch; catch options explained in Table 4) as listed in Table 5. The symbols indicate points that were computed directly from model output and lines interpolate between the points (Source: Johnson et al. 2021).	25
Figure 11 - Estimated stock-recruit relationship for the base model with median predicted recruitments and 95% posterior credibility intervals. Colors indicate time-period, with yellow colors in the early years and blue colors in the recent years. The thick solid black line indicates the central tendency (mean) and the red line indicates the central tendency after bias correcting for the log-normal distribution (median). Shading around stock-recruit curves indicates uncertainty in shape	

associated with distribution of the steepness parameter (h). The gray polygon on the right indicates the expected distribution of recruitments relative to the unfish equilibrium. Source: Johnson et al 2021.216

List of Tables

Table 1. Applicable RFM program documents used during the assessment.	10
Table 2. Certificate holder details.....	10
Table 3. Proposed Unit of Assessment and Unit of Certification	12
Table 4 - Recent commercial fishery catch (t). Tribal catches are included in the sector totals. Research catch includes landed catch associated with certain research-related activities. Catch associated with surveys and discarded bycatch in fisheries not targeting hake is relatively small and not included in the table or model (Source: Johnson et al. 2021).	16
Table 5 - Recent trends in Pacific hake landings and management decisions. Catch targets in 2020 were specified unilaterally (Source: Johnson et al. 2021).	21
Table 6 - Summary of median and 95% credibility intervals of equilibrium conceptual reference points for the Pacific hake base assessment model. Equilibrium reference points were computed using 1975– 2020 averages for mean weight-at-age and baseline selectivity-at-age (1966–1990; prior to time-varying deviations; Source: Johnson et al. 2021).	22
Table 7 - Forecast quantiles of Pacific hake relative spawning biomass at the beginning of the year before fishing. Catch alternatives are based on: constant catch levels (rows a, b, c, d, e, f, g), including catch similar to 2020 (row d), to the (unilaterally summed) TAC from 2020 (row f), and to the TAC from 2019 (row g); and non-constant catch levels that result in a median relative fishing intensity of 100% (row h), median catch estimated via the default harvest policy (FSPR=40%–40:10, row i), and the fishing intensity that results in a 50% probability that the median projected catch will remain the same in 2021 and 2022 (row j). Catch in 2023 does not impact the beginning of the year biomass in 2023 (Source: Johnson et al. 2021).	23
Table 8 - Forecast quantiles of Pacific hake relative fishing intensity $(1-SPR)/(1-SPR_{40\%})$, expressed as a percentage, for the 2021–2023 catch alternatives presented in Table g. Values greater than 100% indicate relative fishing intensities greater than the FSPR=40% harvest policy calculated using baseline selectivity. (Source: Johnson et al. 2021).	23
Table 9 - Probabilities related to spawning biomass, relative fishing intensity, and the 2022 default harvest policy catch for alternative 2021 catch options (explained in Table 5; Source: Johnson et al. 2021).	25
Table 10 - Probabilities related to spawning biomass, relative fishing intensity, and the 2023 default harvest policy catch for alternative 2022 catch options, given the 2021 catch level shown in Table 4 (catch options explained in Table 5; Source: Johnson et al. 2021).	26
Table 11. Catch composition in the US Pacific hake midwater trawl fishery from 2016 to 2020 (NWFSC FRAM Data Warehouse 2021).	29
Table 12. Excerpted from Jannot et. al. (2022). Estimated marine mammal mortality among the U.S. West Coast at-sea hake catcher-processor (CP) vessels fishing with midwater trawl (MT) gears 2015-2019. Because vessels in this fishery are monitored 100% we assume that error around the values presented here is zero, so confidence intervals and coefficients of variation are not estimated.	31
Table 13. Excerpted from Jannot et. al. (2022). Estimated marine mammal mortality among the U.S. West Coast at-sea hake catcher vessels (CV) vessels delivering to motherships fishing with midwater trawl (MT) gears 2015-2019. Because vessels in this fishery are monitored 100% we assume that error around the values presented here is zero, so confidence intervals and coefficients of variation are not estimated.	31
Table 14. Excerpted from Jannot et. al. (2022). Estimated marine mammal mortality among the U.S. West Coast catch share vessels using electronic monitoring (EM) equipment and fishing with bottom and midwater trawl (BMT) gears, 2015–19. Because vessels in this fishery are monitored 100%, we assume that error around the values presented here is zero (0), so confidence intervals and coefficients of variation are not estimated.	32
Table 15. Summary of population size, PBR and estimated fishery mortality and serious injury to marine mammals encountered in the Pacific hake fisheries (Data from NOAA Fisheries’ annual Stock Assessment Reports). Note annual estimated fishery mortality is from all fisheries on the west coast (and in the case of Steller Sea Lions, also Alaska).	32
Table 16. Confidence ratings and conformance levels for each clause of the RFM Standard. . Note Section 13 applies only when fisheries enhancement is utilized, which is not the case for the present fishery.	66

Glossary of Abbreviations

AP	Advisory Panel
CCE	California Current Ecosystem
CI	Credibility Interval
DFO	Department of Fisheries and Oceans Canada
EO	Executive Order
EAM	Ecosystem Approach to Management
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ETP	Endangered, Threatened and Protected species
FEP	Fishery Ecosystem Plan
FMP	Fishery Management Plan
IATTC	Inter-American Tropical Tuna Commission
IFMP	Integrated Fishery Management Plan for Groundfish
IFQ	Individual Fishing Quota
ITS	Incidental Take Statement
IVQ	Individual Vessel Quota
IRFA	Initial Regulatory Flexibility Analysis
JMC	Joint Management Committee
JTC	Joint Technical Committee
LOA	Length Overall
LRP	Limit Reference Points
MMPA	Marine Mammal Protection Act
MSE	Management Strategy Evaluation
MSFCMA	Magnuson-Stevens Fishery Conservation & Management Act
MSY	Maximum Sustainable Yield
mt	Metric tons
nm	Nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic & Atmospheric Administration
NOAA OLE	NOAA Office of Law Enforcement
NRC	National Research Council
OTC	Oregon Trawl Commission
PFMC	Pacific Fishery Management Council
PRI	Point where Recruitment would be Impaired
PSARC	Pacific Scientific Advice Review Committee
PWCC	Pacific Whiting Conservation Cooperative
RCA	Rockfish Conservation Areas
SAFE	Stock Assessment and Fishery Evaluation
SFD	Sustainable Fisheries Division
SFF	Sustainable Fisheries Framework
SPR	Spawning Potential Ratio
SRG	Scientific Review Group
SS	Stock Synthesis
STAL	Short-tailed Albatross
TAC	Total Allowable Catch
USCG	United States Coast Guard
WCGOP	West Coast Groundfish Observer Program
WDFW	Washington Department of Fish and Wildlife

2. Executive Summary

This Final Report contains the findings of an initial full assessment of the US Pacific Whiting/Hake midwater trawl fishery against the Responsible Fishery Management fishery standard. Following peer and public review, the assessment team has determined that the fishery meets all Fundamental and Supporting Clauses of the RFM standard with full compliance. No non-conformances were raised. On this basis, the MRAG Americas Certification Committee decided this fishery shall be certified.

Assessment Team Details

Ms. Amanda Stern-Pirlot served as team leader for the assessment. Amanda is an M.Sc graduate of the University of Bremen, Center for Marine Tropical Ecology (ZMT) in marine ecology and fisheries biology. Ms. Stern-Pirlot joined MRAG Americas in mid-June 2014 and is now Director of the Fishery Certification Division and is currently serving on several different assessment teams as team leader and team member. She has worked together with other scientists, conservationists, fisheries managers and producer groups on international fisheries sustainability issues for over 15 years. With the Institute for Marine Research (IFM-GEOMAR) in Kiel, Germany, she led a work package on simple indicators for sustainable within the EU-funded international cooperation project INCOFISH, followed by five years within the Standards Department at the Marine Stewardship Council (MSC) in London, developing standards, policies and assessment methods informed by best practices in fisheries management around the globe. Most recently she has worked with the Alaska pollock industry as a resources analyst, within the North Pacific Fishery Management Council process, focusing on bycatch and ecosystem-based management issues, and managing the day-to-day operations of the offshore pollock cooperative. She has co-authored a dozen publications on fisheries sustainability in the developing world and the functioning of the MSC as an instrument for transforming fisheries to a sustainable basis.

Dr. Giuseppe Scarcella is an experienced fishery scientist and population analyst and modeller, with wide knowledge and experience in the assessment of demersal stocks. He holds a first degree in Marine Biology and Oceanography (110/110) from the Università Politecnica delle Marche, and a Ph.D. in marine Ecology and Biology from the same university, based on a thesis "Age and growth of two rockfish in the Adriatic Sea". After his degree he was offered a job as project scientist in several research programs about the structure and composition of fish assemblage in artificial reefs, off-shore platform and other artificial habitats in the Italian Research Council – Institute of Marine Science of Ancona (CNR-ISMAR, now CNR-IRBIM). During the years of employment at CNR-ISMAR he has gained experience in benthic ecology, statistical analyses of fish assemblage evolution in artificial habitats, fisheries ecology and impacts of fishing activities, stock assessment, otolith analysis, population dynamic and fisheries management. During the same years he attended courses of uni-multivariate statistics and stock assessment. He is also actively participating in the scientific advice process of FAO GFCM in the Mediterranean Sea. At the moment he is member of the Scientific, Technical and Economic Committee for Fisheries for the European Commission (STECF).

He is author and co-author of more than 50 scientific paper peer reviewed journals and more than 150 national and international technical reports, most of them focused on the evolution of fish assemblages in artificial habitats and stock assessment of demersal species. Dr. Scarcella also holds the credential as certifier of *Responsible Fisheries Management* (RFM).

Dr. Susan Hanna is professor emeritus of marine economics at Oregon State University. Her research and publications are in the area of marine economics and policy, with an emphasis on fishery management, ecosystem-based fishery management, property rights and institutional design. Dr. Hanna has served as a scientific advisor to the U.S. Commission on Ocean Policy, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Minerals Management Service, Northwest Power and Conservation Council and the Pacific Fishery Management Council. She served on the Ocean Studies Board of the National Research Council (NRC), National Academy of Sciences, and several NRC Committees, including the Committee to Review Individual Quotas in Fisheries and the Committee on Protection and Management of Pacific Northwest Anadromous Salmonids.

A discussion between team members regarding conflict of interest and biases was held and none were identified.

Peer Reviewers

Dr. Jim Andrews has over 25 years' experience working in marine fisheries and environmental management. His previous experience includes running the North Western and North Wales Sea Fisheries Committee as its Chief Executive from 2001 to 2005, and previously working as the SFC's Marine Environment Liaison Officer. During this time he was responsible for the regulation, management and assessment of inshore finfish and shellfish stocks along a 1,500km coastline. He has an extensive practical knowledge of both fisheries and environmental management and enforcement under UK and EC legislation. Jim has formal legal training & qualifications, with a special interest in the policy, governance and management of fisheries impacts on marine ecosystems. He has worked as an assessor and lead assessor on more than 25 MSC certifications within the UK, Europe, Africa, Australia, South America and Asia since 2007. In 2008 he worked with the MSC and WWF on one of the pilot assessments using the MSC Risk Based Assessment Framework (RBF) and is fully trained in the use of the RBF. He has carried out many peer reviews of MSC assessments and is a member of the MSC Peer Review College.

Dr. Wes Toller has been an independent consultant in standard setting, sustainability and eco-certification since 2010. His current work includes developing standards, methodologies, guidelines and assessment tools for use in improving sustainability and accountability in the seafood and other natural resources sectors. He has worked closely with leading certification schemes including the Marine Stewardship Council (MSC) and Aquaculture Stewardship Council (ASC) to develop and improve processes for auditing and accreditation of sustainability standards. Wes was previously a program manager with Accreditation Services International (ASI) where he helped establish the company's MSC Program. He has an in-depth knowledge of ISO requirements and international best practices relating to eco-certification. Wes sees his move into the sustainability sector as a natural progression from his background in fisheries management and habitat conservation. Wes received his doctorate in biological sciences from the University of Southern California.

Applicable Program Documents

Table 1. Applicable RFM program documents used during the assessment.

Document title	Version number, Issue Date	Content
RFM Procedure 2: Application to Certification Procedures for the Alaska RFM Fishery Standard Version 2.0.	Version 5, January 2019	Process
Alaska Responsible Fisheries Management Certification Program Fisheries Standard.	Version 2.1, September 2020	Standard
Alaska Responsible Fisheries Management Certification Program Guidance to Performance Evaluation for the Certification of Wild Capture and Enhanced Fisheries in Alaska.	Version 2.1, January 2021	Guidance to Standard
ISO 17065		

3. Certificate Holder Applicant Details

Table 2. Certificate holder details

Applicant Information		
Organization/Company Name:	Pacific Whiting Conservation Cooperative	
Address:	Street:	5303 Shilshole Avenue NW
	City:	Seattle
	State:	WA
	Country:	United States

	Zip code:	98107-4021
Applicant Key Contact Information		
Key Contact Name:		Dan Waldeck
Position:		Executive Director
Address:	Street:	2505 SE 11 th Avenue, Suite 358
	City:	Portland
	State:	OR
	Country:	United States
	Zip code:	97202
Phone:		
E-mail:		dwaldeck@comcast.net

4. Units of Assessment and Certification

Units of Assessment

The proposed Unit of Assessment and Unit of Certification for Pacific Hake/Whiting fishery is as described in Table 3 below.

Table 3. Proposed Unit of Assessment and Unit of Certification

Unit of Assessment 1 (of 1)	
Species:	Common names: Pacific Hake, Pacific Whiting (same species)
	Latin names: <i>Merluccius productus</i>
Geographical areas:	US Federal EEZ waters off Washington, Oregon and California FAO area 67
Stocks:	Pacific coast hake/whiting stock
Management system:	US Federal Fisheries Management System
Fishing gear/methods:	Midwater trawl
All eligible fishery participants:	<ul style="list-style-type: none"> • Non-tribal catcher boats delivering to shore-based processing facilities. • Non-tribal catcher boats delivering to at-sea mothership processors. • Non-tribal vessels that both catch and process the catch at sea. • Non-tribal at-sea mothership processors. • Non-tribal shore-based processing facilities. • Tribal harvesters

5. Background to the Fishery

5.1 Species Biology and stock status

There are numerous articles in the primary literature, grey literature and books that describe details of the life-history and ontogeny of Pacific hake (*Merluccius productus* Ayres, 1855). The best single source of this information is summarized by Bailey et al. (1982).

Pacific hake, also called Pacific Whiting, is a semi-pelagic schooling species distributed from 25° North to 55° North along the west coast of North America (JTC 2013a). The coastal stock of Pacific hake is currently the most abundant groundfish species in the California Current system (JTC 2013a). Smith (1995) recognizes three habitats utilized by the coastal stock of Pacific hake:

- 1) a narrow 30,000 km² feeding habitat near the shelf break of British Columbia, Washington, Oregon, and California populated 6–8 months per year.
- 2) a broad 300,000 km² open-sea area of California and Baja California populated by spawning adults in the winter and embryos and larvae for 4–6 months; and

3) a continental shelf area of unknown size off California and Baja California where juveniles brood.

Smaller populations of hake occur in the major inlets of the North Pacific Ocean (Strait of Georgia, Puget Sound, and Gulf of California).

Genetic studies show that hake occurring in the Strait of Georgia and the Puget Sound are genetically different from the coastal migratory hake (Iwamoto et al. 2004, King et al. 2012). Vrooman and Paloma (1977) have also found genetic differences between the coastal hake population and the hake off the west coast of Baja California. King et al. (2012) conducting a genetic and parasite load study also found evidence of some summer mixing of coastal hake with inshore Queen Charlotte Sound hake.

The coastal stock of Pacific hake is migratory and inhabits the continental slope and shelf within the California current system from Baja California to Southeast Alaska (Quirollo 1992, Mecklenburg et al. 2002). Adult hake migrate annually from spring to fall from the southern Pacific offshore spawning areas to feed off the coasts of Oregon, Washington and British Columbia (Bailey et al 1982, Stauffer 1985). All life stages of hake are found in euryhaline waters at 9–15 °C (NOAA 1990). Adults are epi-mesopelagic (Bailey et al. 1982, NOAA 1990, Sumida and Moser 1980). Pacific hake form dense aggregations along the continental shelf break and near the edges of mid-shelf banks and basins (Bailey et al 1982, Schwartzman 2001). Highest densities of hake are located over bottom depths of 200–300 m (Dorn et al. 1994). Pacific hake school at depth during the day, then move to the surface and disband at night for feeding (Sumida and Moser 1984, Tanasichuck et al. 1991). The summertime Pacific hake aggregations exhibited spatial scale variability between 20–30 km (Dorn 1997). In survey data, adults most frequently occur between 100 and 150 m, with nearly all taken at depths of 50–400 m (Allen and Smith 1988). Juveniles move to deeper water as they get older (NOAA 1990). The Pacific hake is unorthodox amongst the groundfishes because it is highly migratory, moving into many areas of the West Coast, including nearshore shelf, shelf break, and slope. Offshore stocks spawn off Baja California in the winter at depths exceeding 1000 m (Saunders and McFarlane 1997) then the mature adults begin moving northward and inshore, following food supply and Davidson currents (NOAA 1990). Post-spawned females tend to make this migration prior to post-spawned males (Saunders and McFarlane 1997). Pacific hake reach as far north as south eastern Alaska by late summer or fall. The spring northward feeding migration takes place during favorable ocean conditions when polar transport dominates. During warm years Pacific hake have been observed to migrate farther north than during cool years (Dorn 1995). Older Pacific hake migrate the furthest north each season, while 2- and 3-year old hake are seldom found in Canadian waters north of southern Vancouver Island (JTC 2013a). In the fall hake begin the southern migration to spawning grounds and further offshore (Bailey et al. 1982, Dorn 1995, Smith 1995, and Stauffer 1985). Limited information exists regarding the southward migration in the fall. Pacific hake typically disappear from areas off the southwest coast of Vancouver Island around the time of the fall transition (Thomson et al 1989)

Eggs of the Pacific hake are neritic and float to neutral buoyancy (Bailey 1981, Bailey et al. 1982, NOAA 1990). Eggs and larvae of the coastal stock are pelagic in 40–140 m of water (Smith 1995). Moser et al. (1997) investigated the abundance and distribution of Pacific hake eggs at sites off central and southern California, and reported that most of the eggs were at depths of 50–150 m. They also reported that the early-stage eggs were deeper (75–150 m) in the water column compared to the depth (50–100 m) of later-stage eggs. Larvae tend to aggregate near the base of the thermocline or mixed layer (Stauffer 1985). Horne and Smith (1997) analyzed CalCOFI data on the abundance and distribution of Pacific hake larvae from sites off central and southern California for 1955–1984, and reported that the biomass of Pacific hake larvae is strongly influenced by mortality and drift with prevailing currents. They reported that the location of spawning largely determined the survival of the larvae, with higher survival occurring in warm years (when spawning adults moved northward) compared to cold years (when spawning adults moved southward). Juveniles reside in shallow coastal waters, bays, and inland seas (Bailey 1981, Bailey et al. 1982, Dark 1975, Dark and Wilkins 1994, Dorn 1995, NOAA 1990, Smith 1995), and move to deeper water as they get older (NOAA 1990). Juveniles are less abundant in upwelled nearshore coastal waters compared to non-upwelled water. Vetter and Dayton (1999) evaluated the importance to juveniles of submarine canyons in southern California with high levels of organic enrichment by macrophyte detritus. They compared these canyons to flat areas, and reported that the canyons had much higher megafauna abundance and species richness, and the relative abundance of juvenile Pacific hake was hundreds of times higher in the canyons at depths of 150–200 m. Overall, highest densities of Pacific hake are usually between 50 and 500 m, but adults occur as deep as 920 m and as far offshore as 400 km (Bailey 1982, Bailey et al. 1982, Dark and Wilkins 1994, Dorn 1995, Hart 1973, NOAA 1990, Stauffer 1985). Spawning is greatest at depths between 130 and 500 m (Bailey et al. 1982, NOAA 1990, Smith 1995). 3.

The coastal stock of Pacific hake spawns from December through March, peaking in late January (Smith 1995). Spawning takes place hundreds of km offshore of southern and Baja California at depths of 100–500 m (Alverson and Larkins 1969, Bailey et al. 1982). There have been reports that spawning has been occurring north of southern and Baja California (Bailey 1980, Saunders and McFarlane 1997, Dorn 1986). This northward shift of spawning could be attributed to the warming trend observed in the California current system. In the Strait of Georgia, spawning occurs from March through May and peaks in

late April (Beamish and McFarlane 1985, Shaw et al. 1990). In Puget Sound, spawning occurs primarily during February through April, peaking in March. Spawning aggregations begin to form up to a month before actual spawning. Pacific hake may spawn more than once per season, so absolute fecundity is difficult to ascertain. Coastal stocks have 180–232 eggs/gram body weight, but Puget Sound and Strait of Georgia stocks have only 50–165 eggs/gram body weight (Mason 1986). Bailey (1982) estimated that a 28-cm female had 39,000 eggs, while a 60-cm female had 496,000 eggs. Eggs are spherical and 1.14–1.26 mm in diameter with a single oil droplet (Bailey et al. 1982). Embryonic development is indirect and external (NOAA 1990). Hatching occurs in 5–6 days at 9–10°C and 4–5 days at 11–13°C (Bailey 1982, Hollowed 1992). Larvae hatch at 2–3 mm total length (Stauffer 1985, Sumida and Moser 1980) with a yolk sac that is gone in 5–7 days (Bailey 1982). Larvae metamorphose into juveniles at 35 mm, typically in 3–4 months (Hollowed 1992). As larvae grow they move inshore to the continental shelf and slope (Bailey 1981, Grover et al. 2002). Survival of larvae is strongly influenced by environmental conditions (e.g., upwelling, advection, and water temperature) experienced during the first few months after spawning (Bailey 1981, Bailey and Francis 1985, Hollowed 1992, Agostini 2005). Juveniles range from 35 mm to 40 cm depending on gender (Bailey et al. 1982, Beamish and McFarlane 1985, Hollowed 1992). The coastal Pacific hake stock has been observed to have episodic strong year classes. The Year class strengths can vary by as much as two orders of magnitude or more relative to weak year classes (JTC 2012, Bailey and Francis 1985, Methot and Dorn 1995). The occurrence of these dominant year classes appears to be largely independent of spawning stock size, so a reliable stock-recruitment relationship has been difficult to establish (Bailey and Francis 1985, JTC 2012). Eggs and larvae of Pacific hake are eaten by pollock, herring, invertebrates, and sometimes Pacific hake. Juveniles are eaten by lingcod, Pacific cod, and rockfish species. Adults are preyed upon by sablefish, albacore, pollock, Pacific cod, soupfin sharks, and spiny dogfish (Fiscus 1979, NOAA 1990). Another important group of predators of adult Pacific hake are marine mammals, including the northern elephant seal (*Mirounga angustirostris*), northern fur seal (*Callorhinus ursinus*), California sea lion (*Zalophus californianus*), and several species of dolphins and whales (Methot and Dorn 1995). Pacific hake live more than 20 years. Natural mortality rate (m) was estimated by Dorn et al. (1994) at 0.23 yr⁻¹. Hamel and Stewart (2009) applying a meta-analytical approach incorporating multiple life-history correlates resulted in a log-normal prior with mean 0.193 and a coefficient of variation of 0.1.

Dorn (1992) reported that Pacific hake growth can be quite variable. Examining length-at age data from the acoustic and bottom trawl surveys Helser et al. (2008) found variation in the von Bertalanffy growth parameters k (Brody growth coefficient) and L_{∞} (asymptotic size). Both k and L_{∞} declined from the early to mid-1970s and the mid-1980s. Hollowed and Francis (1987) showed that Pacific hake growth was depressed during the 1983–84 El Niño. The functional growth form from the 2008 Pacific hake assessment is shown in Figure 1.

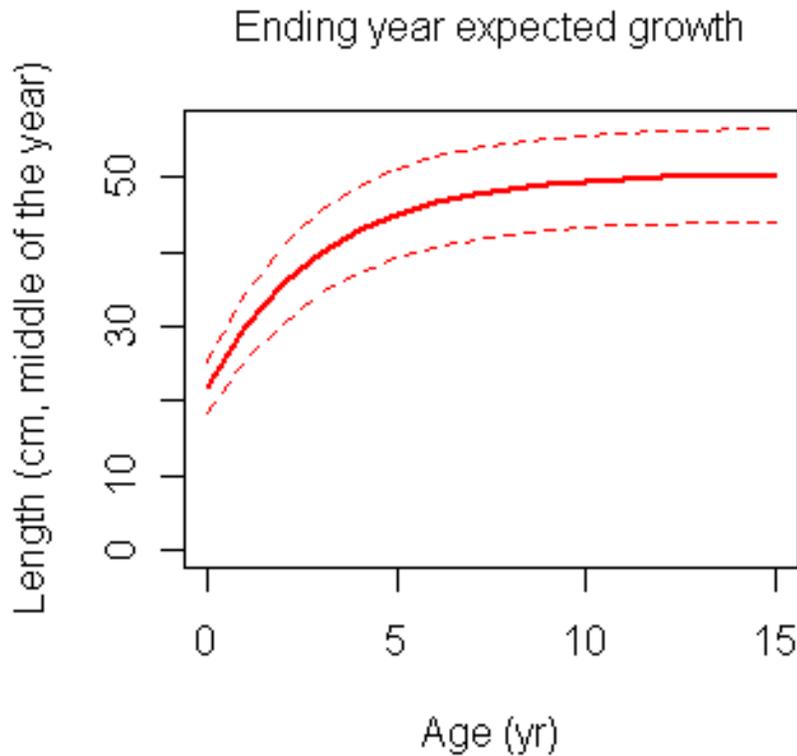


Figure 1 - Functional growth form assumed in the hake model (Source: Helser et al. 2008).

All life stages feed near the surface late at night and early in the morning (Sumida and Moser 1984). Larvae eat calanoid copepods, as well as their eggs and nauplii (Sumida and Moser 1984, McFarlane and Beamish 1986). Juveniles and small adults feed chiefly on euphausiids (Tanasichuck 1999, NOAA 1990). Large adults also eat amphipods, ocean shrimp, squid, herring, smelt, crabs, sometimes juvenile Pacific hake, and pelagic schooling fish (e.g., eulachon and herring) (Gotshall 1969, Bailey 1982, Dark and Wilkins 1994, McFarlane and Beamish 1986, NOAA 1990, Livingston and Bailey 1985). Buckley and Livingston (1997) reported the results of stomach content analyses of Pacific hake collected from 1989 to 1992 along the west coast of the U.S., from southern California to Vancouver Island. They found that diet varied with latitude and season. In general, in all areas the diet was dominated by fishes, but euphausiids were also consistently found in the diets of Pacific hake from all areas. Clupeidae (primarily Pacific herring) were dominant prey in fish from sites off Vancouver Island, Washington, and Oregon, whereas northern anchovy and rockfish dominated the diets in central and southern California, respectively. In areas where a broad range of sizes of Pacific hake were found, considerable cannibalism was observed among fish larger than 40 cm fork length, with a frequency of occurrence of 39%. Some of the major seasonal differences in diet for Pacific hake from sites off of Oregon and Washington included dominance by euphausiids in fish 30–49 cm fork length in the summer compared to dominance by fish and shrimp in the autumn; and in fish from sites off of California, a dominance of fish in the spring compared with a dominance of cannibalized Pacific hake in the autumn (Buckley and Livingston 1997).

Stock Assessment Activities

Prior to 1997, separate Canadian and U.S. assessments for Pacific hake were submitted to each country's assessment review process. This practice resulted in differing yield options being forwarded to each country's managers for this shared trans-boundary fish stock. Multiple interpretations of Pacific hake status made it difficult to coordinate an overall management policy. Between 1997 and 2011, the Stock Assessment and Review (STAR) process for the Pacific Fishery Management Council (PFMC) has evaluated assessment models and the PFMC council process, including NOAA Fisheries, has generated management advice that has been largely utilized by both countries. The Joint US-Canada Agreement on Pacific hake was formally ratified in 2006 (signed in 2007) by the United States as part of the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act. Although the treaty has been considered in force by Canada since June 25, 2008, an error in the original U.S. text required that the treaty be ratified again before it could be implanted. This second ratification occurred

in 2010. Under the treaty, Pacific hake stock assessments are to be prepared by the Joint Technical Committee (JTC) comprised of both U.S. and Canadian scientists and reviewed by the Scientific Review Group (SRG), with memberships to both groups appointed by both parties to the agreement (JTC 2012). Additionally, the Agreement calls for the JTC and SRG to include industry nominated scientists. These are selected and appointed by each of the two parties (JTC 2013a). In 2012, the Pacific whiting Agreement was officially enacted and members of a provisional Joint Technical Committee (JTC), comprised of Canadian and U.S. scientists, continued to collaborate in the production of a single stock assessment document (JTC 2013a). Pacific hake stock assessments now represent the work of the joint U.S. and Canadian JTC and their associates. Extensive modeling efforts conducted from 2010 to 2012, as well as highly productive discussions among analysts resulted in unified documents for the assessments from 2011-2013 (JTC 2013a).

3.3.2.2 Stock Assessment Methods Age-structured assessment models of various forms have been used to assess Pacific hake since the early 1980s, using total fishery landings, fishery length and age compositions, and abundance indices. Modeling approaches have evolved as new analytical techniques have been developed. Initially, a cohort analysis tuned to fishery CPUE was used (Francis et al. 1982). Later, the cohort analysis was tuned to NMFS triennial acoustic survey estimates of absolute abundance at age (Francis and Hollowed 1985, Hollowed et al. 1988). In 1989, the hake population was modeled using a statistical catch-at-age model (Stock Synthesis) that utilized fishery catch-at-age data and survey estimates of population biomass and age composition data (Dorn and Methot 1991). In 1999 Dorn et al. (1999) converted the model to AD Model Builder (ADMB; Fournier et al. 2012). Beginning in 2001, Helser et al. (2001, 2002, 2004, 2005 and 2006; Helser and Martel 2007) used the same ADMB model to assess the hake stock.

The 2021 assessment report (Johnson et al. 2021) provides a full description about the status of the coastal Pacific hake resource off the west coast of the United States and Canada at the start of 2021. This stock exhibits seasonal migratory behavior, ranging from offshore and generally southern waters during the winter spawning season to coastal areas between northern California and northern British Columbia during the spring, summer, and fall when the fishery is conducted. In years with warmer water the stock tends to move farther to the north during the summer. Older hake tend to migrate farther north than younger fish in all years, with catches in the Canadian zone typically consisting of fish greater than four years old. Separate, and much smaller, populations of hake occurring in the major inlets of the northeast Pacific Ocean, including the Strait of Georgia, Puget Sound, and the Gulf of California, are not included in this analysis.

Coast-wide fishery Pacific hake landings averaged 239,919 t from 1966 to 2020, with a low of 89,930 t in 1980 and a peak of 440,950 t in 2017 (Figure 2). Prior to 1966, total removals were negligible compared to the modern fishery. Over the early period (1966–1990) most removals were from foreign or joint-venture fisheries. Across the time series, catch in U.S. waters averaged 181,620 t, (76.1% of the total catch) while catch from Canadian waters averaged 58,299 t. Over the last 10 years, 2011–2020 (Table 4), the average coast-wide catch was 325,105 t with U.S. and Canadian catches averaging 258,306 t and 66,799 t, respectively. The coast-wide catch in 2020 was 379,270 t, out of a total allowable catch (TAC, adjusted for carryovers) of 529,290 t. Attainment in the U.S. was 67.8% of its quota and in Canada it was 87.4%.

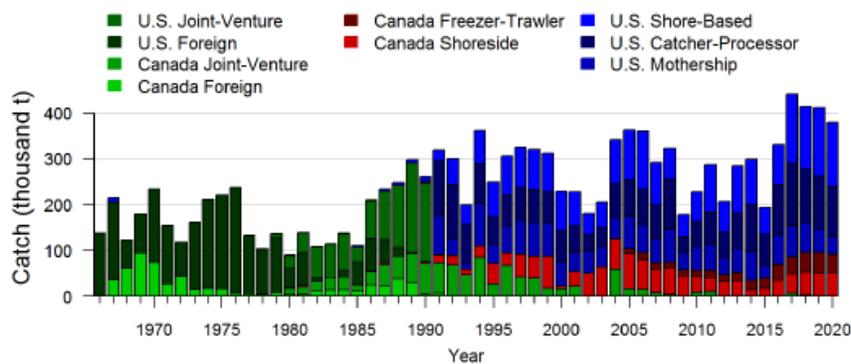


Figure 2 - Total Pacific hake catch used in the assessment by sector, 1966–2020. U.S. tribal catches are included in the sectors where they are represented. CP is catcher-processor and MS is mothership (Source: Johnson et al. 2021).

Table 4 - Recent commercial fishery catch (t). Tribal catches are included in the sector totals. Research catch includes landed catch associated with certain research-related activities. Catch associated with surveys and discarded bycatch in fisheries not targeting hake is relatively small and not included

in the table or model (Source: Johnson et al. 2021).

Year	US Mother-ship	US Catcher-Processor	US Shore-Based	US Research	US Total	CAN Joint-Venture	CAN Shoreside	CAN Freezer-Trawler	CAN Total	Total
2011	56,394	71,678	102,146	1,042	231,261	9,717	31,760	14,596	56,073	287,334
2012	38,512	55,264	65,919	448	160,144	0	32,147	14,912	47,059	207,203
2013	52,470	77,950	102,141	1,018	233,578	0	33,665	18,584	52,249	285,828
2014	62,102	103,203	98,640	197	264,141	0	13,326	21,792	35,118	299,259
2015	27,665	68,484	58,011	0	154,160	0	16,775	22,909	39,684	193,844
2016	65,036	108,786	87,760	745	262,327	0	35,012	34,731	69,743	332,070
2017	66,428	136,960	150,841	0	354,229	5,608	43,427	37,686	86,721	440,950
2018	67,121	116,073	135,112	0	318,306	2,724	50,747	41,942	95,413	413,719
2019	52,646	116,146	148,210	0	317,002	0	50,621	43,950	94,571	411,574
2020	37,978	111,147	138,784	0	287,908	0	51,551	39,812	91,362	379,270

In the last stock assessment, the terms catch and landings are used interchangeably. Estimates of discard within the target fishery are included, but discarding of Pacific hake in non-target fisheries is not. Discard from all fisheries, including those that do not target hake, is estimated to be less than 1% of landings in recent years. During the last five years, catches were considerably above the long-term average catch (239,919 t), with the most recent four years having the highest catches on record. Landings between 2001 and 2008 were predominantly comprised of fish from the very large 1999 year class, with the cumulative removal (through 2020) from that cohort estimated at approximately 1.29 million t. Through 2020, the total catch of the 2010, 2014, and 2016 year classes is estimated to be about 1.17 million t, 0.64 million t, and 0.31 million t, respectively. Landings in 2020 were most represented by the 2016 (35.23%) and 2014 (30.90%) year classes. Due to the coronavirus disease 2019 (COVID-19) pandemic, no biological samples were available from the Canadian freezer-trawler sector in 2020 because observers were not allowed on board.

This Joint Technical Committee (JTC) assessment depends primarily on the fishery landings (1966–2020), acoustic survey biomass indices (Figure 3) and age compositions (1995–2019), as well as fishery age compositions (1975–2020). The 2011 survey index value was the lowest in the time series and was followed by the index increasing in 2012, 2013, and again in 2015 before decreasing to near the time series average in 2017. The 2019 estimate is the fourth highest of the series. Age-composition data from the aggregated fisheries and the acoustic survey provide data that facilitates estimating relative cohort strength, i.e., strong and weak cohorts.

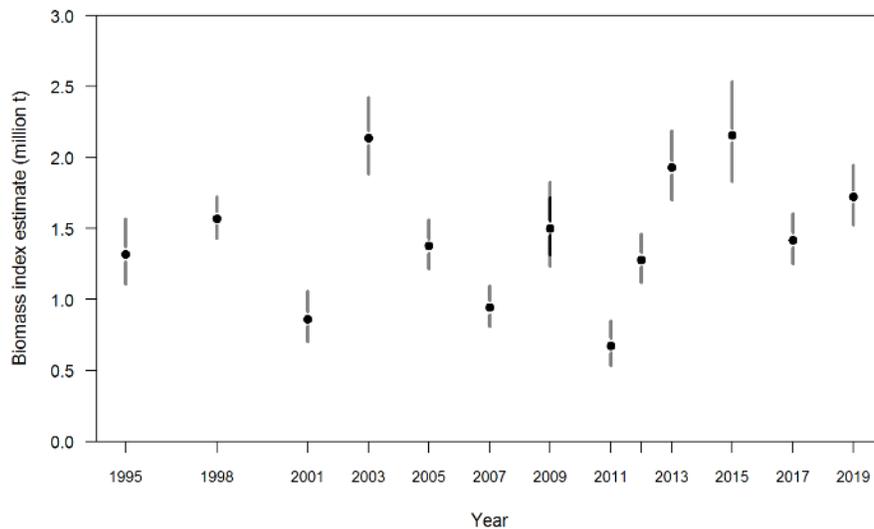


Figure 3 - Acoustic survey biomass indices (millions of tons). Approximate 95% confidence intervals are based on sampling variability (intervals without squid/hake apportionment uncertainty in 2009 are displayed in black) (Source: Johnson et al. 2021).

The assessment uses a Bayesian estimation approach, sensitivity analyses, and retrospective investigations to evaluate the potential consequences of parameter uncertainty, alternative structural models, and historical performance of the assessment model, respectively. The Bayesian approach combines prior knowledge about natural mortality, stock-recruitment steepness (a parameter for stock productivity), and several other parameters, with likelihoods for acoustic survey biomass indices, acoustic survey age-composition data, and fishery age-composition data. Integrating the joint posterior distribution over model

parameters provides probabilistic inferences about uncertain model parameters and forecasts derived from those parameters; this is done via Markov chain Monte Carlo sampling using the efficient No-U-Turn Sampler (NUTS) that was successfully tested in the 2020 assessment. Sensitivity analyses are used to identify alternative model assumptions that may also be consistent with the data. This is the first assessment for which the sensitivity and retrospective analyses also use Bayesian estimation (rather than maximum likelihood estimation). Retrospective analyses identify possible poor performance of the assessment model with respect to future predictions. Past assessments have conducted closed-loop simulations which provide insights into how alternative combinations of survey frequency, assessment model selectivity assumptions, and harvest control rules affect expected management outcomes given repeated application of these procedures over the long-term. The results of past (and ongoing) closed-loop simulations influenced the decisions made for this assessment.

This 2021 assessment retains the structural form of the base assessment model from 2020 as well as many of the previous elements as configured in Stock Synthesis. Analyses conducted in 2014 showed that allowing for time-varying (rather than fixed) selectivity reduced the magnitude of extreme cohort strength estimates. In closed-loop simulations, management based upon assessment models parameterized with time-varying fishery selectivity led to higher median average catch, lower risk of falling below 10% of unfished biomass, smaller probability of fishery closures, and lower inter-annual variability in catch compared to assessment models parameterized with time-invariant fishery selectivity. Even a small degree of flexibility in the fishery selectivity could reduce the effects of errors caused by assuming selectivity is constant over time. Therefore, we retain time-varying selectivity in this assessment. We retain the Dirichlet-multinomial estimation approach to weighting composition data. We again provide sensitivities to alternative data-weighting approaches. Time-varying fecundity, which was introduced in 2019, is retained. The weight-at-age information for the forecast period is a representation of the last five years, as for the 2020 assessment.

Historic Biomass and Removals in the Fishery

Results from the base model indicate that since the 1960s, Pacific hake female spawning biomass has ranged from well below to above unfished equilibrium (Figure 4 and Figure 5). Model estimates suggest that it was below the unfished equilibrium in the 1960s, at the start of the assessment period, due to lower than average recruitment. The stock is estimated to have increased rapidly and was above unfished equilibrium in the mid-1970s and mid-1980s (after two large recruitments in the early 1980s). It then declined steadily to a low in 1999. This was followed by a brief increase to a peak in 2002 as the very large 1999 year class matured. The 1999 year class largely supported the fishery for several years due to relatively small recruitments between 2000 and 2007. With the aging 1999 year class, median female spawning biomass declined throughout the late 2000s, reaching a time-series low of 0.605 million t in 2010. Median spawning biomass is estimated to have peaked again in 2013 and 2014 due to a very large 2010 year class and an above-average 2008 year class. The subsequent decline from 2014 to 2016 is primarily from the 2010 year class surpassing the age at which gains in weight from growth are greater than the loss in weight from mortality (growth-mortality transition). The 2014 year class is estimated to be large, though not as large as the 1999 and 2010 year classes, increasing the biomass in 2017. The estimated biomass has declined since 2017 as the 2014 year class moves through the growth-mortality transition (and the 2010 year class continues to do so) during a time of record catches.

The median estimate of the 2021 relative spawning biomass (spawning biomass at the start of 2021 divided by that at unfished equilibrium, B_0) is 59%. However, the uncertainty is large, with a 95% posterior credibility interval from 25% to 137%. The median estimate of the 2021 female spawning biomass is 0.981 million t (with a 95% posterior credibility interval from 0.404 to 2.388 million t). The current estimate of the 2020 female spawning biomass is 1.300 (0.637–2.914) million t. This is a slightly higher median and broader credibility interval than the 1.196 (0.550–2.508) million t estimated in the 2020 assessment.

The new data available and implementation of NUTS for this assessment do not significantly change the pattern of recruitment estimated in recent assessments. However, estimates of absolute recruitment for some recent years have slightly changed. For example, this assessment's median estimate of the 2014 recruitment is 0.5 billion fish lower than in last year's assessment (a 5% reduction). Similarly, estimates for 2016 and 2018 have changed by +6% and -50%, respectively, but the general notion remains that the 2016 cohort is above average and the 2018 cohort is well below average.

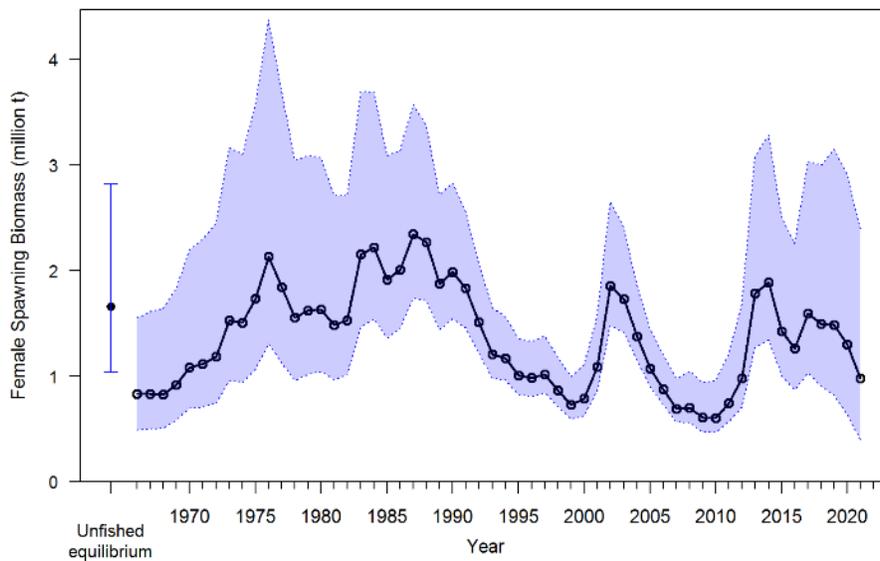


Figure 4 - Median of the posterior distribution for beginning of the year female spawning biomass (B_t in year t) through 2021 (solid line) with 95% posterior credibility intervals (shaded area). The solid circle with a 95% posterior credibility interval is the estimated unfished equilibrium biomass (Source: Johnson et al. 2021).

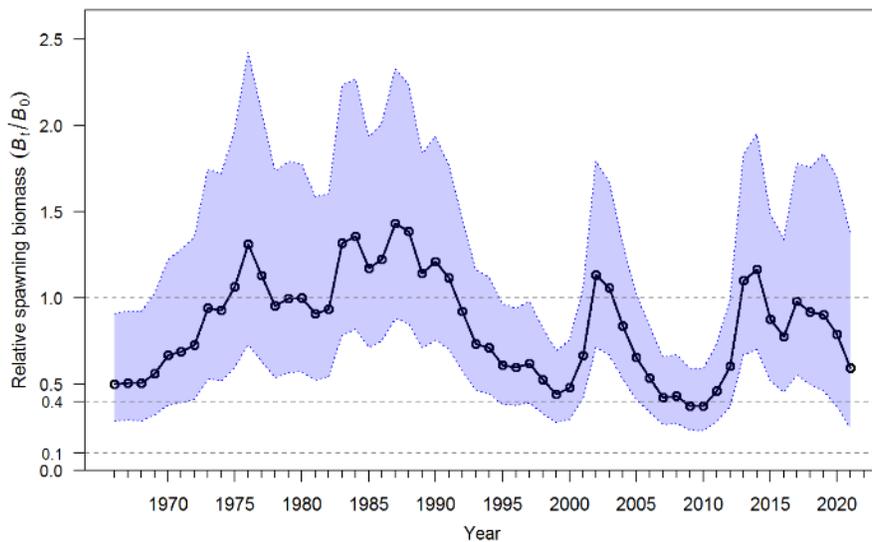


Figure 5 - Median (solid line) of the posterior distribution for relative spawning biomass (B_t/B_0) through 2021 with 95% posterior credibility intervals (shaded area). Dashed horizontal lines show 10%, 40% and 100% levels (Source: Johnson et al. 2021).

Pacific hake appear to have low to moderate recruitment with occasional large year-classes (Figure 6). Very large year classes in 1980, 1984, and 1999 supported much of the commercial catch from the 1980s to the mid-2000s. From 2000 to 2007, estimated recruitment was at some of the lowest values in the time series, but this was followed by an above average 2008 year class. Current estimates continue to indicate a very strong 2010 year class comprising 64% of the coast-wide commercial catch in 2014, 33% of the 2016 catch, 23% of the 2018 catch (all unchanged from last year's assessment), and 15% of the 2020 catch. The decline from 2014 to 2016 was due to the large influx of the 2014 year class (50% of the 2016 catch was age-2 fish from the 2014 year class; this was larger than the proportion of age-2 fish, 41%, from the 2010 year class in 2012). The median estimate of the 2010 year class is just below the highest ever (for 1980), with a 46% probability that the 2010 year class is larger than the 1980 year class (this probability was 36% for last year's assessment). The model currently estimates small 2011, 2013, 2015, and 2018 year classes (median recruitment well below the mean of all median recruitments).

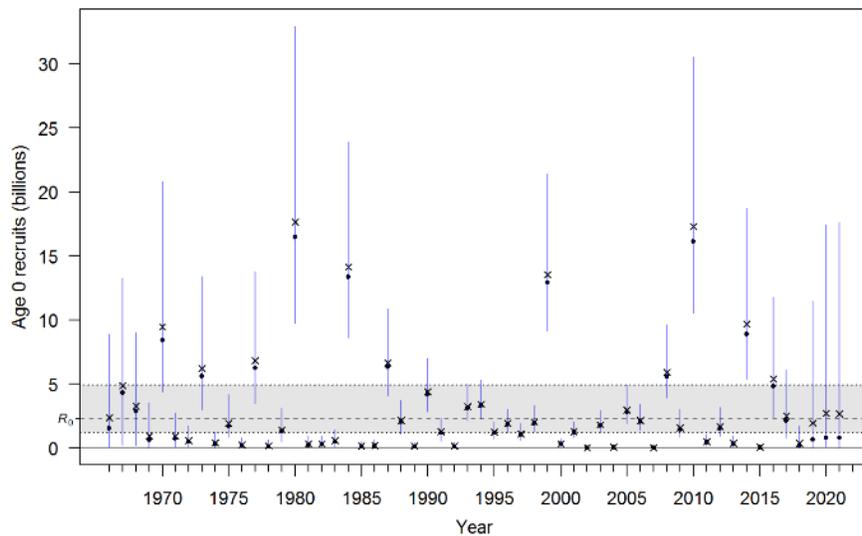


Figure 6 - Medians (solid circles) and means (x) of the posterior distribution for recruitment (billions of age-0) with 95% posterior credibility intervals (blue lines). The median of the posterior distribution for mean unfished equilibrium recruitment (R_0) is shown as the horizontal dashed line with a 95% posterior credibility interval shaded between the dotted lines (Source: Johnson et al. 2021).

The 2014 and 2016 year classes are likely both larger than average, however there is a very high chance (99%) that 2014 is larger than 2016. There is very little information in the data to estimate the size of the 2019 year class because the 2019 acoustic survey did not sample age-0 fish and the 2020 fishery largely did not encounter this year class. There is no information in the data to estimate the sizes of the 2020 and 2021 year classes. Retrospective analyses of year class strength for young fish have shown the estimates of recent recruitment to be unreliable prior to at least model age-3 (observed at age-2).

The default $F_{SPR=40\%}=40:10$ harvest policy prescribes the maximum rate of fishing mortality to equal $F_{SPR=40\%}$. This rate gives a spawning potential ratio (SPR) of 40%, meaning that the spawning biomass per recruit with $F_{SPR=40\%}$ is 40% of that without fishing. If spawning biomass is below $B_{40\%}$ (40% of B_0), the policy reduces the TAC linearly until it equals zero at $B_{10\%}$ (10% of B_0). Relative fishing intensity for fishing rate F is $(1 - SPR(F)) / (1 - SPR_{40\%})$, where $SPR_{40\%}$ is the target SPR of 40%; it is reported here interchangeably as a decimal proportion or a percentage.

Median relative fishing intensity on the stock is estimated to have been below the target of 1.0 for all years (Figure 7). Median exploitation fraction (catch divided by biomass of fish of age-2 and above) peaked in 1999 and then reached similar levels in 2006 and 2008. Over the last five years, the exploitation fraction was the highest in 2017. Note that in earlier assessments the exploitation fraction was often defined in terms of fish age-3 and above, but since the 2018 assessment the definition age was lowered to age-2 because these fish are often caught by the fishery. Median relative fishing intensity is estimated to have declined from 92.7% in 2010 to 45.5% in 2015, and then it leveled off around 75% from 2016 to 2019 before dropping to 65.9% in 2020. The exploitation fraction has increased from a recent low of 0.05 in 2012 to 0.13 in 2017 and has remained relatively stable since then (dropping no further than 0.11). There is a considerable amount of uncertainty around estimates of relative fishing intensity, with the 95% posterior credibility interval reaching above the SPR management target (of 1.0) for 2016–2019.

Over the last decade (2011–2020), the mean coast-wide utilization rate (proportion of catch target removed) has been 69.8% (Table 5). Over the last five years (2016 to 2020), the mean utilization rates were 72.7% for the United States and 63.7% for Canada. However, country-specific quotas (or catch targets) in 2020 were specified unilaterally, due to the lack of an agreement on a coast-wide 2020 TAC. The U.S. catch target was 80.26% of the total coast-wide catch target, and the Canada catch target was 19.74%. These percentages are different to the usual 73.88% and 26.12% as specified in the Joint U.S.-Canada Agreement for Pacific hake.

Total landings last exceeded the coast-wide quota in 2002 when utilization was 112%, though the fishing intensity was relatively low that year due to the appearance of the 1999 year class.

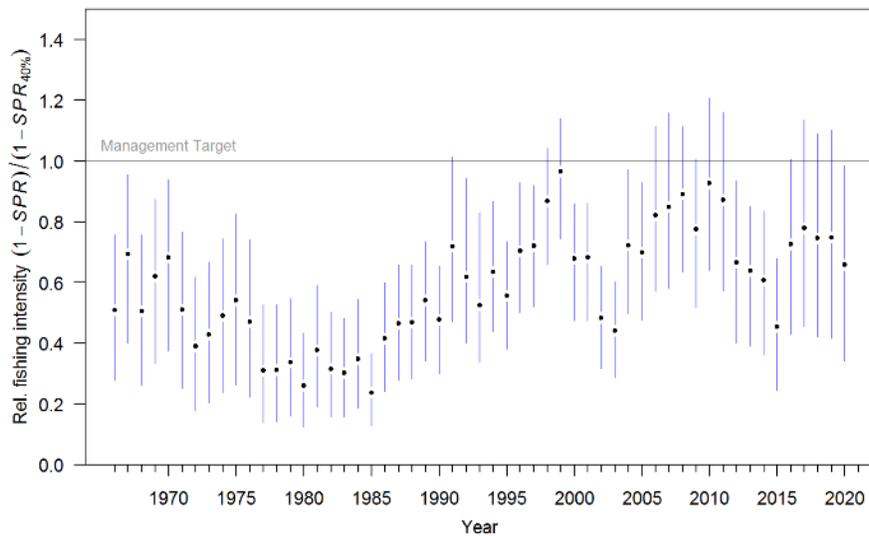


Figure 7 - Trend in median relative fishing intensity (relative to the SPR management target) through 2020 with 95% posterior credibility intervals. The management target defined in the Joint U.S.-Canada Agreement for Pacific hake is shown as a horizontal line at 1.0 (Source: Johnson et al. 2021).

Table 5 - Recent trends in Pacific hake landings and management decisions. Catch targets in 2020 were specified unilaterally (Source: Johnson et al. 2021).

Year	U.S. landings (t)	Canada landings (t)	Total landings (t)	U.S. proportion of total catch	Canada proportion of total catch	U.S. catch target (t)	Canada catch target (t)	Coast-wide catch target (t)	U.S. proportion of catch target removed	Canada proportion of catch target removed	Total proportion of catch target removed
2011	231,261	56,073	287,334	80.5%	19.5%	290,903	102,848	393,751	79.5%	54.5%	73.0%
2012	160,144	47,059	207,203	77.3%	22.7%	186,036	65,773	251,809	86.1%	71.5%	82.3%
2013	233,578	52,249	285,828	81.7%	18.3%	269,745	95,367	365,112	86.6%	54.8%	78.3%
2014	264,141	35,118	299,259	88.3%	11.7%	316,206	111,794	428,000	83.5%	31.4%	69.9%
2015	154,160	39,684	193,844	79.5%	20.5%	325,072	114,928	440,000	47.4%	34.5%	44.1%
2016	262,327	69,743	332,070	79.0%	21.0%	367,553	129,947	497,500	71.4%	53.7%	66.7%
2017	354,229	86,721	440,950	80.3%	19.7%	441,433	156,067	597,500	80.2%	55.6%	73.8%
2018	318,306	95,413	413,719	76.9%	23.1%	441,433	156,067	597,500	72.1%	61.1%	69.2%
2019	317,002	94,571	411,574	77.0%	23.0%	441,433	156,067	597,500	71.8%	60.6%	68.9%
2020	287,908	91,362	379,270	75.9%	24.1%	424,810	104,480	529,290	67.8%	87.4%	71.7%

The median relative fishing intensity was below target in all years (Figure 8). The median relative female spawning biomass was above the $B_{40\%}$ reference point in all years except 2009 and 2010 (Figure 8). As such, the median relative fishing intensity has never been above the target of 1.0 when the female spawning biomass is below the reference point of $B_{40\%}$ (Figure 8). This highlights the highly dynamic nature of the stock due to high variation in recruitment strength. The target fishing mortality ($F_{SPR=40\%}$) and $B_{40\%}$ result in different population sizes, highlighting that there are subtle differences in these conceptual reference points. Between 2007 and 2010, median relative fishing intensity ranged from 78% to 93% and median relative spawning biomass between 0.37 and 0.43. Biomass has risen from the 2010 low with the 2008, 2010, 2014, and 2016 recruitments, and median relative spawning biomass has been above the reference point of 40% since 2011.

While there is large uncertainty in the estimates of relative fishing intensity and relative spawning biomass, the model estimates a 1.7% joint probability of being both above the target relative fishing intensity in 2020 and below the $B_{40\%}$ relative spawning biomass level at the start of 2021.

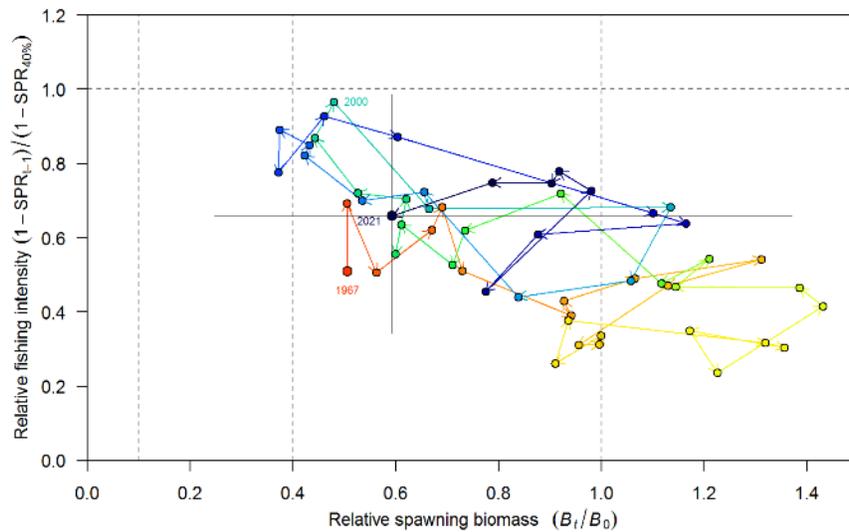


Figure 8 - Estimated historical path of median relative spawning biomass in year t and corresponding median relative fishing intensity in year $t - 1$. Labels show the start year, end year and year of highest relative fishing intensity; labels correspond to year t (i.e., year of the relative spawning biomass). Gray bars span the 95% credibility intervals for 2021 relative spawning biomass (horizontal) and 2020 relative fishing intensity (vertical; Source: Johnson et al. 2021).

Reference points and harvest control rules.

The term reference points is used throughout this document to describe common conceptual summary metrics. The Treaty specifically identifies $F_{SPR=40\%}$ as the default harvest rate and $B_{40\%}$ as a point where the 40:10 TAC adjustment is triggered. Estimates of the 2021 base model reference points with posterior credibility intervals are in Table 6. The medians of sustainable yields and biomass reference points are almost 9% lower than in the 2020 assessment. This is a result of increasing the effective sample size used to describe the posterior distributions of model parameters, leading to more accurate point estimates. The probability that spawning biomass at the beginning of 2021 is below $B_{40\%}$ is $P(B_{2021} < B_{40\%}) = 17.8\%$, and of being below $B_{25\%}$ is $P(B_{2021} < B_{25\%}) = 2.7\%$. The probability that the relative fishing intensity was above its target of 1.0 at the end of 2020 is 2.1%.

Table 6 - Summary of median and 95% credibility intervals of equilibrium conceptual reference points for the Pacific hake base assessment model. Equilibrium reference points were computed using 1975–2020 averages for mean weight-at-age and baseline selectivity-at-age (1966–1990; prior to time-varying deviations; Source: Johnson et al. 2021).

Quantity	2.5 th percentile	Median	97.5 th percentile
Unfished female spawning biomass (B_0 , thousand t)	1,036	1,658	2,818
Unfished recruitment (R_0 , millions)	1,201	2,264	4,935
Reference points (equilibrium) based on $F_{SPR=40\%}$			
Female spawning biomass at $F_{SPR=40\%}$ ($B_{SPR=40\%}$, thousand t)	332	584	999
SPR at $F_{SPR=40\%}$	–	40%	–
Exploitation fraction corresponding to $F_{SPR=40\%}$	16.0%	18.3%	21.0%
Yield associated with $F_{SPR=40\%}$ (thousand t)	148	275	530
Reference points (equilibrium) based on $B_{40\%}$ (40% of B_0)			
Female spawning biomass ($B_{40\%}$, thousand t)	415	663	1,127
SPR at $B_{40\%}$	40.6%	43.6%	51.6%
Exploitation fraction resulting in $B_{40\%}$	12.2%	16.1%	19.3%
Yield at $B_{40\%}$ (thousand t)	147	269	518
Reference points (equilibrium) based on estimated MSY			
Female spawning biomass (B_{MSY} , thousand t)	254	426	789
SPR at MSY	22.4%	30.0%	47.0%
Exploitation fraction corresponding to SPR at MSY	14.4%	25.5%	35.0%
MSY (thousand t)	153	290	568

The catch limit for 2021 based on the default $F_{SPR=40\%}$ –40:10 harvest policy has a median of 565,191 t with a wide range of uncertainty, the 95% credibility interval being 181,094–1,649,905 t.

Decision tables give the projected population status (relative spawning biomass) and fishing intensity relative to the target under different catch alternatives for the base model (Table 7 and Table 8). The tables are organized such that the projected outcome for each potential catch level and year (each row) can be evaluated across the quantiles (columns) of the posterior distribution. Population dynamics and governing parameters assumed during the forecast period include average recruitment (no recruitment deviation); selectivity, weight-at-age and fecundity averaged over the five most recent years (2016–2020); and all other parameters as constant.

A relative fishing intensity above 1 (or 100% when shown as a percentage) indicates fishing greater than the $F_{SPR=40\%}$ default harvest rate catch target. This can happen for the median relative fishing intensity in projected years because the $F_{SPR=40\%}$ default harvest-rate catch limit is calculated using baseline selectivity from all years, whereas the forecasted catches are removed using selectivity averaged over the last five years. Recent changes in selectivity will thus be reflected in the determination of fishing in excess of the default harvest policy. Alternative catch levels where median relative fishing intensity is 100% for three years of projections are provided for comparison (scenario g: FI=100%).

Table 7 - Forecast quantiles of Pacific hake relative spawning biomass at the beginning of the year before fishing. Catch alternatives are based on: constant catch levels (rows a, b, c, d, e, f, g), including catch similar to 2020 (row d), to the (unilaterally summed) TAC from 2020 (row f), and to the TAC from 2019 (row g); and non-constant catch levels that result in a median relative fishing intensity of 100% (row h), median catch estimated via the default harvest policy ($F_{SPR=40\%}$ -40:10, row i), and the fishing intensity that results in a 50% probability that the median projected catch will remain the same in 2021 and 2022 (row j). Catch in 2023 does not impact the beginning of the year biomass in 2023 (Source: Johnson et al. 2021).

Within model quantile Management Action			5%	25%	50%	75%	95%
Year	Catch (t)		Beginning of year relative spawning biomass				
a:	2021	0	28%	45%	59%	80%	120%
	2022	0	28%	44%	58%	80%	124%
	2023	0	29%	45%	61%	85%	145%
b:	2021	180,000	28%	45%	59%	80%	120%
	2022	180,000	24%	39%	54%	75%	118%
	2023	180,000	21%	36%	52%	75%	135%
c:	2021	350,000	28%	45%	59%	80%	120%
	2022	350,000	19%	35%	49%	70%	114%
	2023	350,000	12%	28%	43%	66%	126%
d:	2021	380,000	28%	45%	59%	80%	120%
2020	2022	380,000	19%	34%	48%	69%	113%
catch	2023	380,000	11%	26%	42%	64%	124%
e:	2021	430,000	28%	45%	59%	80%	120%
	2022	430,000	17%	33%	47%	68%	111%
	2023	430,000	9%	24%	39%	62%	121%
f:	2021	529,290	28%	45%	59%	80%	120%
2020	2022	529,290	15%	30%	44%	65%	109%
TAC	2023	529,290	7%	19%	34%	57%	117%
g:	2021	597,500	28%	45%	59%	80%	120%
2019	2022	597,500	13%	29%	42%	63%	107%
TAC	2023	597,500	7%	16%	31%	53%	113%
h:	2021	498,958	28%	45%	59%	80%	120%
FI=	2022	401,394	16%	31%	45%	66%	110%
100%	2023	345,712	8%	23%	39%	61%	121%
i:	2021	565,191	28%	45%	59%	80%	120%
default	2022	427,836	14%	29%	43%	64%	108%
HR	2023	353,096	7%	21%	36%	58%	118%
j:	2021	457,534	28%	45%	59%	80%	120%
C2021=	2022	457,506	17%	32%	46%	67%	111%
C2022	2023	371,194	8%	23%	38%	60%	120%

Table 8 - Forecast quantiles of Pacific hake relative fishing intensity $(1-SPR)/(1-SPR_{40\%})$, expressed as a percentage, for the 2021–2023 catch alternatives presented in Table g. Values greater than 100% indicate relative fishing intensities greater than the $F_{SPR=40\%}$ harvest policy calculated using baseline

selectivity. (Source: Johnson et al. 2021).

Within model quantile Management Action			5%	25%	50%	75%	95%
			Relative fishing intensity				
	Year	Catch (t)					
a:	2021	0	0%	0%	0%	0%	0%
	2022	0	0%	0%	0%	0%	0%
	2023	0	0%	0%	0%	0%	0%
b:	2021	180,000	30%	44%	57%	70%	92%
	2022	180,000	29%	46%	59%	74%	99%
	2023	180,000	27%	45%	59%	76%	104%
c:	2021	350,000	49%	69%	84%	99%	121%
	2022	350,000	50%	74%	91%	108%	135%
	2023	350,000	47%	75%	95%	116%	143%
d: 2020 catch	2021	380,000	52%	73%	88%	103%	124%
	2022	380,000	53%	78%	95%	113%	139%
	2023	380,000	50%	80%	100%	122%	144%
e:	2021	430,000	57%	78%	93%	108%	129%
	2022	430,000	58%	84%	101%	120%	143%
	2023	430,000	56%	87%	108%	130%	146%
f: 2020 TAC	2021	529,290	65%	87%	103%	117%	137%
	2022	529,290	67%	95%	113%	131%	145%
	2023	529,290	65%	99%	122%	139%	147%
g: 2019 TAC	2021	597,500	70%	92%	108%	122%	141%
	2022	597,500	73%	101%	120%	137%	146%
	2023	597,500	70%	106%	129%	141%	147%
h: FI= 100%	2021	498,958	63%	85%	100%	115%	135%
	2022	401,394	56%	82%	100%	119%	143%
	2023	345,712	48%	78%	100%	123%	145%
i: default HR	2021	565,191	68%	90%	105%	120%	139%
	2022	427,836	59%	86%	104%	124%	144%
	2023	353,096	49%	80%	103%	128%	145%
j: C2021= C2022	2021	457,534	59%	81%	96%	111%	132%
	2022	457,506	61%	87%	105%	123%	144%
	2023	371,194	51%	81%	103%	127%	145%

Management metrics that were identified as important to the Joint Management Committee and the Advisory Panel in 2012 are presented for 2022 and 2023 projections (Table 9, Table 10, Figure 9 and Figure 10). These metrics summarize the probability of various outcomes from the base model given each potential management action. Although not linear, probabilities can be interpolated from these results for intermediate catch values in 2021 (Table 9, Table 10, Figure 9 and Figure 10). However, interpolation is not appropriate for all catches in 2022 because catch alternatives in Table 9 and Table 10, have catches that are >430,000 t (the constant catch for alternative e) in 2021 but <430,000 t in 2022. This explains why a few probabilities decline (rather than rise) with increased 2022 catch levels in Table 10 and Figure 10.

The predicted relative spawning biomass trajectory through 2023 is shown in Table 7 for several of the management actions. With zero catch for the next two years, the biomass has a 65% probability of decreasing from 2021 to 2022 (Table 9) and a 52% probability of decreasing from 2022 to 2023 (Table 10).

The probability of the spawning biomass decreasing from 2021 to 2022 is over 65% for all catch levels. It is 86% for the 2021 catch level similar to that for 2020 (catch alternative). For all explored catches, the maximum probability of the spawning biomass dropping below B_{10%} at the start of 2022 is 2%, and of dropping below B_{40%} is 46%. As the large 2010 and 2014 cohorts continue to age, their biomass is expected to decrease as losses from mortality outweigh increases from growth. The smaller but above-average 2016 cohort is entering this growth-mortality transition period, suggesting that its overall biomass will also decrease as it continues to age.

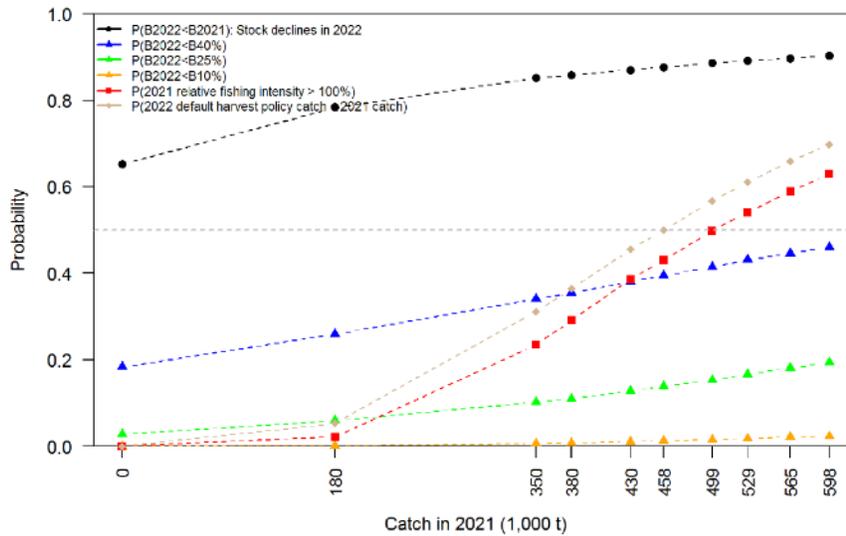


Figure 9 - Graphical representation of the probabilities related to spawning biomass, relative fishing intensity, and the 2022 default harvest policy catch for alternative 2021 catch options (explained in Table 7) as listed in Table 8. The symbols indicate points that were computed directly from model output and lines interpolate between the points (Source: Johnson et al. 2021).

Table 9 - Probabilities related to spawning biomass, relative fishing intensity, and the 2022 default harvest policy catch for alternative 2021 catch options (explained in Table 8; Source: Johnson et al. 2021).

Catch in 2021	Probability $B_{2022} < B_{2021}$	Probability $B_{2022} < B_{40\%}$	Probability $B_{2022} < B_{25\%}$	Probability $B_{2022} < B_{10\%}$	Probability 2021 relative fishing intensity > 100%	Probability 2022 default harvest policy catch < 2021 catch
a: 0	65%	18%	3%	0%	0%	0%
b: 180,000	78%	26%	6%	0%	2%	5%
c: 350,000	85%	34%	10%	1%	23%	31%
d: 380,000	86%	36%	11%	1%	29%	36%
e: 430,000	87%	38%	13%	1%	39%	46%
f: 529,290	89%	43%	17%	2%	54%	61%
g: 597,500	90%	46%	19%	2%	63%	70%
h: 498,958	89%	41%	15%	2%	50%	57%
i: 565,191	90%	45%	18%	2%	59%	66%
j: 457,534	88%	40%	14%	1%	43%	50%

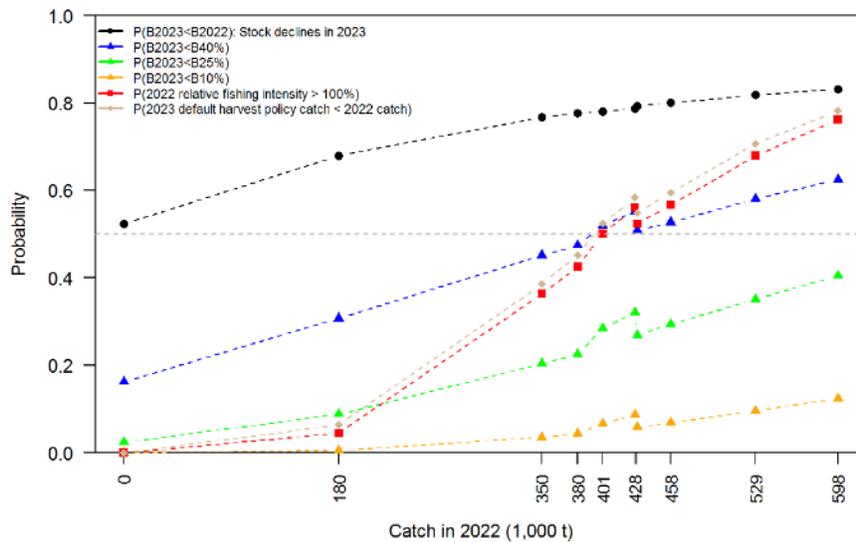


Figure 10 - Graphical representation of the probabilities related to spawning biomass, relative fishing intensity, and the 2023 default harvest policy catch for alternative 2022 catch options (including associated 2021 catch; catch options explained in Table 7) as listed in Table 8. The symbols indicate

points that were computed directly from model output and lines interpolate between the points (Source: Johnson et al. 2021).

Table 10 - Probabilities related to spawning biomass, relative fishing intensity, and the 2023 default harvest policy catch for alternative 2022 catch options, given the 2021 catch level shown in Table 7 (catch options explained in Table 8; Source: Johnson et al. 2021).

Catch in 2022	Probability B ₂₀₂₃ < B ₂₀₂₂	Probability B ₂₀₂₃ < B _{40%}	Probability B ₂₀₂₃ < B _{25%}	Probability B ₂₀₂₃ < B _{10%}	Probability 2022 relative fishing intensity > 100%	Probability 2023 default harvest policy catch < 2022 catch
a: 0	52%	16%	2%	0%	0%	0%
b: 180,000	68%	31%	9%	0%	4%	6%
c: 350,000	77%	45%	20%	4%	36%	39%
d: 380,000	78%	47%	23%	4%	43%	45%
e: 430,000	79%	51%	27%	6%	52%	55%
f: 529,290	82%	58%	35%	10%	68%	71%
g: 597,500	83%	62%	40%	12%	76%	78%
h: 401,394	78%	52%	28%	7%	50%	52%
i: 427,836	79%	55%	32%	9%	56%	58%
j: 457,506	80%	53%	29%	7%	57%	59%

Ecosystem considerations

Pacific hake are important to ecosystem dynamics in the Eastern Pacific Ocean due to their relatively large total biomass and potentially large role as both prey and predator. A more detailed description of ecosystem considerations is given in the 2013 Pacific hake stock assessment (Hicks et al. 2013). Recent research has developed an index of abundance for Humboldt Squid and suggested hake abundance decreased with increasing squid abundance (Stewart et al. 2014) and has evaluated hake distribution, recruitment, and growth patterns in relation to oceanographic conditions for assessment and management (Malick et al. 2020a). The 2015 Pacific hake stock assessment document presented a sensitivity analysis where hake mortality was linked to the Humboldt Squid index (Taylor et al. 2015). This sensitivity was not repeated in this assessment, although further research on this topic is needed. Ongoing research investigating abiotic (environmental conditions) and biotic (e.g., euphausiid distribution and abundance) drivers of hake distribution, recruitment, and survival could provide insight into how the hake population is linked with broader ecosystem considerations. For example, Turley and Rykaczewski (2019) found decreased survival of larval Pacific hake as storm events increased, contrary to many other species in the southern California Current Ecosystem. In terms of an ‘Ecosystem Approach to Fisheries Management’ (a new priority for DFO), the use of empirical weight-at-age somewhat accounts for ecosystem effects.

Management of Pacific hake and precautionary approach

Since the implementation of the Magnuson-Stevens Fishery Conservation and Management Act in the U.S. and the declaration of a 200-mile fishery-conservation zone in the U.S. and Canada in the late 1970s, annual quotas (or catch targets) have been used to limit the catch of Pacific hake in both countries’ zones. Scientists from both countries historically collaborated through the Technical Subcommittee of the Canada-U.S. Groundfish Committee (TSC), and there were informal agreements on the adoption of annual fishing policies. During the 1990s, however, disagreements between the U.S. and Canada on the allotment of the catch limits between U.S. and Canadian fisheries led to quota overruns; 1991-1992 national quotas summed to 128% of the coast-wide limit, while the 1993-1999 combined quotas were an average of 112% of the limit. The Agreement between the U.S. and Canada establishes U.S. and Canadian shares of the coast-wide total allowable catch (TAC) at 73.88% and 26.12%, respectively, and this distribution has been adhered to since 2005. However, a bilateral agreement on the coast-wide TAC could not be reached in 2020, and thus, catch targets were set unilaterally for the first time since the inception of the Agreement.

Throughout the last decade, the total coast-wide catch has tracked harvest targets reasonably well. Since 1999, catch targets have been calculated using an FSPR=40% default harvest rate with a 40:10 adjustment. This decreases the catch linearly from the catch target at a relative spawning biomass of 40%, to zero catch at relative spawning biomass values of 10% or less (called the default harvest policy in the Agreement); relative spawning biomass is the female spawning biomass divided by that at unfished equilibrium. Further considerations have often resulted in catch targets being set lower than the recommended catch limit. In the last decade, total catch has never exceeded the coast-wide quota, and harvest rates have not exceeded the FSPR=40% target. Overall, management appears to be effective at maintaining a sustainable stock size, in spite of uncertain stock assessments and a highly dynamic population. However, management has been risk averse in years when very large quotas were suggested based upon the default harvest control rule and stock assessment outputs.

Management of Pacific hake in the United States. In the U.S. zone, participants in the directed fishery are required to use pelagic trawls with a codend mesh of at least 7.5 cm (3 inches). Regulations also restrict the area and season of fishing to reduce the bycatch of Chinook salmon (*Oncorhynchus tshawytscha*), depleted rockfish stocks (though, all but yelloweye rockfish, *Sebastes ruberrimus*, have rebuilt in recent years), and other species as related to their specific harvest specifications. The at-sea fisheries begin on May 15, but processing and night fishing (midnight to one hour after official sunrise) are prohibited south of 42°N latitude (the Oregon-California border). Shore-based fishing is allowed after April 15 south of 40°30'N latitude, but only a small amount of the shore-based allocation is released prior to the opening of the main shore-based fishery (May 15). The current allocation agreement, effective since 1997, divides the U.S. harvest into tribal (17.5%) and non-tribal (82.5%, with a small amount set aside for research) components. The non-tribal harvest allocation is divided among catcher-processors (34%), motherships (24%), and the shore-based feet (42%). Since 2011, the non-tribal U.S. fishery has been fully rationalized with allocations in the form of Individual Fishing Quotas (IFQs) to the shore-based sector and group shares to cooperatives in the at-sea mothership and catcher-processor sectors. Starting in 1996, the Makah Indian Tribe has conducted a fishery with a specified allocation in its “usual and accustomed fishing area”. The At-Sea hake Observer Program has been monitoring fishing vessel activity since 1975, originally monitoring foreign and joint-venture vessels. Observer coverage has been 100% on all domestic vessels since 1991 (including the 2020 fishing season, despite the COVID-19 pandemic).

Shortly after the 1997 allocation agreement was approved by the Pacific Fishery Management Council, fishing companies owning catcher-processor (CP) vessels with U.S. west coast groundfish permits established the Pacific Whiting Conservation Cooperative (PWCC). The primary role of the PWCC is to distribute the CP allocation among its members to achieve greater efficiency and product quality, as well as promoting reductions in waste and bycatch rates relative to the former “derby” fishery in which all vessels competed for a feet-wide quota. The mothership (MS) feet has also formed a cooperative where bycatch allocations are pooled and shared among the vessels. The individual cooperatives have internal systems of in-season monitoring and spatial closures to avoid and reduce bycatch of salmon and rockfish. The shore-based fishery is managed with IFQs.

Management of Pacific hake in Canada. Canadian groundfish managers distribute their portion (usually 26.12%) of the TAC as quota to individual license holders. In 2020, Canadian hake fishermen were allocated a TAC of 104,480 t, including 18,193 t of uncaught carryover fish from 2019. Canadian priority lies with the domestic fishery, but when there is determined to be an excess of fish for which there is not enough domestic processing capacity, fisheries managers give consideration to a Joint-Venture fishery in which foreign processor vessels are allowed to accept codends from Canadian catcher vessels while at sea. The last year a Joint-Venture fishery was conducted was in 2018.

In 2020, all Canadian Pacific hake trips remained subject to 100% observer coverage, by either electronic monitoring for the shoreside component of the domestic fishery or on-board observer for the freezer-trawler component. However, due to the COVID-19 pandemic, observers were not allowed to board freezer trawler vessels for the entirety of the hake fishing season. All shoreside hake landings are usually subject to 100% verification by the groundfish Dockside Monitoring Program (DMP), but these were also impacted by the COVID-19 pandemic and fewer samples than usual were taken.

Retention of all catch, with the exception of prohibited species, was mandatory. The retention of groundfish other than Sablefish, Mackerel, Walleye Pollock, and Pacific Halibut on non-observed (but electronically monitored) dedicated Pacific hake trips was not allowed to exceed 10% of the landed catch weight. The bycatch allowance for Walleye Pollock was 30% of the total landed weight.

Fishery data

The catch of Pacific hake for 1966–2020 is summarized by nation and fishery sector in Figure 2 and modeled as yearly catches. Catches in U.S. waters prior to 1978 are available only by year from Bailey et al. (1982) and historical assessment documents. Canadian catches prior to 1989 are also unavailable in disaggregated form. The U.S. shore-based landings are from the Pacific Fishery Information Network (PacFIN). Foreign and Joint-Venture catches for 1981–1990 and U.S. domestic at-sea catches for 1991–2020 are calculated from the Alaska Fisheries Science Center (AFSC) North Pacific Groundfish and Halibut Observer (NORPAC) database, which also stores the NWFSC At-Sea hake Observer Program data. Canadian Joint-Venture catches from 1989 are from the Groundfish Biological (GFBio) database. The Canadian shore-based landings are from the Groundfish Catch (GFCatch) database (from 1989 to 1995), the Pacific Harvest Trawl (PacHarvTrawl) database (from 1996 to March 31 2007), and the Fisheries Operations System (FOS) database (from April 1 2007 to present; Johson et al 2021).

The vessels in the U.S. shore-based fishery carry observers and are required to retain all catch and bycatch for sampling by plant observers. All catches from U.S. at-sea vessels, Canadian Joint-Venture vessels, and Canadian freezer trawlers are monitored by at-sea observers. Canadian observers use volume/density methods to estimate total catch in each codend and this is used for catch reporting. Canadian shoreside landings are recorded by dockside monitors using total catch weights provided

by processing plants. Discards and non-target catches and landings are negligible relative to the total fishery catch for all sectors (Johson et al 2021; NWFSC FRAM Data Warehouse 2021; Table 11).

For recent catches with haul or trip-level information, removals by month during the fishing season allowed for the estimation of monthly bycatch rates from observer information. This information has also allowed a detailed investigation of shifts in fishery timing (Taylor et al. 2014).

Minor updates to catches used in previous assessments were made based on the best available information extracted from the aforementioned databases. U.S. shore-based landings from 1986 were decreased by 33 t relative to previous assessments to reflect a change made in the PacFIN database years prior that is yet to be addressed in the data file. This was the most substantial change to U.S. shore-based historical catches; other years were changed less than 4 t. Tribal catches were not available in PacFIN for the U.S. tribal fishery at the time the data were extracted and were added to the extracted number based on information provided by the Makah tribe. With the movement towards digital fish tickets for reporting tribal catches, this should be the last year that tribal catches will need to be provided after the fact. The Makah tribe is also working on providing historical catches such that shore-based catches can be summarized separately from tribal catches since the onset of the fishery (Johson et al 2021).

Biological information from the U.S. at-sea fishery was extracted from the NORPAC database. This included sex, length, weight, and age information from the foreign and Joint-Venture fisheries from 1975–1990 and from the domestic at-sea fishery since 1990. Observers collect data by selecting fish randomly from each haul (Johson et al 2021).

Biological samples from the U.S. shore-based fishery since 1991 were collected by port samplers located where there are substantial landings of Pacific hake, primarily Eureka, Newport, Astoria, and Westport. Port samplers routinely take one sample per offload (or trip) consisting of 100 randomly selected fish for individual length and weight, and from these typically 20 fish are randomly subsampled for otolith extraction. Updates to historical shore-based age compositions may be noticeable for some years compared to the last assessment because PacFIN increased the number of significant digits stored in their database, and thus more precision was available for creating these compositions (Johson et al 2021).

Observers aboard Canadian freezer-trawler vessels (Viking Enterprise, Northern Alliance, Osprey #1, Raw Spirit, Pacific Legacy #1, Sunderoey, and Viking Alliance) sample otoliths and lengths from each haul. The sampled weight from which biological information is collected must be inferred from length-weight relationships (Johson et al 2021).

For electronically observed shoreside trips, port samplers obtain biological data from the landed catch. Observed domestic haul-level information is then aggregated to the trip level to be consistent with the unobserved trips that are sampled in ports. When there is a Canadian Joint-Venture fishery, length samples are collected every second day of fishing operations, and otoliths are collected once a week. Length and age samples are taken randomly from a given codend. The sampled weight from which biological information is collected must be inferred from length-weight relationships (Johson et al 2021).

The sampling unit for the shore-based fisheries is the trip, while the haul is the primary unit for the at-sea fisheries. There is no least common denominator for aggregating at-sea and shore-based fishery samples because detailed haul-level information is not recorded for trips in the shore-based fishery and hauls sampled in the at-sea fishery cannot be aggregated to a comparable trip level. As a result, initial sample sizes are simply the summed hauls and trips for fishery biological data (Johson et al 2021).

Biological data were analyzed based on the sampling protocols used to collect them and expanded to estimate the corresponding statistic from the entire landed catch by fishery and year when sampling occurred. A description of the analytical steps for expanding the age compositions can be found in earlier stock assessment documents (Hicks et al., 2013; Taylor et al., 2014).

The aggregate fishery age-composition data (1975–2020) confirm the well-known pattern of very large cohorts born in 1980, 1984, 1999, 2010, and 2014 and above average cohorts born in 1973, 1977, 1987, 2008, and 2016. Recent age-composition data still easily track the 2010 cohort, as well as the large cohorts born since then. Currently, the 2016 cohort is the largest observed cohort in all three U.S. fleets, whereas the 2014 cohort is still the largest observed cohort in the Canadian shoreside feet (Table 8). Canadian freezer trawlers did not carry observers in 2020 due to the COVID-19 pandemic, and thus did not collect ages in 2020. The 2010 cohort was the largest cohort observed in the Canadian freezer-trawler feet in 2019. No feet observed age-1 fish this year. For the combined data in 2019, the 2014 cohort was the largest (32%), followed by the 2016 cohort (21%), then the 2010 cohort (19%). In 2020, the 2016 cohort was the largest (35%), followed by the 2014 cohort (31%), then the 2010 cohort (15%) (Johson et al 2021).

We caution that proportion-at-age data contain information about the relative numbers-at-age, and these can be affected by changing recruitment, selectivity, or fishing mortality, making these data difficult to interpret on their own. For example, the above-average 2005- and 2006-year-classes declined in proportion in the 2011 fishery samples but persisted in small proportions for years in the fishery catch, although were much reduced starting in 2011 due to mortality and the overwhelming size of the more recent large cohorts. The assessment model is fit to these data to estimate the absolute sizes of incoming cohorts, which become more precise after they have been observed several times (i.e., encountered by the fishery and survey over several years) (Johson et al 2021).

Both the weight-and length-at-age information suggest that hake growth has fluctuated markedly over time (see Figure 7 in Stewart et al. 2011). This is particularly evident in the frequency of larger fish (> 55 cm) before 1990 and a shift to much more average-sized fish in more recent years. Although length-composition data are not fit explicitly in the base assessment model presented here, the presence of the 2008 and 2010 year classes have been clearly observed in length data from both of the U.S. fishery sectors, and the 2014 year class has been apparent since 2016 (Johson et al 2021).

Calculation of a reliable fishery catch-per-unit-effort (CPUE) metric is particularly problematic for Pacific hake and it has never been used as a tuning index for the assessment of this stock. There are many reasons that fishery CPUE would not index the abundance of Pacific hake, which are discussed in the 2013 stock assessment (Hicks et al., 2013).

Non-target species data

As mentioned in the previous section, the at-sea sectors of the US Pacific hake fishery are prosecuted with 100% observer coverage, as are the shore-based vessels who participate in the catch shares program. Trained observers monitor the incidental capture of marine mammals, sea turtles and seabirds, as well as details on fishing activity, gear configuration the catch and disposition of target and non-target fish species. Observers collect biological samples for use in life history studies and stock assessments (<https://www.fisheries.noaa.gov/west-coast/fisheries-observers/observer-programs-west-coast>). Table 11 shows the catch composition in the midwater hake fleet as collected via the observer programs (At-Sea Hake monitoring program and West Coast Groundfish Observer Program). There is very little catch of non-hake, which means, under RFM definitions, there are no main or minor non-target species, as the total non-target catch comprises less than 5% of the total catch.

Table 11. Catch composition in the US Pacific hake midwater trawl fishery from 2016 to 2020 (NWFSC FRAM Data Warehouse 2021).

Species	2016	2017	2018	2019	2020	Total	%of total
Pacific Hake	259,578	349,302	312,637	312,878	287,722	1,522,119	98.10%
Yellowtail Rockfish	551.9	1,583.2	1,278.9	1,605.5	1,746.2	6,765.7	0.44%
Widow Rockfish	427.1	1,449.1	1,075.3	1,106.0	754.3	4,811.8	0.31%
Spiny Dogfish Shark	377.9	241.5	1,348.7	987.3	291.3	3,246.8	0.21%
Jack Mackerel	395.0	878.3	271.0	1,101.8	562.2	3,208.3	0.21%
American Shad	152.8	438.8	352.3	434.6	714.2	2,092.7	0.13%
Shortbelly Rockfish	25.0	293.8	471.7	597.8	388.0	1,776.3	0.11%
Squid Unid	193.8	217.1	158.4	122.1	157.9	849.4	0.05%
Sablefish	33.7	251.8	189.5	258.0	104.6	837.5	0.05%
Pacific Mackerel	20.6	158.7	127.8	177.8	163.6	648.6	0.04%
Splitnose Rockfish	74.4	120.8	205.7	132.9	26.2	560.0	0.04%
Darkblotched Rockfish	20.8	72.7	146.1	148.9	109.1	497.6	0.03%
Pacific Ocean Perch	38.1	73.7	102.5	160.8	109.7	484.9	0.03%
Canary Rockfish	7.5	80.8	199.8	93.0	87.3	468.4	0.03%
Rougheye/Blackspotted Rockfish	45.3	40.6	163.8	134.6	71.1	455.4	0.03%
Pacific Herring	2.9	42.1	96.1	209.9	63.8	414.9	0.03%
King of the Salmon	152.5	32.7	44.6	105.7	60.2	395.7	0.03%
Brown Cat Shark	62.5	36.3	141.0	80.3	31.6	351.7	0.02%

Shortspine Thornyhead	22.4	29.0	71.0	58.6	23.7	204.7	0.01%
Arrowtooth Flounder	21.5	24.4	62.2	49.8	11.1	168.9	0.01%
Walleye Pollock	2.6	22.2	11.7	82.3	11.1	130.0	0.01%
Ragfish	47.9	16.1	36.4	12.5	16.4	129.3	0.01%
Chilipepper Rockfish	6.1	63.9	13.4	25.6	0.4	109.4	0.01%
Rex Sole	8.1	8.5	31.0	34.0	5.7	87.3	0.01%

Information on endangered, threatened and protected species interactions is also collected by observers. The Pacific Hake fishery encounters ESA-listed populations of Chinook salmon, short-tailed albatross, and some marine mammals (protected by the MMPA).

Short-tailed albatross

The USFWS 2017 BiOp for non-salmon ESA-listed species interactions in the Pacific Coast Groundfish Fishery concluded that it is not likely to jeopardize the continued existence of short-tailed albatross (USFWS 2017), though some takes are expected to occur. Therefore, the Incidental Take Statement (page 48) mandates a series of Reasonable and Prudent Measures, including: "RPM 2. NMFS shall minimize the risk of short-tailed albatross interacting with trawl cables. Because short-tailed albatross are vulnerable to striking aerial trawl cables, particularly in the catcher-processor fleet, The Terms and Conditions specific to RPM 2 states, "T&C1 for RPM2 --To minimize the risk of short-tailed albatross interacting with trawl cables, NMFS shall: a) Continue to conduct research that investigates the extent of take associated with trawl gear and new or improved management actions that minimize take as a result of interactions with trawl gear in the PCGF. In collaboration with Oregon Sea Grant, the Pacific hake fleet has completed a study designed to detect and quantify cryptic seabird bycatch in its fishery (Gladics 2019). This project, led by Amanda Gladics, created standardized seabird observation protocols and electronic monitoring systems to collect data on seabird behavior, incidence, type, and severity of interactions, as well as what activities (such as setting or hauling back the net, towing, etc) were associated with different events. Ms. Gladics presented the assessment team with a summary of results to date (Gladics 2021). The project resulted in a realization that the midwater hake trawl fishery is likely posing a relatively low risk to endangered albatrosses and other seabirds, thus trailing different methods for mitigation has been somewhat deprioritized, though it is ongoing within the industry. The only known short-tailed albatross take in a Pacific Coast Groundfish Fishery was reported in the Limited Entry sablefish longline fishery off the Oregon coast in 2011, with 69 total observations reported between 2012 and 2019 (Good et. al. 2021). The other 68 observations were short-tailed albatrosses feeding on discarded catch, bait floating free or on hooks (in the case of the hook and line observations) or other interactions not resulting in mortality. Of these, none were attributed to the midwater trawl fleet. Other sightings have also been reported, a handful of which were in the shoreside or mothership catcher vessel hake fisheries, but sightings are classified as such because the birds are not interacting with the fishing vessels in any way when spotted (Good et. al. 2021).

Pacific salmon

Regarding salmon, in December 2017 the NMFS completed a new BiOp related to impacts of the Pacific coast groundfish fishery on ESA-listed salmon. The BiOp requires the NMFS to act to avoid exceeding thresholds of Chinook salmon bycatch, including fishery closure. It also requires the NMFS and PFMC to review and develop mechanisms to prevent exceeding Coho salmon thresholds. (Waldeck 2020)

These requirements were previously met through a delay in the primary hake season by area, prohibition of at-sea processing by area, trip limit restrictions by area and depth, and limits on the percentage of shore-based allocation to be taken by time and area.

New implementation measures designed to meet the BiOp requirements were added in 2020. Salmon Bycatch Management: New salmon bycatch mitigation measures were adopted in the 2019-2020 groundfish specifications to satisfy mandates in the December 2017 ESA Salmon BiOp (NOAA Fisheries 2017). The measures include:

- Automatic for NMFS to (1) close the whiting fishery when it exceeds (or is projected to exceed) 14,500 Chinook or close the non-whiting fishery when it exceeds (or is projected to exceed) 9,000 Chinook; and (2) after (1) happens, the sector that remains open is closed if that sector exceeds (or is projected to exceed) its threshold (that is, 11,000

Chinook for whiting or 5,500 Chinook for non-whiting). The goal is to ensure that the overall 20,000 Chinook threshold is not exceeded by the groundfish fishery.

- A new bycatch reduction area (BRA) at the 200-fm depth contour. Council and NMFS monitor salmon bycatch rates inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector – whiting IFQ fishery, CP sector, MS sector, and non-whiting midwater trawl sector. If 200-fm BRA implemented, vessels would be prohibited from using midwater trawl gear to target either whiting or non-whiting groundfish in waters shoreward of the 200-fm depth contour, but would still be allowed to fish in waters seaward of 200-fm. This action only applies to non-tribal midwater trawl vessels.

In October 2020, NMFS published the proposed rule for additional measures adopted by the Council (50 CFR 660 2020e). The final rule was published in February 2021 (50 CFR 660 2020f). The new measures include items necessary for access to the 3,500 Chinook salmon “reserve,” including fishery cooperative annual Salmon Mitigation Plans (SMP) that may be submitted to NMFS and detail measures used to manage salmon bycatch. The SMP provides a nexus to a NMFS management action (that is, approval of the SMP) that is necessary for a sector to use the Chinook salmon reserve amount (that is, the 3,500 Chinook available above the 11,000 Chinook threshold for the whiting fishery).

Another new measure, Block Area Closures (BACs), may also be used if NMFS determines a sector of the whiting fishery is catching too much salmon then NMFS may implement a sector specific spatial closure that is more discrete than closing at 200 fathoms coastwide (Waldeck 2022).

Marine Mammals and other ETP

The latest available report covers the period 2002 – 2019 (Janot et. al. 2022), and shows fishery interactions with California sea lions, Steller sea lions, elephant seals, harbor seals, and Pacific white-sided dolphin and Dall’s porpoise, between 2015 and 2019. The tables below, excerpted from Jannot et. al. 2022, provide the estimated mortality of marine mammals in the at-sea hake catcher-processor fleet, catcher-boat fleet delivering to floating processors, and shore-based (catch share) fleet.

Table 12. Excerpted from Jannot et. al. (2022). Estimated marine mammal mortality among the U.S. West Coast at-sea hake catcher-processor (CP) vessels fishing with midwater trawl (MT) gears 2015-2019. Because vessels in this fishery are monitored 100% we assume that error around the values presented here is zero, so confidence intervals and coefficients of variation are not estimated.

Sector	Gear	Species	2015	2016	2017	2018	2019
At-sea hake CP	MT	California sea lion	0.00	49.00	21.00	5.00	6.00
At-sea hake CP	MT	Harbor seal	0.00	0.00	0.00	0.00	0.00
At-sea hake CP	MT	Northern elephant seal	1.00	1.00	0.00	0.00	1.00
At-sea hake CP	MT	Pacific white-sided dolphin	0.00	0.00	1.00	0.00	0.00
At-sea hake CP	MT	Steller sea lion	0.00	21.00	1.00	4.00	0.00

Table 13. Excerpted from Jannot et. al. (2022). Estimated marine mammal mortality among the U.S. West Coast at-sea hake catcher vessels (CV) vessels delivering to motherships fishing with midwater trawl (MT) gears 2015-2019. Because vessels in this fishery are monitored 100% we assume that error around the values presented here is zero, so confidence intervals and coefficients of variation are not estimated.

Sector	Gear	Species	2015	2016	2017	2018	2019
At-sea hake CV	MT	California sea lion	0.00	3.00	9.00	2.00	0.00
At-sea hake CV	MT	Dall’s porpoise	0.00	0.00	0.00	0.00	0.00
At-sea hake CV	MT	Harbor seal	0.00	0.00	0.00	0.00	0.00
At-sea hake CV	MT	Northern elephant seal	1.00	0.00	2.00	0.00	0.00
At-sea hake CV	MT	Northern fur seal	0.00	1.00	0.00	0.00	0.00

At-sea hake CV	MT	Northern right whale dolphin	0.00	1.00	0.00	0.00	0.00
At-sea hake CV	MT	Otariid, unidentified	0.00	0.00	0.00	0.00	0.00
At-sea hake CV	MT	Pacific white-sided dolphin	0.00	0.00	0.00	0.00	0.00
At-sea hake CV	MT	Steller sea lion	0.00	2.00	8.00	8.00	0.00

Table 14. Excerpted from Jannot et. al. (2022). Estimated marine mammal mortality among the U.S. West Coast catch share vessels using electronic monitoring (EM) equipment and fishing with bottom and midwater trawl (BMT) gears, 2015–19. Because vessels in this fishery are monitored 100%, we assume that error around the values presented here is zero (0), so confidence intervals and coefficients of variation are not estimated.

Sector	Gear	Species	2015	2016	2017	2018	2019
Catch share EM	BMT	California sea lion	0.00	1.00	6.00	1.00	0.00
Catch share EM	BMT	Northern elephant seal	1.00	0.00	0.00	0.00	0.00
Catch share EM	BMT	Pacific white-sided dolphin	0.00	0.00	1.00	0.00	0.00
Catch share EM	BMT	Sea lion, unidentified	0.00	1.00	2.00	1.00	2.00
Catch share EM	BMT	Steller sea lion	0.00	0.00	1.00	1.00	1.00

The following information (Table 15) about the stock status and fishery impacts of the marine mammals listed above is summarized from NOAA fisheries’ marine mammal stock assessment reports (available here: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region>).

Table 15. Summary of population size, PBR and estimated fishery mortality and serious injury to marine mammals encountered in the Pacific hake fisheries (Data from NOAA Fisheries’ annual Stock Assessment Reports). Note annual estimated fishery mortality is from all fisheries on the west coast (and in the case of Steller Sea Lions, also Alaska).

Stock	Estimated population size (N)	PBR (N)	Fishery mortality and serious injury annual estimate (N)	Strategic status
California sea lion	257,606	14,011	197	Not strategic
Northern elephant seal, CA breeding stock	179,000	4,882	4	Not strategic
Steller sea lion (Eastern DPS)	43,201	259	24	Not strategic
Harbor seal	Unknown	Undetermined	37.4	Not strategic
Dall’s porpoise	25,750	172	0.3	Not strategic
Pacific white-sided dolphin	26,814	191	1.1	Not strategic
Northern right whale dolphin	26,556	179	3.8	Not strategic

Regarding Pacific eulachon, in the offshore and inshore midwater trawl hake sectors, between 2015 and 2019 there have been between 56 and 1,088 individual eulachon estimated as caught annually. In 2019, the most recent year with data, there approximately five times more eulachon caught than in any other previous recent year, although mortalities are still extremely low at just over 1,000 individuals. This increase in eulachon bycatch in the hake fishery corresponds with a large increase in eulachon abundance starting in 2019 (Gustafson et al 2021).

There has been no observed or estimated green sturgeon bycatch in the hake fishery since 2006 (Richerson et al. 2021).

Similarly, no leatherback sea turtles were observed as bycatch in any US West Coast groundfish fishery in the period between 2015 and 2019 (Benson et al 2021).

5.2 Fishery Location and Methods

Area of Fishery Operation

The US Pacific hake fishery operates in federal waters of the U.S. EEZ, extending from 3nm - 200 nm west of Washington, Oregon, and California. The Pacific Coast Groundfish FMP defines the management area as the U.S. EEZ of the northeast Pacific Ocean, between the U.S.- Canada border and the U.S.-Mexico border (PFMC 2020).

The PFMC divides the coast into statistical areas that have been determined to be the most convenient biological and administrative areas (Figure 11). These areas are based on the International North Pacific Fisheries Commission (INPFC) statistical areas, and are listed from north to south:

- Vancouver - 47°30' N latitude to northern boundary of the EEZ
- Columbia - 43°00' N latitude to 47°30' N latitude
- Eureka - 40°30' N latitude to 43°00' N latitude
- Monterey - 36°00' N latitude to 40°30' N latitude
- Conception – Southern boundary of EEZ to 36°00' N latitude

The seaward border in Figure 11 represents the international waters, or those outside the 200-mile boundary of the Federal EEZ. The Council is active in international organizations that manage fish stocks migrating through the Council's area of jurisdiction, including the International Pacific Halibut Commission (for Pacific halibut), the Western and Central Pacific Fisheries Commission (for albacore tuna and other highly migratory species), and the Inter-American Tropical Tuna Commission (for yellowfin tuna and other high migratory species) (PFMC 2022a).

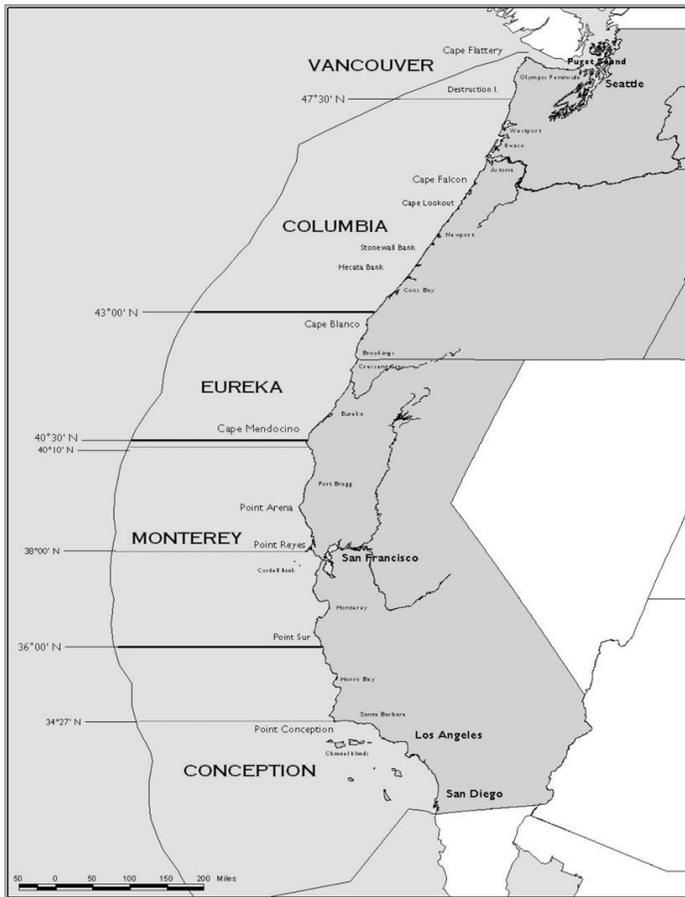


Figure 11 International North Pacific Fisheries Commission (INPFC) statistical area in the U.S. EEZ seaward of Washington, Oregon, and California (PFMC 2020q)

Makah groundfish trawl fisheries operate within the Makah Usual and Accustomed (U and A) Area bounded by red in Figure 12. The U and A includes state and federal waters within the Strait of Juan de Fuca and westward of the Olympic Peninsula. The U and A areas for inside waters and the northern and southern boundaries for the coastal tribes were defined in 1974 as part of the Boldt decision (U.S. v. Washington 1974). The western boundary for the U and A was established in 1982 by Phase II of the Boldt Decision (U.S. v. Washington 1994) and further affirmed in 1999 (Washington v. William M. Daley 1999).

The CFR 660.4 defines usual and accustomed fishing area for the Makah tribe as the area north of 48°02.25' N. lat. (Norwegian Memorial) and east of 125°44' W. long. The western boundary lies 40 miles offshore. Within this area the tribe is entitled to 50% of the harvestable surplus of groundfish (50 CFR 660.4 2018).

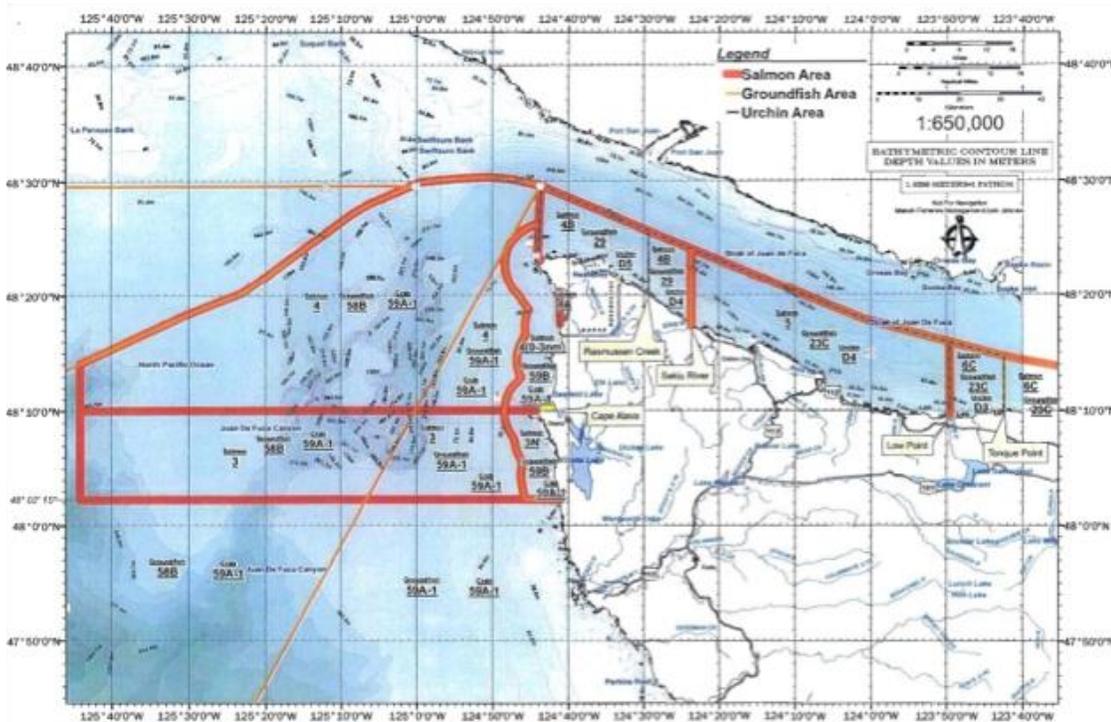


Figure 12 Usual and Accustomed Fishing Areas of the Makah Tribe (50 CFR 660.4 2018)

Fishing Methods

The Pacific whiting fishery is composed of vessels utilizing midwater trawl gear. It is unlawful for any person to fish on a Pacific whiting IFQ trip with gear other than midwater groundfish trawl gear.

There are four sectors of the Pacific hake fishery, all using midwater trawl gear:

- Non-tribal catcher boats delivering to shore-based processing facilities.
- Non-tribal catcher boats delivering to at-sea mothership processors.
- Non-tribal vessels that both catch and process the catch at sea.
- Tribal catcher boats delivering to either non-tribal shore-based or at-sea mothership processors.

The domestic non-tribal Pacific whiting fishery consists of catcher boats delivering to shore-based processing plants and to at-sea mothership processors and by large catcher-processor vessels. Catcher boats delivering to shore-based processing plants are participants in the shore-based trawl fleet. Catcher boats delivering to the mothership processors and large catcher-processor vessels are collectively referred to as the "at-sea" whiting sectors and may participate in cooperatives under the trawl catch share program

Washington coastal Indian treaty tribes, primarily the Makah Tribe, also fish for whiting using midwater trawl gear.

Midwater (pelagic) trawl gear is the only gear allowed for vessels participating in the primary whiting season. *Midwater (pelagic or off-bottom)* trawl is defined as a trawl in which the otter boards and footrope of the net remain above the seabed. It includes pair trawls if fished in midwater. A midwater trawl has no rollers or bobbins on any part of the net or its component wires, ropes, and chains. Additional midwater trawl gear requirements and restrictions are listed at 50 CFR 660.130 (b) subpart D (2022).

Gear regulations in the midwater trawl fishery have changed over time in response to changes in the larger fishery context. Prior to 2011, the fishery was managed primarily with trip limits, landing limits and area closures. Monitoring was limited with fewer than 25% of the bottom and midwater trawl trip landings subject to at-sea observer coverage. Midwater trawl gear restrictions to reduce bycatch and discards included minimum mesh size and codend and chafing gear requirements (NMFS 2018).

In 2011 Amendments 20 and 21 to the Pacific Coast Groundfish Fishery Management Plan (PCGFMP) established the Trawl Rationalization (TRat) Program, replacing trip and landing limits with fixed allocations for limited entry trawl participants in the form of individual quota shares for the shorebased trawl fleet (shoreside IFQ program) and cooperative programs for the at-sea mothership (MS coop program) and catcher/processor (CP coop program) fleets. The TRat program fundamentally changed the incentive structure of fishing. The fishing focus shifted from maximizing catch to maximizing the utilization of catch and minimizing bycatch. At-sea and shoreside monitoring was required for 100% of trips and landings of midwater trawl vessels. The program showed rapid success in reducing bycatch (50 CFR 660 2014a; NMFS 2018).

After TRat implementation the PFMC, NMFS and the industry began working on program refinements, called trailing actions, with the objective of identifying regulations that limited the use and configuration of bottom and midwater trawl gear and might no longer be necessary given the success of the TRat Program in reducing bycatch. In April 2011 the Council appointed the ad hoc Trawl Rationalization Regulatory Evaluation Committee (TRREC) to identify specific regulations that could be revised or eliminated to increase the efficiency of fishing under TRat. Existing regulations on chafing gear restricted chafing coverage to 50% or less of the codend circumference, restricted chafing coverage to the last 50 meshes of the codend, prohibited chafing gear from being longer than 50 meshes and required chafing gear to be attached outside riblines and restraining straps (PFMC Nov 2012b).

Chafing gear is used in the midwater trawl fishery to protect codends from abrasion, wear and damage caused by repeated contact with the stern ramp and trawl alley of the vessel. The sides and bottom of the codend are the areas most likely to be abraded by vessel contact. Some Pacific hake vessel owners requested changes to midwater trawl regulations to reconcile midwater gear regulations in the Pacific whiting fishery with those of the Alaska pollock fishery, where over 60% of the whiting fleet fished. The requested changes would increase operating flexibility, reduce operating costs of purchasing additional codends, and reduce costs of gear abrasion, wear and damage (Waldeck 2014; 50 CFR 660 2014a).

In November 2011 The TRREC recommended changes in gear regulations to the PFMC, two of which affected midwater trawl gear: remove restrictions on chafing gear on midwater trawls and eliminate codend and mesh size restrictions (50 CFR 660 2014a).

Thus began a several-year iterative process of regulatory development and analysis. In April 2012 the Council took final action on chafing gear, recommending that a single panel of chafing gear be allowed to cover all but the top panel of the codend. By September 2012 NMFS concerns about bycatch of ESA-listed species and forage fish led the Council to reconsider its earlier action. A draft Environmental Assessment was prepared analyzing four alternative chafing gear regulations for midwater trawl gear harvesting Pacific whiting and some rockfish species. The analysis included the potential impacts of the alternatives on codend “blinding” reducing bycatch escapement of small fish. It also addressed potential impacts on nontarget species, protected species, marine mammals and seabirds, ecosystem considerations, harvest and processing sectors and fishing communities (PFMC 2012b).

In March 2014 the Council proposed additional modifications to chafing gear regulations for midwater trawl gear. It proposed to amend midwater trawl gear restrictions to allow for greater chafing gear coverage in the codend consistent with Alaska groundfish fishery regulations: up to 75% of the circumference of a codend to be covered with chafing gear, with the top panel remaining open. It also proposed that the chafing gear be allowed to be attached inside or outside the riblines and straps. The EA analysis of this alternative had shown that compared to the status quo, the rule change under consideration

would have no negative impacts on the physical environment, while showing some negative impact on the biological environment in decreased escapement of small forage fish, shown for the period 2006-2011 to be on average .08% of the whiting catch. Impacts on the socioeconomic environment were shown to be positive, in terms of reduced operating costs from gear wear and gear change between the whiting and pollock fisheries (50 CFR 660 2014a; PFMC 2012b; Waldeck 2014).

In December 2014 a Final Rule was published detailing regulation modifications for midwater trawl. These included: 1. Prohibition of double-walled codends and on using chafing gear to create a double-walled codend; 2. Minimum midwater mesh size of 3.0 inches, applying throughout the net, including chafing gear; 3. Unprotected footropes at the trawl mouth, no rollers, bobbins, tires, wheels, rubber discs or any similar device anywhere on the net; 4. No enlarged footropes; 5. Lines parallel to footrope must be bare; 6. Sweep lines must be bare; 7. For at least 20 ft. immediately behind or mesh of minimum 16” must completely encircle the net; 8. Chafing gear not permitted on top codend panel; may cover bottom or sides of codend in one or more sections; 9. Mesh skirt may encircle the net under or over transfer cables, chokers, riblines and restraining straps but must coincide knot to knot with the net (50 CFR 660 2014b).

The next Council action affecting midwater trawl gear was in 2018. Reflecting the improved status of a number of overfished stocks and the continuing success of the TRat Program in reducing bycatch, the Council proposed new gear regulations intended to provide flexibility to TRat Program vessels in the configuration and use of fishing gear. The expectation was that greater flexibility would foster innovation and allow for more optimal harvest operations. For midwater trawl gear, the Council proposed eliminating restrictions on: minimum mesh size, except for the first 20 ft. behind the foot rope or head rope; chafing gear placement and double-walled codends. It also proposed changing the definition of mesh size to account for knotless nets (50 CFR 660 2018a).

The rationale behind the midwater trawl rules changes was as follows:

Elimination of minimum mesh size: it was not anticipated that midwater trawl vessel operators would significantly reduce mesh size to create less selective fishing gear because it would increase catch of undersized, and unmarketable IFQ species or other unwanted species, decrease trawl efficiency and increase fuel consumption. Instead, vessel operators would be provided the flexibility to configure gear for the most efficient catch of target species and for the strategic use of smaller mesh to reduce gilling and reinforce the net where excluder or guiding panels are attached.

Revised definition of mesh size: procedures for measuring minimum mesh size were updated to include knotless nets in use by most vessels.

Double-walled codends: removing the prohibition on double-walled codends was seen as providing the flexibility necessary to reinforce webbing to facilitate escapement through escape panels such as ramps and funnels, and to prevent abrasion of the net from trawl components such as straps. The revision was also expected to assist in the escapement of smaller fish by reducing the effective mesh size of the codend and herd fish through the net, as well as to protect the net through “armoring.”

Chafing gear: removing the restrictions on the use of chafing gear was expected to provide greater operational flexibility in the use of chafing gear to protect nets and codends, as well as in the use of gear relative to the seafloor. It was also expected that vessel operators would use chafing gear strategically to provide protection in areas of the net susceptible to wear, extending the life of the net and reducing operating costs. Strategic use of chafing gear would not likely include attaching additional chafing gear sections for net protections because it would increase drag on the net, increase fuel consumption and reduce fishing efficiency. The change was not expected to substantially alter gear contact with the bottom, where numerous disincentives already exist (risk of gear damage, reduced fishing efficiency, and increased operating costs.) In addition, the continuation of the small footrope requirement would limit the ability to fish in high relief habitat areas (NMFS 2018; 50 CFR 660 2018a).

NMFS approved the changes and the final rule, revising and eliminating restrictions on groundfish bottom and midwater trawl gear used in the Pacific Coast Groundfish Fishery’s Trawl Rationalization Program was published in December 2018. The rules became effective January 1, 2019. (50 CFR 660 2018b).

As of January 1, 2019, midwater trawl gear has the following requirements (50 CFR 660 2018b):

- No mesh size restrictions except the first 20 feet behind footrope or headrope must have bare ropes with 16 inches minimum mesh
- Mesh size is measured as the distance between opposing knots or corners in knotless webbing
- Codends may be single-wall or double-walled
- Chafing gear can be used to create the double-walled codend
- No restrictions on the use and configuration of chafing gear
- Vessels may have any type of groundfish bottom trawl (small or large footrope) or midwater trawl gear onboard simultaneously or successively on the same trip except:
- Between 42° N. lat. and 40°10' N. lat. and shoreward of the trawl RCA, vessels may have SFFT, midwater trawl, and large footrope trawl gear on board simultaneously or successively on the same trip. Vessels are prohibited from carry any other type of small footrope trawl gear in this area.
- Vessels may only declare one type of trawl gear at a time
- Vessels may fish with both groundfish bottom trawl gear and midwater trawl gear on the same fishing trip as long as a new declaration is made before fishing with a new gear
- Vessels may make declarations from sea and do not have to return to port to do so as long as the new declaration is made before fishing with a new gear
- Vessels must keep and land catch from different gears separate by gear type

For shorebased vessels:

- Vessels may fish in multiple IFQ management areas on a single trip
- Vessels may record catch from multiple areas on the same fish ticket
- Vessels may cross management lines on a single tow.
- Vessels must record the number of tows in a management area. Catch will be prorated based on the ratio of tows.
- Vessels may bring a new haul on board before the previous haul has been stowed, but catch from hauls cannot mix until the observer has had an opportunity to complete the required sampling protocols and all protocols in the specific Vessel's Monitoring Plan have been followed (50 CFR 660 2018b).

The Pacific hake fishery has 100 percent at-sea and shoreside monitoring (using a combination of at-sea observers, shorebased catch monitors, and electronic monitoring) and total catch accounting. The fishery is part of the [West Coast Groundfish Trawl Catch Share Program](#), a management system implemented by NOAA Fisheries in 2011. The trawl catch program, also called the trawl rationalization program, consists of an individual fishing quota program for the shore-based trawl fleet. The at-sea whiting sectors target Pacific whiting and consists of cooperatives for the mothership and catcher/processor trawl fleets.

5.3 Fishery Management History and Organization

International Management

The fishery operates on a shared stock of Pacific hake under the jurisdiction of the United States and Canada. The fishery is managed under the controlling framework of the bilateral agreement known as the Pacific Whiting Treaty, agreed by the Parties in November 2003. The preamble to the Agreement describes the goals of international cooperation in scientific research and management in support resource stewardship and the social and economic sustainability of fishery stakeholders (US Government 2003). NOAA Fisheries maintains a website for the Pacific Hake Treaty (NOAA Fisheries 2021b).

Annual quotas have been used to limit the catch of Pacific hake in the US and Canada since 1977, when the US Fishery Conservation and Management Act (Later the Magnuson-Stevens Act) and the Canada Fishery Conservation Zone were implemented (Johnson et al. 2021; Edwards et al. 2022).

During the late 1970s and 1980s U.S. and Canadian scientists collaborated through the Technical Subcommittee (TSC) of the Canada-U.S. Groundfish Committee (TSC) to develop informal agreements on the adoption of annual fishing policies. During the 1990s disagreements between the U.S. and Canada on the allotment of the catch limits between the two countries' fisheries led to quota overruns; 1991-1992 national quotas summed to 128% of the coast-wide limit, while the 1993-1999 combined quotas were an average of 112% of the limit (Johnson et al. 2021; Edwards et al. 2022).

The Pacific Whiting Treaty was formally ratified in 2006 by the United States for implementation in 2007 as part of the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act. Although the Agreement has been considered to be in force by Canada since June 25, 2008, an error in the original U.S. text required that the Agreement be ratified again before it could be implemented. This second ratification occurred in 2010 (US Government 2003; NOAA Fisheries 2021b; MSA 2007; Johnson et al. 2021; Edwards et al. 2022).

The Agreement establishes U.S. and Canadian shares of the coast-wide total allowable catch (TAC) at 73.88% and 26.12%, respectively, and this distribution has been adhered to since 2005.

The Hake Treaty process has been fully engaged since 2012, supported by an active committee structure. The process comprises an integrated management system of international committees specified in the agreement, all with shared US and Canadian membership: Joint Management Committee, Advisory Panel, Joint Technical Committee and Scientific Review Group. The Joint Management Committee (JMC) is responsible for annual TAC recommendations. It is composed of four members from each country. Current U.S. members are affiliated with the Pacific Fishery Management Council, NOAA Fisheries West Coast Regional Office, Pacific Coast Treaty Indian Tribes and the Pacific Whiting Conservation Cooperative. Current Canadian members are affiliated with Department of Fisheries and Oceans Canada, Province of BC Ministry of Agriculture, Food and Fisheries, Pacific Fisheries Management Inc. and Fisher Bay Seafoods Ltd. (NOAA Fisheries 2021b).

The Advisory Panel (AP) comprises industry representatives, who review scientific advice and management of the fishery and provide advice on Total Allowable Catch to the Joint Management Committee. Current U.S. members are affiliated with Phoenix Processor Limited Partnership, Ocean Gold Seafoods, United Catcher Boats, American Seafoods, California Shellfish Co., Inc./Hallmark Fisheries/Point Adams Packing Company, Arctic Storm Management Group, and an independent fisherman. Current Canadian members are affiliated with Independent Seafood Canada Corporation, Aqualine Seafoods, S&S Seafoods Canada, F/D Nordic Pearl, Mariner Seafoods International, Deep Sea Trawlers Association, Canadian Fishing Company, an independent fisherman, and a license holder (NOAA Fisheries 2021b).

The Joint Technical Committee (JTC) authors an annual stock assessment to inform harvest management decisions of the JMC, including scientific advice on the annual potential yield of the offshore whiting resource that may be caught for that fishing year (NOAA Fisheries 2021b). Current members are affiliated with NOAA Fisheries Northwest Fisheries Science Center, Fisheries and Oceans Canada Pacific Biological Station and Simon Fraser University (NOAA Fisheries 2021b).

The Scientific Review Group (SRG) provides independent peer review of the Joint Technical Committee's work. Current US members are affiliated with NOAA Fisheries Northwest Fisheries Science Center and Fisheries Analysis with Integrity. Current Canadian members are affiliated with the Department of Fisheries and Oceans Canada. Current Independent members are affiliated with Oregon State University and the University of Washington. Current advisors are affiliated with Mariner Seafoods International Canada and West Coast Seafood Processors Association US (NOAA Fisheries 2021b)

The overarching goal of the Treaty process is to manage the Pacific hake resource in a precautionary and sustainable manner, utilizing the best available science. The set of management principles continue to be those adopted by the JMC in 2014:

- Maintain a healthy stock status across a range of recruitment events and consider total allowable catch levels that spread the harvest of strong cohorts over multiple years
- Manage the fishery resource in a manner that aims to provide the best long-term benefits to the Parties.
- Manage the fishery to ensure that each country has the opportunity to receive the intended benefits contemplated in the treaty.
- These management principles are dynamic and shall be reviewed annually by the JMC and the AP to ensure they remain valid (NOAA Fisheries 2021b).

The Treaty website describes the usual process by which the TAC is set:

The annual coastwide TAC-setting process begins with a stock assessment completed by the Joint Technical Committee in January. The Scientific Review Group reviews the stock assessment at their annual meeting (February or March) and provides scientific advice, which is incorporated into the final stock assessment. The Advisory Panel and Joint Management Committee meet to review the stock assessment and to provide advice to the governments of Canada and of the United States on an annual

coastwide TAC by March of each year. Once approved by the respective governments, the TAC advice is in turn implemented in accordance with each countries' laws and regulations (NOAA Fisheries 2021b).

The JMC holds an annual meeting in conjunction with the AP, the most recent being by Webinar March 1-3, 2022. The purpose of the annual meeting is to review advice from the stock assessment, JTC and SRG and recommend for approval of the Parties the overall total allowable catch (TAC) for the year. The Canadian and U.S scientists of the JTC meet in December to prepare for the next year's stock assessment by reviewing the integrated acoustic and trawl survey data and fishery landings data; the most recent meeting was held remotely December 15, 2021 (NOAA 2021b; SRG 2020a; 2021; 2022).

The SRG meets in February to review the draft Pacific hake/whiting stock assessment, the most recent being held virtually February 14-17, 2022 (SRG 2022). In addition to reviewing the draft stock assessment document prepared by the Canada/U.S.A. Joint Technical Committee (JTC), the SRG also reviewed the 2021 coastwide acoustic survey conducted by the U.S. and Canada, the Management Strategy Evaluation (MSE) of Pacific hake, research on ecosystem drivers of recruitment and acoustic trawl survey research (SRG 2022).

The remote meeting format imposed by Covid-19 protocols in 2020 and 2021 contributed to difficulties in bilateral negotiations within the JMC and in a departure from normal process, the JMC was unable to agree on a coastwide TAC in those years. The JMC did agree on coastwide mortality in 2020 and 2021 but because of different utilization rates in each country were unable to reach an agreement on TAC (Turriss 2022). Accordingly, the Canada and US TACs were set independently, each based on the joint stock assessment. The rest of the Treaty management system functioned as usual during those two years: scientific research and stock assessments were produced by the JTC and reviewed by the SRG; stakeholder input was received from the AP; work on the ongoing Management Strategy Evaluation (MSE) was maintained (Grandin et al. 2020; Johnson et al. 2021; SRG 2020a; 2021; Marshall 2020a; 2020b. Marshall et al. 2020b).

The Agreement does not specify a procedure for when the JMC does not agree on a coastwide TAC. However, the Pacific Whiting Act of 2006 anticipated the possibility that a joint agreement on a coastwide TAC might not take place in any given year. Section 7006(c) of the Act outlines the procedure to be followed under that contingency that maintains reliance on and participation in the Treaty structure. Paraphrased, it directs NMFS, as delegated by the Secretary of Commerce to establish the TAC for the United States catch by:

- Taking into account recommendations from the PFMC and the Treaty bodies: JMC, JTC SRG and AP;
- Base the TAC on the best scientific information available;
- Use the default harvest rate (F.40) set out in paragraph 1 of Article III of the Agreement unless the scientific evidence demonstrates the need for a different rate to sustain the whiting resource;

Establish the US share of the TAC based on the US/Canada percentage split in the Agreement (paragraph 2 of Article III) and make any adjustments necessary to the TAC to account for overages, if either the US or Canada exceeded its individual TAC in the previous year, or carryovers, if the US or Canada TAC was less than the individual TAC in the previous year (Pacific Whiting Act 2006). In 2020 and 2021 The US used the contingent protocol outlined in the Pacific Whiting Act. NMFS implemented a US TAC based on a final adjusted coastwide TAC of 575,000 mt and 500,000 mt in 2020 and 2021, respectively. These amounts account for allocations for each country (26.12% Canada; 73.88% US) and adjustments for uncaught fish in 2020 and 2021. The final US adjusted TAC in 2020 was 424,810 mt (367,202 mt + 57,608 mt carryover adjustment). The final US adjusted TAC in 2021 was 369,400 mt (314,320 mt + 55,080 mt carryover adjustment). (Waldeck 2022).

Canada followed its normal TAC-setting process as authorized by the Fisheries Act, implementing the Canadian TAC through the Groundfish Integrated Fisheries Management Plan (IFMP), Pacific Fishery Regulations and General Fishery Regulations. In the years 2020 and 2021, The Minister of Fisheries approved a TAC developed on the scientific advice of the joint stock assessment and after consultations with Canadian members of the JMC, AP, the Hake Advisory Committee, and the Groundfish Trawl Advisory Committee. The 2020 adjusted TAC was 104,480 mt; the 2021 TAC was 104,535. (Turriss 2022; Edwards et al. 2022).

Both the US and Canada set their 2021 TACs at levels that would stay within their share of the coastwide mortality agreed to at the 2021 JMC meeting. In 2021 the US caught 73% of its quota; Canada caught 54.6% of its quota. The treaty committee process continued to function as usual during 2020 and 2021, adhering to the joint management goals for the fishery (Turriss 2022; Waldeck 2022; Edwards et al. 2022).

In 2022 the JMC agreed to an adjusted coastwide TAC of 545,000 mt (50 CFR 660 2022).

An on-going Management Strategy Evaluation (MSE) of the hake management process is being conducted to evaluate adherence to the management principles adopted by the JMC and trade-offs among them. The goal of the JMC is to have the fishery managed sustainably, grounded in good science and supported by the Parties, their respective management agencies and their technical and advisory committees (Jacobsen et al. 2020a; Marshall 2020a; Marshall 2020b; SRG 2020b; Marshall et al. 2020a; 2020b; Jacobsen et al. 2020b).

U.S. Domestic Management

6.3.2.1 Legal Framework

Federal fishery management is carried out under the authority of the Magnuson Stevens Fishery Conservation and Management Act (MSA), first passed in 1976 and most recently reauthorized in 2006 (MSA 2007). The MSA is the principal law governing the harvest of fishery resources within the federal portion of the U.S. 200-mile zone. Under the MSA, the Pacific Fishery Management Council (PFMC) recommends management actions to the National Marine Fisheries Service (NMFS; also called NOAA Fisheries) for approval. Ultimate decision authority for fishery management lies with the Secretary of Commerce.

The MSA contains ten national standards with which all fishery management plans (FMPs) must conform (MSA 2007). The national standards, listed below, provide the primary guidance for the management of US fisheries.

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the U.S. fishing industry; [SEP]
2. Conservation and management measures shall be based upon the best scientific information available; [SEP]
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination; [SEP]
4. Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonable calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of privileges; [SEP]
5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose; [SEP]
6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches; [SEP]
7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication; [SEP]
8. Conservation and management measures shall, consistent with the conservation requirements of the Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities;
9. Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch;
10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea. [SEP]

As mandated by the Magnuson-Stevens Fishery Conservation and Management Act, NOAA Fisheries has developed guidelines for each National Standard. The Secretary of Commerce must ensure that fishery management plans, plan amendments, and regulations are consistent with the National Standard guidelines (50 CFR 660 2022).

In addition to the MSA, a suite of “other applicable laws” also apply (PFMC 2022b):

- National Environmental Policy Act (NEPA): requires environmental impact assessments of federal actions and compliance with other laws and executive orders (EO).
- Endangered Species Act (ESA): prohibits actions that are expected to jeopardize the continued existence of any endangered or threatened species under NMFS’ jurisdiction or result in harmful effects on critical habitat.

- Marine Mammal Protection Act (MMPA): requires protection of marine mammals. NMFS is responsible for whales, dolphins, porpoise, seals, sea lions and fur seals. The U.S. Fish and Wildlife Service (USFWS) is responsible for walrus, sea otters, and the West Indian manatee.
- Migratory Bird Treaty Act (MBTA): a shared agreement between the United States, Canada, Japan, Mexico, and Russia to protect migratory birds, prohibiting their taking, killing, or possession. The directed take of seabirds is prohibited.
- Coastal Zone Management Act (CZMA): requires all federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable
- Administrative Procedures Act (APA): provides for public participation in the rulemaking process
- Paperwork Reduction Act (PRA): regulates the collection of information from the public
- Regulatory Flexibility Act (RFA): requires assessment of the regulatory impact on small entities through a regulatory flexibility analysis. The analysis is combined with the regulatory impact review (RIR) and NEPA analyses.
- EO 12866 (Regulatory Planning and Review): establishes guidelines for promulgating new regulations and reviewing existing regulations and requires agencies to assess the costs and benefits of all regulatory action alternatives.
- EO 12898 (Environmental Justice): requires federal agencies to identify and address “disproportionately high adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States” as part of an environmental impact analysis associated with an action.
- EO 13175 (Consultation and Coordination with Indian Tribal Governments): requires regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications and the avoidance of unfunded mandates imposed on tribes.
- EO 13132 (Federalism): requires federal agencies to consider the implications of policies that may limit the scope of or pre-empt states’ legal authority. Such actions require a consultation process with the states and may not create unfunded mandates for the states.
- EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds): supplements the MBTA by requiring Federal agencies to work with the USFWS to develop memoranda of agreement to conserve migratory birds and to evaluate the effects of their actions on migratory birds in NEPA documents.

6.3.2.2 Management Framework

Pacific Fishery Management Council

The MSA established the Pacific Fishery Management Council (PFMC) as one of eight regional councils to manage fisheries in the US EEZ. The PFMC is responsible for managing Pacific Ocean fisheries in the 317,690 nm² federal EEZ off the coasts of California, Oregon and Washington. The Pacific fisheries comprise about 119 species of salmon, groundfish, coastal pelagic species (sardines, anchovies, and mackerel), shellfish, and highly migratory species (tunas, sharks, and swordfish) (PFMC 2022a; 2022b).

As specified by the MSA, the Council has fourteen voting members, consisting of four state fishery agency directors, the regional administrator of NMFS (NW or SW Region, depending on the issue under consideration), 4 state obligatory appointments, four at-large appointments, and one tribal appointment representing Federally recognized fishing rights from California, Oregon, Washington, or Idaho. The state obligatory and at-large appointments are made by the Secretary of Commerce based on nominations from the governors of the four member states, with a maximum of three terms. The tribal appointment is made by the Secretary of Commerce in consultation with the Secretary of the Interior and tribal governments based on a list of nominees submitted by the tribal governments, with representation to be rotated among the treaty tribes (MSA 2007).

Under the MSA, each council must reflect the expertise and interests of its constituent States, with membership that is knowledgeable about conservation, management, commercial or recreational harvest, of the fishery resources within the council area. The Secretary of Commerce is charged with ensuring each council has membership that fairly represents the commercial and recreational fisheries under that Council’s jurisdiction. Each year the Secretary submits a report on council membership to the Senate Committee on Commerce, Science, and Transportation that list the fisheries under the jurisdiction of each Council and their characteristics, assesses council membership in terms of the apportionment of the active participants

in each council's fisheries, and states a plan and schedule for actions to achieve a fair and balanced apportionment on each council (MSA 2007).

The MSA (§ 302(j)) requires the disclosure of financial interests in seafood harvesting, processing, or marketing by those nominated or serving as a voting member of a council. Financial interests of the appointee and any family members or related organizations, as well as the nature of that interest, must be disclosed. Disclosure forms are retained by the PFMC and are available for public review at the Council office as well as at Council meetings. In 2020 NMFS took final action to amend regulations addressing disclosure of financial interests by, and voting recusal of, members of regional fishery management councils. The purpose of the change is to ensure transparency with regard to members' financial interests, determine whether financial interests are tied to decisions, and establish regional procedures for issuing recusal determinations (50 CFR 660 2020).

The Council meets five times a year. Most Council meetings take six days, with individual advisory body meetings occurring during the course of the week. All meetings are open to the public, except for occasional, brief closed sessions in which the Council deals with personnel, administrative, and/or litigation issues. Meeting locations rotate among member state cities. Advisory bodies also meet at various times between Council meetings. Minutes are created for each Council meeting, and are available to the public. During the COVID pandemic all meetings were conducted remotely, but on the same schedule (PFMC 2021c; Phillips 2021).

The Council briefing books containing meeting agendas, agenda item summaries, and background information are available to the public online in advance of each meeting. Post-meeting summaries of Council decisions are also available online, as are complete minutes of meetings (PFMC 2022a; 2022c).

The PFMC is responsible for managing fisheries that target salmon, coastal pelagic species (sardines, anchovies, and mackerel), highly migratory species (tunas, sharks, and swordfish), and groundfish (rockfish, round fish, and flatfish) species using trawl, troll, longline, jig, and pot gear. The PFMC has prepared and implemented four FMPs for these fisheries. Pacific hake is managed under the Pacific Coast Groundfish FMP.

The Council also makes allocation decisions for halibut, in concert with the International Pacific Halibut Commission (IPHC). After a total allowable catch (TAC) is set by the IPHC, the Council allocates portions of the U.S. share to three categories of user groups as directed and incidental catch: non-tribal commercial, sport, and treaty Indian commercial and ceremonial & subsistence (PFMC 2022b).

Each FMP contains a suite of management tools that together characterize the fishery management regime. These management tools are defined in the FMP, or its implementing regulations, and require a formal plan or regulatory amendment to change.

Management measures developed by the Council are recommended to the Secretary of Commerce through the National Marine Fisheries Service (NMFS). Management measures are implemented by NMFS West Coast Regional office and enforced by the NOAA Office of Law Enforcement, the U.S. Coast Guard 11th and 13th District, and state and tribal enforcement agencies (PFMC 2022b).

The Council staff works at the direction of the Council to coordinate and expedite routine Council activities. Staff numbers fifteen, including an Executive Director, Deputy Director, Administrative Officer and Staff Officers. Staff Officers oversee each fishery management plan (groundfish, coastal pelagic species, highly migratory species, and salmon), and also focus on economics, social science, habitat, and outreach and education (PFMC 2022d).

Advisory Committees

Technical and Management Teams monitor fisheries and prepare stock assessments and fishery impact analyses. They may monitor catch rates and management impacts, analyze or recommend harvest limits, develop rebuilding plans, or conduct other tasks assigned by the Council. The Council has five technical and management teams: Groundfish Management Team (GMT), Salmon Technical Team (STT), Coastal Pelagic Species Management Team (CPSMT), Ecosystem Workgroup, and Highly Migratory Species Management Team (HMSMT). Of these, the team most directly relevant to Pacific hake is the GMT (PFMC 2022d).

The *Groundfish Management Team (GMT)* is involved throughout the decision process described above. The GMT is composed of two representatives each from Washington, Oregon, and California fish and wildlife agencies, two representatives from the NMFS West Coast Regional office, three representatives from the NMFS Science Centers, and one representative of tribes with a recognized treaty right to take federally-managed groundfish. Traditionally, the GMT monitors catch rates, recommends harvest regulations and annual limits, and analyzes the impacts of various management measures. It makes recommendations on proposed management measures, presenting information to the Council, Groundfish Advisory Subpanel (GAP), and other Council advisory bodies. GMT meetings are open to the public and public comment is generally accepted during the meetings (PFMC 2022d).

Plan Development Teams (PDTs) focus on the development of fishery management plans. This includes appraising Council fisheries and resources, working with other teams to draft fishery management plans and amendments, presenting alternative management objectives to the Council, analyzing the short- and long-term tradeoffs of management measures, helping Council and NMFS staff prepare related documents, attending public hearings, advising the Council on biological and socioeconomic impacts of fisheries management, providing information to advisory subpanels, and presenting stock assessments and analyses to the SSC for review (PFMC 2022d).

Advisory Subpanels (APs) represent the commercial and recreational fishing industry, tribes, the public, and conservation interests. They advise the Council on fishery management measures and provide input into fishery management planning. Members are selected by a Council vote and serve three-year terms.

The Council has five advisory subpanels: Groundfish (GAP), Coastal Pelagic Species (CPSAS), Highly Migratory Species (HMSAS), Salmon (SAS) and Ecosystems (EAS). Subpanels most directly relevant to Pacific hake are the GAP and EAS.

The *Groundfish Advisory Subpanel (GAP)* consists of industry representatives of commercial and recreational groundfish sectors, a tribal representative, charterboat owners and operators, fishing organization representatives, processors, an environmental organization representative, and a public at-large representative. Each major commercial and recreational gear group is represented. Meetings are held at most Council meetings. The GAP operates by consensus and through majority and minority position statements that are offered as advice to the Council. GAP meetings are open to the public, and public comment is generally accepted during the meetings (PFMC 2022d).

The *Ecosystems Advisory Subpanel (EAS)* includes three representatives each from California, Idaho, Oregon, and Washington; and one tribal representative. As with the other advisory committees, meetings are open to the public, and public comment is generally accepted during the meetings (PFMC 2022d).

The *Scientific and Statistical Committee (SSC)* is required by the MSA to be maintained by council to provide ongoing scientific advice for fishery management decisions. Advice includes recommendations for acceptable biological catch, preventing overfishing, maximum sustainable yield, and achieving rebuilding targets, and reports on stock status and health, bycatch, habitat status, social and economic impacts of management measures, and sustainability of fishing practices. Members appointed by councils to the SSC's are required to have strong scientific or technical credentials and experience (MSA 2007).

The Council appoints the PFMC SSC, including scientists from NOAA Fisheries, state agencies, the Northwest Indian Fisheries Commission, academic institutions, and private consultants. At-large members serve three-year terms, while management agency representatives serve indefinite terms. The SSC has six subcommittees: salmon, groundfish, highly migratory species, coastal pelagic species, ecosystem-based management, and economics (PFMC 2022d).

The SSC identifies scientific resources required for the development of FMPs and amendments; provides a multidisciplinary review of FMPs and FMP amendments and advises the Council on their scientific content, helps the Council evaluate statistical, biological, economic, social, and other scientific information and analyses, and makes recommendations on the composition of plan development, technical, and management teams (PFMC 2022d).

The *Habitat Committee (HC)* provides advice to the Council on a wide variety of habitat-related issues. The committee works with other advisory bodies on habitat issues, helps develop ways to resolve habitat problems and avoid future habitat conflicts, and makes recommendations for actions that will help achieve the Council's habitat objectives. HC membership includes members from the U.S. Fish and Wildlife Service, the Pacific States Marine Fisheries Commission, the National Marine

Sanctuary program; NMFS region science center representative; conservation groups, state management agencies and tribal representatives. Meetings are open to the public (PFMC 2022d).

Enforcement Consultants (EC) are representative from state fish and wildlife agencies, state police agencies, NMFS regions and the Coast Guard. They provide advice to the Council about whether proposed management actions are enforceable and how they affect safety at sea. Six enforcement consultants serve indefinite terms. The EC includes one representative each from the U.S. Coast Guard, 11th District; U.S. Coast Guard, 13th District; National Marine Fisheries Service, West Coast Division, Office of Law enforcement; Washington Department of Fish and Wildlife, Oregon State Police, and California Department of Fish and Wildlife (PFMC 2022d).

Ad-hoc Committees are created to serve special needs. Current PFMC ad-hoc committees are Climate and Communities Core Team (2019); Climate Scenarios Investigation Workgroup (2018); Cost Recovery Committee (2011); Ecosystem Workgroup (2013); Groundfish Electronic Monitory Policy Advisory Committee (2013); Groundfish Electronic Monitory Technical Advisory Committee (2013); Sablefish Management and Trawl Allocation Attainment Committee (2018); Southern Oregon Northern California Coast Coho Workgroup (2020); Southern Resident Killer Whale Workgroup (2019); Marine Planning Committee (2021) (PFMC 2022d).

The *Groundfish Allocation Committee (GAC)* is charged with developing options for allocating certain groundfish species among the commercial and recreational sectors and among gear groups within the commercial sector. The purpose of the GAC is to distribute the harvestable surplus among competing interests in a way that resolves allocation issues on a short- or long-term basis. The GAC is composed of voting members who sit on the Council (one representative each from the California, Oregon, and Washington management agencies, National Marine Fisheries Service, Pacific States Marine Fisheries Commission, and the Council Chair). NOAA Northwest Regional Counsel provides legal advice. In addition, there are seven non-voting members representing the non-whiting trawl, whiting trawl, fixed gear, open access, and recreational sectors; conservation groups; and processors.

The *Budget Committee* is composed of Council members. It reviews the Council's budget and grant proposals (PFMC 2022d).

The *Legislative Committee* is also composed of Council members. It monitors federal legislation affecting Council operations and West Coast fisheries and drafts Council positions and potential actions (PFMC 2022d).

The Pacific Coast Groundfish Fishery Management Plan

The PFMC has no formal role in the TAC setting process for Pacific hake but reviews the results of the JMC process annually in April and may advise NMFS on JMC recommendations. The PFMC does, however, control the fishery management process through the framework of the Pacific Coast Groundfish FMP. The Groundfish FMP establishes the fishery management program, the process, procedures the Council will follow in making adjustments, and sets the limits of management authority of the Council and the Secretary (PFMC 2020q).

FMP History and Amendments

The following history section is an abbreviated extract from the FMP, highlighting amendments that have particular relevance to the Pacific hake fishery (PFMC 2020q):

The Pacific Coast Groundfish Fishery Management Plan (FMP) was approved by the U.S. Secretary of Commerce (Secretary) on January 4, 1982 and implemented on October 5, 1982. Prior to implementation of the FMP, management of domestic groundfish fisheries was under the jurisdiction of the states of Washington, Oregon, and California. State regulations have been in effect on the domestic fishery for more than 100 years, with each state acting independently in both management and enforcement. Management and a lack of uniformity of regulations had become a difficult problem, which stimulated the formation of the Pacific States Marine Fisheries Commission (PSMFC) in 1947. The PSMFC had no regulatory power but acted as a coordinating entity with authority to submit specific recommendations to states for their adoption.

The 1977 Fishery Conservation and Management Act (later amended and renamed the Magnuson-Stevens Fishery Conservation and Management Act or Magnuson-Stevens Act) established eight regional fishery management Councils, including the Pacific Council. Between 1977 and the implementation of the groundfish FMP in 1982, state agencies worked

with the Council to address conservation issues. Specifically, in 1981, managers proposed a rebuilding program for Pacific Ocean perch. To implement this program, the states of Oregon and Washington established landing limits for Pacific Ocean perch in the Vancouver and Columbia management areas.

Management of foreign fishing operations began in February 1967 when the U.S. and U.S.S.R. signed the first bilateral fishery agreement affecting trawl fisheries off Washington, Oregon, and California. The U.S. later signed bilateral agreements with Japan and Poland for fishing off the U.S. West Coast. Each of these agreements was renegotiated to reduce the impact of foreign fishing on important West Coast stocks, primarily rockfish, Pacific whiting, and sablefish.

When the U.S. extended its jurisdiction to 200 miles (upon signing the Fishery Conservation and Management Act of 1976), the National Marine Fisheries Service (NMFS) developed and the Secretary implemented the preliminary management plan for the foreign trawl fishery off the Pacific Coast. From 1977 to 1982, the foreign fishery was managed under that plan. Many of these regulations were incorporated into the FMP, which provided for continued management of the foreign fishery.

Joint-venture fishing, where domestic vessels caught the fish to be processed aboard foreign vessels, began in 1979 and by 1989 had entirely supplanted directed foreign fishing. These joint ventures primarily targeted Pacific whiting. Joint-venture fisheries were then rapidly replaced by wholly domestic processing; by 1991 foreign participation had ended and U.S.-flagged motherships (MS), catcher-processors, and shorebased vessels had taken over the Pacific whiting fishery. Since then, U.S. fishing vessels and seafood processors have fully utilized Pacific Coast fishery resources. Although the Council may entertain applications for foreign or joint venture fishing or processing at any time, provisions for these activities have been removed from the FMP. Re-establishing such opportunities would require another FMP amendment.

Since it was first implemented in 1982, the Council has amended the Groundfish FMP 33 times in response to changes in the fishery, reauthorizations of the Magnuson-Stevens Act, and litigation that invalidated provisions incorporated by earlier amendments. During the first 10 years of plan implementation the Secretary approved six amendments. An important change was implemented in 1992 with Amendment 6, which established a license limitation (limited entry) program intended to address overcapitalization by restricting further participation in groundfish trawl, longline, and trap fisheries. Amendments 11, 12, and 13 were responses to changes in the Magnuson-Stevens Act due to the 1996 Sustainable Fisheries Act. These changes required FMPs to identify essential fish habitat (EFH), more actively reduce bycatch and bycatch mortality, and strengthen conservation measures to both prevent fish stocks from becoming overfished and promote rebuilding of any stocks that had become overfished.

Most of the amendments adopted since 2001 address overfishing, bycatch monitoring and mitigation, and EFH. In relation to the first of these three issues, the Magnuson-Stevens Act now requires FMPs to identify thresholds for both the fishing mortality rate constituting overfishing and the stock size below which a stock is considered overfished. Once the Secretary determines a stock is overfished, the Council must develop and implement a plan to rebuild it to a healthy level.

Amendment 15 was initiated in 1999 in response to provisions in the American Fisheries Act intended to shield West Coast fisheries from certain effects of that legislation. Because of competing workload and no threatened imminent harm, the Council tabled action on Amendment 15 in 2001. Work on the amendment was re-initiated in 2007 in response to changes in the Pacific whiting fishery. Its purpose was to address conservation and socioeconomic issues in the shoreside, catcher/processor, and mothership sectors of the Pacific whiting fishery by requiring vessels to qualify for an additional license to participate in a given sector, based on their historical participation. It was an interim measure, which sunsetted with trawl rationalization program (Amendment 20) implementation.

Amendment 18, approved in 2006, incorporates a description of the Council's bycatch-related policies and programs. It also effected a substantial reorganization and update of the FMP, so that it better reflects the Council's and NMFS's evolving framework approach to management. Under this framework, the Council may recommend a range of broadly defined management measures for NMFS to implement. In addition to the range of measures, this FMP specifies the procedures the Council and NMFS must follow to establish and modify these measures. When first implemented, the FMP specified a relatively narrow range of measures, which were difficult to modify in response to changes in the fishery. The current framework allows the Council to effectively respond when faced with the dynamic challenges posed by the current groundfish fishery.

Amendment 19, also approved in 2006, revises the definition of groundfish EFH, identified habitat areas of particular concern (HAPCs), and describes management measures intended to mitigate the adverse effects of fishing on EFH. This amendment supplants the definition of EFH added to the FMP by Amendment 11.

Amendment 20 was approved in 2010 and establishes the groundfish trawl rationalization program. Under this program, groundfish LE trawl vessels making shoreside deliveries are managed with individual fishing quotas. Motherships and associated catcher-vessels in the at-sea Pacific whiting sector are managed under a system of regulated cooperatives. Pacific whiting catcher-processors fish within a voluntary cooperative; the amendment establishes provisions to strengthen this cooperative.

Amendment 21 was approved in 2010 and establishes long-term allocations between the trawl and nontrawl sectors of the groundfish fishery; establishes a short-term allocational split between the shoreside whiting and non-whiting fishery, necessary for implementation of the individual fishing quota (IFQ) program (established through Amendment 20); establishes darkblotched rockfish, Pacific ocean perch and widow rockfish allocations among the at-sea trawl and shoreside trawl sectors (later removed by Amendment 21-4); identifies the need for initial set-asides for the at-sea trawl sectors; and establishes a Pacific halibut bycatch allowance to be provided to the trawl fishery in the form of individual bycatch quota (established through Amendment 20).

Amendment 21-1 was approved in 2011. It clarified that the Amendment 21 allocation percentages supersede the limited entry/open access allocations for certain groundfish species and revised the amount of bycatch quota pounds that will be issued for the shoreside trawl fishery to cover Pacific halibut mortality to better match the objective specified in Amendment 21. Amendment 21-2 was approved in 2012. It revised catch accounting provisions for clarity, reinstated provisions that were inadvertently deleted with Amendment 21, and revised annual catch limit set-aside provisions to allow for the routine reallocation of unused harvest set-asides as part of any considered inseason fishery adjustment.

Amendment 21-3 was approved in 2017. It changed the at-sea whiting sectors' allocations of darkblotched rockfish and POP from total catch limits to set-asides, while maintaining the allocation formulas in the Fishery Management Plan (FMP) for these two stocks to determine the set-aside amounts.

Amendment 21-4 was approved in 2018. It changed the at-sea whiting sectors' allocations of canary rockfish and widow rockfish from total catch limits to set-asides and removed from the FMP the formulas for determining the set-aside amounts for darkblotched rockfish, POP, and widow rockfish going to the atsea sectors.

Amendment 23 was approved in 2010 to incorporate new National Standard 1 guidelines to prevent overfishing. These new National Standard 1 guidelines were developed in response to the Magnuson Stevens Act re-authorization of 2006 which mandated an end to overfishing.

Amendment 24 was approved in February 2015 to describe the use of default harvest control rules in the biennial harvest specifications process and to clarify the descriptions of new and routine management measures that may be implemented during the biennial process. Amendment 24 also designated some species as Ecosystem Component Species and incorporated a variety of technical changes to the FMP.

Amendment 25 was approved in 2015 and added a suite of lower trophic level species to the FMP's list of ecosystem component (EC) species. Consistent with the objectives of the Council's FMPs and its Fishery Ecosystem Plan, Amendment 25 prohibits future development of directed commercial fisheries for the suite of EC species shared between all four FMPs until and unless the Council has had an adequate opportunity to both assess the scientific information relating to any proposed directed fishery and consider potential impacts to existing fisheries, fishing communities, and the greater marine ecosystem.

Amendment 28 modified the configuration of EFH Conservation Areas (EFHCAs) that are closed to groundfish bottom trawl fishing in order to protect EFH, closed waters deeper than 3,500 meters to bottom contact fishing gear, opened the trawl RCA to bottom trawl fishing off Oregon and California, and created a framework to consider and implement more flexible area closures with block area closures.

Amendment 29 designated shortbelly rockfish as an ecosystem component species and removed the formal allocations of lingcod south of 40°10' N lat., petrale sole, widow rockfish, and Minor Slope Rockfish south of 40°10' N lat. from the FMP (PFMC 2020q).

FMP Goals and Objectives

The PFMC Groundfish FMP recognizes the need to balance many competing uses of marine resources and different social and economic goals for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. The FMP recognizes that management must be flexible enough to meet changing social and economic needs of the fishery as well as to address fluctuations in the marine resources supporting the fishery. It establishes three goals in order of priority for managing the west coast groundfish fisheries, to be considered in conjunction with the national standards of the Magnuson-Stevens Act.

Goal 1 - Conservation. Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources.

Goal 2 - Economics. Maximize the value of the groundfish resource as a whole.

Goal 3 - Utilization. Within the constraints of overfished species rebuilding requirements, achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities (PFMC 2020q).

To accomplish these management goals, 17 objectives in categories of conservation, economic, utilization and social factors will be considered and followed as closely as practicable:

Conservation

Objective 1. Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems.

Objective 3. For species or species groups that are overfished, develop a plan to rebuild the stock as soon as possible, taking into account the status and biology of the stock, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock within the marine ecosystem.

Objective 4. Where conservation problems have been identified for non-groundfish species and the best scientific information shows that the to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a non-groundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of non-groundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.

Objective 5. Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.

groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures

Economics

Objective 6. Within the constraints of the conservation goals and objectives of the FMP, attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.

Objective 7. Identify those sectors of the groundfish fishery for which it is beneficial to promote year-round marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.

Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP. Utilization

Objective 9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries.

Objective 10. Recognize the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.

Objective 11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

Social Factors

Objective 12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.

Objective 13. Minimize gear conflicts among resource users.

Objective 14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.

Objective 15. Avoid unnecessary adverse impacts on small entities.

Objective 16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.

Objective 17. Promote the safety of human life at sea.

6.3.2.3 Management Process

The Pacific Coast Groundfish Fishery Management Plan contains the rules for managing the groundfish fishery. It outlines the areas, species, regulations, and methods that the Council and the Federal government must follow to make changes to the fishery. The plan also creates guidelines for the biennial process of setting harvest levels. The three main processes used to regulate groundfish harvests are described below. Since these processes can take up to six months, they may be streamlined for some decisions.

1. Process for controversial or complex issues: This process takes at least three Council meetings. Proposals for management measures can come from the public, participating management agencies, advisory groups or from Council members. If the Council chooses to pursue a proposal, it will ask for other possible solutions to the problem and then directs the Groundfish Management Team (GMT), the National marine Fisheries Service (NMFS), and/or Council staff to prepare the analysis. The Council will make a final decision at the next meeting the item is scheduled.
2. The biennial management process: This process was implemented in 2003 by Amendment 17 to the Groundfish FMP. Under the biennial cycle, eligible management measures are implemented for a two-year period and adjusted through routine actions. Non-eligible management measures within the biennium can be considered for future action by the Council in June of the even years. Overfishing limits (OFLs), acceptable biological catches (ABCs) and annual catch limits (ACLs) are identified for each year in the two-year period. The Council reviews management performance and socioeconomic impacts relative to management objectives in order to consider modifying harvest specifications and management measures in the next biennial management period.
3. After considering Council recommendations and public comments, NMFS publishes the adopted regulations, putting them into effect. NMFS publishes a Federal Register notice and provides a public comment period before finalizing non-routine and annual management decisions (PFMC 2020q).

Pacific whiting are managed annually, with harvest levels set each year under the terms of the U.S.-Canada Pacific Whiting Treaty and the Pacific Whiting Act of 2006, as amended.

Framework Procedures

The FMP establishes three framework procedures through which the Council is able to recommend the adjustment and establishment of specific management measures for the Pacific Coast groundfish fishery:

- 1) *The points of concern framework* allows the Council to develop management measures that respond to resource conservation issues
- 2) *The socio-economic framework* allows the Council to develop management measures in response to social, economic, and ecological issues that affect fishing communities.
- 3) *The habitat conservation framework* allows the Council to modify the number, location and extent of areas closed to bottom trawling in order to protect Essential Fish Habitat (EFH).

Depending on the nature of the action, its impacts on the fishing industry, resource, and environment, the time required to take action under these frameworks will vary (PFMC 2020).

There are four different categories of management actions authorized by the Groundfish FMP, each of which requires a different process.

- 1) *Automatic Actions* – The NMFS Regional Administrator may initiate automatic management actions without prior public notice, opportunity to comment, or a Council meeting. Examples include fishery, season, gear type closures when a quota has been projected to have been attained. A single notice will be published in the Federal Register that makes the action effective.
- 2) *Notice Actions* requiring one Federal Notice, Council meeting or NMFS actions outside of a Council meeting. Notice actions include all management actions other than automatic actions and are intended to have a temporary effect. Examples include inseason management actions defined as routine, such as trip landings, size limits, boat limits, dressing requirements, etc.
- 3) *Management Measures Rulemaking* for actions developed through the three-Council meeting biennial specification process and two Federal Register rules – this process refers to the following decision-making schedule:
 - a. The Council will develop harvest specifications during the first meeting (usually November). They will finish drafting harvest specifications and develop management measures during the second meeting (usually April).
 - b. The Council will analyze and develop proposed management actions over the span of least two Council meetings and provide public advance notice and opportunity to comment on both the proposals and analysis prior to and at the second Council meeting.
 - c. The Council will make final recommendations to the Secretary on the complete harvest specifications and management measures at the third meeting.
- 4) *Full Rulemaking* for actions normally requiring at least two Council meetings and two Federal Register Rules (Regulatory Amendment) – These include any proposed new management measures classified as routine, including those considered highly controversial, or any measure that directly allocates the resource. The full rulemakings will usually use a two-Council-meeting process, although additional meetings may be required. The Secretary publishes a proposed rule in the Federal Register with appropriate time for public comment followed by publication of a final rule in the Federal Register (PFMC 2020q).

5.4 Management Measures and Regulations

Management Measures

The PFMC management measures for Pacific hake include:

- at-sea set asides to accommodate incidental catch of typical non-target species
- 100% monitoring (i.e., observers or electronic monitoring) on MS CVs
- prohibition of discarding for MS CVs,
- 100% monitoring (i.e., observers or electronic monitoring) for SS CVs
- two NMFS-observers on all catcher-processors and mothership processors
- regulations for depth-based closures to control bycatch inseason and/or if Chinook salmon bycatch is running above levels proscribed in the BiOp
- Permits and limited entry to the fishery.
- Certain seasons and areas are closed to fishing

- Gear restrictions and area closures help reduce bycatch and impacts on habitat.
- Annual harvest quotas to regulate the coastwide catch of Pacific whiting (NOAA Fisheries 2022b)

The NMFS West Coast Region maintains a website that provides detailed information about on-going management and research activities related to the hake fishery (NOAA Fisheries 2022a).

Managers divide allowable catch among four sectors of the Pacific hake fishery:

- Non-tribal catcher boats delivering to shore-based processing facilities.
- Non-tribal catcher boats delivering to at-sea mothership processors.
- Non-tribal vessels that both catch and process the catch at sea.
- Tribal catcher boats delivering to either non-tribal shore-based or at-sea mothership processors.

The shore-based trawl fishery, which includes vessels targeting Pacific whiting, is managed under the trawl rationalization catch share program that includes:

- Catch limits based on the population status of each fish stock and divided into shares that are allocated to individual fishermen or groups.
- Provisions that allow fishermen to decide how and when to catch their share.
- Total catch accounting and 100 percent observer coverage.

As described above, in 2011 Amendments 20 and 21 to the Groundfish FMP implemented the rationalization of the Pacific Coast groundfish fishery. The Trawl Rationalization Program (TRat) changed how the sectors in the Pacific hake fishery operated. The mothership sector, in which catcher vessels make at-sea deliveries to motherships for processing, was established as a coop. The catcher-processor sector continued as a coop. Nontribal trawlers making landing onshore fished under a system of individual species quotas by vessel. The Tribal sector managed its allocation using trip limits.

National Standard 1 of the MSA requires that conservation and fisheries management measures prevent overfishing while achieving optimal yield on a continuing basis. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the U.S. fishing industry.

The determination of optimum yield (OY) is a decisional mechanism for resolving the MSA’s multiple purposes and policies, implementing an FMP’s objectives and balancing the various interests that comprise the national welfare. OY is based on MSY or on MSY as it may be reduced by social, economic or ecological factors. OY and the conservation and management measures proposed to achieve it must prevent overfishing (50 CFR 600.310 2016).

In establishing OYs for west coast groundfish, the FMP uses the interim step of calculating overfishing limits (OFLs), acceptable biological catches (ABCs), and annual catch limits (ACLs) for major stocks or management units (groups of species). OFL is the MSY harvest level associated with the current stock abundance. ABC is a threshold below the OFL, which accounts for scientific uncertainty in the estimate of OFL. ACL is a harvest specification set at or below ABC and is intended to prevent overfishing. The ACLs are established to achieve OY in the fishery. The OY for a stock or stock complex is the longterm average of the stock’s ACLs.

Pacific whiting/hake is a transboundary stock managed under an international treaty (the US/Canada Hake Agreement) and is, therefore, managed via a bilateral process independent of the NS1 OY setting process.

For the purpose of setting MSY, OFL, MFMT, MSST, ABC, OY, ACL and rebuilding standards, three categories of species are identified:

- Category 1 species, are the relatively few species for which a “data rich”, quantitative stock assessment can be conducted on the basis of catch-at-age, catch-at-length, or other data. OFLs and overfished/rebuilding thresholds can generally be calculated for these species. ABCs can also be calculated for these species based on the uncertainty of the biomass estimated within an assessment or the variance in biomass estimates between assessments for all species in this category (PFMC 2020q).

- Category 2 species includes a large number of species for which some biological indicators are available, yet status is based on a “data-moderate” quantitative assessment.
- Category 3 species include minor species which are caught, but for which there is, at best, only information on landed biomass. For species in this category, there is limited data to quantitatively determine MSY, OFL, or an overfished threshold. Typically, catch-based methods (e.g., depletion-based stock reduction analysis (DBSRA), depletion-corrected average catch (DCAC), and average catches) are used to determine the OFL for Category 3 species.
- Ecosystem component (EC) species. These species are not “in the fishery” and therefore not actively managed. EC species are not targeted in any fishery and are not generally retained for sale or personal use. EC species are not determined to be subject to overfishing, approaching an overfished condition, or overfished, nor are they likely to become subject to overfishing or overfished in the absence of conservation and management measures.

Measures for regulating the Pacific hake fisheries are found in the Federal Code of Regulations (50 CFR 660.131, at 50 CFR 660 2021b).

Protected Species

Management measures exist for a number of protected species covered under federal legislation. These protections are described in the Groundfish FP, from which the following text is paraphrased (PFMC 2020q).

Endangered Species Act Species

Marine species protected under the ESA that are not otherwise protected under either the Marine Mammal Protection Act (MMPA) or the Migratory Bird Treaty Act (MBTA) include various salmon and sea turtle species. Threatened and endangered Pacific salmon runs are protected by a series of complex regulations affecting marine and terrestrial activities. In the west coast groundfish fisheries, management measures to reduce incidental salmon take have focused on the Pacific whiting fisheries, which have historically encountered more salmon than the non-whiting groundfish fisheries. Salmon bycatch reduction measures include marine protected areas (MPA) where Pacific whiting fishing is prohibited and an at-sea observer program intended to track whiting and incidental species take inseason.

In December 2017 the NMFS completed a new BiOp related to impacts of the Pacific coast groundfish fishery on ESA-listed salmon. The BiOp requires the NMFS to act to avoid exceeding thresholds of Chinook salmon bycatch, including fishery closure. It also requires the NMFS and PFMC to review and develop mechanisms to prevent exceeding Coho salmon thresholds. New implementation measures designed to meet the BiOp requirements were added in 2020. These are described in the “Regulations” section (Waldeck 2020).

Sea turtles are rare in areas where groundfish fisheries are prosecuted and no incidental take of sea turtles has been documented in any directed groundfish fishery. Eulachon sometimes occurs as incidental catch in the groundfish bottom trawl and at-sea whiting fisheries, and mortalities result from encounters with fishing gear. However, eulachon bycatch and bycatch mortality is low (or non-existent) in most years, and is monitored through the at-sea observer program.

Marine Mammal Protection Act Species

Incidental take of marine mammals is addressed under the MMPA and its implementing regulations. Section 118 of the MMPA requires that NMFS place all commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occur in each fishery. To implement this requirement, NMFS publishes a list of U.S. commercial fisheries and categorizes their effects on marine mammals. Directed west coast groundfish fisheries have consistently been categorized as Category III fisheries, meaning that they are “commercial fisheries determined by the [NMFS] Assistant Administrator to have a remote likelihood of, or no known incidental mortality and serious injury of marine mammals.”

Migratory Bird Treaty Act Species

Incidental take of seabirds is addressed under the MBTA and its implementing regulations. The MBTA implements various treaties and conventions between the U.S., Canada, Mexico, Japan, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. The U.S. Fish and Wildlife Service (USFWS) is the Federal agency responsible for management and protection of migratory birds, including seabirds. NMFS is required to consult with the USFWS if FMP actions may affect seabird species listed as endangered or threatened. In February 2001, NMFS adopted the National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries. This National Plan of Action contains guidelines that are applicable to the groundfish fisheries and would require seabird incidental catch mitigation if a significant problem is found to exist.

Shared Ecosystem Component Species

Ecosystem Component Species are FMP species that are not actively managed in the fishery and for which no harvest specifications are specified. Ecosystem component species are not targeted, are not generally retained for sale or personal use, are not subject to overfishing, and are not overfished or approaching an overfished condition. Shared ecosystem component species are those that are shared among all four of the Council's FMPs (PFMC 2020).

Shared EC Species could continue to be taken incidentally without violating Federal regulations, unless regulated or restricted for other purposes, such as with bycatch minimization regulations. The targeting of Shared EC Species is prohibited

It is unlawful to retain any prohibited or protected species unless authorized. Prohibited and protected species must be returned to the sea as soon as practicable with a minimum of injury when caught and brought on board.

In cases of protected species mortality, requirements are in place for handling, reporting and disposition.

Protected Species Handling:

- Whole animals must be labeled with the vessel name, E-fish ticket number, and landing date.
- Whole animals must be kept frozen or iced until transferred or disposal instructions are given.

Reporting requirements:

- All albatross must be reported to the USFWS as soon as possible
- Marine mammals and sea turtles must be reported to NMFS as soon as possible
- Green sturgeon must be reported on the E- fish ticket and to NMFS within 72 hours after the completion of the offload
- Eulachon must be recorded on E-fish ticket
- Remaining seabirds must be reported to catch monitor before disposal

Disposition:

- All Albatross: transfer to USFWS
- Sea turtles: transfer to NMFS
- Green sturgeon: transfer to NMFS
- Marine mammals: instructions given when reported
- No part of a protected species may be retained for personal use
- No part of a protected species may reach commercial markets (Compliance Guide)

An example of protected species regulations may be found in 50 CFR 660. 21 (2019), in which detailed requirements of the Seabird Avoidance Program are listed.

Monitoring, Control and Enforcement

The NMFS Office of Law Enforcement (OLE) partners the U.S. Coast Guard in the monitoring, control and enforcement of fisheries regulations. The OLE protects marine wildlife and habitat by enforcing domestic laws, e.g. Federal Fisheries Regulations for Fisheries within the EEZ and international agreements, e.g. combating Illegal, Unreported, Unregulated (IUU) fishing, in line with the UN agreement to promote Compliance with international Conservation and Management Measures by Fishing Vessels on the High Seas.

The USCG objectives are to prevent encroachment into the US EEZ, ensure compliance with domestic fisheries regulations, ensure compliance with international agreements and high seas fishing regulations. The 11th Coast Guard District covers the California EEZ. The 13th Coast Guard District covers the Oregon and Washington EEZ.

Enforcement coordination between federal and non-federal agencies remains active and effective. Joint Enforcement Agreements (JEA) authorizing state and U.S. territorial marine conservation law enforcement officers to enforce federal laws and regulations remain in place and are fully funded for the next several years. Under the JEA the states provide law enforcement support in support of OLE enforcement priorities.

The state marine conservation law enforcement agencies (California Department of Fish and Wildlife; Oregon Department of Fish and Wildlife; Washington Department of Fish and Wildlife) enforce state enforcement priorities under state funding and authorities. Federal partners like the U.S. Coast Guard, Customs and Border Protection, U.S. Fish and Wildlife Service, and the Environmental Protection Agency also help the OLE identify and investigate incidents at sea, on the borders and in critical habitat (Busch 2021).

Enforcement summaries from the NMFS OLE, USCG, and the state fish and wildlife agencies of California, Oregon and Washington are provided annually to the PFMC (PFMC 2021a; 2021 b; USCG 2021)

The West Coast Groundfish Observer Program (WCGOP) places NMFS-trained observers aboard fishing vessels primarily to monitor catch of target and non-target species, as well as the incidental capture of marine mammals, sea turtles, and seabirds. It is an important component of hake fishery monitoring. The program is the main data gathering program for all biological and fishery data that provide the basis for management and for the US portion of the stock assessment. While observers are not directly part of the enforcement program they are required to report infringements. OLE and USCG officers conduct debriefing interviews with observers, checking on vessels fishing practices and the conduct of the crew (NOAA Fisheries 2022e).

The budget for the OLE West Coast Division has remained relatively stable. There has been a temporary decline in the number of enforcement officers in the past year, but the multi-year process of increasing the number of special agents and enforcement officers is ongoing. The 'staffing snapshot' for the West Coast Division at the start of FY-22 includes 13 Special Agents (several more to be hired); 9 Enforcement Officers (6 more to be hired); 7 Mission Support; 7 Investigative Support and 1 Complaints (Busch 2021).

Enforcement coordination between federal and non-federal agencies remains active and effective. Joint Enforcement Agreements (JEA) authorizing state and U.S. territorial marine conservation law enforcement officers to enforce federal laws and regulations remain in place and are fully funded for the next several years. Under the JEA the states provide law enforcement support in support of OLE enforcement priorities.

The state marine conservation law enforcement agencies (California Department of Fish and Wildlife; Oregon Department of Fish and Wildlife; Washington Department of Fish and Wildlife) and tribal enforcement agencies enforce state and tribal enforcement priorities under state and tribal funding and authorities. Federal partners like the U.S. Coast Guard, Customs and Border Protection, U.S. Fish and Wildlife Service, and the Environmental Protection Agency also help the OLE identify and investigate incidents at sea, on the borders and in critical habitat (Busch 2021).

Mothership and Catcher/Processor Sector Monitoring

Under the trawl rationalization program the Catcher/Processor (C/P) and Mothership (MS) Cooperatives are required to submit an annual report of the prior year's fishery to the PFMC and NMFS. Among the required elements of the reports are two that relate to monitoring and enforcement: 1. a description of the method used by the coop to monitor performance of cooperative vessels that participation the fishery; 2. A description of any actions taken by the coop in response to any vessels that exceed their allowed catch and bycatch (50 CFR 660 2021a).

Monitoring: All coop vessels carry observers to monitor and account for catch of Pacific hake, non-target species and prohibited species. Observers report each vessel's catch on a daily basis to the NMFS OP. In addition, both the C/P and MS coops contract with the third-party Sea State Inc to monitor catch. All coop members provide waivers allowing Sea State access to the NMFS observer data and VMS location data. Sea State uses the data to produce daily reports to coop members and managers. The reports are used to monitor target catch against the sector allocation as well as to identify levels and location

of bycatch by vessel and by fleet. Bycatch data are monitored to identify bycatch “hotspot” areas and ensure that species’ set asides are not exceeded (McQuaw 2021; PWCC 2021).

Response to Vessel Overages: In 2020 no vessels exceeded their allowed catch or bycatch amounts to the extent that overall coop totals exceeded allowable amounts. In-season adjustments may be made to individual vessel allocations as needed; this was the case for both the C/P and MS sectors (McQuaw 2021; PWCC 2021).

The MS Coop agreement includes measures to prevent exceeding allowable levels of catch and bycatch:

- precautionary closures of past bycatch hotspots
- night fishing restrictions
- fleet relocation triggers and fleet to fleet reporting
- required test tows upon relocation to a new fishing area
- in-season “hot spot” closure authority
- seasonal apportionments (pools) of whiting and bycatch allowances
- sanctions against vessels exceeding a bycatch rate within a seasonal pool (McQuaw 2021)

Minimizing incidental catch is also a stated priority for the CP sector cooperative (CP coop). The CP coop uses methods similar to the MS coop to prevent and respond to bycatch of species of concern, for example Chinook salmon. Because the CP coop has a relatively small number of participants (ten vessels and three companies in 2020 (PWCC 2021)), communication among the fleet and fleet managers is fluid and ongoing. Daily catch data reports produced by Sea State provide the necessary information to assess and respond to bycatch events as they arise, for example, by identifying and avoiding hotspot areas (McQuaw 2021; PWCC 2021).

Regulations

Seasons

The primary Pacific hake fishery begins on May 15 (for all tribal and non-tribal sectors) and runs through the end of the calendar year (Waldeck 2022). The shorebased sector also includes an early season for waters off California, to allow vessels in that area to access whiting when it is migrating through waters off California (PFMC 2020q).

Harvest Specifications

The final rule detailing groundfish harvest specifications and management measures for the 2021-2022 biennium was published in December 2020 with the effective date of January 1, 2021 (50 CFR 660 2020a; 2020b; 2020c). The final rule for harvest specifications for the 2021 Pacific whiting fishery and the 2021 Pacific whiting tribal allocation was published in June 2021 (50 CFR 660 2021b).

Sector allocations

Projected total mortalities of Pacific whiting in recreational, research, and non-whiting fisheries are first set aside (these deductions are decided in the annual process for specifying Pacific whiting harvest specifications and management measures based on the best available information at the time of the decision), then a yield amount is set-aside to accommodate tribal whiting fisheries. In some years the whiting set-aside may be increased to accommodate other programs, such as Experimental Fishing Permits (EFPs). The nontribal commercial share of whiting is allocated to LE whiting trawl sectors as follows: 42 percent for the shoreside whiting sector, 24 percent for the at-sea mothership whiting sector, and 34 percent for the at-sea catcher processor whiting sector. No more than five percent of the shoreside whiting sector’s allocation may be taken and retained south of 42° N latitude prior to the start of the shore-based whiting season north of 42° N latitude (in waters off Oregon and Washington) (PFMC 2020q).

Harvest specifications and management measures for 2021-2022 were developed in 2020, with the Final Rule published in December 2020 (PFMC 2020a; 2020d; 50 CFR660 2020b; 2020c).

Reapportionment

Regulations at 50 CFR 660.131 contain provisions that allow the Regional Administrator to reapportion Pacific hake to nontribal sectors from the tribal allocation that will not be harvested by the end of the fishing year. The reapportionment takes place in September if it becomes clear that a portion of the tribal allocation will not be harvested by December 31 of that year. The purpose of the reapportionment is to allow for increased utilization of the resource. The amount to be reapportioned is allocated from the Tribal sector to the Shore-based IFQ Program, C/P Co-op, and MS Co-op in proportion to each sector's original allocation. Reapportioning this amount is expected to allow for greater attainment of the TAC while not limiting tribal harvest opportunities for the remainder of the year. In 2021 it was estimated that 34,645 mt of the tribal allocation would not be used by December 31.

As part of reapportionment, NMFS is required under the 2017 Endangered Species Act (ESA) Section 7(a)(2) biological opinion on the effects of the Pacific Coast Groundfish Fishery Management Plan on listed salmonids to consider the number and bycatch rate of Chinook salmon taken by the Pacific whiting fishery sectors prior to reapportionment. Based on the best available information in early September NMFS is to determine whether there is a risk that the reapportionment would cause the Pacific whiting sector fisheries to exceed the guideline limit of Chinook salmon under current regulations and practices. In 2021, for example, it was determined that by September the incidental take of Chinook salmon by the non-tribal sector was 4 percent of the guideline limit, allowing 34,645 mt to be reapportioned (50 CFR 660.131 2021d).

Closures

Rockfish Conservation Areas, or RCAs, are depth-based closed areas. The RCA boundaries are lines that connect a series of latitude and longitude coordinates and are intended to approximate particular depth contours. RCA boundaries are different depending on what types of fishing gear are being used. RCA boundaries are likely to differ between the northern and southern areas of the coast. RCA boundaries are also likely to change seasonally, and may also be changed during the year through inseason actions. The RCA boundaries are set primarily to minimize incidental catch of overfished rockfish, by eliminating fishing in areas at locations and at times when those overfished species are likely to co-occur with more healthy target stocks of groundfish.

Block Area Closures (BAC) are areas of federal waters that may be closed to groundfish bottom trawl fishing if NMFS determines a sector of the whiting fishery is catching too much salmon then NMFS may implement a sector-specific spatial closure that is more discrete than closing at 200 fathoms coastwide. Areas will be bounded on the north and south by a line of latitude or the EEZ boundary, and on the east and west by boundary lines that approximate depth contours. BACs, when implemented, would have restrictions very similar to those of the trawl RCA. (NOAA Fisheries 2022a; Waldeck 2022).

Bycatch Reduction Area (BRA) at the 200-fm depth contour. The PFMC and NMFS monitor salmon bycatch rates inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector (50 CFR 660 2020d; 2020e; Waldeck 2022)

Essential Fish Habitat Conservation Areas (EFHCA) are habitats that are necessary to the species for spawning, breeding, feeding, or growth to maturity of groundfish species. Boundaries are set by regulation. Some EFH that is especially important ecologically or particularly vulnerable to degradation may be further designated as "habitat areas of particular concern" (HAPC) to provide additional focus for conservation efforts (50 CFR 660.75 through 660.79 2011).

Long-term Bycatch Mitigation Closed Areas (LBMCA) are areas that do not vary seasonally and are not usually modified through inseason or biennial management actions. The location and extent of these areas are described by coordinates published in permanent regulations. As of January 1, 2005, there are five such closures, two of which directly apply to Pacific hake fishery:

- Klamath River Conservation Zone (KRCZ): Established in Federal regulations in 1993 to reduce the bycatch of threatened and endangered salmon stocks taken incidentally in the Pacific whiting fisheries. The KRCZ is closed to trawling for whiting. Its boundaries are defined as the ocean area surrounding the Klamath River mouth, bounded on the north by 41°38.80' N. latitude, on the west by 124°23.00' W. longitude, and on the south by 41°26.63' N. latitude.
- Columbia River Conservation Zone (CRCZ): Established in Federal regulations in 1993 to reduce the bycatch of threatened and endangered salmon stocks taken incidentally in the Pacific whiting fisheries. The CRCA is closed to trawling for whiting. Its boundaries are defined as the ocean area surrounding the Columbia River mouth, bounded by a line extending for six nautical miles due west from North Head along 46°18.00' N. latitude to 124°13.30' W.

longitude, then southerly along a line of 167 true to 46°11.10' N. latitude by 124°11.00' W. longitude, then northeast along Red Buoy Line to the tip of the south jetty (PFMC 2020q; NOAA Fisheries 2022i).

Gear Regulations

Midwater (pelagic) trawl gear is the only allowable gear for vessels participating in the primary whiting season. Specific regulations governing midwater trawl are described in Section 6.2, Fishing Methods.

Catch Shares Program

The Catch Shares Program was implemented in 2011 through Amendments 20 and 21 to the Pacific Coast Groundfish FMP. Amendment 20 established a limited entry IFQ system for shorebased trawl vessels and cooperatives for the at-sea Pacific whiting mothership (MS) and catcher/processor (C/P) sectors; Amendment 21 established fixed allocations for limited entry trawl participants of four species that were overfished at the time: canary rockfish, widow rockfish, darkblotched rockfish and Pacific Ocean perch (POP) (PFMC 2020q).

The Magnuson-Stevens Act requires that all limited access privilege programs such as the Catch Share Program be periodically reviewed beginning five years after implementation (50 CFR 660 2019e)). The PFMC conducted a five-year review in 2016 and approved the final review report in 2017 (PFMC and NMFS 2017).

Acting on issues identified in the review report and on subsequent recommended actions recommended by the ad hoc Community Advisory Board, the PFMC considered several alternatives to meet the management needs of the at-sea sectors in relation to the four rockfish species that were previously overfished but subsequently rebuilt.

Under fixed allocations, if the at-sea MS or C/P catch exceeds the allocation amounts NMFS is required to close the sector. The Council concluded that instead of fixed allocations, the use of set-asides for these four species was the most expeditious and likely most effective management change to help ensure the at-sea sectors were able to optimally attain their annual whiting allocations. Under set-asides, the Council recommends an expected bycatch level for the at-sea Pacific whiting fishery and deducts it before allocating catch to the trawl sector. These set-aside deductions do not require automatic closure of the at-sea Pacific whiting sectors or any other management action if catch exceeds the amount of the set-aside. NMFS retains authority to take inseason action if a species' catch exceeds the set-aside amount at the risk of exceeding the harvest specification, cause unforeseen impact on another fishery, or result in other conservation concerns. (50 CFR 660 2020b) In the shoreside sector, rockfish bycatch is managed via individual fishing quota held by fishery participants (50 CFR 660 2020b; Waldeck 2020).

At the November 2018 PFMC meeting, the Council took final action to move forward with implementation of set-aside management for all four species (PFMC 2018). The proposed rule reflecting this and other changes was published in October 2019 (50 CFR 660 2019d); In December 2019, NMFS published the final rule on the Catch Shares Program follow-on actions with an effective implementation date of January 2020 (50 CFR 660 2019e). The rule includes several elements relevant to the whiting fishery:

1. Set-aside management for non-whiting species in the at-sea whiting sectors (change for management of four constraining rockfish species: canary, widow, darkblotched and Pacific Ocean perch.
2. CP sector ownership limits – the PFMC established a limit on accumulation and control of CP-endorsed trawl limited entry permits (five permits). The limit only comes into effect in the event that the CP cooperative disbands.
3. New requirement for CP companies to submit ownership and control information.
4. Cost recovery – clarified that the cost recovery fee is based on retained catch.

Total Catch Accounting

Total catch accounting has two main components: monitoring landed catch through reports by fish processors (fish tickets) and at-sea observer programs to estimate bycatch.

Combining bycatch information with information on landed catch gives an estimate of total catch. The Council uses total catch information in inseason management to determine the relationship between catch at a given point in time and an ACL/ annual

OY. Management measures within a given year may be adjusted based on total catch information in order to prevent total catch from exceeding ACL/OY levels. Fishery managers also use historic total catch data in stock assessments and to develop future harvest specifications and management measures.

Federal regulations require fishers to sort all species with trip limits, HGs, or ACLs/OYs, including all overfished species. The states also require LE groundfish trawl fishermen to maintain logbooks to record the start and haul locations, time, and duration of trawl tows, as well as the total catch by species market category (i.e., those species and complexes with sorting requirements). Landings are recorded on state fish receiving tickets. Fish tickets are designed by the individual states, but there is an effort to coordinate record-keeping requirements with state and Federal managers through PSMFC.

Landings, logbook data, and state port sampling data are reported inseason to the PacFIN database, which is managed by PSMFC. The GMT and PSMFC manage the Quota Species Monitoring (QSM) data set reported in PacFIN. All landings of groundfish stocks of concern (overfished stocks and stocks below BMSY) and target stocks and stock complexes in west coast fisheries are tracked in QSM reports of landed catch. QSM reports also include bycatch (discard) estimates, allowing them to be used to track total catch. The GMT recommends prescribed landing limits and other inseason management measures to allow Council-managed fisheries to attain, but not exceed, total catch ACLs/OYs of QSM species. Stock and complex landing limits are modified inseason to control total fishing-related mortality; QSM reports and landed catch forecasts are used to control the landed catch component (PFMC 2020q; 202).

Observer Coverage

The Pacific hake fishery has 100 percent at-sea and shoreside monitoring (using a combination of at-sea observers, shorebased catch monitors, and electronic monitoring) and total catch accounting. Vessels participating in the at-sea Pacific whiting fishery have been carrying observers voluntarily since 1991. NMFS made observer coverage mandatory for at-sea processors in July 2004 (50 CFR 660 2004). The Trawl Catch Share Program requires vessels participating in the shore-based IFQ program to have observer coverage *at all times* the vessel is at sea. The West Coast Groundfish Observer Program (WCGOP) places NOAA Fisheries-trained observers aboard fishing vessels. Fisheries observers are deployed under the authority of the Marine Mammal Protection Act, the Endangered Species Act, and the Magnuson-Stevens Fishery and Conservation Management Act primarily to monitor catch of target and non-target species, as well as the incidental capture of marine mammals, sea turtles, and seabirds. Observers also record details on fishing activity, gear configuration, and the catch and disposition of target and non-target fish species. The observers are employed by private third-party companies.

Under the trawl rationalization program the Catcher/Processor (C/P) and Mothership (MS) Cooperatives are required to submit an annual report of the prior year's fishery to the PFMC and NMFS. Among the required elements of the reports are two that relate to monitoring and enforcement: 1. a description of the method used by the coop to monitor performance of cooperative vessels that participation the fishery; 2. A description of any actions taken by the coop in response to any vessels that exceed their allowed catch and bycatch (50 CFR 660 2021a).

All coop vessels carry observers to monitor and account for catch of Pacific hake, non-target species and prohibited species. Observers report each vessel's catch on a daily basis to the NMFS OP. In addition, both the C/P and MS coops contract with the third-party Sea State Inc to monitor catch. All coop members provide waivers allowing Sea State access to the NMFS observer data and VMS location data. Sea State uses the data to produce daily reports to coop members and managers. The reports are used to monitor target catch against the sector allocation as well as to identify levels and location of bycatch by vessel and by fleet. Bycatch data are monitored to identify bycatch "hotspot" areas and ensure that species' set asides are not exceeded (McQuaw 2021; PWCC 2021).

In March 2020 NMFS issued a temporary rule (emergency action) to waive observer coverage requirements in order to address public health concerns relating to COVID-19 (50 CFR 660 2020h; PFMC 2020f). The action was taken "to protect public health, economic security, and food security, and to safeguard the health and safety of fishermen, observers, and other persons involved with such monitoring programs, while safeguarding the ability of fishermen to continue business operations and produce seafood for the Nation." Whereas previously observers had moved from vessel to vessel, the new protocol specified one observer per vessel for a month at a time. The same one-month assignment applied to catch monitors assigned to processing plants. The standard observer sampling protocols remained in place for all sectors of the fishery in 2020 and 2021. The 2020 West Coast Groundfish bottom trawl survey was also cancelled as a COVID precaution (NOAA Fisheries 2020c).

The emergency action also authorized waiving some training or other program requirements to ensure that as many observers were available as possible. National criteria for waiver qualification were issued in July 2020 (NOAA Fisheries 2020a; 2020b; 2020d; PFMC 2020f; 2020g; 2020h; 2020i; 2020k). In September 2020 the emergency rule was extended until March 2021 (50 CFR 660 2020g; 2020h).

On June 17, 2021, NOAA Fisheries provided updated information relative to the national-level criteria for vessels to be waived (released) from at-sea observer or shorebased catch monitor coverage requirements under the authority of the emergency rule originally published on March 24, 2020 and recently extended on March 29, 2021 in light of COVID-19 vaccination efforts (NOAA Fisheries 2021a).

Observer and catch monitor providers have updated their protocols to be consistent with the Center for Disease Control and Prevention (CDC) guidelines for fully vaccinated persons. Vaccination rates of West Coast observers/monitors are nearly 100 percent. Waivers will not be issued if there is an observer/monitor available that has completed a 14-day self-isolation period, or if a fully vaccinated observer/monitor is available (NOAA Fisheries 2021b; 2021d).

Electronic Monitoring

Electronic monitoring is an integrated assortment of electronic components combined with a software operating system. An electronic monitoring system typically includes one or more video cameras, a central processing unit with removable hard drive, and software that can integrate data from other components of a vessel's electronic equipment. The system autonomously logs video and vessel sensor data during the fishing trip without human intervention. When the vessel has completed its fishing operations and returned to port, the video and other data are transferred to a separate computer system for analysis. Video records are typically reviewed by human samplers on shore, but electronic techniques are being developed to automate some of this activity.

NOAA Fisheries began testing electronic monitoring equipment in the 2004 shorebased whiting fishery, in order to determine whether a full-retention program could be adequately monitored by an electronic monitoring system. The FMP authorizes the use of electronic monitoring programs for appropriate sectors of the fishery. Development and implementation of an electronic monitoring program would be done through the full rulemaking process.

In 2019 at the recommendation of the PFMC, NMFS authorized the use of electronic monitoring (EM) in place of human observers to meet requirements for 100-percent at-sea monitoring of catcher vessels in the groundfish trawl ITQ fishery (TRat). In August 2020 NMFS posted a proposed rule that would change the earlier authorization rule to delay implementation of the EM Program for the West Coast Groundfish Trawl Rationalization Program until January 1, 2022. The purpose of the delay is to provide more time for industry and prospective service providers to prepare for implementation and to increase support for participation (50 CFR 660 2020g; 2020h; PFMC 2020n).

Bycatch

Provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) require FMPs to establish a standardized reporting methodology to assess the amount and type of bycatch occurring in a fishery. Regional fishery management councils in coordination with NMFS must conduct a review of their FMPs for consistency with the rule. All FMPs must be consistent with the rule by February 21, 2022. At the November 2020 meeting, the PFMC reviewed each FMP for consistency with the final rule in order to identify any needed FMP amendments (PFMC 2020r).

In the most recent five-year review of the Catch Shares Program the Council considered several alternatives to meet the management needs of the at-sea sectors in relation to rebuilt rockfish species – widow rockfish, canary rockfish, darkblotched rockfish, and POP. The Council concluded that use of set-asides for these four species was the most expeditious and likely most effective management change to help ensure the at-sea sectors were able to optimally attain their annual whiting allocations. At the November 2018 PFMC meeting, the Council took final action to move forward with implementation of set-aside management for all four species. This regulatory change was implemented prior to the 2020 season. In the shoreside sector, rockfish bycatch is managed via individual fishing quota held by fishery participants (Waldeck 2020).

Salmon and Rockfish Bycatch

New salmon bycatch mitigation measures were adopted in the 2019-2020 groundfish specifications to satisfy mandates in the December 2017 ESA Salmon BiOp (NOAA Fisheries 2017a; 50 CFR 660. 2019c). The BiOp requires the NMFS to act to avoid exceeding thresholds of Chinook salmon bycatch, including fishery closure. It also requires the NMFS and PFMC to review and develop mechanisms to prevent exceeding Coho salmon thresholds (Waldeck 2020). Actions adopted by the PFMC include monitoring, review and adaptation of management measures. The following text on these measures is excerpted verbatim from Waldeck (2022), with in-text citations added.

- Automatic for NMFS to (1) close the whiting fishery when it exceeds (or is projected to exceed) 14,500 Chinook or close the non-whiting fishery when it exceeds (or is projected to exceed) 9,000 Chinook; and (2) after (1) happens, the sector that remains open is closed if that sector exceeds (or is projected to exceed) its threshold (that is, 11,000 Chinook for whiting or 5,500 Chinook for non-whiting). The goal is to ensure that the overall 20,000 Chinook threshold is not exceeded by the groundfish fishery.
- A new bycatch reduction area (BRA) at the 200-fm depth contour. Council and NMFS monitor salmon bycatch rates inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector – whiting IFQ fishery, CP sector, MS sector, and non-whiting midwater trawl sector. If 200-fm BRA implemented, vessels would be prohibited from using midwater trawl gear to target either whiting or non-whiting groundfish in waters shoreward of the 200-fm depth contour, but would still be allowed to fish in waters seaward of 200-fm. This action only applies to non-tribal midwater trawl vessels (Waldeck 2022).

In February 2021, NMFS published the final rule for additional measures adopted by the Council (50 CFR 660 2021a). The new measures include items necessary for access to the 3,500 Chinook salmon “reserve,” including fishery cooperative annual Salmon Mitigation Plans (SMP) that may be submitted to NMFS and detail measures used to manage salmon bycatch. The SMP provides a nexus to a NMFS management action (that is, approval of the SMP) that is necessary for a sector to use the Chinook salmon reserve amount (that is, the 3,500 Chinook available above the 11,000 Chinook threshold for the whiting fishery).

Another new measure, Block Area Closures (BACs), may also be used if NMFS determines a sector of the whiting fishery is catching too much salmon then NMFS may implement a sector specific spatial closure that is more discrete than closing at 200 fathoms coastwide (Waldeck 2022).

The MS Coop agreement includes measures to prevent exceeding allowable levels of catch and bycatch:

- precautionary closures of past bycatch hotspots
- night fishing restrictions
- fleet relocation triggers and fleet to fleet reporting
- required test tows upon relocation to a new fishing area
- in-season “hot spot” closure authority
- seasonal apportionments (pools) of whiting and bycatch allowances
- sanctions against vessels exceeding a bycatch rate within a seasonal pool (McQuaw 2021)

The CP Coop also prioritizes minimizing incidental catch, using methods similar to the MS coop to prevent and respond to bycatch of species of concern, for example Chinook salmon. Because the CP coop has a relatively small number of participants (ten vessels and three companies in 2020 (PWCC 2021)), communication among the fleet and fleet managers is fluid and ongoing. Daily catch data reports produced by Sea State provide the necessary information to assess and respond to bycatch events as they arise, for example, by identifying and avoiding hotspot areas (McQuaw 2021; PWCC 2021).

In 2020 the PFMC adopted and NMFS implemented a management measure for rockfish bycatch.

Rockfish Bycatch Management: For the at-sea sectors (CP and MS) canary rockfish, darkblotched rockfish, Pacific ocean perch, and widow rockfish were managed as true set asides (that is, without automatic authority to close fishery if set aside amounts were attained or exceeded). NMFS and the Council have the ability to take in-season action to address conservation concerns if warranted. In the shoreside sector, rockfish bycatch is managed via individual fishing quota held by fishery participants.

For 2021-2022 whiting fisheries set-aside amounts developed by industry in collaboration with the PFMC were implemented by NMFS as part of the specifications and management measures rulemaking. NMFS does not anticipate the need to take action based on performance against whiting fishery set asides. However, NMFS and PFMC maintain the authority to take in-season action if warranted (Waldeck 2022).

Shortbelly Rockfish

Short-belly rockfish is a small highly abundant species that is typically located off Central California but has recently expanded its range to PNW waters. As a result, high-bycatch (“lightning-strike”) tows of shortbelly rockfish have occurred with increasing frequency. The increase in incidental catch (IC) created a management problem because the IC limits had been set by the PFMC based on the pre-expansion stock distribution, and the unexpectedly high bycatch caused the ACL to be exceeded (Waldeck 2022). In 2019 the PFMC considered a range of management measures to address the problem and in 2020 increased the ACL from 500mt to 3,000mt. (PFMC 2019a). In 2020 as part of FMP Amendment 29 the Council classified shortbelly rockfish as an Ecosystem Component (EC) species (50 CFR 660 2020i; 2020j).

The FMP defines an EC species as not “in the fishery:” not targeted, not generally retained for sale or personal use, and not actively managed. EC species are not subject to overfishing, approaching an overfished condition, or overfished, nor are they likely to become subject to overfishing or overfished in the absence of conservation and management measures (PFMC 2020q). Recordkeeping and reporting requirements will be maintained to continue to monitor shortbelly rockfish bycatch (50 CFR 660 2020b).

Cost Recovery

Cost recovery from rationalized fisheries, such as the Pacific hake fishery, is required by the MSA. Section 304(d) of the MSA authorizes and requires the collection of cost recovery fees for limited access privilege programs. Cost recovery fees recover the actual costs directly related to the management, data collection, and enforcement of the programs. Section 304(d) of the MSA mandates that cost recovery fees not exceed 3% of the annual ex-vessel value of fish harvested by a program subject to a cost recovery fee, and that the fee be collected either at the time of landing, filing of a landing report, or sale of such fish during a fishing season or in the last quarter of the calendar year in which the fish is harvested. NOAA Fisheries prepares an annual report on cost recovery in the Trawl Rationalization program, covering current year cost recovery payments and projected fees for the upcoming year (MSA 2007; NOAA Fisheries 2014; 2020f; 2021c; 2022b).

Other Management Issues

Fishing Capacity

The Pacific Coast Groundfish FMP directly addresses capacity reduction in the specific objectives to be followed to accomplish management goals. FMP Objective 2 states that the fishery may “Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems” (PFMC 2020q).

The PFMC has acted to reduce fleet capacity in the groundfish fishery since 1992 when it adopted and NMFS approved Amendment 6 to the Groundfish FMP. Amendment 6 established a license limitation (limited entry) program intended to address overcapitalization by restricting further participation in groundfish trawl, longline, and trap fisheries.

A second major capacity reduction action was taken in 2010 with the Adoption and approval of Amendment 20 to the FMP establishing establishes the groundfish trawl rationalization program. Under this program, groundfish LE trawl vessels making shoreside deliveries are managed with individual fishing quotas. Motherships and associated catcher-vessels in the at-sea Pacific whiting sector are managed under a system of regulated cooperatives. Pacific whiting catcher-processors fish within a voluntary cooperative; the amendment establishes provisions to strengthen this cooperative. The catch shares program implemented by Amendment 20 to the groundfish FMP is in itself a market mechanism to respond to resource limitations through further capacity reductions.

Amendment 21 was approved in 2010 and establishes long-term allocations between the trawl and nontrawl sectors of the groundfish fishery; establishes a short-term allocational split between the shoreside whiting and non-whiting fishery, necessary for implementation of the individual fishing quota (IFQ) program (established through Amendment 20); establishes darkblotched rockfish, Pacific ocean perch and widow rockfish allocations among the at-sea trawl and shoreside trawl sectors (later removed by Amendment 21-4); identifies the need for initial set-asides for the at-sea trawl sectors; and establishes a Pacific halibut bycatch allowance to be provided to the trawl fishery in the form of individual bycatch quota (established through Amendment 20).

Each of the FMP amendments was supported by accompanying research assessing fleet capacity. Routine monitoring and ongoing reporting requirements of fishery sectors ensure regular updating on all fishing operations.

At the federal level, the US National Plan of Action for the Measurement of Fishing Capacity discusses a number of methods for capacity measurement and assessment (NOAA Fisheries 2004). NMFS has published a procedural guide for the review of catch share programs.

The guidance document is reviewed every five years. It also provides guidance on the assessment of fishing capacity subsequent to the implementation of a catch share program (NOAA Fisheries 2017b).

Federal Legislation

The Maritime Security and Fisheries Enforcement Act (S.11269) was signed into law on December 20, 2019 as part of the National Defense Authorization Act. The Act addresses illegal, unreported and unregulated (IUU) fishing, giving federal agencies more tools to protect maritime security, lawful fishing and the global seafood supply chain (PFMC 2020k).

Section 3551 of the Act requires the establishment of an Interagency Working Group to strengthen maritime security and combat IUU fishing. The working group was formed in 2020, comprising twenty-one federal agencies with chair and deputy chair positions rotating among NOAA, the U.S. Department of State, and the U.S. Coast Guard (Maritime SAFE 2020).

In 2020 the working group discussed priority activities, processes for identifying priority regions and priority flag states, engagement with stakeholders, reports to Congress, and working group structure. It also developed a work plan (Maritime SAFE 2020). One of the group's tasks is to implement Section 5 of the Executive Order on Promoting American Seafood Competitiveness and Economic Growth, concerning combating IUU fishing. (E.O. 13921 2020)

PFMC Operations

Financial Disclosures: NMFS took final action to amend regulations addressing disclosure of financial interests by, and voting recusal of, members of regional fishery management councils. The purpose of the change is to ensure transparency with regard to members' financial interests, determine whether financial interests are tied to decisions, and establish regional procedures for issuing recusal determinations (50 CFR 600 2020).

Research

Seabirds and Catcher Processor Trawl Gear

The 2017 USFWS BiOp for non-salmon ESA-listed species includes an Incidental Take Statement mandating a series of Reasonable and Prudent Measures (RPM) to minimize seabird take. RPM2 states: "NMFV shall minimize the risk of short-tailed albatross interacting with trawl cables. Because short-tailed albatross are vulnerable to striking aerial trawl cables, particularly in the catcher-processor fleet."

The terms and conditions associated with RPM2 include conducting research to document the extent of seabird take (specifically short-tailed albatross) associated with trawl gear and implementing measures to minimize the potential for short-tailed albatross interactions with trawl gear (NOAA Fisheries 2017a).

In 2019 research was conducted on seabird bycatch in West Coast at-sea hake fisheries. Project objectives were:

1. Enhance seabird-cable strike data collection
2. Test candidate seabird bycatch mitigation techniques
3. Conduct effective industry outreach and engagement to advance best practices of bycatch prevention in the at-sea hake fleet (Gladics 2019; Gladics et al., 2020).

Research continued in 2020 with three objectives:

1. Document interactions
 - a. Hard strikes
 - b. mortalities
2. Identify higher risk conditions
3. Test mitigation options

Results from the 2020 research conducted under operational fishing conditions are described in Gladics et al. 2021.

In addition to the industry, Oregon Sea Grant, and NMFS cooperative research project (detailed above) there are numerous ongoing research endeavors conducted by NMFS, including:

- Age-1 Hake Index
- Acoustic Data From Hake Industry Vessels
- Acoustic Data in Inclement Weather
- Hake Migration
- Artificial Intelligence / Machine Learning
- 2021 Sairdrones Deployments
- Hake Genetic Stock Structure
- Euphausiid Distribution and Drivers
- Co-occurrence of Euphausiids and Hake
- Euphausiid Dynamics in Canadian Waters
- Pacific Hake Diet Research
- Multispecies Ecosystem Modeling

5.5 Economic Value of the Fishery

In 2020, commercial landings of Pacific whiting totaled 546 million pounds and were valued at \$36.8 million, according to the NOAA Fisheries commercial fishing landings database (NOAA Fisheries 2022a).

6. Assessment Process

This Assessment constitutes an evaluation of the applicant fisheries' management systems against the conformance criteria outlined in the Alaska Responsible Fisheries Management Certification Program Fisheries Standard Version 2.0.

6.1 Scoring

Each clause of the Alaska RFM Fishery Standard is scored based on defined process which Certification Bodies are required to follow. The process is described in brief below and is also outlined in detail in the relevant scheme documents (See [Details of Applicable Alaska RFM Documents](#) for further details).

Evaluation Parameters

Evaluation Parameters (described below), which effectively break down each clause using defined performance related parameters, form the basis of scoring.

Process Evaluation Parameter

Requires that evidence is provided outlining the process or system used by a fishery management organization to implement or maintain key aspects of fishery management practices, such as systems for data collection, laws and

regulations, stock assessments, and enforcement. If evidence on the current process/system of a given process-based requirement is scarce or non-existent, then this Evaluation Parameter is not satisfied.

Current Status/Appropriateness/Effectiveness Evaluation Parameter

Requires that the current status, appropriateness, or effectiveness of an element of fisheries management practices (depending on which one of these attributes is most relevant to a given clause) is demonstrated, such as data collected, results of stock assessment including stock status, and enforcement data. If evidence on the current status, appropriateness, or effectiveness of a given output-based requirement is scarce or non-existent, then this Evaluation Parameter is not satisfied.

Evidence Basis EP

Requires that the availability, quality, or adequacy of the evidence that is the base for scoring a given clause is assessed. If evidence availability (such as studies, reports, other data, and regulations) is scarce, low quality or non-existent, then this Evaluation Parameter is not satisfied.

Numerical Scoring based on Evaluation Parameters

Confidence Ratings and Conformance Levels for each Clause are determined based on the following process:

1. Numerical scoring is effectively a reverse process with each applicable Clause starting out the maximum possible overall score of 10.
2. The Assessment Team is then required to subtract 3 from that total for each Evaluation Parameter not met to reach an overall numerical score for that Clause
3. The Clause is then assigned both a Confidence Rating and an overall Conformance Level based on its overall numerical score as follows:

Overall Score	Confidence Rating	Conformance Level
10	High	Full Conformance
7	Medium	Minor Non-conformance
4	Medium	Major Non-conformance
1	Low	Critical Non-conformance

Confidence Ratings and Non-conformances

Based on the numerical scoring process described above, clauses of the fisheries standards are assigned Confidence Ratings and Conformance Levels—these are intended to reflect the below descriptions.

- **Critical Non-Conformance – Low Confidence Rating**
Information/evidence is completely absent or contradictory to demonstrate conformance to a clause. Absence of information/evidence results in a low confidence rating. In these cases, a critical non-conformance is assigned.
- **Major Non-Conformance – Medium Confidence Rating**
Information/evidence to demonstrate conformance to a clause is limited. In these cases, a major improvement is needed to achieve full conformance. A medium confidence rating with a major non-conformance is assigned.
- **Minor Non-Conformance – Medium Confidence Rating**
Information/evidence is broadly available to demonstrate conformance to a clause although there are limited gaps in information that, if available, could clarify aspects of conformance and allow the assessment team to assign a high confidence rating. In these cases, a minor improvement is needed to achieve full conformance. A medium confidence rating with a minor non-conformance is assigned.
- **Full Conformance – High Confidence Rating**
Sufficient information/evidence is available to demonstrate full conformance to a clause. In these cases, a high confidence rating is assigned. Sufficient evidence is that which allows objective determination by the assessment team that a fishery fully complies with a given clause in the Alaska RFM Fishery Standard.

Where a non-conformance (regardless of type) is assigned, the assessment team requests further information/clarification from the Client to confirm the non-conformance. The non-conformance is then re-considered in light of any further evidence provided; this may result in a non-conformance being upgraded, downgraded or closed.

Overall Assessment Scoring

Alaska RFM Fishery Standard clauses are categorized into four sections:

- A. The Fishery Management System
- B. Science and Stock Assessment Activities, and the Precautionary Approach
- C. Management Measures, Implementation, Monitoring and Control
- D. Serious Impacts of the Fishery on the Ecosystem

Any more than one (1) major non-conformance or three (3) minor non-conformances assigned to any Section will result in the assignment of a critical non-conformance at section level.

A critical non-conformance for any clause or section stops the assessment, unless/until the Client is able to provide additional information/evidence that demonstrates a higher level of conformity.

6.2 Consultation Meetings

The assessment process as defined in the RFM Procedure 2 was followed in this audit. The original plan was to hold the site visit in Seattle, but because of the timing of the rise of the omicron wave of COVID-19, all meetings were held remotely.

Information supplied by the clients and management agencies was reviewed by the assessment team ahead of the remote meeting, and discussions with the clients and management agencies centered on the content within the provided documentation. In cases where relevant documentation was not provided in advance of the meeting, it was requested by the assessment team and subsequently supplied during, or shortly after the meeting.

Thirty days prior to the audit site visit, all identified stakeholders were informed of the visit and the opportunity to provide information to the auditors in advance of, or during, the site visit. The site visit was conducted remotely via the Zoom meeting platform, with meetings held on January 12, 13 and 14, 2022. This audit site visit was carried out in conjunction with the audit for this fishery against the Marine Stewardship Council (MSC) standards, therefore meeting attendees include those that were involved in only that part of the process as well. This is indicated in the “affiliation” column.

The following participants were in attendance:

Name	Affiliation
Amanda Stern-Pirlot	MRAG Americas assessment team member
Giuseppe Scarcella	MRAG Americas assessment team member
Max Stocker	MRAG Americas MSC assessment team member
Susan Hanna	MRAG Americas assessment team member
Michealene Corlett	MRAG Americas assessment team support
Aaron Berger	NMFS/NWFSC
Averill Lamont	DFO Groundfish Management
Amanda Gladics	Oregon State University/OR Sea Grant
Ann Bussell	DFO Groundfish Enforcement
Bruce Turriss	Client group, Canada (MSC portion)
Dan Waldeck	Pacific Whiting Conservation Cooperative (Client group, US)
Dierdre Finn	DFO Groundfish Management (MSC portion)
Frank Lockhart	NMFS West Coast Region
Greg Busch	NOAA Fisheries Office of Law Enforcement
Jim Hastie	NMFS/NWFSC
Jon McVeigh	NMFS/NWFSC
Katie Pierson	Oregon Department of Fish and Wildlife/PFMC groundfish management team
Keeley Kent	NMFS West Coast Region
Kristin Marshall	NMFS/NWFSC
Mike Luchino	Trident Seafoods (Client group, US)
Shannon Mann	Association of Pacific Hake Fishermen (Client group, Canada; MSC portion)
Stacey Miller	NMFS West Coast Region
Susan Ranck	ANAB Accreditation Officer
Todd Phillips	Pacific Fishery Management Council
Trent Hartill	American Seafoods Company (Client group member, US)
Trevor Ruele	DFO Groundfish Enforcement (MSC portion)
Vanessa Tuttle	NMFS/NWFSC
Whitney Roberts	Washington Department of Fish and Wildlife/PFMC groundfish management team
Yelena Nowak	Director of Oregon Trawl Commission (Client group)

The site visit was held remotely via videoconference according to the agenda shown below. Unless otherwise stated, “Assessment Team” comprises Amanda Stern-Pirlot, Susan Hanna, Giuseppe Scarcella and Michealene Corlett.

US Pacific whiting RFM assessment remote site-visit agenda.

Date and Time	Topic	Attendees
12 Jan 2022 9:00AM	Opening Meeting for the RFM assessment and industry interviews	PWCC (including a fishing company person if possible, and Yelena or someone representing shoreside) RFM Assessment Team (Amanda, Susan and Giuseppe) ANAB Accreditation officer
10AM-11AM	NMFS West Coast Region	Frank Lockhart (JMC) Keeley Kent Greg Busch MSC and RFM Assessment teams ANAB Accreditation officer

12 Jan 2022 11:00am	Break	
12pm-1pm	PFMC including management teams	Todd Philips Katie Pierson (ODFW) Whitney Roberts (WDFW) MSC and RFM Assessment teams ANAB Accreditation officer
12 Jan 2022 2pm-4pm	NMFS NWFSC and ASHOP	Jim Hastie (SRG) Aaron Berger (JTC) Kristin Marshall (MSE) Vanessa Tuttle (ASHOP) Jon McVeigh (WCGOP) MSC and RFM Assessment team ANAB Accreditation officer
4pm	Amanda Gladics OSU/OR Sea Grant	Amanda Gladics MSC and RFM Assessment teams ANAB Accreditation officer
5pm	End Day 1	
13 Jan 2022 9:00	RFM Team Meeting	RFM Assessment Team ANAB Accreditation Officer
11:30 AM	RFM Closing Meeting	PWCC, RFM Assessment Team, ANAB Accreditation Officer

7. Summary of Assessment Outcomes

7.1 Assessment Outcomes by Clause

Table 16 below presents Confidence Ratings and Conformance Levels for each applicable Clause resulting from this Assessment. Note supporting evidence specific to each Clause is outlined in section 9 AKRFM 2.1 Standard A-D key points. Section 13 is not applicable to this fishery because it is not enhanced.

Table 16. Confidence ratings and conformance levels for each clause of the RFM Standard. . Note Section 13 applies only when fisheries enhancement is utilized, which is not the case for the present fishery.

Section	Fundamental Clause	Supporting Clause	Applicable?	Numerical score	Confidence Rating	Conformance Level	NC No.	
Topics that will trigger immediate assessment failure			Yes	n/a	High	Full		
A	The Fisheries Management System	1	1.1	Yes	10	High	Full	
			1.2	Yes	10	High	Full	
			1.2.1	Yes	10	High	Full	
			1.3	Yes	10	High	Full	
			1.3.1	Yes	10	High	Full	
			1.4	No				
			1.4.1	Yes	10	High	Full	
			1.5	Yes	10	High	Full	
			1.6	Yes	10	High	Full	
			1.6.1	No				
			1.7	Yes	10	High	Full	
			1.8	Yes	10	High	Full	
			1.9	No				
			2.1	Yes	10	High	Full	
		2.1.1	Yes	10	High	Full		
2.1.2	Yes	10	High	Full				
2.2	Yes	10	High	Full				

		2	2.3	Yes	10	High	Full	
			2.4	Yes	10	High	Full	
			2.5	Yes	10	High	Full	
			2.6	Yes	10	High	Full	
			2.7	Yes	10	High	Full	
		3	3.1	Yes	10	High	Full	
			3.1.1	Yes	10	High	Full	
			3.1.2	Yes	10	High	Full	
			3.1.3	Yes	10	High	Full	
			3.2	Yes	10	High	Full	
			3.2.1	Yes	10	High	Full	
			3.2.2	Yes	10	High	Full	
			3.2.3	Yes	10	High	Full	
			3.2.4	Yes	10	High	Full	
		B	Science, Stock Assessment Activities and the Precautionary Approach	4	4.1	Yes	10	High	Full
4.1.1	Yes				10	High	Full	
4.1.2	Yes				10	High	Full	
4.2	Yes				10	High	Full	
4.2.1	Yes				10	High	Full	
4.3	Yes				10	High	Full	
4.4	Yes				10	High	Full	
4.5	Yes	10	High	Full				

Section		Fundamental Clause	Supporting Clause	Applicable?	Numerical score	Confidence Rating	Conformance Level	NC No.		
			4.6	Yes	10	High	Full			
			4.7	Yes	10	High	Full			
			4.8	Yes	10	High	Full			
			4.9	No						
			4.10	No						
			4.11	No						
			5	5.1	Yes	10	High	Full		
				5.1.1	Yes	10	High	Full		
				5.1.2	Yes	10	High	Full		
				5.2	Yes	10	High	Full		
				5.3	Yes	10	High	Full		
		5.4		Yes	10	High	Full			
		6	6.1	Yes	10	High	Full			
			6.2	Yes	10	High	Full			
			6.3	Yes	10	High	Full			
			6.4	Yes	10	High	Full			
			6.5	Yes	10	High	Full			
		7	7.1	Yes	10	High	Full			
			7.1.1	Yes	10	High	Full			
			7.1.2	Yes	10	High	Full			
			7.2	No						
		C	Management measures, implementation, monitoring, and control	8	8.1	Yes	10	High	Full	
					8.1.1	Yes	10	High	Full	
					8.1.2	Yes	10	High	Full	
					8.2	Yes	10	High	Full	
					8.3	Yes	10	High	Full	
					8.4	Yes	10	High	Full	
					8.4.1	Yes	10	High	Full	
					8.5	Yes	10	High	Full	
					8.5.1	Yes	10	High	Full	
					8.6	Yes	10	High	Full	
					8.7	Yes	10	High	Full	
					8.8	Yes	10	High	Full	
8.9	Yes				10	High	Full			
8.10	Yes				10	High	Full			
8.11	Yes				10	High	Full			
8.12	Yes				10	High	Full			
8.13	No									
9	9.1			Yes	10	High	Full			
	9.2			Yes	10	High	Full			
	9.3			Yes	10	High	Full			
10	10.1			Yes	10	High	Full			
	10.2			Yes	10	High	Full			
	10.3			No						
	10.3.1			No						
				10.4	No					

Section		Fundamental Clause	Supporting Clause	Applicable?	Numerical score	Confidence Rating	Conformance Level	NC No.
D	Serious Impacts of the Fishery on the Ecosystem		10.4.1	No				
		11	11.1	Yes	10	High	Full	
			11.2	Yes	10	High	Full	
			11.3	Yes	10	High	Full	
			11.4	Yes	10	High	Full	
		12	12.1	Yes	10	High	Full	
			12.2	Yes	10	High	Full	
			12.2.1	Yes	10	High	Full	
			12.2.2	Yes	10	High	Full	
			12.2.3	Yes	10	High	Full	
			12.2.4	Yes	10	High	Full	
			12.2.5	Yes	10	High	Full	
			12.2.6	Yes	10	High	Full	
			12.2.7	Yes	10	High	Full	
			12.2.8	Yes	10	High	Full	
			12.2.9	Yes	10	High	Full	
			12.2.10	Yes	10	High	Full	
			12.2.11	Yes	10	High	Full	
			12.3	Yes	10	High	Full	
			12.4	Yes	10	High	Full	
12.5	Yes		10	High	Full			
12.6	Yes	10	High	Full				
12.7	Yes	10	High	Full				
13	All	No	Section 13 is not applicable to the Pacific whiting fishery, as fisheries enhancement is not utilized					

7.2 Certification Recommendation

Following this Assessment, the Assessment Team recommends that the applicant fishery:

- **US Pacific Hake/Whiting Midwater Trawl Fishery**

be awarded certification against the RFM Certification Program Fisheries Standard v2.01.

7.3 Certification Determination

Following peer- and public-review, the MRAG Certification Committee has determined that this fishery meets the RFM Fishery Standard, and shall be certified.

8. Assessment Outcomes

8.1 Topics that will trigger immediate assessment failure

According to the Alaska RFM Standard Version 2.0, the following fisheries management issues will cause a fishery to immediately fail assessment:

- Dynamiting, poisoning, and other comparable destructive fishing practices.
- Significant illegal, unreported, and unregulated (IUU) fishing activities in the country jurisdiction.
- Shark finning (i.e., removal and retention of shark fins while the remainder of the shark is discarded in the ocean).
- Slavery and slave labor on board fishing vessels.
- Any significant lack of compliance with the requirements of an international fisheries agreement to which the U.S. is signatory. A fishery will have to be formally cited by the International Governing body that has competence with the international Treaty in question, and that the US has been notified of that citation of non-compliance.

The Assessment Team has, as part of this Assessment, carried out a review of the available evidence with respect to these issues. The results of this review are presented below.

Topics that will trigger immediate assessment failure.						
Dynamiting, poisoning, and other comparable destructive fishing practices.						
Confidence that this is <u>NOT</u> occurring:	Low	<input type="checkbox"/>	Medium	<input type="checkbox"/>	High	
EVIDENCE:	There is no evidence of such methods being employed in the fishery under assessment.					
Significant illegal, unreported, and unregulated (IUU) fishing activities in the country jurisdiction.						
Confidence that this is <u>NOT</u> occurring:	Low	<input type="checkbox"/>	Medium	<input type="checkbox"/>	High	
EVIDENCE:	There is no evidence of significant (or otherwise) illegal, unreported, and unregulated (IUU) fishing activities within State and Federal jurisdictions of the US West Coast.					
Shark finning.						
Confidence that this is <u>NOT</u> occurring:	Low	<input type="checkbox"/>	Medium	<input type="checkbox"/>	High	
EVIDENCE:	There is no evidence of shark finning in the fishery under assessment and such a practice is highly unlikely given the small quantities of shark bycatch.					
Slavery and slave labor on board fishing vessels.						
Confidence that this is <u>NOT</u> occurring:	Low	<input type="checkbox"/>	Medium	<input type="checkbox"/>	High	
EVIDENCE:	There is no evidence of incidences of successful prosecutions of entities involved in the fishery under assessment for slavery and/or slave labor offences.					
Significant lack of compliance with the requirements of an international fisheries agreement.						
Confidence that this is <u>NOT</u> occurring:	Low	<input type="checkbox"/>	Medium	<input type="checkbox"/>	High	
EVIDENCE:	The fishery under assessment is managed under an international agreement between the US and Canada (the Pacific Hake Treaty). There is no evidence of lack of compliance with this agreement.					

8.2 Section A: The Fisheries Management System

Fundamental Clause 1. Structured and legally mandated management system

There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.

Supporting Clause 1.1.

1.1. There shall be an effective legal and administrative framework established at international, State and local levels appropriate for fishery resource conservation and management. The management system and the fishery operate in compliance with the requirements of international, State, and local laws and regulations, including the requirements of any regional and/or international fisheries management agreement.

Relevance: Relevant.

Evaluation Parameters	Met?
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<p>Process: <i>Management agencies are physically and legally established at international, State and local levels.</i></p>	✓
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EVIDENCE:

Pacific hake is a transboundary stock managed through the Pacific Hake/Whiting Treaty, formally named the Agreement Between the Government of the United States of America and the Government of Canada on Pacific Hake/Whiting of 2003. Under the agreement an annual TAC is established with fixed shares of the TAC allocated to each of the Parties: United States 73.88%; Canada 26.12% (NOAA 2021b).

Once the TAC is established, the US hake fishery is managed under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act or MSA). The MSA is the primary law governing marine fisheries management in US federal waters, setting ten National Standards (NS) for fishery conservation and management (MSA 2007). The MSA is implemented by the National Marine Fisheries Service (NMFS), one of six line offices of the National Oceanic and Atmospheric Administration (NOAA), within the US Department of Commerce. NMFS is also referenced as NOAA Fisheries.

The management structure process for Pacific hake have been in place since 1977 and are well- established and transparent. Management is conducted through the Pacific Fishery Management Council (PFMC, or Council), one of eight regional councils established by the MSA to manage fisheries within the US EEZ. The PFMC develops fishery management plans (FMPs) and plan amendments for fisheries under its authority (the US EEZ off California, Oregon and Washington, plus Idaho) which are submitted to the Secretary of Commerce for approval. The PFMC typically meets five times per year in various locations throughout its region.

The PFMC has fourteen voting members, consisting of four state fishery agency directors, the regional administrator of NMFS (NW or SW Region, depending on the issue under consideration), 4 state obligatory appointments, four at-large appointments, and one tribal appointment representing Federally recognized fishing rights from California, Oregon, Washington, or Idaho (PFMC 2022b; 2022d). The state obligatory and at-large appointments are made by the Secretary of Commerce based on nominations from the governors of the four member states for terms of three years, with a maximum of three terms. The tribal appointment is made by the Secretary of Commerce in consultation with the Secretary of the Interior and tribal governments based on a list of nominees submitted by the tribal governments, with representation to be rotated among the treaty tribes (MSA 2007). Under the MSRA, each council must

reflect the expertise and interests of its constituent States, with membership that is knowledgeable about conservation, management, commercial or recreational harvest, of the fishery resources within the council area. The Secretary of Commerce is charged with ensuring each council has membership that fairly represents the commercial and recreational fisheries under that Council’s jurisdiction. Each year the Secretary submits a report on council membership to the Senate Committee on Commerce, Science, and Transportation that list the fisheries under the jurisdiction of each Council and their characteristics, assesses council membership in terms of the apportionment of the active participants in each council’s fisheries, and states a plan and schedule for actions to achieve a fair and balanced apportionment on each council (MSA 2007).

The Pacific hake fishery is conducted in a manner consistent with provisions of the U.N. Convention of the Law of the Sea (UNCLOS) (United Nations 1982), the Agreement for the Implementation of the Provisions of the United Nations Convention on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (United Nations 2001), and the U.N. FAO Code of Conduct for Responsible Fisheries (United Nations 1995).

Current status:
The output of the management organization(s) is in line with fishery resource management needs. Examples may include rule making, scientific research, stock and ecosystem assessments, implementation of rules and regulations, and enforcement activities.

EVIDENCE:

The JMC holds an annual meeting in conjunction with the AP, the most recent being by Webinar March 1-3, 2022. The purpose of the annual meeting is to review advice from the stock assessment, JTC and SRG and recommend for approval of the Parties the overall total allowable catch (TAC) for the year. The Canadian and U.S scientists of the JTC meet in December to prepare for the next year’s stock assessment by reviewing the integrated acoustic and trawl survey data and fishery landings data; the most recent meeting was held remotely December 15, 2021 (NOAA 2021b; SRG 2020a; 2021; 2022).

The SRG meets in February to review the draft Pacific hake/whiting stock assessment, the most recent being held virtually February 14-17, 2022 (SRG 2022). In addition to reviewing the draft stock assessment document prepared by the Canada/U.S.A. Joint Technical Committee (JTC), the SRG also reviewed the 2021 coastwide acoustic survey conducted by the U.S. and Canada, the Management Strategy Evaluation (MSE) of Pacific hake, research on ecosystem drivers of recruitment and acoustic trawl survey research (SRG 2022).

The remote meeting format imposed by Covid-19 protocols in 2020 and 2021 contributed to difficulties in bilateral negotiations within the JMC and in a departure from normal process, the JMC was unable to agree on a coastwide TAC in those years. The JMC did agree on coastwide mortality but because of different utilization rates in each country were unable to reach an agreement on TAC (Turris 2022). Accordingly, the Canada and US TACs were set independently, each based on the joint stock assessment. The rest of the Treaty management system functioned as usual during those two years: scientific research and stock assessments were produced by the JTC and reviewed by the SRG; stakeholder input was received from the AP; work on the ongoing Management Strategy Evaluation (MSE) was maintained (Grandin et al. 2020; Johnson et al. 2021; SRG 2020a; 2021; Marshall 2020a; 2020b. Marshall et al. 2020b).

The Agreement does not specify a procedure for when the JMC does not agree on a coastwide TAC. However, the Pacific Whiting Act of 2006 anticipated the possibility that a joint agreement on a coastwide TAC might not take place in any given year. Section 7006(c) of the Act outlines the procedure to be followed under that contingency that maintains reliance on and participation in the Treaty structure (Pacific Whiting Act 2006).

In 2020 and 2021 The US used the contingent protocol outlined in the Pacific Whiting Act to set its TAC. Canada followed its normal TAC-setting process as authorized by the Fisheries Act to set its TAC. Both countries set their 2021 TACs at levels that would stay within their share of the coastwide mortality agreed to at the 2021 JMC meeting. In 2021 the US caught 73% of its quota; Canada caught 54.6% of its quota. The treaty committee process continued to function as usual, albeit remotely, during 2020 and 2021, adhering to the joint management goals for the fishery (Turris 2022; Waldeck 2022; Edwards et al. 2022).

In 2022 the JMC agreed to an adjusted coastwide TAC of 545,000 mt (50 CFR 660 2022).

The PFMC annually prepares and submits to the Secretary of Commerce for approval, fishery management plans (FMP) and any necessary amendments for each fishery under its authority that requires conservation and management actions. The PFMC manages Pacific hake as a component of the Pacific Coast Groundfish Fishery Management Plan (FMP), which was approved by the U.S. Secretary of Commerce (Secretary) on January 4, 1982, and implemented on October 5, 1982. Since implementation the FMP has been amended 29 times in response to changes in the fishery, reauthorizations of the Magnuson-Stevens Act, and litigation that invalidated provisions incorporated by earlier amendments. Amendment 20, approved in 2010, established the groundfish trawl rationalization program. Under this program, groundfish limited entry (LE) trawl vessels making shoreside deliveries are managed with individual fishing quotas. Motherships and associated catcher-vessels in the at-sea Pacific whiting sector are managed under a system of regulated cooperatives. Pacific whiting catcher-processors fish within a voluntary cooperative; the amendment establishes provisions to strengthen this cooperative.

Working with the TAC developed through the Treaty process, the Council develops biennial recommendations for the specification of the overfishing limit (OFL), acceptable biological catch (ABC) and annual catch limit (ACL). During this process, which takes place over three meetings, the Council may recommend establishment of an annual catch target (ACT), harvest guideline (HG) and/or quotas for species or species groups within an ACL. Depending on stock assessment availability and fishery management interactions with Canada, the Council may also develop recommendations for the specification of the Pacific hake ABC/OY and quotas in a separate, annual process governed by the Pacific whiting treaty (PFMC 2020q).

The PFMC recommends regulations to govern the directed hake fisheries in the West Coast EEZ. These include:

- at-sea set asides to accommodate incidental catch of typical non-target species
- 100% monitoring (i.e., observers or electronic monitoring) on MS CVs
- prohibition of discarding for MS CVs,
- 100% monitoring (i.e., observers or electronic monitoring) for SS CVs
- two NMFS-observers on all catcher-processors and mothership processors
- regulations for depth-based closures to control bycatch inseason and/or if Chinook salmon bycatch is running above levels proscribed in the BiOp
- Permits and limited entry to the fishery.
- Certain seasons and areas are closed to fishing
- Gear restrictions and area closures help reduce bycatch and impacts on habitat.
- Annual harvest quotas to regulate the coastwide catch of Pacific whiting (NOAA Fisheries 2022b)

The NMFS West Coast Region maintains a website that provides detailed information about on-going management and research activities related to the hake fishery (NOAA Fisheries 2022a).

NMFS is charged with carrying out the federal mandates of the U.S. Department of Commerce with regard to commercial fisheries such as approving and implementing FMPs and FMP amendments recommended by the PFMC. The NMFS West Coast Regional Office oversees fisheries in federal waters (3-200 nautical miles – nm).

The NMFS Office of Law Enforcement (OLE) partners the U.S. Coast Guard in the monitoring, control and enforcement of fisheries regulations. The OLE protects marine wildlife and habitat by enforcing domestic laws, e.g. Federal Fisheries Regulations for Fisheries within the EEZ and international agreements, e.g. combating Illegal, Unreported, Unregulated (IUU) fishing, in line with the UN agreement to promote Compliance with international Conservation and Management Measures by Fishing Vessels on the High Seas.

The USCG objectives are to prevent encroachment into the US EEZ, ensure compliance with domestic fisheries regulations, ensure compliance with international agreements and high seas fishing regulations. The 11th Coast Guard District covers the California EEZ. The 13th Coast Guard District covers the Oregon and Washington EEZ.

Enforcement coordination between federal and non-federal agencies remains active and effective. Joint Enforcement Agreements (JEA) authorizing state and U.S. territorial marine conservation law enforcement officers to enforce federal laws and regulations remain in place and are fully funded for the next several years. Under the JEA the states provide law enforcement support in support of OLE enforcement priorities.

The state marine conservation law enforcement agencies (California Department of Fish and Wildlife; Oregon Department of Fish and Wildlife; Washington Department of Fish and Wildlife) enforce state enforcement priorities under state funding and authorities. Federal partners like the U.S. Coast Guard, Customs and Border Protection, U.S. Fish and Wildlife Service, and the Environmental Protection Agency also help the OLE identify and investigate incidents at sea, on the borders and in critical habitat (Busch 2021).

Enforcement summaries from the NMFS OLE, USCG, and the state fish and wildlife agencies of California, Oregon and Washington are provided annually to the PFMC (PFMC 2021a; 2021 b; USCG 2021)

The West Coast Region Observer Program (WCROP) places NMFS-trained observers aboard fishing vessels primarily to monitor the incidental capture of marine mammals, sea turtles, and seabirds and is an important component of hake fishery monitoring. The program is the main data gathering program for all biological and fishery data that provide the basis for management and for the US portion of the stock assessment. While observers are not directly part of the enforcement program they are required to report infringements. OLE and USCG officers conduct de-briefing interviews with observers, checking on vessels fishing practices and the conduct of the crew (NOAA Fisheries 2022e).

US scientists sit on the Pacific Whiting Treaty Joint Technical Committee (JTC) and working with Canadian counterparts author an annual stock assessment to inform the harvest management decisions of the Joint Management Committee (JMC), including scientific advice on the annual potential yield of the offshore whiting resource that may be caught for that fishing year (NOAA Fisheries 2021b). US scientists also share membership with Canadian scientists in the Scientific Review Group (SRG) which provides independent peer review of the JTC's work.

Working with scientists from Department of Fisheries and Oceans Canada (DFO) the NMFS has a well-established institutional framework for research and stock assessment developed within the Northwest Fishery Science Center (NMFSC). The joint U.S. and Canadian integrated acoustic and trawl survey has been the primary fishery-independent tool used to assess the distribution, abundance and biology of coastal Pacific hake. (Edwards et al. 2022).

Supporting Clause 1.2.

1.2.	Management measures shall consider (1) stock status (i.e., overfished, biomass) and genetic diversity (stock structure) over its entire area of distribution, and (2) other biological characteristics of the fish stock (stock) including age of maturity and reproductive potential.
Relevance:	Relevant
Evaluation Parameters	
<p>Current status/Appropriateness: <i>If a stock is subject to two or more jurisdictions (nations, states, etc.) (either by distribution or migration), then exploitation by all jurisdictions shall be considered when defining exploitation levels and determining stock status to avoid overfishing/depletion of the resource. The scoring of this parameter shall consider that significant migration may take a species outside the jurisdiction of the managing agency (e.g., for significant feeding or ontogenetic migration).</i></p>	<p>Met?</p> <p style="text-align: center;">✓</p>
<p>EVIDENCE:</p> <p>Pacific hake is a semi-pelagic schooling species distributed from 25° North to 55° North along the west coast of North America. The coastal stock of Pacific hake is currently the most abundant groundfish species in the California Current system . The coastal stock of Pacific hake is migratory and inhabits the continental slope and shelf within the California current system from Baja California to Southeast Alaska The joint U.S. and Canadian integrated acoustic and trawl survey has been the primary fishery-independent tool used to assess the distribution, abundance and biology of coastal Pacific hake. (Edwards et al. 2022)</p> <p>Under the Treaty, Pacific hake stock assessments are to be prepared by the Joint Technical Committee (JTC) comprised of both U.S. and Canadian scientists and reviewed by the Scientific Review Group (SRG), with memberships to both groups appointed by both parties to the agreement. Additionally, the Agreement calls for the JTC and SRG to include industry nominated scientists. These are selected and appointed by each of the two parties (NOAA Fisheries 2021b; Edwards et al. 2022).</p> <p>The 2022 assessment report (Edwards et al. 2022) provides a full description about the status of the coastal Pacific hake resource off the west coast of the United States and Canada at the start of 2022. This stock exhibits seasonal migratory behavior, ranging from offshore and generally southern waters during the winter spawning season to coastal areas between northern California and northern British Columbia during the spring, summer, and fall when the fishery is conducted. In years with warmer water the stock tends to move farther to the north during the summer.</p> <p>The biological unity and other biological characteristics of the stock are fully considered within the management system. Within the US EEZ, hake are managed within the framework of the Pacific Coast Groundfish FMP.</p> <p>The NOAA Fisheries webpage on Pacific Whiting (NOAA Fisheries 2022a) has detailed information on Pacific hake research and stock assessment. It includes links to the public access web-based tool Stock SMART (Status Management Assessment Resource Trends) which provides summary information on stock assessment results, as reported to the NOAA Fisheries developed Office of Science and Technology through the Species Information System. Stock SMART allows the user to view summaries of individual stock assessments, plot stock condition, chart time series and download data in customized reports (NOAA Fisheries 2020e). Links are also provided to the Treaty website that contains the stock assessment, PFMC and its regulations, Pacific Coast Groundfish FMP, trawl rationalization catch share program, Pacific Whiting Conservation Cooperative and the commercial fishing landings database.</p>	

Effectiveness: <i>Managers shall have an understanding of stock structure and composition as these relate to stock resilience over its entire distribution area. The underlying objective is to preserve genetic diversity between and within species and avoid localized depletions (overall affecting the stock contributing to its resilience and stability). This assessment shall consider, when appropriate, demographic independence of populations or stocks (i.e., if a component stock of a species is demographically independent from another because it is genetically different, has significant difference in age structure, or if there is insignificant exchange among groups due to distance, environmental barriers, or other reasons).</i>		✓
EVIDENCE: See discussion in “current status” section above.		
Effectiveness: <i>The stock may spend a portion of its life (migration for feeding, growth, or reproduction) in both fresh and saltwater, in international waters, or in another jurisdiction, and may suffer mortality or other pressures. These must be accounted for when assessing stock status.</i>		✓
EVIDENCE: See discussion in “current status” section above.		
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that management measures consider</i> <i>(1) the stock status over its entire area of distribution, (2) the area through which the stock migrates during its life cycle, and (3) other biological characteristics of the stock. Examples may include the presence of genetic studies, age structure data, stock assessments or other relevant information.</i>		✓
EVIDENCE: The availability and adequacy of evidence is sufficient to substantiate that management measures consider stock status, other biological characteristics of the stock.		
References: Edwards et al. 2022; NOAA Fisheries 2020e; NOAA Fisheries 2021b; NOAA Fisheries 2022a		
Numerical score:	Starting score – (Number of EPs <u>NOT</u> met x 3) = Overall score	
	10 – (0 x 3) = 10	
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)		High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)		Full Conformance
Non-conformance Number (if applicable):		

Supporting Clause 1.2.1.

1.2.1.	Previously agreed management measures established and applied in the same region is region shall be taken into account by management.	
Relevance:	Relevant	
Evaluation Parameters		
Process:	<i>There is a process or system that allows the continuity and updating of previously agreed and implemented management measures. Examples may include a specific review process or management plan where these measures can be clearly identified and continued implementation and updating can be carried out.</i>	
	✓	

EVIDENCE:

The PFMC operates with a well-developed process of continual review of scientific assessments and management measures. Groundfish are managed through a number of measures including harvest guidelines, quotas, trip and landing limits, area restrictions, seasonal closures, and gear restrictions. The Pacific Coast Groundfish Fishery Management Plan outlines the areas, species, regulations, and methods that the Council and the Federal government must follow to make changes to the fishery.

A biennial management process was implemented in 2003 through Amendment 17 to the groundfish FMP and is detailed in Council Operating Procedure 9 (PFMC 2021c). Under the biennial cycle, eligible management measures are implemented for a two-year period and adjusted through routine inseason actions. The Council reviews management performance (i.e., fishing-related mortality, including landings plus discard mortalities) and socioeconomic impacts relative to management objectives (e.g., rebuilding plans) during the two-year management period in order to consider modifying harvest specifications and management measures in the next biennial management period. New assessment results are also considered when deciding biennial harvest specifications and management measures. An exception is Pacific whiting which are managed annually, with harvest levels set each year under the terms of the U.S.-Canada Pacific Whiting Treaty.

After considering Council recommendations and public comments, NMFS publishes the adopted regulations, thereby putting them into effect. For non-routine and annual management decisions, NMFS publishes a Federal Register notice and provides a public comment period before finalizing the recommendations. The PFMC holds public meetings five times each year, in various locations throughout the four-state Council region. The process allows for the routine participation of stakeholders who provide review and input to the process of hake management.

In addition to this annual cycle of review, the TRat program is reviewed on a five-year cycle. The most recent review took place in 2016. The next scheduled review is planned for Council development in Fall 2022 (PFMC and NMFS 2017; Phillips 2022).

Current status/Appropriateness/Effectiveness:

Previously agreed management measures established and applied in the same region are included and part of current management decisions. Examples may include international or other agreements not honored by the management system or a management agency. The management system is effectively continuing implementation of agreed management measures.



EVIDENCE:

The Pacific hake fishery management system routinely takes into account all previously-agreed management measures.

The website of the Pacific Hake/Whiting treaty describes the Treaty process in the following way: “The annual coastwide TAC-setting process begins with a stock assessment completed by the Joint Technical Committee in January. The Scientific Review Group reviews the stock assessment at their annual meeting (February or March) and provides scientific advice, which is incorporated into the final stock assessment. The Advisory Panel and Joint Management Committee meet to review the stock assessment and to provide advice to the governments of Canada and of the United States on an annual coastwide TAC by March of each year. Once approved by the respective governments, the TAC advice is in turn implemented in accordance with each countries’ laws and regulations.”

The ability of the Treaty process to effectively continue implementation of agreed management measures was demonstrated in 2020 and 2021 when the Joint Management Committee, although agreeing on a coastwide

morality figure, was unable to come to an agreement on a coastwide TAC. In those two years the management system continued to function according to the stated management principles through the ongoing joint research, stock assessments, scientific review, stakeholder input and Management Strategy Evaluation. In the absence of a coastwide TAC the US and Canada set their TACs unilaterally, according to their respective previously-established backup protocols, well within the sustainability framework of the Treaty (Edwards et al. 2022; Grandin et al. 2020; Johnson et al. 2021; SRG 2020a; 2021; Marshall 2020a; 2020b. Marshall et al. 2020b).

In 2022 the JMC agreed to an adjusted coastwide TAC of 545,000 mt (50 CFR 660 2022).

Title VI of the MSA reauthorization of 2006 - called the Pacific Whiting Act of 2006 - directs the Secretary of Commerce to appoint U.S. individuals to a joint management committee, a scientific review group, a joint technical committee, and an advisory panel established by the Agreement between the Government of the United States and the Government of Canada on Pacific Hake/Whiting. It also requires the Secretary to establish the U.S. catch level for Pacific whiting according to the standards of the Agreement (subjecting all other aspects of Pacific whiting management to the Magnuson-Stevens Act) and requires the Secretary to approve catch level recommendations made by the joint management committee (MSA 2007).

Through this authorization the decisions made by the JMC of the Treaty are honored in subsequent management decisions made by the PFMC. The regional council management system is effectively continuing implementation of internationally agreed management measures

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that previously agreed management measures established and applied in the same region are taken into account by management.</i>		✓
The availability and adequacy of the evidence is sufficient to substantiate that previously management measures are taken into account by management.		
References:	MSA 2007; PFMC 2021c; PFMC and NMFS 2017; Edwards et al. 2022; Turriss 2022; Waldeck 2022; US Government 2003; Pacific Whiting Act 2006; Grandin et al. 2020; Johnson et al. 2021; SRG 2020a; 2021; Marshall 2020a; 2020b. Marshall et al. 2020b; 50 CFR 660 2022; Phillips 2022.	
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met x 3) = Overall score

1.2.1.	Previously agreed management measures established and applied in the same region is region shall be taken into account by management.	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High	
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance	
Non-conformance Number (if applicable):				

Supporting Clause 1.3.

1.3.	Where transboundary, shared, straddling, highly migratory, or high seas stocks are exploited by two or more States (neighboring or not), the applicant and appropriate management organizations concerned shall cooperate and take part in the formal fishery commission or arrangements appointed to ensure effective conservation and management of the stock(s) in question and their environment.
Relevance:	Relevant

Note: This clause pertains only if the stock is transboundary, shared, straddling, highly migratory, or high seas. Otherwise, this clause is not applicable. This clause is justified by the evidence provided in clause 1.2. Where sub-stocks are referred to as part of an overall stock, there shall be sufficient information on biology, distribution, and life cycle that demonstrates the degree of association or disassociation, and the basis for the management approach taken, to prevent recruitment failure of the stock or other negative impacts that are likely to be irreversible or very slowly reversible.

Evaluation Parameters	Met?
<p>Process: <i>There is a mechanism in place by which the applicant organization(s) cooperates for the management of the transboundary, shared, straddling, highly migratory or high seas stock. This mechanism has the sustainable total exploitation of the stock as its main objective.</i></p>	✓
<p>EVIDENCE: The Hake Treaty process has been fully engaged since 2012, supported by an active bilateral committee structure that includes the Joint Management Committee, Joint Technical Committee, Advisory Panel and Scientific Review Group (NOAA Fisheries 2021b).</p> <p>The Joint Management Committee is primarily responsible for providing annual Total Allowable Catch recommendations.</p> <p>The Joint Technical Committee (JTC) authors an annual stock assessment to inform harvest management decisions of the JMC, including scientific advice on the annual potential yield of the offshore whiting resource that may be caught for that fishing year (Edwards et al. 2022).</p> <p>The Advisory Panel (AP) comprises industry representatives, who review scientific advice and management of the fishery and provide advice on Total Allowable Catch to the Joint Management Committee.</p> <p>The Scientific Review Group (SRG) provides independent peer review of the Joint Technical Committee's work.</p> <p>The overarching goal of the Treaty process is to manage the Pacific hake resource in a precautionary and sustainable manner, utilizing the best available science. The set of management principles continue to be those adopted by the JMC in 2014:</p> <ul style="list-style-type: none"> • Maintain a healthy stock status across a range of recruitment events and consider total allowable catch levels that spread the harvest of strong cohorts over multiple years • Manage the fishery resource in a manner that aims to provide the best long-term benefits to the Parties. • Manage the fishery to ensure that each country has the opportunity to receive the intended benefits contemplated in the treaty. • These management principles are dynamic and shall be reviewed annually by the JMC and the AP to ensure they remain valid. <p>NOAA Fisheries maintains a website for the Pacific Hake Treaty (NOAA Fisheries 2021b).</p>	
<p>Current Status/Appropriateness/Effectiveness: <i>There is evidence that the mechanism described in the process parameter is effective at ensuring the stock is sustainably exploited. This can take the form of evidence that the stock is not overfished or subject to overfishing across the entirety of the range of the stock.</i></p>	✓

EVIDENCE:

According to the 2022 stock assessment, Pacific hake is not overfished or subject to overfishing, and the population is at above target population levels (Edwards et al. 2022). For the years 2020 and 2021, the remote meeting format in response to Covid-19 hindered the ability of the JMC to effectively negotiate a joint TAC. In those years the U.S. and Canada set unilateral TACs based on the joint stock assessment and within the sustainability constraints of their respective national statutes and the management principles and parameters established under the Treaty. In 2022 the JMC once again achieved agreement on a coastwide TAC.

The ongoing The continuing normal functioning of the JTC, SRG and AP, during the 2020-2021 period, and the existence of complementary national protocols in the absence of a joint agreement on coastwide TAC is evidence of the effectiveness of the cooperative process for the sustainable management of Pacific hake.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that where transboundary, shared, straddling, highly migratory, or high seas fish stocks are exploited by two or more States, the applicant and appropriate management organizations concerned cooperate and take part in formal fishery discussions or arrangements that have been appointed to ensure effective conservation and management of the stock(s) and fisheries in question. Examples may include evidence of formal agreements, records of meetings, and decisions.

✓

EVIDENCE:

The availability and adequacy of evidence is sufficient to substantiate that supporting clause 1.3 is met by management agencies where transboundary, shared, straddling fish stocks are exploited by two or more states.

References: NOAA Fisheries 2021b; Edwards et al. 2022

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x	3	)	=	Overall score
	10			0					10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low) High

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC) Full Conformance

Supporting Clause 1.3.1.

1.3.1.	Conservation and management measures established for the stock under consideration within the jurisdiction of the relevant States for transboundary, shared, straddling, highly migratory, or high seas stocks, shall be compatible in a manner consistent with the rights, competence, and interests of the States concerned.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process:	Identification of common objectives for maintenance of stock biomass.	✓

EVIDENCE:

The overarching goal of the Pacific Hake/Whiting Treaty is to manage the Pacific hake resource in a precautionary and sustainable manner, utilizing the best available science. The set of management principles continue to be those adopted by the JMC in 2014:

- Maintain a healthy stock status across a range of recruitment events and consider total allowable catch levels that spread the harvest of strong cohorts over multiple years
- Manage the fishery resource in a manner that aims to provide the best long-term benefits to the Parties.
- Manage the fishery to ensure that each country has the opportunity to receive the intended benefits contemplated in the treaty.
- These management principles are dynamic and shall be reviewed annually by the JMC and the AP to ensure they remain valid (NOAA Fisheries 2021b)

Current status/Appropriateness/Effectiveness:

Implementation of measures to achieve the common objectives mentioned above (i.e., similar harvest rates based on stock status, common rebuilding objectives for depleted stocks).

✓

EVIDENCE:

Both US and Canada fishery management organizations implement management measures to meet the common objectives and management principles outlined in the Treaty. Under normal treaty functioning, each country develops management measures to implement its share of a jointly agreed coastwide TAC. The TAC is based on a jointly prepared stock assessment using a default harvest policy that prescribes the maximum rate of fishing mortality to equal FSPR=40%. During 2020 and 2021, when no joint agreement on a coastwide TAC was achieved, the US and Canada estimated their respective TACs based on the same jointly produced and scientifically reviewed stock assessment, used the same default harvest policy and adhering to the management principles agreed to under the Treaty (Edwards et al. 2022; Pacific Whiting Act 2006; Turris 2022; Waldeck 2022). Within the US share of the coastwide TAC, the PFMC manages Pacific hake according to the principles and mandates of the MSA, expressed operationally in the Pacific Coast Groundfish FMP, biennial management measures and inseason management measures.

The objectives of the MSA include (MSA 2007):

- Preventing overfishing
- Rebuilding overfished stocks
- Increasing long-term economic and social benefits
- Ensuring a safe and sustainable supply of seafood
- Protecting habitat that fish need to spawn, breed, feed, and grow to maturity

The Magnuson-Stevens lists ten national standards that are statutory principles that must be followed in any fishery management plan to ensure sustainable and responsible fishery management. In abbreviated form:

Conservation and management measures shall:

1. Prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery.
2. Be based upon the best scientific information available.
3. Manage a fish stock as a unit throughout its range; manage interrelated stocks as a unit or in close coordination.
4. Not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among U.S. fishermen, such allocation shall be: fair and equitable; reasonably promote conservation; and avoid accumulation of excessive shares.

5. Consider efficiency in the utilization of fishery resources; no measure shall have economic allocation as its sole purpose.
6. Allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
7. Minimize costs and avoid unnecessary duplication.
8. Take into account the importance of fishery resources to fishing communities in order to provide for their sustained participation and minimize adverse community economic impacts.
9. Minimize bycatch and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
10. Promote the safety of human life at sea.

The Department of Fisheries and Oceans (DFO) implements the Fisheries Act expressed operationally through the Integrated Fishery Management Plan for Groundfish (IFMP) and The Offshore Pacific Hake Harvest Plan (DFO 2020a; 2020b)

The Fisheries Act was revised in 2019 to improve the protection of fisheries and their ecosystems. The new *Fisheries Act* improves the protection of our fisheries and their ecosystems (DFO 2019). The Act:

- reinstates lost protections by providing comprehensive protection for all fish and fish habitat
- restores the previous prohibition against the harmful alteration, disruption or destruction of fish habitat
- provides for strengthening the role of Indigenous peoples in project reviews, monitoring and policy development as part of early steps to advance reconciliation
- recognizes that decisions can be guided by principles of sustainability, precaution and ecosystem management
- promotes restoration of degraded habitat and rebuilding of depleted fish stocks
- allows for the better management of large and small projects impacting fish and fish habitat through a new permitting framework and codes of practice
- creates new fisheries management tools to enhance the protection of fish and ecosystems
- strengthens marine refuges to ensure the long-term protection of biodiversity
- helps ensure that the economic benefits of fishing remain with the licence holders and their community by providing clear ability to enshrine current inshore fisheries policies into regulations
- phases out the practice of keeping whales and other cetaceans in captivity for display purposes, while providing exceptions for rescue and rehabilitation
- prohibits shark finning, as well as the import and export, or attempted import or export of shark fins that are not naturally attached to the carcass

The Offshore Pacific Hake Harvest Plan was updated in June 2020 (DFO 2020c).

<p>Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that conservation and management measures established for the stock within the jurisdiction of the relevant States for shared, straddling, high seas, or highly migratory stocks, are compatible in a manner consistent with the rights, competences, and interests of the States concerned. Examples may include evidence of formal agreements, records of meetings and decisions, stock assessment, and other reports.</i></p>	
<p>EVIDENCE: The availability and adequacy of evidence is sufficient to substantiate that supporting clause 1.3.1 is met by the US-Canada Pacific Whiting Treaty and the federal agencies of the US and Canada in a manner consistent with the interests of the two states.</p>	
<p>References:</p>	<p>NOAA Fisheries 2021b; MSA 2007; DFO 2019; DFO 2020a; 2020b; 2020c; Edwards et al. 2022; Pacific Whiting Act 2006; Turriss 2022; Waldeck 2022; Grandin et al. 2020; Johnson et al. 2021; SRG 2020a; 2021; Marshall 2020a; 2020b. Marshall et al. 2020b; 50 CFR 660 2022;</p>

1.3.1.	Conservation and management measures established for the stock under consideration within the jurisdiction of the relevant States for transboundary, shared, straddling, highly migratory, or high seas stocks, shall be compatible in a manner consistent with the rights, competence, and interests of the States concerned.			
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	) x 3 = Overall score
	10		0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)				High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)				Full Conformance
Non-conformance Number (if applicable):				

Supporting Clause 1.4.

1.4.	A State's fishery management organization not member or participant of a sub-regional or regional fisheries management organization shall cooperate, in accordance with relevant international agreements and law, in the conservation and management of the relevant fisheries resources by giving effect to any relevant measures adopted by such organization or arrangement.			
Relevance:	Not relevant. Note: This clause pertains only if stock is transboundary, shared, straddling, highly migratory, or high seas. Otherwise, this clause is not applicable. This clause is justified by the evidence provided in clause 1.2.			
Evaluation Parameters				
Process: <i>There is ongoing cooperation in stock assessment, data sharing, and other activities.</i>				
EVIDENCE: Supporting Clause 1.4 is not relevant because the nations that fish Pacific hake, the US and Canada, are parties to the Pacific Hake/Whiting Treaty.				
Current status/Appropriateness/Effectiveness: <i>Relevant measures are implemented by non-member States.</i>				
EVIDENCE:				
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the State non-member or participant of a sub-regional or regional fisheries management organization cooperates, in accordance with relevant international agreements and law, in the conservation and management of the relevant fisheries resources by giving effect to any relevant measures adopted by such organization or arrangement. Examples may include reports detailing results of common surveys or acceptable harvest rates.</i>				
EVIDENCE:				
References:				
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	) x 3 = Overall score
	10			NA

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)	
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)	
Non-conformance Number (if applicable):	

Supporting Clause 1.4.1

1.4.1.	A fishery management organization seeking to take any action through a non-fishery organization which may affect the conservation and management measures taken by a competent sub-regional or regional fisheries management organization or arrangement shall consult with the latter, in advance to the extent practicable, and take its views into account.		
Relevance:	Relevant Note: This clause pertains only if stock is transboundary, shared, straddling, highly migratory, or high seas. Otherwise, this clause is not applicable. This clause is justified by the evidence provided in clause 1.2.		
Evaluation Parameters			Met?
Process: <i>There is a history of prior consultation.</i>			✓
EVIDENCE: The US and Canada have a history of consultation and cooperation in the management of Pacific hake, as evidenced by the existence of the Treaty structure and implementation of the Treaty process (NOAA Fisheries 2021b).			
Current status/Appropriateness/Effectiveness: <i>The views of the managing fishery organization are taken into account.</i>			✓
EVIDENCE: The ongoing consultation and collaboration within the management and advisory committees of the Treaty as described in Supporting Clause 1.3.1 are evidence of management organization views being taken into account through the Treaty process.			
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that a fishery management organization seeking to take any action through a non-fishery organization which may affect the conservation and management measures taken by a competent sub-regional or regional fisheries management organization or arrangement consults with the latter, in advance to the extent practicable, and take its views into account. Examples may include reports detailing action taken by the State(s) in question.</i>			✓
EVIDENCE: The availability and quality of evidence are sufficient to substantiate that the US and Canada are seeking to affect conservation and management through cooperative and collaborative actions with non-fishery organizations.			
References:	NOAA Fisheries 2021b		
Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met
	10	)	x 3 =
			Overall score
			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High

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Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)	Full Conformance
Non-conformance Number (if applicable):	

Supporting Clause 1.5.

1.5.	The applicant’s fishery management system, when appropriate for the stock under consideration, shall actively foster cooperation between States with regard to (1) information gathering and exchange, (2) fisheries research, (3) fisheries management, and (4) fisheries development.	
Relevance:	Relevant	
Evaluation Parameters		
Process: <i>The extent to which a formal process or system is available.</i>		Met? ✓
EVIDENCE:		
<p>Active cooperation between the US and Canada exists in the management of Pacific hake. As described in Supporting Clause 1.1, American and Canadian scientists and managers share membership of the Joint Management Committee (JMC) and its advisory bodies – the Joint Technical Committee (JTC), Scientific Review Group (SRG) and the Advisory Panel (AP) - under the Treaty.</p> <p>Within the US management system, the composition and operations of the Pacific Fishery Management Council, as described in Supporting Clause 1.1 fosters inter-state and inter-agency cooperation.</p>		
Current Status/Appropriateness/Effectiveness: <i>Level of activity, application, and level of engagement.</i>		✓

EVIDENCE:

As described on the Treaty website (NOAA Fisheries 2021b):

The annual coastwide TAC-setting process begins with a stock assessment completed by the Joint Technical Committee in January. The Scientific Review Group reviews the stock assessment at their annual meeting (February or March) and provides scientific advice, which is incorporated into the final stock assessment. The Advisory Panel and Joint Management Committee meet to review the stock assessment and to provide advice to the governments of Canada and of the United States on an annual coastwide TAC by March of each year. Once approved by the respective governments, the TAC advice is in turn implemented in accordance with each countries’ laws and regulations.

Under normal treaty functioning, each country develops management measures to implement its share of a jointly agreed coastwide TAC. The TAC is based on a jointly prepared stock assessment using a default harvest policy that prescribes the maximum rate of fishing mortality to equal FSPR=40%. Even during a period (2020-2021) when no joint agreement on a coastwide TAC was achieved, the level of activity and engagement under the Treaty process remained the same. The JMC continued to collaborate through remote meetings, agreeing on coastwide mortality. The JTC, SRG and AP continued meeting and fulfilling their respective functions. The joint MSE work continued. The one difference from normal process was that in the absence of a coastwide TAC, the US and Canada unilaterally estimated their respective TACs. However, each country’s TAC was based on the same jointly produced and scientifically reviewed stock assessment, used the same default harvest policy and adhered to the management principles agreed to under the Treaty (Edwards et al. 2022; Pacific Whiting Act 2006; Turris 2022; Waldeck 2022; Grandin et al. 2020; Johnson et al. 2021; SRG 2020a; 2021; Marshall 2020a; 2020b. Marshall et al. 2020b;).In 2022 a coastwide agreement on TAC was achieved (50 CFR 660 2022).

In addition, the joint U.S. and Canadian integrated acoustic and trawl survey has been the primary fishery-independent tool used to assess the distribution, abundance and biology of coastal Pacific hake along the west coasts of the United States and Canada.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the applicant’s fishery management system, when appropriate for the stock under consideration, fosters active international cooperation on fishery matters with regard to information gathering and exchange, fisheries research, fisheries management, and fisheries development. Example of evidence sources may include outputs from activity (e.g., reports, minutes, common or collective themes).



EVIDENCE:

The evidence provided in Supporting Clauses 1.1, 1.2 and 1.3 in addition to 1.5 is sufficient to substantiate that the fishery management system fosters active international cooperation on fishery matters

References: NOAA Fisheries. 2021b; Edwards et al. 2022; Pacific Whiting Act 2006; Turris 2022; Waldeck 2022; Grandin et al. 2020; Johnson et al. 2021; SRG 2020a; 2021; Marshall 2020a; 2020b. Marshall et al. 2020b; 50 CFR 660 2022

Numerical score:	Starting score	- (	Number of EPs NOT met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance

Non-conformance Number (if applicable):	
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Supporting Clause 1.6.

1.6.	A fishery management organization and sub-regional or regional fisheries management organizations and arrangements, as appropriate, shall agree on the means by which the activities of such organizations and arrangements will be financed, bearing in mind, inter alia, the relative benefits derived from the fishery and the differing capacities of States to provide financial and other contributions. Where appropriate, and when possible, such organizations and arrangements shall aim to recover the costs of fisheries conservation, management, and research.
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Relevance:	Relevant
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Evaluation Parameters	Met?
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Process: <i>There is an agreed-upon system to finance the fishery management organizations and arrangements.</i>	✓
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EVIDENCE:
 The US Contribution to the Pacific Hake /Whiting Treaty implementation is required by statute. Section VI (The Pacific Whiting Act) of the 2006 reauthorization of the MSA authorizes the Secretary to enforce the requirements of the Agreement between the Government of the United States and the Government of Canada on Pacific Hake/Whiting (the “Treaty”) and authorizes appropriations to the Secretary for implementation of the Agreement (MSA 2007).

 For within-US management of Pacific hake, the NMFS and PFMC are funded by Congressional appropriation and cost recovery from limited access privilege programs, as required by the MSA (NOAA Fisheries 2022b; MSA 2007).

 Cost recovery from rationalized fisheries, such as the Pacific hake fishery, is also in operation. Section 304(d) of the MSA authorizes and requires the collection of cost recovery fees for limited access privilege programs. Cost recovery fees recover the actual costs directly related to the management, data collection, and enforcement of the programs. Section 304(d) of the MSA mandates that cost recovery fees not exceed 3% of the annual ex-vessel value of fish harvested by a program subject to a cost recovery fee, and that the fee be collected either at the time of landing, filing of a landing report, or sale of such fish during a fishing season or in the last quarter of the calendar year in which the fish is harvested (MSA 2007).

Current status/Appropriateness/Effectiveness: <i>The fishery management organizations and arrangements are currently financed using a cost recovery or other system.</i>	✓
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EVIDENCE:
 In January 10, 2014, NOAA Fisheries implemented a Cost Recovery Program for the Trawl Catch Share Program, as required by the MSA. The Act requires that NMFS collect mandatory fees of up to three percent of the ex-vessel value of groundfish from all trawl rationalization program sectors (Shorebased Individual Fishing Quota (IFQ) Program, Mothership Cooperative Program, and Catcher/Processor Cooperative Program) managed under the Pacific Coast Groundfish FMP. Fish buyers to collect cost recovery fees from fish sellers and remit those fees to NMFS via online payments through Pay.gov. During the last quarter of the calendar year NMFS announces in a Federal Register document the next year’s applicable fee percentages and the applicable MS pricing to be used as a proxy by the C/P Coop Program. NMFS will calculate and announce the

fee percentage after each fiscal year ends, and before the fee would go into effect on January 1 of the following year (50 CFR 660 2013).

In March 2014 NMFS published a compliance guide to help fishery participants understand the cost recovery requirements which are based on recommendations by the PFMC and implemented by the NMFS through the cost recovery final rule (NOAA Fisheries 2014).

As an example of the annual notice of cost recovery fees for the following year, in December 2021 NMFS published the cost recovery notice for 2022 (50 CFR 660 2021c). The notice provides participants in the Pacific Coast Groundfish Trawl Rationalization Program with the 2022 cost recovery fee percentages and the average mothership (MS) price per pound to be used in the catcher/processor (C/P) coop program to calculate the fee amount for the upcoming calendar year. For the 2022 calendar year, NMFS announces the following fee percentages by sector specific program:

- 3.0 percent for the Shorebased Individual Fishing Quota Program;
- 0.2 percent for the C/P Co-op Program; and
- 1.7 percent for the MS Co-op Program.

For 2022, the MS pricing to be used as a proxy by the C/P Co-op Program is \$0.09/pound for Pacific whiting. (50 CFR 660 2021c).

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is agreement on the means by which the activities of such organizations and arrangements are financed. Where appropriate, and when possible, such organizations and arrangements aim to recover the costs of fisheries conservation, management, and research. Examples may include data showing the expenditure and cost recovery derived from fisheries management.</i>		✓
EVIDENCE: The evidence is sufficient to substantiate that there is agreement on means to finance the costs of fisheries management and that these finances are forthcoming by regulation and appropriation.		
References:	MSA 2007; NOAA Fisheries 2022b; 50 CFR 660 2013; NOAA Fisheries 2014; 50 CFR 660 2021c	
Numerical score:	Starting score 10	Number of EPs <u>NOT</u> met 0
	- (	x 3) =
		Overall score 10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)		High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)		Full Conformance
Non-conformance Number (if applicable):		

Supporting Clause 1.6.1.

1.6.1.	Without prejudice to relevant international agreements, States or fishery management organizations shall encourage banks and financial institutions not to require, as a condition of a loan or mortgage, fishing vessels or fishing support vessels to be flagged in a jurisdiction other than that of the State of beneficial ownership where such a requirement would have the effect of increasing the likelihood of non-compliance with international conservation and management measures.		
Relevance:	Not relevant		
	Note: The fishery for the <i>stock under consideration</i> occurs outside the exclusive economic zone (EEZ), there is evidence of flags of convenience, and evidence of illegal, unreported, and unregulated (IUU) fishing. Not applicable otherwise.		
Evaluation Parameters			Met?
Process:	<i>There is a system that encourages banks to require vessels to be flagged within the jurisdiction of interest.</i>		
EVIDENCE:			
Supporting clause 1.61 is not relevant because the Pacific hake fishery does not operate outside of the EEZ and all vessels operating in the fishery must be US owned and licensed.			
Current Status/Appropriateness/Effectiveness:			
<i>There is regulation that directs for vessels to be flagged outside the State's jurisdiction. The fishery for the stock under consideration occurs outside EEZ, and there are flags of convenience operations present, or evidence of IUU fishing.</i>			
EVIDENCE:			
Evidence Basis:			
<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the State or fishery management organizations encourages banks and financial institutions not to require, as a condition of a loan or mortgage, fishing vessels or fishing support vessels to be flagged in a jurisdiction other than that of the State of beneficial ownership where such a requirement would have the effect of increasing the likelihood of non-compliance with international conservation and management measures. Examples may include data showing fishery operation by vessels flying a flag different from that of the State where fishing geographically occurs.</i>			
EVIDENCE:			
References:			
Numerical score:	Starting score	Number of EPs <u>NOT</u> met	Overall score
	10		NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			
Non-conformance Number (if applicable):			

Supporting Clause 1.7.

1.7.	Within the fishery management system, procedures shall be in place to keep the efficacy of current conservation and management measures and their possible interactions under continuous review, and to revise or abolish them in the light of new information.		
Relevance:	Relevant		

Evaluation Parameters	Met?
<p>Process: <i>There is a procedure to review management measures. The procedure includes the use of outcome indicators against which the success of management measures in achieving specific management objectives is measured. The procedure covers all management measures, including those relating to the sustainable exploitation of the target stock; the mitigation of negative impacts on non-target species through bycatch, discarding, and indirect effects; and the protection of Endangered, Threatened, Protected (ETP) species and the physical environment.</i></p>	✓
<p>EVIDENCE:</p> <p>Both the PFMC and the Treaty process have procedures at multiple levels to review analytical products and management measures. The adaptive management approach used at national and international levels of the Pacific hake fishery is supported by routine periodic review.</p> <p>Treaty:</p> <p>The Pacific hake stock assessment is annually reviewed by the Scientific Review Group and the Advisory Panel. A Management Strategy Evaluation is undergoing development and frequent review (SRG 2020b; 2022).</p> <p>PFMC system:</p> <p>As the principle statute establishing the system of regional council management, the MSA is reviewed by Congress every five years and is periodically revised and reauthorized.</p> <p>The PFMC annual process is one of continual development and review, conducted through layers of scientific and stakeholder advisory committees. For Pacific hake and other groundfish, these are the Groundfish Advisory Panel (GAP), Groundfish Management Team (GMT) and Scientific and Statistical Committee (SSC).</p> <p>As outlined in the Groundfish FMP, management measures are normally imposed, adjusted, or removed at the beginning of the biennial fishing period, but may, if the Council determines it necessary, be imposed, adjusted, or removed at any time during the period. The FMP establishes three framework procedures through which the Council is able to recommend the establishment and adjustment of specific management measures for the Pacific Coast groundfish fishery. The points of concern framework allows the Council to develop management measures that respond to resource conservation issues; the socioeconomic framework allows the Council to develop management measures in response to social, economic, and ecological issues that affect fishing communities. The habitat conservation framework allows the Council to modify the number, extent, and location of areas closed to certain fishing gear or methods, in order to protect EFH. Criteria associated with each framework form the basis for Council recommendations, and Council recommendations will be consistent with them. The process for developing and implementing management measures normally will occur over the span of at least two Council meetings, with an exception that provides for more timely Council consideration under certain specific conditions (PFMC 2020q).</p> <p>Stock assessments are routinely subjected to layers of review against National Standards contained in the MSA. Assessments receive regular additional third-party reviews through the STAR (Stock Assessment Review Panels) process.</p>	

Component parts of the Groundfish FMP are regularly reviewed, including outcome indicators. When the FMP is amended an Environmental Impact Statement (EIS) is conducted as required by the National Environmental Policy Act (NEPA) to assess the environmental and socio-economic consequences, as well as assess the effectiveness of the changes. Stakeholders are actively encouraged to participate in Council meetings and to review and comment on proposed management measures.

Provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) require FMPs to establish a standardized reporting methodology to assess the amount and type of bycatch occurring in a fishery. Regional fishery management councils in coordination with NMFS must conduct a review of their FMPs for consistency with the rule. All FMPs must be consistent with the rule by February 21, 2022. At the November 2020 meeting, the PFMC reviewed each FMP for consistency with the final rule in order to identify any needed FMP amendments (PFMC 2020r).

By regulation the Trawl IFQ Program is reviewed every five years. The next review is scheduled for 2022 (PFMC and NMFS 2017).

In September 2018, the PFMC initiated a 5-year review of their Pacific Coast Fishery Ecosystem Plan (FEP). In March 2021, the Ecosystem Workgroup presented a first draft of Chapter 4 of the Plan (Environmental Change, Human Activities and Social-Ecological Dynamics in the California Current Ecosystem) (PFMC 2021d; 2021e).

The Groundfish FMP outlines a process for modifying existing or designating new Habitat Areas of Particular Concern (HAPCs). “Recognizing that new scientific information could reveal other important habitat areas that should be designated HAPCs or call into question the criteria for existing HAPCs, or identify new threats that warrant designating additional HAPCs, the Council may designate a new HAPC or modify or eliminate an existing HAPC through an interim process.” (PFMC 2020q).

<p>Current status/Appropriateness/Effectiveness: <i>If, as a result of the review process, it is determined that management measures are not achieving the specific management objectives they are designed to achieve, they are revised and updated as appropriate.</i></p>	<p>✓</p>
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EVIDENCE:

The PFMC routinely makes adjustments to management measures as conditions change throughout a season.

For example, the Council uses total catch information in inseason management to determine the relationship between catch at a given point in time and an ACL/ annual OY. Management measures within a given year may be adjusted based on total catch information in order to prevent total catch from exceeding ACL/OY levels. The GMT recommends prescribed landing limits and other inseason management measures to allow Council-managed fisheries to attain, but not exceed, total catch ACLs/OYs of QSM species. Stock and complex landing limits are modified inseason to control total fishing-related mortality (PFMC 2020q).

In the most recent five-year review of the Catch Shares Program the Council considered several alternatives to meet the management needs of the at-sea sectors in relation to rebuilt rockfish species – widow rockfish, canary rockfish, darkblotched rockfish, and POP. The Council concluded that use of set-asides for these four species was the most expeditious and likely most effective management change to help ensure the at-sea sectors were able to optimally attain their annual whiting allocations. At the November 2018 PFMC meeting, the Council took final action to move forward with implementation of set-aside management for all four species. This regulatory change

was implemented prior to the 2020 season. In the shoreside sector, rockfish bycatch is managed via individual fishing quota held by fishery participants (PFMC and NMFS 2017; Waldeck 2020).

New salmon bycatch mitigation measures were adopted in the 2019-2020 groundfish specifications to satisfy mandates in the December 2017 ESA Salmon BiOp (NOAA Fisheries 2017a; PFMC 2020u). The measures include monitoring, review and adaptation of management measures:

- Automatic for NMFS to (1) close the whiting fishery when it exceeds (or is projected to exceed) 14,500 Chinook or close the non-whiting fishery when it exceeds (or is projected to exceed) 9,000 Chinook; and (2) after (1) happens, the sector that remains open is closed if that sector exceeds (or is projected to exceed) its threshold (that is, 11,000 Chinook for whiting or 5,500 Chinook for non-whiting). The goal is to ensure that the overall 20,000 Chinook threshold is not exceeded by the groundfish fishery.
- A new bycatch reduction area (BRA) at the 200-fm depth contour. Council and NMFS monitor salmon bycatch rates inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector – whiting IFQ fishery, CP sector, MS sector, and non-whiting midwater trawl sector. If 200-fm BRA implemented, vessels would be prohibited from using midwater trawl gear to target either whiting or non-whiting groundfish in waters shoreward of the 200-fm depth contour, but would still be allowed to fish in waters seaward of 200-fm. This action only applies to non-tribal midwater trawl vessels.

In February 2021, NMFS published the final rule for additional measures adopted by the Council (50 CFR 660 2020e). The new measures include items necessary for access to the 3,500 Chinook salmon “reserve,” including fishery cooperative annual Salmon Mitigation Plans (SMP) that may be submitted to NMFS and detail measures used to manage salmon bycatch. The SMP provides a nexus to a NMFS management action (that is, approval of the SMP) that is necessary for a sector to use the Chinook salmon reserve amount (that is, the 3,500 Chinook available above the 11,000 Chinook threshold for the whiting fishery).

Another new measure, Block Area Closures (BACs), may also be used if NMFS determines a sector of the whiting fishery is catching too much salmon then NMFS may implement a sector specific spatial closure that is more discrete than closing at 200 fathoms coastwide (Waldeck 2022).

The MS Coop agreement measures to prevent exceeding allowable levels of catch and bycatch provides a good example of adapting management measures to changing circumstances identified through review :

- precautionary closures of past bycatch hotspots
- night fishing restrictions
- fleet relocation triggers and fleet to fleet reporting
- required test tows upon relocation to a new fishing area
- in-season “hot spot” closure authority
- seasonal apportionments (pools) of whiting and bycatch allowances
- sanctions against vessels exceeding a bycatch rate within a seasonal pool (McQuaw 2021)

The CP Coop also prioritizes minimizing incidental catch, using methods similar to the MS coop to prevent and respond to bycatch of species of concern, for example Chinook salmon. Because the CP coop has a relatively small number of participants (ten vessels and three companies in 2020 (PWCC 2021)), communication among the fleet and fleet managers is fluid and ongoing. Daily catch data reports produced by Sea State provide the necessary information to assess and respond to bycatch events as they arise, for example, by identifying and avoiding hotspot areas (McQuaw 2021; PWCC 2021).

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that within the fishery management system, procedures are in place to keep the efficacy of current conservation and management measures and their possible interactions under continuous review, and to revise or abolish them in the light of new information. Examples may include data showing recent regulation or management plan revisions.</i>	✓
EVIDENCE: The availability and adequacy of the evidence is sufficient to substantiate that within the fishery management system procedures are in place to achieve the efficacy of current conservation and management measures and under continuous review in light of new information.	

References:	SRG 2020b; 2022; PFMC 2020q; PFMC 2020r; PFMC and NMFS 2017; PFMC 2021d; 2021e; PFMC and NMFS 2017; Waldeck 2020; 2022; NOAA Fisheries 2017a; 50 CFR 660 2020e; McQuaw 2021; PWCC 2021				
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 1.8

1.8.	The management arrangements and decision-making processes for the fishery shall be organized in a transparent manner.			
Relevance:	Relevant			
Evaluation Parameters				Met?
Current status: <i>There is transparency in management arrangements. Please note that both the management processes of the NPFMC for federal waters, and the BOF for state waters, shall be clearly documented to provide evidence for the transparency of these arrangements and decision-making processes.</i>				✓
EVIDENCE:				
Management arrangements for the Pacific whiting fisheries are publicly available on the Treaty, NMFS and PFMC websites and from NMFS and Council offices as well as local offices of the Office of Law Enforcement (OLE) (NOAA Fisheries 2021b; 2022a; PFMC 2022c; NOAA Fisheries 2022d)				
Within the PFMC process are many procedural elements that enable and promote transparency of management arrangements. (www.pcouncil.org):				
<ul style="list-style-type: none"> • Published timely notice of all meetings and meeting agendas according to requirements of the MSA, with meeting dates and locations scheduled three years in advance, posted on PFMC website; • Regular dissemination of the Council newsletter, blogpost and twitter feed on the PFMC website; • Identification of committee membership, affiliation and contact information of council committees; • Publication of FMP amendments, and the proposed rules implementing such measures, in the <i>Federal Register</i> to allow for public comment. All comments to final rules receive a written response. A Record of Decision explains the rationale for NMFS action. 				

Effectiveness: <i>There is transparency in decision-making processes.</i>	✓
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EVIDENCE:
Meetings of the Treaty management and advisory committees are open to the public (Treaty website). The PFMC imposes transparency so that all deliberations are open to the public. The Council actively encourages stakeholder participation, Within the PFMC process are many procedural elements that enable and promote transparency of decisionmaking.

- Consultation among federal agencies, state agencies, universities and stakeholders in the provision of scientific information;
- Review of data and analysis through interdisciplinary Groundfish Management Team meetings which are publicly announced and at which public comment is accepted;
- Scientific review and comment on all scientific matters on the Council’s agenda by the interdisciplinary SSC, at meetings open to the public;
- Advice to PFMC provided by a the Groundfish Advisory SubPanel, the Ecosystem Advisory Subpanel and several ad hoc advisory committees representing major segments of the fishing industry and other stakeholders; catching and processing, subsistence and commercial fishermen, observers, consumers, environmental/conservation, and sport fishermen. All proposed actions are discussed at open meetings at which public comment is taken.
- Rotating meeting locations to facilitate public involvement;
- A guide to the Council process posted on the PFMC website;
- Instructions for submitting written or oral public comment, posted on PFMC website;
- Public comment on all action items at PFMC meetings;

No more than a predetermined number of Council members can meet together unless the meeting is an open public meeting. Each Council decision is made by recorded vote in a public forum after public comment. Final decisions then go to the Secretary of Commerce for a second review, public comment, and final approval. Decisions must conform with the MSA, the NEPA, Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA) and other applicable law including several executive orders.

The decision-making process used by the PFMC is described on the Council “Rules and Procedures” webpage (PFMC 2022e) and the Council Operating Procedures (PFMC 2021c).

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the management arrangements and decision-making processes for the fishery are organized in a transparent manner. Examples may include records of the management arrangements and decision-making processes.</i>	✓
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EVIDENCE:
The availability and adequacy of evidence is sufficient to substantiate that management and decision making processes are organized in a transparent manner.

References: NOAA Fisheries 2021b; 2022a; 2022d; PFMC 2021c; 2022c; 2022e

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10				10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 1.9

1.9.	Management organizations not party to the Agreement to Promote Compliance with International Conservation and Management Measures by Vessels Fishing in the High Seas shall be encouraged to accept the Agreement and to adopt laws and regulations consistent with the provisions of the Agreement.		
Relevance:	Not relevant. Note: Not applicable if the fishery does not occur in high seas.		
Evaluation Parameters			Met?
Process:	<i>Regulation to implement the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas has been adopted. Assessors shall consult the following document http://www.fao.org/docrep/meeting/003/x3130m/X3130E00.htm for reference to the Agreement.</i>		
EVIDENCE:	Supporting Clause 1.9 is not relevant. The United States ratified the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (“Compliance Agreement”) on 19 December 1995. The Pacific hake fishery takes place within the EEZs of the U.S and Canada and does not occur in the high seas.		
Current status/Appropriateness/Effectiveness:	<i>There are laws regulating high seas fishing activity. Describe how they accomplish this.</i>		
EVIDENCE:			
Evidence Basis:	<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization is party to the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, or has adopted laws and regulations consistent with the provisions of the Agreement. Examples may include reports on the management of high seas fishing activities.</i>		
EVIDENCE:			
References:			
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met x 3) =	Overall score
	10		NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			
Non-conformance Number (if applicable):			

Fundamental Clause 2. Coastal area management frameworks

Management organizations shall participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance.

Supporting Clause 2.1.

2.1.	Within the fisheries management organization’s jurisdiction, an appropriate policy, legal, and institutional framework shall be adopted in order to achieve sustainable and integrated use of living marine resources, (1) taking into account the fragility of coastal ecosystems and finite nature of their natural resources, (2) allowing for determination of the possible uses of coastal resources and governing access to them, and (3) recognizing the rights and needs of coastal communities and their customary practices to the extent
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compatible with sustainable development. In setting policies for the management of coastal areas, States shall take due account of the risks and uncertainties involved.	
Relevance:	Relevant
Evaluation Parameters	
Process: <i>A mechanism exists by which the integrated management of multiple coastal area uses is conducted, the possible uses of coastal resources are assessed, and access to them is governed. Accordingly, policies for the management of the coastal area are set. Assessment teams shall document how existing authorities and/or processes cooperate and interact together to manage coastal resources (living and non-living) in a transparent, organized, and sustainable way that minimizes environmental issues while taking into account the socio-economic aspects, needs, and interests of the various stakeholders of the coastal zone.</i>	✓
EVIDENCE:	
<p>The PFMC and NMFS cooperate with the management of coastal resources (living and non-living) in a transparent, organized, and sustainable way that minimizes environmental issues while taking into account the socio-economic aspects, needs, and interests of the various stakeholders of the coastal zone. This cooperation is accomplished through an institutional framework of federal laws and regional practice. The Coastal Zone Management Act (CZMA) (NOAA 2022a) was enacted in 1972, to preserve, protect and develop, and, where possible, to restore and enhance the resources of the coastal zone. The CZMA was designed to encourage and assist states in developing coastal management programs, to coordinate state activities, and to safeguard regional and national interests in the coastal zone. It created a voluntary partnership between NOAA and the states in coastal management programs in which a state or university program takes the lead to manage these special places with assistance from NOAA.</p> <p>The states of California, Oregon and Washington all have NOAA- approved Coastal Zone Management Programs (NOAA 2022b).</p> <p>The NMFS, states, and PFMC have processes, committees and groups that allow potential coastal zone developments and issues to be brought to formal review and engagement. For example, offshore wind energy development remains an active issue in the Pacific EEZ that could intrude into the coastal zone. At its May 2020 meeting the Council Coordinating Committee of the eight U.S. regional fishery management councils discussed the need for a process that allows the councils to verify impacts of wind energy projects to fisheries in their region and to comment on project planning. The PFMC expressed concern about the use in project planning of short-term fishery data that would not reflect the effort patterns expected in fisheries that are rebuilt and about to be reopened (PFMC 2020t). In a letter and report to the Secretary of Commerce the NOAA Marine Fishery Advisory Committee, a stakeholder advisory body, supported and expanded on these concerns (PFMC 2020m).</p> <p>The National Environmental Policy Act (NEPA) applies to actions taken in the coastal zone. To implement NEPA’s policies, Congress prescribed a procedure, commonly referred to as “the NEPA process” or “the environmental impact assessment process.” This process provides public information and opportunity for public involvement at both the state and federal levels. When a company applies for a permit (e.g. a building application that will impact coastal resources) the agency that is being asked to issue the permit must evaluate the environmental effects of the permit decision under NEPA (EPA 2022).</p>	

Current status/Appropriateness/Effectiveness:

The coastal management framework includes explicit consideration of the fragility of coastal ecosystems, the finite nature of coastal resources, and the needs of coastal communities, and accounts for the rights and customary practices of coastal communities. These policies take due account of risks and uncertainties.



The coastal zone is monitored as part of the coastal management process using physical, chemical, biological, economic and social parameters. Involvement include federal and state agencies and programs including the U.S. Forest Service, U.S. Fish and Wildlife Service, NMFS Pacific Marine Environmental Lab (PMEL), California Coastal Commission, Oregon Department of Land Conservation and Development (DLCD), Washington Department of Ecology (DOE), The NMFS' Habitat Conservation Division (HCD) and their Essential Fish Habitats (EFH) monitoring and protection program, the U.S. Coast Guard.

The Council and National Marine Fisheries Service are required by law to identify and protect the essential fish habitat (EFH) of species managed under fishery management plans. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The NMFS and regional Fishery Management Councils must describe and identify EFH in fishery management plans, minimize adverse effects of fishing on EFH, and encourage the conservation and enhancement of EFH (MSA 2007).

The needs of coastal communities are explicitly addressed in fishery management through National Standard 8 of the MSA, which requires that conservation and management measures shall, consistent with conservation requirements (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that are based upon the best scientific information available (50 CFR 600.305 2022). Socioeconomic considerations are included in the PFMC Fishery Ecosystem Plan (FEP) (PFMC 2021d). Additionally, assessing the social and cultural value of coastal resources is stated as an explicit part of the decision-making process for allocation and use of resources within NEPA (EPA 2022).

The rights and customary practices of treaty Indian tribes are protected under Executive Order 13175 (2000), which requires regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications. The MSA specifies a seat on the PFMC for a representative of an Indian tribe with Federally-recognized fishing rights from California, Oregon, Washington, or Idaho (PFMC 2022h).

The annual harvest specifications for Pacific hake include a tribal allocation of 17.5% of the US TAC. The tribal sector comprises tribal commercial fishers who have a federally recognized treaty right to fish for federally managed groundfish within their usual and accustomed fishing areas. The Makah Tribe has an active fishery for Pacific whiting within its usual and accustomed fishing grounds off the Washington coast. Tribal catcher boats deliver to either non-tribal shore-based processors or at-sea mothership processors (50 CFR 660.4 2018; 50 CFR 660 2022; PFMC 2020d; Waldeck 2022).

NOAA Fisheries' Habitat Conservation Division (HCD) works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on EFH and living marine resources (NOAA Fisheries 2022f).

The Council can create an area closure (like a Rockfish Conservation Area) or put limits on gear to protect fish habitat, whether or not it is designated as EFH. However, the Council *must* identify and describe EFH for the

Council’s managed species, and must describe both fishing and non-fishing impacts on EFH. These descriptions can be found in the Council’s FMPs and are updated roughly every five years. The Council must also identify habitat areas of particular concern, which are a subset of EFH that highlight especially important habitat areas or types (NOAA Fisheries 2022g).

The Council is also required to comment upon and make recommendations on activities it views as likely to “substantially affect the habitat, including EFH” of anadromous species (salmon) under its authority. For all other species’ EFH, the Council *may* make comments and recommendations. This includes commenting on activities that affect prey species, which are legally considered a component of EFH. The Council’s Habitat Committee provides advice to the Council on a wide variety of habitat-related issues, working with other advisory bodies to resolve habitat problems and avoid future habitat conflicts and recommending actions that will help achieve the Council’s habitat objectives (PFMC 2022d). Meetings are open to the public.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that within the fisheries management organization’s jurisdiction, an appropriate policy within the legal and institutional framework has been adopted in order to achieve sustainable and integrated use of living marine resources. Examples may include coastal management plans or other policy documents, and frameworks for resource/coastal management.

✓

EVIDENCE:

The availability and quality of the evidence is sufficient to substantiate that within the fisheries management organization’s jurisdiction an appropriate policy has been adopted to achieve sustainable and integrated use of living marine resources.

References NOAA 2022a; 2022b; 2022f; 2022g; 2022h; PFMC 2020g; 2020m; 2020t; 2022d; EPA 2022; 50 CFR 660.4 2018; 50 CFR 600.305 2022; Executive Order 13175 (2000); PFMC 2021d; EPA 2022; Waldeck 2022; 50 CFR 660 2022; PFMC 2020d;

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 2.1.1.

2.1.1.	States shall establish mechanisms for cooperation and coordination in planning, development, conservation, and management of coastal areas.
Relevance:	Relevant.
Evaluation Parameters	Met?

<p>Process: <i>There is a mechanism to allow cooperation between neighboring States to improve coastal resource management.</i></p>	✓
<p>EVIDENCE: Federal and state agencies cooperate in managing the Pacific Hake Fishery and in carrying out the associated legislative mandates that affect the health of coastal resources as discussed in 2.1 above.</p> <p>NOAA Fisheries' Habitat Conservation Division (HCD) works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on Essential Fish Habitat (EFH) and living marine resources (NOAA Fisheries 2022f).</p> <p>Section 1452 of the Coastal Zone Management Act states that it is national policy to encourage coordination and cooperation with and among the appropriate federal, state, and local agencies, and international organizations where appropriate, in collection, analysis, synthesis, and dissemination of coastal management information, research results, and technical assistance (NOAA 2022a).</p> <p>Management of the coastal stock of Pacific whiting is accomplished through a bilateral agreement between the United States and Canada, known as the Pacific Whiting Treaty (NOAA Fisheries 2021b).</p>	
<p>Current status/Appropriateness/Effectiveness: <i>There are records of cooperation. Examples may include fishery, fishery enhancement, or other agreements or records from international forums.</i></p>	✓
<p>EVIDENCE: Internationally, there is an extensive history and record of cooperation between the US and Canada in the management of Pacific hake under the Pacific Whiting Treaty (NOAA Fisheries 2021b).</p> <p>Under normal treaty functioning, each country develops management measures to implement its share of a jointly agreed coastwide TAC. The TAC is based on a jointly prepared stock assessment using a default harvest policy that prescribes the maximum rate of fishing mortality to equal FSPR=40% (Edwards et al. 2022).</p> <p>Even during a period (2020-2021) when no joint agreement on a coastwide TAC was achieved, the level of international cooperation under the Treaty process remained the same. The JMC continued to collaborate through remote meetings, agreeing on coastwide mortality. The JTC, SRG and AP continued meeting and fulfilling their respective functions. The joint MSE work continued. The one difference from normal process was that in the absence of a coastwide TAC, the US and Canada unilaterally estimated their respective TACs. However, each country's TAC was based on the same jointly produced and scientifically reviewed stock assessment, used the same default harvest policy and adhered to the management principles agreed to under the Treaty (Edwards et al. 2022; Pacific Whiting Act 2006; Turriss 2022; Waldeck 2022; Grandin et al. 2020; Johnson et al. 2021; SRG 2020a; 2021; Marshall 2020a; 2020b. Marshall et al. 2020b). Within the US the PFMC process and other federal-state coordination processes described in Supporting Clauses 2.1 and 2.1.1 are detailed examples of the types of cooperation. Records of decisions on protection of coastal resources and habitat protections are found throughout Council documents, specifically EFH designations, Conservation area designations and EIS analyses of amendments to the Groundfish FMP (PFMC 2020q).</p> <p>The Pacific States Marine Fisheries Commission (PSMFC) is an interstate compact agency that that is built on the interstate cooperation of California, Oregon, Washington, Idaho, and Alaska. The PSMFC helps resource agencies and the fishing industry sustainably manage Pacific Ocean resources. The PSMFC Habitat Program is involved in West Coast programs that further habitat protection for anadromous, estuarine, and marine fish species. Program efforts are focused on watershed and estuarine conservation and restoration, work with</p>	

2.1.2.	The fisheries management organization shall ensure that the authority or authorities representing the fisheries sector and fishing communities in the coastal management process have the appropriate technical capacities and financial resources.				
Relevance:	Relevant.				
Evaluation Parameters					
Process: <i>There are appropriate technical capacities and financial resources.</i>	Met? ✓				
EVIDENCE: The technical capacities of the federal and state agencies involved in the management of Pacific hake are significant, including internationally recognized scientists, seasoned fishery managers and policy makers and highly professional and trained enforcement officers. Financial resources appropriate to management and regulatory requirements are ensured by appropriation and cost-recovery programs (NOAA Fisheries 2014; 2020g; 2021c).					
Current status/Appropriateness/Effectiveness: <i>It can be determined with confidence that there are appropriate technical capacities and financial resources.</i>			✓		
EVIDENCE: US participation in the Pacific Whiting Treaty is financed through congressional appropriation, as are the PFMC and associated federal agencies. State agencies are funded through their respective legislatures. During the site visit, no indication was given regarding a lack of resources or technical capacity within the agencies responsible for managing the fisheries. Given the positive state of the fishery resource and the science and management system in place through the Treaty, NMFS and PFMC the assessment team is confident that there are appropriate technical and financial resources in place.					
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fisheries management organization ensures that the authority or authorities representing the fisheries sector and fishing communities in the coastal management process have the appropriate technical capacities and financial resources. Examples may include reports or data, overall operating staff, and financial resources/budgets available.</i>			✓		
EVIDENCE:					
2.1.2.	The fisheries management organization shall ensure that the authority or authorities representing the fisheries sector and fishing communities in the coastal management process have the appropriate technical capacities and financial resources.				
The availability and quality of the evidence is sufficient to substantiate that the fisheries management organization ensures that the authority or authorities representing the fisheries sector and fishing communities in the coastal management process have the technical capacities and financial resources.					
References:	NOAA Fisheries 2021b; 2022a; PFMC 2022b; 2022d				
Numerical score:	Starting score	- (Number of EPs NOT met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High

Corresponding Conformance Level: (10 = Full 7 = Minor NC; 4 = Major NC; 1 = Critical NC)	Full Conformance
Non-conformance Number (if applicable):	
Treaty, NMFS and PFMC staffing and programmatic information is available on their respective websites (NOAA Fisheries 2021b; 2022a; PFMC 2022b; 2022d)	

Supporting Clause 2.2.

2.2.	Representatives of the fisheries sector and fishing communities shall be consulted in the decision-making processes involving activities related to coastal area management planning and development. The public, as well as others affected, shall also be kept aware of the need for protection and management of coastal resources, and shall participate in the coastal management process.
Relevance:	Relevant
Evaluation Parameters	
Process: <i>Describe how fishery-related information is disseminated and how a process is in place to consult with the fishery sector and fishing communities.</i>	Met? ✓
<p>EVIDENCE:</p> <p>The NMFS and the PFMC participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. These include consultation, and decision-making processes and activities relevant to fishery resources and users in support of sustainable and integrated use of living marine resources and avoidance of conflict among users (EPA 2022).</p> <p>To implement NEPA’s policies, Congress prescribed a procedure, commonly referred to as “the NEPA process” or “the environmental impact assessment process.” The NEPA processes provide public information and opportunity for stakeholder involvement at both the state and federal levels. In this way, any application for a permit to undertake an activity or development in the coastal region, requires the agency that is being asked to issue the permit to evaluate the environmental effects of the permit and follow the NEPA process (PFMC 2022f).</p> <p>As a result, representatives of the fisheries sector and fishing communities are consulted in the decision-making processes and in other activities related to coastal area management planning and development and kept aware of the need for protection and management of coastal resources.</p>	
<p>Current status/Appropriateness/Effectiveness: <i>There are records of consultations with the fisheries sector and fishing communities. Attempts have been made to create public awareness on the need for protection and management of coastal resources, and those affected by the management process have been made aware of its provision.</i></p>	✓
<p>EVIDENCE:</p> <p>All the fishery agencies have processes, committees and groups that allow coastal zone resource management issues to be brought to formal review and engagement. The PFMC meetings are fora for consulting and creating awareness of issues to do with coastal resource management and their potential impact on fish stocks and socio-economic interests.</p> <p>Representatives from fishery management organizations and fishing communities participate in coastal area management planning through the federal National Environmental Policy Act (NEPA) processes. This includes decision-making processes and activities relevant to the fishery resource and its users in support of sustainable and integrated use of living marine resources and avoidance of conflict among users. All construction activities in the coastal zone (e.g., work on docks, breakwaters, harbors and other infrastructure) are subject in many cases to the NEPA process. These processes deliberately take into account all resources and users of those resources. Conflict resolution mechanisms include both administrative (through governmental agencies) and legal (through courts of law) procedures. The review process requires participation by: the project applicant, state resource agencies the affected local coastal district and other interested members of the public, including fishermen’s organizations and private individuals. Other state and federal programs affecting fishery resources include the National Fish Habitat Action Plan administered by the U.S. Fish and Wildlife Service (USFWS). The mission of this program is to protect, restore and enhance fish and aquatic communities through partnerships with state and local groups and agencies (NOAA Fisheries 2022h; USFWS 2022).</p>	

A recent example of consultations with the fisheries sector and fishing communities is over the issue of offshore wind energy development. The Bureau of Ocean Energy Development (BOEM) of the US Department of the Interior has committed to a robust process of stakeholder, tribal and public engagement by sharing information and resources. The PFMC has been actively engaged in this process (PFMC 2021g; 2022j). The BOEM has included federal waters offshore Oregon (at water depths >1300m) as potential lease areas for wind farms (BOEM 2021a). In 2021 BOEM conducted a series of workshops and webinars to provide an overview of leasing planning, present maps of fishery related data in the OROWindMap database, and get feedback on fisheries and more general issues (BOEM 2021b). An ongoing BOEM Oregon Intergovernmental Renewable Energy Task Force coordinates federal, Tribal, state, and local governmental bodies, serving as a forum to discuss stakeholder issues and concerns, exchange data and information and facilitate dialogue and collaboration (BOEM 2021a).

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that representative of the fisheries sector and fishing communities are consulted in the decision-making processes and involved in other activities related to coastal area management planning and development. The public, and others affected, are also kept aware of the need for the protection and management of coastal resources and are participants in the management process. Examples may include public records of
EVIDENCE: The PFMC website (2022a) actively encourage and demonstrate participation by stakeholders at their respective public meetings and cover a wide range of topics regarding the use, development and management of coastal resources. Furthermore, the Council is statutorily obliged to establish or participate in more regional or local fora in order to engage stakeholders and encourage their contribution to the decision-making process

References:	
Numerical score:	Starting score 10 - (Number of EPs NOT met 0 x 3) = Overall score 10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)	High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)	Full Conformance
Non-conformance Number (if applicable):	

Between 2009 and 2011 NOAA completed the estuarine and coastal components of the National Fish Habitat Assessment in support of the National Fish Habitat Action Plan. The assessment compiled and analyzed existing data on the condition of coastal fish habitats and added these data to an online map tool for coastal managers establishing fish habitat policies (NOAA NCCOS 2022).

Evidence Basis: ✓

References

EPA 2022; PFMC 2021g; 2022a; 2022f; 2022j; USFWS 2022; NOAA NCCOS 2022; NOAA Fisheries 2022h; BOEM 2021a; 2021b

Supporting Clause 2.3.

2.3.	Fisheries practices that avoid conflict among fishers and other users of the coastal area (e.g., fisheries enhancement facilities, tourism, energy) shall be adopted, and fishing shall be regulated in such a way as to avoid risk of conflict among fishers using different vessels, gear, and fishing methods. Procedures and mechanisms shall be established at the appropriate administrative level to settle conflicts that arise within the fisheries sector and between fisheries resource users and other coastal users.
Relevance:	Relevant
Evaluation Parameters	Met?
Process: <i>These practices have been adopted, and there is a process to regulate fishing gear, methods, and vessels so as to avoid risk of conflict. If conflicts arise, there is a process in place to settle conflicts between fishery users and other users.</i>	✓

EVIDENCE:

The federal and state management processes provide multiple options for stakeholder engagement and participation in decision making. These processes are intended to minimize conflict and contribute to resolving disputes.

All regulations and management measures are discussed at Council meetings. Council meetings are public fora for stakeholder involvement. Stakeholders are actively encouraged to participate and contribute to existing agenda items or offer up new items for public discussion and management consideration.

Potential conflict between fishermen and other coastal users at the federal level are usually discussed and resolved through the NEPA Process. The NEPA review process deliberately takes into account all resources and users of those resources in order to resolve potential conflicts among users before project approvals are given. The PFMC process serves to provide a forum for fishery conflict resolution. The PFMC encourages testimony from fishers, the environmental community, and the public at-large at meetings and hearings. Conflict resolution mechanisms include both administrative (through governmental agencies) and legal (through courts of law) procedures. However, in most cases management plan and project approvals are withheld until substantive conflicts are resolved (PFMC 2022f)..

Current Status/Appropriateness/Effectiveness:

Describe these practices and their effectiveness within the fishery sector, and between fishers and other coastal users.



EVIDENCE:

A suite of management measures are in place for the hake fisheries that may contribute to minimizing conflict within the fishery sectors or other coastal users. For example, the hake fishery uses pelagic trawls which helps to reduce interaction with the seabed and other sectors that fish on the sea bed; the hake fishery is subject to bycatch limits and fishery closures if bycatch exceeds allowable levels; rockfish conservation area restrictions are in place; Allocation disputes in the hake fishery are minimized by pre-established allocation formulas among the sectors.

The Council process provides a forum for fishery conflict resolution. All regular PFMC meetings, committee meetings and advisory panel meetings are open to the public. Council meetings include a section for public testimony on each issue on the agenda. PFMC and other public meetings are held throughout the management region to encourage public access. Written public comments and summaries are provided to PFMC members in their briefing books and oral testimony is provided at meetings.

Members of the commercial and recreational fishery, the environmental community, and the public at-large are encouraged to testify at PFMC meetings and hearings. This involves speaking in a formal public forum. Public testimony to the Advisory Panel may lead to a proposal to the PFMC, which may then lead to a discussion paper and PFMC development of alternatives to address the problem or situation identified (PFMC 2021c; 2022e).

FMP amendments have been introduced to enhance environmental protection and avoid potential conflict between the fisheries sector and other coastal users. For example Amendment 28 to the Groundfish FMP modified the configuration of EFH Conservation Areas (EFHCAs) that are closed to groundfish bottom trawl fishing in order to protect EFH, closed waters deeper than 3,500 meters to bottom contact fishing gear, opened the trawl RCA to bottom trawl fishing off Oregon and California, and created a framework to consider and implement more flexible area closures with block area closures. The amendment process is well defined and involves extensive discussions over several Council meetings (PFMC 2020q).

Evidence Basis:



The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fisheries practices that avoid conflict among fishers and other users of the coastal area (e.g., fisheries enhancement facilities, tourism, energy) are adopted and fishing is regulated in such a way as to avoid risk of conflict among fishers using different vessels, gear, and fishing methods. Procedures and mechanisms are established at the appropriate administrative level to settle conflicts that arise within the fisheries sector, and between fisheries resource users and other coastal users. Examples may include laws and regulations or other documents.

EVIDENCE:

The availability and adequacy of the evidence is sufficient to substantiate that fisheries practices that avoid conflict among fishers and other users in the coastal areas are adopted and fishing is regulated to avoid risk of conflict.

References: PFMC 2020q; 2021c; 2022e

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)							High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)							Full Conformance
Non-conformance Number (if applicable):							

Supporting Clause 2.4.

2.4. States' fisheries management organizations and sub-regional or regional fisheries management organizations and arrangements shall give due publicity to conservation and management measures and ensure that laws, regulations, and other legal rules governing their implementation are effectively disseminated. The bases and purposes of such measures shall be explained to users of the resource in order to facilitate their application and thus gain increased support in the implementation of such measures.

Relevance:	Relevant
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Evaluation Parameters	Met?
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Process: <i>There is a process that allows for fishery-related information to be disseminated.</i>	✓
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EVIDENCE:
Representatives of the fisheries sector and fishing communities are consulted in the decision-making processes and in other activities related to coastal area management planning and development. This happens through the PFMC and NEPA processes and proceedings, as well as through public review processes organized by NMFS. Detailed information on the nature of the consultation processes within the PFMC system is provided in Supporting Clauses 1.7 and 1.8.

NOAA, and PMFC have websites that provide extensive information on management and conservation measures for interested parties. This information includes news releases, species profiles, newsletters, meeting agendas, meeting minutes and supporting documentation (NOAA Fisheries 2022a; 2022c; PFMC 2022a; 2022c).

Current status/Appropriateness/Effectiveness: <i>There is a record of the disseminated information, and is it disseminated effectively, and the basis and purposes of such regulation explained to users.</i>	✓
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EVIDENCE:

The MSA requires Councils to hold public meetings within their respective regions to discuss the development and amendment of FMPs. These meetings are publicized by the PFMC and stakeholders actively encouraged to participate changes and allow input from stakeholders (MSA 2007).

The public Council meetings provide an opportunity for discussion of new regulations and management measures. Extensive information is disseminated at meetings, on the Council and NMFS websites, local offices of federal and state enforcement and through state fish and wildlife agency offices. In addition to local radio, printed news releases and Emergency Orders (available at local harbor master's offices, marine supply outlets, etc) are also important sources of public information.

OLE, USCG and state enforcement agencies place an emphasis on educating and informing stakeholders of new regulatory changes and other important fishery related matters (Busch 2021).

Evidence Basis:	✓
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2.4. States' fisheries management organizations and sub-regional or regional fisheries management organizations and arrangements shall give due publicity to conservation and management measures and ensure that laws, regulations, and other legal rules governing their implementation are effectively disseminated. The bases and purposes of such measures shall be explained to users of the resource in order to facilitate their application and thus gain increased support in the implementation of such measures.

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States' fisheries management organizations and sub-regional or regional fisheries management organizations and arrangements give due publicity to conservation and management measures and ensure that laws, regulations and other legal rules governing their implementation are effectively disseminated. The bases and purposes of such measures are explained to users of the resource in order to facilitate their application and thus gain increased support in the implementation of such measures. Examples may include records of such management measures published in the internet or distributed at public meetings.

EVIDENCE:
The evidence is sufficient to substantiate that the fishery management organizations give due publicity to conservation and management measures are effectively disseminated.

References: NOAA Fisheries 2022a; 2022c; PFMC 2022a; 2022c; MSA 2007; Busch 2021

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x	3	)	=	Overall score
	10								10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)									High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)									Full Conformance
Non-conformance Number (if applicable):									

Supporting Clause 2.5.

2.5. The economic, social, and cultural value of coastal resources shall be assessed by the appropriate fisheries management organization in order to assist decision making on their allocation and use.

Relevance: Relevant

Evaluation Parameters	Met?
Process: <i>There is a system that allows for socio-economic value assessments and cultural value assessments to be carried out.</i>	✓

EVIDENCE:
The PFMC Groundfish FMP recognizes the need to balance many competing uses of marine resources and different social and economic goals for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. It includes social and economic characteristics of the fishery as an element in the FMP. Section 6.2.3 is a Socioeconomic Framework that addresses occasions when the Council will recommend management actions to address certain social or economic issues in the fishery. Examples of management issues with a social or economic basis include resource allocation, seasons, or landing limits based on market quality and timing, safety measures, and prevention of gear conflicts among others.

Utilization and Economics and Social factors comprise 12 of the 17 objectives of the Groundfish FMP. FMPs must examine the social and economic importance of fisheries to communities potentially affected by management measures. Appendix A of the Groundfish FMP contains information in support of management, including a section on Social and Economic Characteristics of the fishery (PFMC 2020q).

National Standard 8 of the MSA requires that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of

overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that are based upon the best scientific information available (50 CFR 600.305 2022).

Executive Order 13175 (2000) requires regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes. The Secretary recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources, and in doing so opens the management decision system to a broader sphere of cultural values. In addition, the MSA specifies a seat on the PFMC for a representative of an Indian tribe with Federally-recognized fishing rights from California, Oregon, Washington, or Idaho.

Current status/Appropriateness/Effectiveness:

There are socio-economic value assessments and cultural value assessments, both of which are effectively assisting decision making on resource allocation and use.



EVIDENCE:

The NEPA processes provide the public with information and opportunity for public involvement that is robust and inclusive at both the state and federal levels. Decisions are made through public processes and involvement of fishery managers, fishermen, fishing organizations and fishing communities is actively invited through publicly advertised and scheduled meetings. Assessing the social and cultural value of coastal resources is stated as an explicit part of the decision making process for allocation and use of resources.

For the trawl groundfish IFQ program specifically, Amendment 20 is motivated by the long-term goal of capacity rationalization that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch. This goal is supported by 8 measurable objectives that are long-term in their implementation: a system of total catch accounting, profitable, and efficient fishery, reduction of bycatch and discard mortality and the minimization of ecological impacts, avoidance of adverse effects on communities and other fisheries, promotion of measurable economic and employment benefits, provision of quality product and increased safety (PFMC 2021f)

A five-year review of the trawl catch shares program was conducted in 2016. A report was published in 2017 (PFMC and NMFS 2017). The review evaluated a number of cost-effectiveness and social impacts aspects of the program, including 1. Changes in the net benefits to the nation 2. Financial outcomes for fishery participants 3. Distribution of cost, revenues, effort, and net benefits among fishery participants 4. Changes in utilization rates of available fish species under the catch share program.

Social factors are embedded in discussions of these major categories.

Socio-economic considerations are included in the PFMC Fishery Ecosystem Plan (FEP) (PFMC 2021d). FEP Initiative 3 is the Climate and Communities Initiative, combining the socioeconomic effects of fisheries and the effects of climate variability and change on managed fish stocks. To achieve a more holistic modeling approach, NMFS intends both ecosystem and socioeconomic drivers to be incorporated into stock assessments, where appropriate. Since the development of the original Pacific Coast FEP there have been advances in the use of ecosystem information as the supporting context for west coast stock assessments.

The Annual Ecosystem Status Report (ESR) for the California Current Ecosystem includes contextual information on a range of biophysical and socioeconomic indicators:

- Chapter 4 Fishery Landings, Revenue and Activity
- Chapter 5 Human Wellbeing.

Report Appendices encompass a number of social and economic indicators:

- State-By-State Fishery Landings And Revenues
- Potential For Spatial Interactions Among Ocean-Use Sectors
- Social Vulnerability Of Fishing-Dependent Communities
- Fleet Diversification Indicators For Major West Coast Ports

The Council is also required to comment upon and make recommendations on activities it views as likely to “substantially affect the habitat, including EFH” of anadromous species (salmon) under its authority. For all other species’ EFH, the Council *may* make comments and recommendations. This includes commenting on activities that affect prey species, which are legally considered a component of EFH. The Council’s Habitat Committee provides advice to the Council on a wide variety of habitat-related issues, working with other advisory bodies to resolve habitat problems and avoid future habitat conflicts and recommending actions that will help achieve the Council’s habitat objectives. Meetings are open to the public.

<p>Current status/Appropriateness/Effectiveness: <i>Systems of monitoring and research have taken into account physical, chemical, biological, economic, social, legal, and institutional capabilities to support coastal area management.</i></p>	
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EVIDENCE:

The coastal zone is monitored as part of the coastal management process using physical, chemical, biological, economic and social parameters. Involvement include federal and state agencies and programs including the U.S. Forest Service, U.S. Fish and Wildlife Service, NMFS Pacific Marine Environmental Lab (PMEL), California Coastal Commission, Oregon Department of Land Conservation and Development (DLCD), Washington Department of Ecology (DOE), The NMFS’ Habitat Conservation Division (HCD) and their Essential Fish Habitats (EFH) monitoring and protection program, the U.S. Coast Guard.

The NOAA Fisheries Strategic Plan calls for predictive models of the consequences of climate change on ecosystems through monitoring changes in coastal and marine ecosystems, conducting research on climate-ecosystem linkages, and incorporating climate information into physical-biological models (NOAA Fisheries 2019).

NOAA Fisheries and its partners have developed Regional Action Plans to guide implementation of the NOAA Fisheries Climate Science Strategy in each of its regions. In the Western Region, climate-related changes include changes in precipitation patterns, stream flow, temperatures, sea level, and water chemistry. The Northwest and Southwest Fishery Science Centers focus on research to improve understanding of risks to marine ecosystems, species, and communities; how to forecast them; and identify ways to mitigate their impacts. Additionally, they conduct a variety of climate-related science activities including research on the impacts of environmental variability and climate change on marine ecosystems, fish stocks, and fisheries (NOAA Fisheries 2022i).

The NOAA Pacific Marine Environmental Laboratory (PMEL) undertakes marine ecosystem research focusing on measuring, understanding, and predicting impacts of natural physical, chemical, biological, geological, and anthropogenic processes on the oceanic web of life. A sub-set of their work known as “Oceans and Coastal Processes Research” includes an understanding of ocean physics and interactions between the ocean and both the seafloor and atmosphere (NOAA 2022d).

<p>2.6.</p>	<p>States shall cooperate to support and improve coastal area management, and in accordance with capacities, measures shall be taken to establish or promote (1) systems for research and monitoring of the coastal environment, and (2) multidisciplinary research of the coastal area using physical, chemical, biological, economic, social, legal, and institutional capabilities.</p>
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<p>Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is cooperation to support and improve coastal area management, and in accordance with capacities, measures are taken to establish or promote (1) systems for research and monitoring of the coastal environment, and (2) multidisciplinary research of the coastal area using physical, chemical, biological, economic, social, legal, and institutional capabilities. Examples may include reports on the status of the coastal area using the various aspects listed above.</i></p>	
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EVIDENCE:

The availability and quality of the evidence is sufficient to substantiate that there is cooperation to support and improve coastal area management and measures are taken to establish or promote systems for research and monitoring and multidisciplinary research of the coastal areas.

References: NOAA Fisheries 2019; 2022i; NOAA 2022d

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x	3	)	=	Overall score
	10								10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)									High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)									Full Conformance
Non-conformance Number (if applicable):									

Supporting Clause 2.7.

2.7. In the case of a States’ activities that may have an adverse environmental effect on coastal areas of other States, States shall provide timely information and if possible, prior notification to potentially affected States, and consult with those States as early as possible.

Relevance: Relevant

Evaluation Parameters	Met?
Process: <i>There is a system to allow early information sharing (i.e., within appropriate timeframes to avoid negative consequences) between States in case of adverse environmental effects from one State.</i>	

EVIDENCE:

Oil spills: The Pacific States - British Columbia Oil Spill Task Force has been in place since 1989, formed in the wake of a 1988 oil spill off the Washington coast to which agencies were unequipped and unprepared to respond. The task force brought together Washington, Oregon, California, Alaska, British Columbia and Hawaii to fulfill the mandates of the Oil Pollution Act of 1990 in their jurisdictions. Now, they have proactive spill response times, enhanced funding for equipment and training, geographic risk assessments, insurance requirements for oil shippers, emergency tug programs, and partnerships with the U.S. Coast Guard. The Task Force produces annual reports which include, prevention, preparedness, response and communication updates as well as jurisdictional reviews of the US members’ states and British Columbia (Oil Spill Task Force 2022).

Invasive Species: In 1999, in response to the significant environmental threats posed by aquatic invasive species, PSMFC established the AIS Prevention Program. The goal of the program is to prevent and/or minimize the impacts of AIS, particularly those species that affect fisheries and the habitat upon which those fisheries depend. The program elements include prevention, research, monitoring, education and outreach, and interjurisdictional planning and coordination (PSMFC 2022b).

Ocean Health: On September 18, 2006 the Governors of California, Oregon and Washington announced the West Coast Governors’ Agreement on Ocean Health. The Agreement launched a new, proactive regional collaboration to protect and manage the ocean and coastal resources along the entire West Coast, as called for in the recommendations of the U.S. Commission on Ocean Policy and the Pew Oceans Commission (NOAA 2022c).

After extensive public participation and close coordination with three federal co-leads from the Department of Commerce, the Department of the Interior, and the Environmental Protection Agency, the Governors released their Action Plan in July 2008.

The Action Plan highlights two overarching actions:

- 1) establish a national ocean trust fund and
- 2) mitigate and adapt to climate change impacts.

In addition to these overarching actions, there are 24 visionary actions within the following areas:

Polluted runoff

- * Harmful algal blooms and hypoxia
- * Marine debris
- * Oil spill prevention and response
- * Maritime shipping emission controls
- * Habitat protection and restoration
- * Marine invasive species
- * Ecosystem-based management
- * Offshore oil and gas operations
- * Alternative environmentally sustainable energy development
- * Ocean awareness and literacy
- * Regional marine research
- * Ocean observing and long-term monitoring
- * Seafloor mapping
- * Working waterfronts and sustainable coastal economies
- * Regional sediment management

In late summer 2008, nine Action Coordination Teams (ACTs) were established including representatives from the three states, federal and tribal governments, academia, industry, non-governmental organizations and interested citizens.

- * Climate change
- * Polluted runoff
- * Marine debris
- * Spartina eradication
- * Renewable ocean energy
- * Ocean education
- * Sustainable communities
- * Sediment
- * Regional research
- * Seafloor mapping
- * Integrated ecosystem assessments (IEAs)

Partners in the agreement are the California Governors Office, California Natural Resources Agency, Oregon Governors Office, Washington Governors Office, NOAA National Marine Fisheries Service, NOAA Coastal Services Center, Department of the <http://www.doi.gov/> Interior and the U.S. Environmental Protection Agency (NOAA 2022c).

The at-sea sectors of the Pacific hake fishery worked with EPA to develop a general National Pollutant Discharge Elimination System (NPDES) permit to authorize at-sea discharge of fish processing wastes. This process was completed in 2019 with the final NPDES permit issued May 1, 2019 (Waldeck 2020).

Current status/Appropriateness/Effectiveness:

There are current agreements for or past records of such occurrences. Examples may include oil spills, and aquaculture farm escapes among others.



EVIDENCE:

The West Coast and Canada agreements on oil spill response, aquatic invasive species and ocean health described above are all evidence of current agreements.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the case of a States' activities that may have an adverse environmental effect on coastal areas of other States, the State provides timely information and if possible, prior notification to potentially affected States. Examples may include reports or data on the international cooperation in these events.

✓

EVIDENCE:

The evidence is sufficient to substantiate that in the case of West Coast states' activities having an adverse environmental impact on each other or on the coastal area of Canada the states are parties to agreements that are designed to foster communication and provide timely information or prior notification.

References:	Oil Spill Task Force 2022; PSMFC 2022b; NOAA 2022c; Waldeck 2020				
Numerical score:	Starting score 10	-(	Number of EPs NOT met	x3)=	Overall score 10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance

Fundamental Clause 3. Management objectives and plan

Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.

Supporting Clause 3.1.

3.1.	Long-term management objectives shall be translated into a plan or other management document (taking into account uncertainty and imprecision) and be subscribed to by all interested parties.
Relevance:	Relevant
Evaluation Parameters	
Process:	
Management objectives based on the best scientific evidence available (which can include traditional/local knowledge, if verifiable) have been translated into a fishery management plan, are in regulation, or are in another document.	✓
EVIDENCE:	
Management objectives under the Pacific Whiting Treaty are contained in the four management principles adopted by the Joint Management Committee in 2014:	
<ul style="list-style-type: none"> • Maintain a healthy stock status across a range of recruitment events and consider total allowable catch levels that spread the harvest of strong cohorts over multiple years • Manage the fishery resource in a manner that aims to provide the best long-term benefits to the Parties. • Manage the fishery to ensure that each country has the opportunity to receive the intended benefits contemplated in the treaty. • These management principles are dynamic and shall be reviewed annually by the JMC and the AP to ensure they remain valid (NOAA Fisheries 2021b). 	
Under the MSA, the PFMC is required to prepare and submit an FMP to the secretary of Commerce for approval for each fishery under its authority that is considered to require conservation and management. In so doing, the FMPs have to be consistent with ten national standards for fishery conservation and management (MSA 2007). The US allocation of Pacific Hake is managed under the Pacific Coast Groundfish FMP (PFMC 2020q).	
Current status/Appropriateness/Effectiveness:	
The objectives described by the management plan are consistent with the sustainable use of the resource, and are subscribed to by all relevant fishery stakeholders.	✓
EVIDENCE:	
The preamble to the Pacific Whiting Treaty, developed and adopted by both Parties, describes the goals of international cooperation in scientific research and management in support resource stewardship and the social and economic sustainability of fishery stakeholders (US Government 2003).The Treaty’s management objectives are directly related to the sustainable use of the Pacific hake resource, addressing the need to maintain healthy stocks under conditions of biological variability, manage for long-term benefits and access to those benefits by the Parties, and to continually review and adapt to changing conditions. The continuing collaboration among American and Canadian scientists, managers and stakeholders in Treaty processes is evidence of support for the management objectives. The absence of an agreement on a coastwide TAC in 2020 and 2021 did not indicate a weakening of support for the objectives, but rather a reflection of different utilization contexts of the Parties.	
The PFMC’s Pacific Coast Groundfish FMP covers the US portion of the Pacific hake fishery. The FMP is organized around three management goals and 17 objectives intended to meet the goals.	
Management Goals are listed in order of priority for managing the west coast groundfish fisheries, to be considered in conjunction with the national standards of the Magnuson-Stevens Act.	
1. Conservation.	Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources.
<div style="display: flex; justify-content: space-between;"> Americas, Inc. Page 117 of 310 </div>	

2. Economics. Maximize the value of the groundfish resource as a whole.
3. Utilization. Within the constraints of overfished species rebuilding requirements, achieve the maximum biological yield of the overall groundfish fishery, promote year-round availability of quality seafood to the consumer, and promote recreational fishing opportunities.

Management Objectives are intended to accomplish the management goals, and are listed by category as conservation, economics, utilization and social factors (PFMC 2020q).

Conservation Objectives

1. Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.
2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems.
3. For species or species groups that are overfished, develop a plan to rebuild the stock as soon as possible, taking into account the status and biology of the stock, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock within the marine ecosystem.
4. Where conservation problems have been identified for non-groundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a non-groundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of non-groundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.
5. Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.

Economics

6. Within the constraints of the conservation goals and objectives of the FMP, attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.
7. Identify those sectors of the groundfish fishery for which it is beneficial to promote yearround marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.
8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.

Utilization

9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries.
10. Recognize the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.
11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

Social Factors.

12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably
13. Minimize gear conflicts among resource users.
14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.
15. Avoid unnecessary adverse impacts on small entities.
16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.
17. Promote the safety of human life at sea.

For the trawl groundfish IFQ program specifically, Amendment 20 is motivated by the long-term goal of capacity rationalization that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch. This goal is supported by 8 measurable objectives that are long-term in their implementation: a system of total catch accounting, profitable, and efficient fishery, reduction of bycatch and discard mortality and the minimization of ecological impacts, avoidance of adverse effects on communities and other fisheries, promotion of measurable economic and employment benefits, provision of quality product and increased safety.

Economics

6. Within the constraints of the conservation goals and objectives of the FMP, attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.
7. Identify those sectors of the groundfish fishery for which it is beneficial to promote yearround marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.
8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.

Utilization

9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries.
10. Recognize the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.
11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

Social Factors.

12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably
13. Minimize gear conflicts among resource users.
14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.
15. Avoid unnecessary adverse impacts on small entities.
16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.
17. Promote the safety of human life at sea.

For the trawl groundfish IFQ program specifically, Amendment 20 is motivated by the long-term goal of capacity rationalization that increases net economic benefits, creates individual economic stability, provides for full utilization of

the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch. This goal is supported by 8 measurable objectives that are long-term in their implementation: a system of total catch accounting, profitable, and efficient fishery, reduction of bycatch and discard mortality and the minimization of ecological impacts, avoidance of adverse effects on communities and other fisheries, promotion of measurable economic and employment benefits, provision of quality product and increased safety (PFMC 2018; 2020q; 2021f).

In 2013 the Council adopted the Pacific Coast Fishery Ecosystem Plan (FEP) for the U.S. Portion of the California Current Large Marine Ecosystem that contains long-term objectives. The FEP identifies existing FMP ecosystem-based principles and management measures taken to mitigate the impact of fishing on the environment or ecosystem, or measures that take into account the effects of the biophysical environment on managed species. Appendix A of the FEP identifies ecosystem-based fishery management initiatives to coordinate Council management across its FMPs and the California Current Ecosystem (PFMC 2021d).

3.1.	Long-term management objectives shall be translated into a plan or other management document (taking into account uncertainty and imprecision) and be subscribed to by all interested parties.			
Evidence Basis:	<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that scientifically based long-term management objectives consistent with the sustainable use of the resource are translated into a plan or other management document which is subscribed to by all interested parties. Examples may include fishery management plan/framework or legal rules.</i>			✓
EVIDENCE:	The four management principles guiding decisions under the Pacific Whiting Treaty are based on using the best available science to promote the sustainable use of the resource, and are subscribed to by American and Canadian stakeholders. The requirement for the PFMC Groundfish FMP to be consistent with the national standards combined with the adoption of management and policy objectives demonstrates that the Pacific hake fishery has long-term management objectives that are consistent with the sustainable use of the resource, and are subscribed to by all relevant fishery stakeholders.			
References:	MSA 2007; PFMC 2020q; 2018; 2021d; 2021f; NOAA Fisheries 2021b; US Government 2003			
Numerical score:	Starting score	-	(Number of EPs <u>NOT</u> met x 3) =	Overall score
	10		0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)				High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)				Full Conformance
Non-conformance Number (if applicable):				

Supporting Clause 3.1.1

3.1.1.	There shall be management objectives seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification and any fisheries enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.			
Relevance:	Relevant			

Evaluation Parameters	Met?
<p>Process: <i>There is a process that allows for setting specific management objectives in fishery management plans or other relevant regulation (or other appropriate frameworks) for the protection of ETP species.</i></p>	✓
<p>EVIDENCE:</p> <p>Management objectives 3-5 of the Groundfish FMP specifically address the protection of ETP species by requiring the rebuilding of overfished stocks, addressing impacts of the groundfish fishery on conservation problems in other species, and identifying adverse impacts on EFH (PFMC 2020q).</p> <p>3. For species or species groups that are overfished, develop a plan to rebuild the stock as soon as possible, taking into account the status and biology of the stock, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock within the marine ecosystem.</p> <p>4. Where conservation problems have been identified for non-groundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a non-groundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of non-groundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.</p> <p>5. Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.</p> <p>External to MSA requirements to develop rebuilding plans for overfished stocks, ETP species are protected under “other applicable laws” applied to fisheries management. These include the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA) and the Migratory Bird Treaty Act (MBTA) (PFMC 2022b). Each of these statutes has inter-agency consultation provisions and regulatory authority over species under their jurisdiction.</p> <p>For example, as described in SC 12.2.4, Section 4(f) ESA directs NOAA’s National Marine Fisheries Service (NMFS) to develop and implement recovery plans for threatened and endangered species. NMFS Office of Law Enforcement works with the U.S. Coast Guard and other partners to enforce and prosecute ESA violations. Recovery plans for ESA-listed species must include: (1) a description of site-specific management actions necessary to conserve the species or populations; (2) objective, measurable criteria which, when met, will allow the species or populations to be removed from the endangered and threatened species list; and (3) estimates of the time and funding required to achieve the plan’s goals. Each ESA-listed species has a recovery plan, and regular updates on progress toward recovery are made.</p>	
<p>Current status/Appropriateness/Effectiveness: <i>There are clear objectives in management plans or other relevant regulations (or other appropriate frameworks) seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification and fishery enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible. Such objectives may be outlined in overarching fisheries legislation, regulations, or management plans.</i></p>	✓
<p>EVIDENCE:</p> <p>FMP objectives related to the protection of ETP species are outlined above. An example of regulations relevant to ETP species are those pertaining to salmon bycatch:</p> <ul style="list-style-type: none"> • Automatic closure of the Pacific hake fishery when it exceeds (or is projected to exceed) 14,500 Chinook 	

- Bycatch reduction area (BRA) at the 200-fm depth contour.
- Salmon bycatch rates are monitored inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector - whiting IFQ fishery, CP sector, MS sector, and non-whiting midwater trawl sector - to prohibit the use of midwater trawl gear to target either whiting or non-whiting groundfish in waters shoreward of the 200-fm depth contour.
- Salmon Mitigation Plans (SMP) are submitted annually by fishery cooperatives to NMFS detailing measures used to manage salmon bycatch. Block Area Closures (BACs), a sector-specific spatial closure if too much salmon is being caught (50 CFR 660 2020e; PFMC 2021; Waldeck 2022).

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are management objectives seeking to ensure that endangered species are protected from adverse impacts resulting from interactions with the unit of certification and any associated culture or enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible. Examples may include fishery management plans/framework or legal rules.

✓

EVIDENCE:

The available evidence is sufficient to substantiate that ETP species are protected through management measures, regulations and fishery operations.

References:

PFMC 2020q; 2021; Waldeck 2022; 50 CFR 660 2020e

Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 3.1.2

3.1.2. There shall be management objectives seeking to avoid, minimize, or mitigate impacts of the unit of certification on the stock under consideration’s essential habitats, and on habitats that are highly vulnerable to damage by the unit of certification’s fishing gear.

Relevance:

Relevant.

Evaluation Parameters

Met?

Process:

There is a mechanism in place by which the essential habitat of the stock under consideration and the potential impacts of the fishery (i.e., employing bottom contact gear) upon them are identified. This or a similar mechanism shall also be in place to identify habitats, which are highly vulnerable to fishery activities by the unit of certification. The information provided by these mechanisms shall be used to produce specific management objectives seeking to avoid significant negative impacts on habitats. When identifying highly vulnerable habitats, their value to ETP species shall be also considered, with habitats essential to ETP species being categorized accordingly. Note that this clause shall consider Alaska- specific designation of important and essential fish habitats categorized as such at the state and federal level. Such objectives may be outlined in overarching fisheries legislation, regulations, or management plans.

✓

EVIDENCE:

The Council and National Marine Fisheries Service are required by law to identify and protect the essential fish habitat (EFH) of species managed under fishery management plans. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The NMFS and regional Fishery Management Councils must describe and identify EFH in fishery management plans), minimize adverse effects of fishing on EFH, and encourage the conservation and enhancement of EFH (MSA 2007).

The requirement is reflected in Objective 5 of the Groundfish FMP: Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH (PFMC 2020q).

Midwater (pelagic, or off-bottom) trawl gear is the only gear allowed for vessels participating in the primary whiting season. A midwater trawl is defined as a trawl in which the otter boards and footrope of the net remain above the seabed. It has no rollers or bobbins on any part of the net or its component wires, ropes, and chains (50 CFR 660.130 (b) subpart D (2022)).

Current status/Appropriateness/Effectiveness:
There is evidence that the objectives described above are in place, and that effective management measures relative to those have been implemented. ✓

EVIDENCE:

NOAA Fisheries' Habitat Conservation Division (HCD) works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on EFH and living marine resources NOAA Fisheries 2022f).

The Council can create an area closure (like a Rockfish Conservation Area) or put limits on gear to protect fish habitat, whether or not it is designated as EFH. However, the Council *must* identify and describe EFH for the Council's managed species, and must describe both fishing and non-fishing impacts on EFH. These descriptions can be found in the Council's FMPs and are updated roughly every five years. The Council must also identify habitat areas of particular concern, which are a subset of EFH that highlight especially important habitat areas or types.

The Council is also required to comment upon and make recommendations on activities it views as likely to "substantially affect the habitat, including EFH" of anadromous species (salmon) under its authority. For all other species' EFH, the Council *may* make comments and recommendations. This includes commenting on activities that affect prey species, which are legally considered a component of EFH. The Council's Habitat Committee provides advice to the Council on a wide variety of habitat-related issues, working with other advisory bodies to resolve habitat problems and avoid future habitat conflicts and recommending actions that will help achieve the Council's habitat objectives. Meetings are open to the public.

FMP amendments have been introduced to enhance environmental protection and avoid potential conflict between the fisheries sector and other coastal users. For example Amendment 28 to the Groundfish FMP modified the configuration of EFH Conservation Areas (EFHCAs) that are closed to groundfish bottom trawl fishing in order to protect EFH, closed waters deeper than 3,500 meters to bottom contact fishing gear, opened the trawl RCA to bottom trawl fishing off Oregon and California, and created a framework to consider and implement more flexible area closures with block area closures. The amendment process is well defined and involves extensive discussions over several Council meetings (PFMC 2020q).

Midwater gear requirements are routinely enforced in the fishery (PFMC 2021b).

Evidence Basis:
The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are management objectives seeking to avoid, minimize, or mitigate impacts of the unit of certification on the stock under consideration's essential habitats and on habitats that are highly vulnerable to damage by the unit of certification's fishing gear. Examples may include various regulations, fishery management plans, data, and reports. ✓

EVIDENCE:
 The availability and adequacy of evidence is sufficient to substantiate that there are gear regulations and management objectives seeking to avoid, minimize or mitigate impacts of the unit of certification on the stock under consideration's essential habitats and on habitats vulnerable to damage by the unit of certification's fishing gear.

References:	MSA 2007; PFMC 2020q; NOAA Fisheries 2022f; PFMC 2021b		
Numerical score:	Starting score	Number of EPs <u>NOT</u> met	Overall score
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)	Full Conformance
Non-conformance Number (if applicable):	

Supporting Clause 3.1.3

3.1.3.	There shall be management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement) on the structure, and function of the ecosystems that are likely to be irreversible or very slowly reversible.
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Evaluation Parameters

Process:

There is a process in place by which adverse impacts of the fishery (including any fishery enhancement) on the structure, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible are identified. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored. This process results in setting relative management objectives. Management priority shall be focused primarily towards minimizing and avoiding identified impacts.

EVIDENCE:

Regional fishery management councils develop fishery ecosystem plans as a metric to help fishery managers determine whether management effectively incorporates core ecosystem principles. Fishery ecosystem plans:

- Provide a clear description and understanding of the fundamental physical, biological, and human/institutional context of ecosystems within which fisheries are managed.
- Direct how that information should be used in the context of fishery management plans.
- Set policies that guide development and implementation of fishery management options (NOAA Fisheries 2022j).

In November 2009, the Council appointed two new ad hoc advisory bodies, the Ecosystem Plan Development Team (EPDT) and the Ecosystem Advisory SubPanel (EAS). From 2010 through early 2013, these advisory bodies, with direction from the Council and in cooperation with its permanent committees, developed a draft FEP for public review, released in February 2013. At its April 2013 meeting the Council adopted a final FEP, providing instructions for the document's last revisions and for the Council's future discussions of ecosystem science and cross-FMP policy issues (PFMC 2021d; 2021e; 2022d).

The Pacific Fishery Management Council's Fishery Ecosystem Plan helps the Council incorporate ecosystem science into its fishery management decisions. Unlike the Council's four other fishery management plans, it is not focused on directly regulating fisheries. Instead, it focuses on "initiatives" that focus on specific ecosystem topics and how they affect managed fisheries. Recent initiatives include protection of unfished forage fish, ecosystem indicators, and the effects of climate change on fishing communities (PFMC 2021d).

The Fishery Ecosystem Plan (FEP) calls for an annual report to the Council on status and trends in the California Current Ecosystem (CCE). The purpose of the Report is to present ecosystem information for the CCE to the Council in a succinct, straightforward format so that the Council may take into account ecosystem variability in its decisions. The Report synthesizes data to present key environmental, biological, and socioeconomic indicators. Trends in physical, biological, and socioeconomic components of the ecosystem – taking into account the effects of fisheries and other human activities – are thus highlighted (PFMC 2021d).

The main impacts of the fishery on these key ecosystem issues can be inferred from the Ecosystem (CCE) Integrated Ecosystem Assessment (IEA) (NOAA Fisheries 2022k; PFMC 2022g). Results suggest that the Hake mid-water trawl primarily has direct impacts on its target and bycatch species. Few indirect effects from the fleet extended through predator-prey links to other parts of the food web, but the few include increases in krill, small planktivores, large piscivorous flatfish, Dover sole, shortbelly rockfish, and shrimp.

Current status/Appropriateness/Effectiveness:

There are management measures in place to achieve the objectives described in the process parameter. Such objectives may be outlined in overarching fisheries legislation, regulations, or management plans.

EVIDENCE:

Appendix A to the FEP is an Ecosystem Initiatives appendix that:

- 1) provides the Council with a process by which it may consider ecosystem-based management initiatives to address issues of interest to the Council that may cross authorities of two or more of its FMPs;
- 2) provides a fleshed-out example FEP Initiative 1 that the Council has decided to consider in 2013 and beyond, to protect unfished lower trophic level (forage) fish species within the U.S. West Coast Exclusive Economic Zone (EEZ); and
- 3) provides additional potential cross-FMP initiatives for review and consideration by the Council and the public.

Each year at the Council’s March meeting, the Council and its advisory bodies review progress to date on any ecosystem initiatives the Council already has underway, review the list of potential ecosystem initiatives provided in Appendix A to the FEP and determine whether any of those initiatives merit Council attention in the coming year. If initiatives are chosen for Council efforts background materials are from the appropriate entities. Every two years the Council assesses whether there are new ecosystem initiative proposals that could be added to the appendix (PFMC 2021d).

Amendment 25 to the Groundfish FMP was approved in 2015, adding a suite of lower trophic level species to the FMP’s list of ecosystem component (EC) species. Consistent with the objectives of the Council’s FMPs and its Fishery Ecosystem Plan, Amendment 25 prohibits future development of directed commercial fisheries for the suite of EC species shared between all four FMPs until and unless the Council has had an adequate opportunity to both assess the scientific information relating to any proposed directed fishery and consider potential impacts to existing fisheries, fishing communities, and the greater marine ecosystem (PFMC 2020q).

In September 2018, the Council initiated a five-year review of the Pacific Coast Fishery Ecosystem Plan. In March 2020 the Council took final action to adopt revised FEP Chapters 1 & 2 based on the public review draft with revisions recommended by its advisory bodies and the public. In March 2021 the EWG provided revised drafts of FEP Chapters 3 and 4 to the Council and an outline for a stand-alone document titled Guidance Document on Offshore Non-Fishing Activities (based on current Chapter 5). In September 2021 the EWG provided a complete draft of the revised FEP. Based on advisory body comments, a final draft was completed and made available for public review on the Council website. The Council intends to adopt the revised FEP at its March 2022 meeting, concluding the review process. In doing so, additional initiatives may be incorporated into FEP Appendix A, which describes potential future FEP initiatives for Council consideration (PFMC 2021d; 2021e).

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are management objectives seeking to minimize adverse impacts of the fishery (including any enhancement activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. Examples may include fishery management plans, other regulatory documents, or laws.

3.1.3. There shall be management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement) on the structure, and function of the ecosystems that are likely to be irreversible or very slowly reversible.

EVIDENCE:

The availability and quality of the evidence is sufficient to substantiate that there are management objectives and Council actions seeking to minimize adverse impacts of the fishery on the structure, processes and function of aquatic ecosystems that likely to be irreversible or very slowly reversible.

References: NOAA Fisheries 2022k; PFMC 2022g; PFMC 2021d; 2021e; 2022d

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 3.2.

Management measures shall provide, inter alia, that:

Supporting Clause 3.2.1.

3.2.1	Excess fishing capacity shall be avoided and exploitation of the stocks shall remain economically viable.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>There are management measures in place to limit and/or reduce the total fishing capacity of the unit of certification. These measures shall include specific fishing capacity objective(s), which themselves are based on the best scientific evidence available to understand the level of fishing pressure appropriate to ensure the long-term sustainability of the fishery. Please note that assessors should ensure that catches are within limits, and that data from enforcement show an adequate level of compliance with fisheries laws and regulation.</i>		✓
EVIDENCE:		
<p>The issue of fishing capacity is not explicitly addressed under the Pacific Whiting Treaty as the fleets of both Parties have been rationalized and remain under capacity controls. For the US fleet, incentives are in place under the IFQ and Fishing Cooperative programs to limit capacity expansion and encourage capacity reduction.</p> <p>The Pacific Coast Groundfish FMP directly addresses capacity reduction in the specific objectives to be followed to accomplish management goals. FMP Objective 2 states that the fishery may “Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems.” (PFMC 2020q).</p> <p>The PFMC has acted to reduce fleet capacity in the groundfish fishery since 1992 when it adopted and NMFS approved Amendment 6 to the Groundfish FMP. Amendment 6 established a license limitation (limited entry) program intended to address overcapitalization by restricting further participation in groundfish trawl, longline, and trap fisheries.</p> <p>A second major capacity reduction action was taken in 2010 with the Adoption and approval of Amendment 20 to the FMP establishing establishes the groundfish trawl rationalization program. Under this program, groundfish LE trawl vessels making shoreside deliveries are managed with individual fishing quotas. Motherships and associated catcher-vessels in the at-sea Pacific whiting sector are managed under a system of regulated cooperatives. Pacific whiting catcher-processors fish within a voluntary cooperative; the amendment establishes provisions to strengthen this cooperative. The catch shares program implemented by Amendment 20 to the groundfish FMP is in itself a market mechanism to respond to resource limitations through further capacity reductions (PFMC 2020q).</p> <p>Amendment 21 was approved in 2010 and establishes long-term allocations between the trawl and nontrawl sectors of the groundfish fishery; establishes a short-term allocational split between the shoreside whiting and non-whiting fishery, necessary for implementation of the individual fishing quota (IFQ) program (established through Amendment 20); establishes darkblotched rockfish, Pacific ocean perch and widow rockfish allocations among the at-sea trawl and shoreside trawl sectors (later removed by Amendment 21-4); identifies the need for initial set-asides for the at-sea trawl sectors; and establishes a Pacific halibut bycatch allowance to be provided to the trawl fishery in the form of individual bycatch quota (established through Amendment 20) (PFMC 2020q).</p> <p>Each of the FMP amendments was supported by accompanying research assessing fleet capacity. Routine monitoring and ongoing reporting requirements of fishery sectors ensure regular updating on all fishing operations.</p> <p>At the federal level, the US National Plan of Action for the Measurement of Fishing Capacity (NOAA Fisheries 2004) discusses a number of methods for capacity measurement and assessment. NMFS has published a procedural guide for the review of catch share programs. The guidance document is reviewed every five years. It also provides guidance on the assessment of fishing capacity subsequent to the implementation of a catch share program (NOAA Fisheries 2017b).</p>		

Current status/Appropriateness/Effectiveness: <i>The fishing capacity of the unit of certification is at or below the level of the specific fishing capacity objective(s).</i>	✓
EVIDENCE:	
<p>A system of total and individual quotas that are quantitatively defined, regularly monitored and effectively enforced, in combination with capacity reductions that reduce fishing pressure, provide positive incentives to prevent overfishing and promote recovery of rebuilding stocks. Capacity reduction is often one objective of implementing a catch share program. Evidence of past actions taken by the PFMC to reduce excess fishing capacity are described in the section above.</p> <p>Management mechanisms such as TACs and quota allocations regulate the catch and amount of fishing effort applied to Pacific hake. The PFMC routinely makes adjustments to management measures as conditions change throughout a season, for example monitoring total catch information throughout the season to determine the relationship between catch at a given point in time and an ACL/ annual OY.</p> <p>In addition, a number of bycatch control measures apply to participants in the Pacific whiting fishery work in conjunction with the ITQ program elements to promote sustainable exploitation of the resource.</p> <ul style="list-style-type: none"> • Salmon bycatch limits with automatic closure of the fishery if exceeded • Bycatch reduction areas • Block area closures if salmon bycatch rates exceeds defined levels • FMP provisions for the use of sanctuaries, marine protected areas (MPAs) and the protection of Habitat Areas of Particular Concern (HAPC) <p>The offshore fleets (CP and MS coops) have adopted measures designed to further restrict bycatch, including:</p> <ul style="list-style-type: none"> • precautionary closures of past bycatch hotspots • night fishing restrictions • fleet relocation triggers and fleet to fleet reporting • required test tows upon relocation to a new fishing area • in-season “hot spot” closure authority • seasonal apportionments (pools) of whiting and bycatch allowances • sanctions against vessels exceeding a bycatch rate within a seasonal pool (McQuaw 2021; PWCC 2021) <p>The routine groundfish management cycle provides extensive points of review of groundfish fishing sustainability. Review of compliance with habitat protection measures is included in these reviews. In addition, Amendment 20 requires a regular review of the trawl ITQ program to ensure that it does not contribute to unsustainable fishing. The review mandates under Amendment 20 include catch limits, ownership concentration and program performance (PFMC 2021f). These are in conformance with the federal guidance on the review of catch share programs (NOAA Fisheries 2017b).</p>	

3.2.1	Excess fishing capacity shall be avoided and exploitation of the stocks shall remain economically viable.			
Evidence Basis:	<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that excess fishing capacity is avoided and exploitation of the stocks remains economically viable. Examples may include fishery reports on harvest recommendation or fleet reports.</i>			
	✓			
EVIDENCE:				
The evidence is sufficient to substantiate that excess fishing capacity is avoided and exploitation of the stocks remain economically viable.				
References:	NOAA Fisheries 2017b; PFMC 2020q; 2021f; McQuaw 2021; PWCC 2021			
Numerical score:	Starting score	- (Number of EPs <u>NOT</u> met x 3) =	Overall score
	10			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)				High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)				Full Conformance

Non-conformance Number (if applicable):

Supporting Clause 3.2.2.

3.2.2. The economic conditions under which fishing industries operate shall promote responsible fisheries.	
Relevance:	Relevant
Evaluation Parameters	Met?
Process: <i>There are management measures in place to limit and/or reduce the total fishing capacity of the unit of certification. These measures shall include specific fishing capacity objective(s), which themselves are based on the best scientific evidence available to understand the level of fishing pressure appropriate to ensure the long-term sustainability of the fishery. Please note that assessors should ensure that catches are within limits, and that data from enforcement show an adequate level of compliance with fisheries laws and regulation.</i>	✓
EVIDENCE: As evidenced in 3.2.1 above, the PFMC through the TRat Program has implemented a suite of management measures to limit fishing capacity. A system of total and individual quotas that are quantitatively defined, regularly monitored and effectively enforced, in combination with capacity reductions that reduce fishing pressure, provide positive incentives to prevent overfishing and promote recovery of rebuilding stocks. Capacity reduction is often one objective of implementing a catch share program. The PFMC has taken a sequence of actions to monitor and reduce excess fishing capacity. Catches are maintained within limits. Management mechanisms such as TACs and quota allocations regulate the catch and amount of fishing effort applied to Pacific hake. The PFMC routinely makes adjustments to management measures as conditions change throughout a season, for example monitoring total catch information throughout the season to determine the relationship between catch at a given point in time and an ACL/ annual OY. From the federal enforcement perspective the Pacific hake fishery is a well-managed fishery with a highly regulated and observed fleet considered to be one of the most compliant with regulations. Overlapping observation systems at sea and shoreside (observer coverage, electronic monitoring and VMS) as well as systems in place to cover accidental catch overages, create a degree of oversight in the fishery that decreases the amount of enforcement time required (Busch 2022).	
Current status/Appropriateness/Effectiveness: <i>The fishing capacity of the unit of certification is at or below the level of the specific fishing capacity objective(s).</i>	✓
EVIDENCE: Amendment 20 requires a regular review of the Trawl Rationalization Program to ensure that it does not contribute to unsustainable fishing. The review mandates include catch limits, ownership concentration and program performance (PFMC 2021f). Upon implementation of Amendment 20 in 2011, NMFS collected both baseline and annual socioeconomic data to judge the effectiveness of the Catch Share Program for the 5-Year Review, and collected data annually thereafter, as required under the MSA (MSA 2007). Section 6.9.5 of the groundfish FMP is Capacity Reduction Data Collection, and is a forward-facing recognition of the potential future need to further reduce fishing capacity in the groundfish fleet. These elements are in conformance with the federal guidance on the review of catch share programs (NOAA Fisheries 2017b). The evidence provided above substantiates the fleet capacity is monitored and measured, and mechanisms exist to reduce capacity should it be excess to sustainable resource levels.	
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that excess fishing capacity is avoided and exploitation of the stocks remains economically viable. Examples may include fishery reports on harvest recommendation or fleet reports.</i>	✓
EVIDENCE: The evidence is sufficient to substantiate the excess fishing capacity is avoided and exploitation of the stocks remains economically viable.	

References:	Busch 2022; PFMC 2021f; NOAA Fisheries 2017b; MSA 2007		
Numerical score:	Starting score	Number of EPs <u>NOT</u> met	Overall score
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 3.2.3

3.2.3.

Relevance:

Evaluation Parameters

Process:
There is a system or process in place that identifies the interests of small-scale fishers, either through stakeholder engagement or social research, in a way, which permits the utilization of the information during the management measure development process.

EVIDENCE:
 Legal rights of people dependent on fishing for food and livelihood are formally recognized by the US government. The U.S. government formally recognizes the four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish. In general terms, the quantification of those rights is 50 percent of the harvestable surplus of groundfish available in the tribes’ usual and accustomed (U & A) fishing areas. Each of the treaty tribes has the discretion to administer their fisheries and to establish their own policies to achieve program objectives. (PFMC 2022h; 50 CFR 660.4 2018).

Executive Order 13175 (2000) requires regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes. The Secretary recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources. The MSA specifies a seat on the PFMC for a representative of an Indian tribe with Federally-recognized fishing rights from California, Oregon, Washington, or Idaho.

In addition, National Standard 8 of the MSA requires that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that are based upon the best scientific information available in order to:

- (1) Provide for the sustained participation of such communities; and
- (2) To the extent practicable, minimize adverse economic impacts on such communities.

FMPs must examine the social and economic importance of fisheries to communities potentially affected by management measures. For example, severe reductions of harvests for conservation purposes may decrease employment opportunities for fishermen and processing plant workers, thereby adversely affecting their families and communities. Similarly, a management measure that results in the allocation of fishery resources among competing sectors of a fishery may benefit some communities at the expense of others.

An appropriate vehicle for analyses under National Standard 8 is the fishery impact statement required by section 303(a)(9) of the Magnuson-Stevens Act. Qualitative and quantitative data may be used, including information provided by fishermen, dealers, processors, and fisheries organizations and associations. In cases where data are severely limited, effort should be directed to identifying and gathering needed data (MSA 2007; 50 CFR 600.305 2022).

Current status/Appropriateness/Effectiveness:

There is evidence that the interests of small-scale fishers are effectively taken into account during the development of management measures, and there is no evidence that small-scale fisheries are adversely impacted by any management measures currently in place.

EVIDENCE:

Tribal interests are represented on the Pacific Fishery Management Council through a designated Council seat and membership in scientific, technical and stakeholder advisory committees. Under an allocation sharing agreement in place since 1997, the US portion of the TAC is divided into fixed shares, allocating 17.5% to the tribal fishery and 82.5% to the non-tribal fishery, from which is set-aside a small amount for research purposes. The translation of percentage share into poundage is published in the Federal Register as a Final Rule (cf CFR 660 2021b).

More broadly, social and economic considerations are addressed throughout the Groundfish FMP. Section 6.2.3 of the FMP is a Socioeconomic Framework that addresses occasions when the Council will recommend management actions to address certain social or economic issues in the fishery. Examples of management issues with a social or economic basis include resource allocation, seasons, or landing limits based on market quality and timing, safety measures, and prevention of gear conflicts among others (PFMC 2020q).

The Council may evaluate current information and issues to determine if social or economic factors warrant imposition of management measures to achieve the Council’s established management objective

If the Council concludes that a management action is necessary to address a social or economic issue, it will prepare a report containing the rationale in support of its conclusion. The report will include the proposed management measure, a description of other viable alternatives considered, and an analysis that addresses the following criteria:

- (a) how the action is expected to promote achievement of the goals and objectives of the FMP;
- (b) likely impacts on other management measures, other fisheries, and bycatch;
- (c) biological impacts;
- (d) economic impacts, particularly the cost to the fishing industry;
- (e) impacts on fishing communities; and
- (f) how the action is expected to accomplish at least one of the following, or any other measurable benefit to the fishery:
 1. Enable a quota, HG, or allocation to be achieved.
 2. Avoid exceeding a quota, HG, or allocation.
 3. Extend domestic fishing and marketing opportunities as long as practicable during the fishing year, for those sectors for which the Council has established this policy.
 4. Maintain stability in the fishery by continuing management measures for species that previously were managed under the points of concern mechanism.
 5. Maintain or improve product volume and flow to the consumer.
 6. Increase economic yield.
 7. Improve product quality.
 8. Reduce anticipated bycatch and bycatch mortality.
 9. Reduce gear conflicts, or conflicts between competing user groups.
 10. Develop fisheries for underutilized species with minimal impacts on existing domestic fisheries.
 11. Increase sustainable landings.

12. Reduce fishing capacity.

13. Maintain data collection and means for verification.

14. Maintain or improve the recreational fishery.

Appendix A to the Groundfish FMP includes Social and Economic Characteristics of the Fishery among other sections:

- Information in Support of the Management Program
- Biological and Environmental Characteristics of the Resource
- Description of the Fishery
- Social and Economic Characteristics of the Fishery
- History of Management
- History of Research
- Weather-Related Vessel Safety
- Relationship of this FMP to Existing Laws and Policies
- Management and Enforcement Costs

Socioeconomic concerns also enter the setting of the Annual Catch Limit (ACL). The ACL is a harvest specification set equal to or below the ABC in consideration of conservation objectives, socioeconomic concerns, management uncertainty, ecological concerns, and other factors (PFMC 2020q)

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the interests of fishers, including those engaged in subsistence, small-scale, and artisanal fisheries are taken into account. Examples may include dedicated quotas, public meeting records, laws, and regulations.

EVIDENCE:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the interests of fishers, including those engaged in subsistence, small-scale, and artisanal fisheries are taken into account.

References:

Numerical score:

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)

Non-conformance Number (if applicable):

References: PFMC 2020q; 2022h; 50 CFR 660.4 2018; EO 13175 2000; MSA 2007; 50 CFR 600.305 2022

Supporting Clause 3.2.4.

3.2.4.	Biodiversity of aquatic ecosystems shall be conserved and ETP species shall be protected. Where relevant, there shall be management objectives, and as necessary, management measures.
Relevance:	Relevant
Evaluation Parameters	Met?
Process: <i>There are management measures in place specifically designed to ensure that the biodiversity of aquatic ecosystems are conserved and ETP species are protected. This shall reflect the existence of specific management objectives and measures, which are based on the best scientific evidence available.</i>	✓

EVIDENCE:

The Pacific Fishery Management Council’s Fishery Ecosystem Plan helps the Council incorporate ecosystem science into its fishery management decisions. Unlike the Council’s four other fishery management plans, it is not focused on directly regulating fisheries. Instead, it focuses on “initiatives” that focus on specific ecosystem topics and how they affect managed fisheries. Recent initiatives include protection of unfished forage fish, ecosystem indicators, and the effects of climate change on fishing communities (PFMC 2021e).

The Fishery Ecosystem Plan (FEP) calls for an annual report to the Council on status and trends in the California Current Ecosystem (CCE). The purpose of the Report is to present ecosystem information for the CCE to the Council in a succinct, straightforward format so that the Council may take into account ecosystem variability in its decisions. The Report synthesizes data to present key environmental, biological, and socioeconomic indicators. Trends in physical, biological, and socioeconomic components of the ecosystem – taking into account the effects of fisheries and other human activities – are thus highlighted. (PFMC 2021d)

The Council and National Marine Fisheries Service are required by law to identify and protect the essential fish habitat (EFH) of species managed under fishery management plans. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The NMFS and regional Fishery Management Councils must describe and identify EFH in fishery management plans), minimize adverse effects of fishing on EFH, and encourage the conservation and enhancement of EFH (MSA 2007).

The requirement is reflected in Objective 5 of the Groundfish FMP: Describe and identify EFH, adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH (PFMC 2020q).

FMP amendments have been introduced to enhance environmental protection and avoid potential conflict between the fisheries sector and other coastal users. For example Amendment 28 to the Groundfish FMP modified the configuration of EFH Conservation Areas (EFHCAs) that are closed to groundfish bottom trawl fishing in order to protect EFH, closed waters deeper than 3,500 meters to bottom contact fishing gear, opened the trawl RCA to bottom trawl fishing off Oregon and California, and created a framework to consider and implement more flexible area closures with block area closures. The amendment process is well defined and involves extensive discussions over several Council meetings (PFMC 2020q).

NOAA Fisheries' Habitat Conservation Division (HCD) works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on EFH and living marine resources (NOAA Fisheries 2022f).

Current status/Appropriateness/Effectiveness:

The management measures currently in place have been successful in meeting the management objectives. Such objectives may be outlines in overarching fisheries legislation, regulations, or management plans. There is no evidence that the fishery is currently having a significant adverse impact on aquatic ecosystems, and it is not putting any ETP species at risk of extinction.



A suite of management measures are in place for the hake fisheries to ensure that biodiversity of aquatic ecosystems are conserved and ETP species are protected. The hake fishery uses pelagic trawls which helps to reduce interaction with the seabed and other sectors that fish on the sea bed; the hake fishery is subject to bycatch limits and fishery closures if bycatch exceeds allowable levels; rockfish conservation area restrictions are in place. A description of all West Coast groundfish closed areas is provided by NOAA Fisheries and summarized below (NOAA Fisheries 2022a).

Rockfish Conservation Areas, or RCAs, are depth-based closed areas set to minimize incidental catch of overfished rockfish. The RCA boundaries approximate particular depth contours and are different depending on the types of fishing gear being used. They may be changed during the year through inseason actions.

Block Area Closures (BAC) are areas of federal waters that may be closed to fishing. If NMFS determines a sector of the whiting fishery is catching too much salmon then NMFS may implement a sector- specific spatial closure that is more discrete than closing at 200 fathoms coastwide.

Bycatch Reduction Area (BRA) at the 200-fm depth contour. The PFMC and NMFS monitor salmon bycatch rates inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector.

Essential Fish Habitat Conservation Areas (EFHCA) are habitats that are necessary to the species for spawning, breeding, feeding, or growth to maturity of groundfish species. Boundaries are set by regulation. Some EFH that is especially important ecologically or particularly vulnerable to degradation may be further designated as “habitat areas of particular concern” (HAPC) to provide additional focus for conservation efforts (50 CFR 660.11 2022; 50 CFR 660.75 through 660.79 2022).

The main impacts of the fishery on these key ecosystem issues can be inferred from the Ecosystem (CCE) Integrated Ecosystem Assessment (IEA) (NOAA Fisheries 2022k; PFMC 2022g). Results suggest that the Hake mid-water trawl primarily has direct impacts on its target and bycatch species. Few indirect effects from the fleet extended through predator–prey links to other parts of the food web, but the few include increases in krill, small planktivores, large piscivorous flatfish, Dover sole, shortbelly rockfish, and shrimp.

Evidence Basis: <i>Evidence Basis: The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that biodiversity of aquatic ecosystems is conserved and ETP species are protected. Where relevant, there are management objectives, and as necessary, management measures. Examples may include laws and regulations, fisheries management plans, and species status reports.</i>	✓
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EVIDENCE:
 Evidence Basis: The evidence is sufficient to substantiate that biodiversity of aquatic ecosystems is conserved and ETP species are protected through management objectives and management measures.

References: MSA 2007; PFMC 2020q; 2021d; 2021e; 2020k; 2021d; 2021e; 2021i; 50 CFR 660 2020e; 2020j; 2022g; NOAA Fisheries 2022a; 2022f; 2022k; 50 CFR 660.11 2022; CFR 660.75 through 660.79 2022

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	) x 3	=	Overall score
	10		0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance
Non-conformance Number (if applicable):						

8.3 Section B: Science & Stock Assessment Activities, and the Precautionary Approach

Fundamental Clause 4. Fishery data

There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.

Supporting Clause 4.1.

4.1.	<p>All significant fishery removals and mortality of the target species shall be considered by management. Specifically, reliable and accurate data required for assessing the status of fishery(ies) and ecosystems—including data on retained catch, bycatch, discards, and waste—shall be collected. Data can include relevant traditional, fisher, or community knowledge, provided their validity can be objectively verified. These data shall be collected, at an appropriate time and level of aggregation, by relevant management organizations connected with the fishery, and provided to relevant States regional, and international fisheries organizations.</p>	
Relevance:	Relevant	
Evaluation Parameters		Met?
<p>Process: <i>There is a process or system that allows for effective data collection (including data on retained catch, bycatch, discards and waste) on the status of fisheries and ecosystems for management purposes. In the case of stocks fished by more than one State, this includes a system or agreement with other States to ensure mortality and removals data are available for the entirety of the biological stock. Some fisheries and/or fish stock are hard to monitor for various reasons, including remoteness of operation/distribution and complexity of fishing operations—posing particular challenges with the collection and maintenance of adequate, reliable, and current data and/or other information. Assessors shall acknowledge and explain these challenges, data collection, and maintenance to cover all stages of fishery development in accordance with applicable international standards and practices. For salmon, the assessors shall describe and present the enumeration methods (i.e., peak aerial survey, feet survey, weir count, tower, mark–recapture, sonar, etc.) utilized for all the major stocks managed by formal escapement goal in Alaska. Such summary data can be found in the annually released ADF&G document Summary of Pacific salmon escapement goals in Alaska with a review of escapements from [year] to [year]. The document generally reviews the latest 9–10 years of salmon escapements, enumeration, goal development methods, and the relative escapement goal performance.</i></p>		✓
<p>EVIDENCE: All fishery removals and mortality of Pacific hake are considered in the assessment and management of the stock. Reliable and accurate data are provided annually to JTC to assess the status of Pacific hake fisheries and ecosystems. These data as well as tribal (subsistence) catches, estimates of bycatch, discards and wastage are used in the assessment. Several data reporting systems are in place for the various fishery components to ensure timely and accurate collection and reporting of catch data.</p>		
Current status:		✓

EVIDENCE:

Pacific hake catcher vessels are 100 percent monitored (with a combination of electronic monitoring and NMFS observers) and are required to retain all catch and bycatch for sampling by plant observers. At sea, all catches delivered to mothership processing vessels and caught/processed by catcher-processor vessels are 100 percent monitored by at-sea NMFS observers. Discards are negligible relative to the total fishery catch for all sectors (Johson et al 2021).

For recent catches with haul or trip-level information, removals by month during the fishing season allowed for the estimation of monthly bycatch rates from observer information. This information has also allowed a detailed investigation of shifts in fishery timing (Taylor et al. 2014).

NOAA Fisheries and the Pacific Fishery Management Council manage the Pacific whiting fishery on the West Coast, in U.S. federal waters (3 to 200 miles offshore) under the Pacific Coast Groundfish Fishery Management Plan (see: http://www.pcouncil.org/wp-content/uploads/GF_FMP_FINAL_May2014.pdf). c

On June 23, 2021, NOAA Fisheries published a final rule for the 2021 Pacific whiting fishery under the authority of the Pacific Coast Groundfish Fishery Management Plan, the Magnuson-Stevens Fishery Conservation and Management Act, and the Pacific Whiting Act of 2006. The final rule establishes the 2021 Pacific whiting coastwide TAC of 500,000 mt following requirements in the Pacific Whiting Act after the U.S. and Canada Pacific Whiting Treaty's Joint Management Committee did not reach an agreement on the 2021 Pacific whiting coastwide TAC. The final rule also establishes the U.S. TAC, the 2021 tribal allocation of 17.5 percent of the U.S.TAC, allocations for three commercial whiting sectors, and set-asides for research and incidental mortality of Pacific whiting as shown in the table below.

2021 Pacific Whiting Harvest Specifications (mt)	
U.S. TAC	369,400
Tribal Allocation	64,645
Research and Incidental Mortality Set-Aside	750
Catcher/Processor (C/P) Coop Program	103,362
Mothership (MS) Coop Program	72,961
Shorebased IFQ Program	127,682

Current status/Appropriateness/Effectiveness:

There are appropriate and reliable data collection and estimation methods. Reliable and accurate data are collected on retained catch, bycatch, discards, and waste (for targeted and non-targeted fisheries), and the direct and indirect impacts of the fishery on the ecosystem. Such information is disseminated to all relevant fishery management authorities. Overall, the data collection system is considered effective for the purposes of this clause if fishery scientists believe there is a high probability that the total estimated mortality is an accurate reflection of the actual total mortality across the entire biological stock. Fishery data are collected with a frequency and level of aggregation, which allows the effective and informed management of the stock. The appropriate level of aggregation will often be the stock level, but could also reflect specific habitats, gear types, sub-populations, etc. The requirements for data collection are focused on the need to assess the effects of the unit of certification on non-target stocks. Non-target catches and discards refer to species/stocks that are taken by the unit of certification other than the stock for which certification is being sought. The adequacy of data relates primarily to the quantity and type of data collected (including sampling coverage) and depends crucially on the nature of the systems being monitored and purposes to which the data are being put. Some analysis of the precision resulting from sampling coverage would normally be part of an assessment of adequacy and reliability. The currency of data is important, inter alia, because its capacity for supporting reliable assessment of current status and trends declines as it gets older.



EVIDENCE:

The US West Coast mid-water trawl fishery for Pacific hake has adopted electronic monitoring to help manage quotas,

reduce discards, and control costs. Introduced as an automated alternative to onboard observers more than a decade ago, this monitoring initiative is helping to ensure the long-term livelihood of local fishermen, while setting a global benchmark for responsible fishing practices around the world. The US whiting fishery is a high-volume midwater trawl fishery operating off the coasts of Washington, Oregon and northern California. The fishery has three sectors: catcher vessels delivering to shore-based seafood processors, catcher vessels delivering to at-sea mothership processors, and catcher processors that catch and process fish onboard the same vessel. Thirty-seven catcher vessels are endorsed to participate in the shoreside and mothership sectors.

Although the fishery initially assessed total removals by monitoring catch offloaded at the dock, this method was later revised to account for all catch, including fish discarded at sea. This requirement led to a prohibition of at-sea discards, along with a fleet-wide program to monitor and verify—at sea—each vessel’s compliance with the fishery’s catch-retention regulations. However, the realities of monitoring and verifying compliance at sea posed a challenge. For the shoreside fishery, the requirement of running many short fishing trips of less than a day, often departing with little notice, made onboard human observations a challenge. To accommodate the unique logistical requirements of this fishery, an automated electronic monitoring system was identified as an appropriate alternative.

To further explore and develop this initiative, the National Marine Fisheries Service, Northwest Fisheries Science Center developed, and managed a program to monitor the shore-based component of the fishery using electronic monitoring (EM) data to achieve several goals:

- Verify maximized retention of catch
- Confirm fishing occurs only within permitted areas
- Provide a resource of accurate data to help characterize the fishery
- Verify catch records provided by skippers
- Develop a cost-effective approach to providing at-sea monitoring for the fishery

As part of EM program, participating vessels were equipped with an onboard electronic monitoring system that was configured to operate continuously while the vessel was at sea. Each system consisted of up to four video cameras, fishing gear sensors (on the winch drum and hydraulic lines), and a GPS receiver, all monitored by a control center and data logger installed on the bridge.

Annual reports were compiled for each fishery year, and a summary report produced to document the entire program.

By the program’s conclusion in 2010, participants had witnessed significant improvements. Sensor and image data had successfully profiled over 96% of fishery activity for most years. Success rates for data collection were highest in the final years of the program, with 99.0% (2009) and 98.7% (2010) of all video data recorded successfully. EM was found to provide the same or better data quality as an onboard observer in recording the times and locations of each haul, and in confirming retention of all catch (although the wide-angle camera views used in this early application had in some cases limited the ability to identify individual species).

While operating under the EM program, participants had reduced discard quantities by 90%, to levels less than 0.3% of the total allowable catch (with the remaining incidences limited to occasional “operational” events).

Comparisons between the monitoring data and the logbook data showed strong agreement in event reporting (89%) and significant correlation in discard quantities. The quality of most (90%) of the EM data gathered was classified as either “medium” or “good”; overall the program was determined to be effective at documenting and characterizing discard activity (i.e. quantity, method, and reason for discarding).

In the last stock assessment report, the terms catch and landings are used interchangeably. Estimates of discard within the target fishery are included, but discarding of Pacific hake in non-target fisheries is not. Discard from all fisheries, including those that do not target hake, is estimated to be less than 1% of landings in recent years. Therefore can be considered negligible. Due to the coronavirus disease 2019 (COVID-19) pandemic, no biological samples were available from the Canadian freezer-trawler sector in 2020 because observers were not allowed on board. However, the assessment approach used has the possibility to take into account such uncertainty.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that all significant fishery removals and mortality of the target species are considered by the fishery management organizations. Specifically, reliable and accurate data required for assessing the status of fishery/ies and ecosystems—including data on retained catch, bycatch, discards, and waste—are collected. Data can include relevant traditional, fisher, or community knowledge, provided their validity can objectively be verified (i.e., the knowledge has been collected and analyzed through a systematic, objective, and well-designed process, and is not just hearsay). Examples may include stock assessment reports, catch data, and observer data.

**EVIDENCE:**

Detailed information on the nature and amount of retained catch, bycatch, discards, and waste in the midwater hake fisheries under certification is collected by the At-Sea Hake Observer Program (A-SHOP) and the West Coast Groundfish Observer Program (WCGOP) operated by the NMFS. There is 100% observer coverage. A-SHOP sectors include the at sea catcher-processor and mothership catcher-vessels, while WCGOP covers the shoreside trawlers. The total non-hake catch by all sectors is less than 0.7 percent of the weight of hake catch in the fishery, most (61-94%) of which were retained and composed by demersal species.

References:

<https://www.archipelago.ca/catch-monitoring-in-the-pacific-whiting-fishery>

http://www.pcouncil.org/wp-content/uploads/GF_FMP_FINAL_May2014.pdf

Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

Taylor, N., Hicks, A.C., Taylor, I.G., Grandin, C. and Cox, S. 2014. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2014 with a management strategy evaluation. International Joint Technical Committee for Pacific hake. 194 p. Available at https://archive.fisheries.noaa.gov/wcr/publications/fishery_management/groundfish/whiting/2014-stock-assess.pdf.

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 4.1.1.

4.1.1.	<p>Timely, complete, and reliable statistics shall be compiled on catch and fishing effort and maintained in accordance with applicable international standards and practices, and in sufficient detail to allow sound statistical analysis for stock assessment. Such data shall be updated regularly and verified through an appropriate system. The use of research results as a basis for setting management objectives, reference points, and performance criteria, as well as for ensuring adequate linkage between applied research and fisheries management (e.g., adoption of scientific advice) shall be promoted. Results of analysis shall be distributed accordingly as a contribution to fisheries conservation, management, and development.</p>
Relevance:	<p>Relevant</p>
<p>Evaluation Parameters</p>	
<p>Process: <i>There is a process or system that allows for the production, maintenance, update, and verification of statistical data to international standards. Such standards include the FAO Coordinating Working Party on Fishery Statistics Handbook of Fishery Statistical Standards. Also, there is a process for the use and distribution of research results as a basis for setting management objectives, reference points, and performance criteria, as well as for ensuring adequate linkage between applied research and fisheries management (e.g., adoption of scientific advice). Please note that stock assessment for salmon is intended as the process that leads to enumeration, escapement goal development, and fishery management activities to meet escapement goals.</i></p>	<p>Met?</p> <p>✓</p>
<p>EVIDENCE: The process for collection of catch data via electronic monitoring (EM) is outlined above as required by states. Timely and reliable statistics are compiled on Pacific hake for all catch and fishing effort, and Joint Technical Committee of the Pacific Hake/Whiting and other agencies maintain databases of these catches. The catch data also includes by-catch, sport fishing, personal and subsistence use, and wastage. All databases are updated regularly, verified, and feed into the annual peer-reviewed stock assessments. The catch data are also used for other scientific and management purposes related to hake conservation and management, are published in annual reports.</p>	
<p>Current status/Appropriateness/Effectiveness: <i>There is evidence for the production, maintenance, updating, and review of statistical data on catch and fishing effort in the fishery under assessment. There is evidence that the best scientific evidence available is used to inform the fisheries management process. Where there is a legal requirement for the advice of scientific authorities to be adopted, this shall be viewed as conformance with this evaluation parameter.</i></p>	<p>✓</p>
<p>EVIDENCE: The catch of Pacific hake for 1966–2020 in U.S. waters prior to 1978 are available only by year from Bailey et al. (1982) and historical assessment documents. Canadian catches prior to 1989 are also unavailable in disaggregated form. The U.S. shore-based landings are from the Pacific Fishery Information Network (PacFIN). Foreign and Joint-Venture catches for 1981–1990 and U.S. domestic at-sea catches for 1991–2020 are calculated from the Alaska Fisheries Science Center (AFSC) North Pacific Groundfish and Halibut Observer (NORPAC) database, which also stores the NWFSC At-Sea Hake Observer Program data. Canadian Joint-Venture catches from 1989 are from the Groundfish Biological (GFBio) database. The Canadian shore-based landings are from the Groundfish Catch (GFCatch) database (from 1989 to 1995), the Pacific Harvest Trawl (PacHarvTrawl) database (from 1996 to March 31 2007), and the Fisheries Operations System (FOS) database (from April 1 2007 to present). In the last stock assessment report, the terms catch and landings are used interchangeably. Estimates of discard within the target fishery are included, but discarding of Pacific hake in non-target fisheries is not. Discard from all fisheries, including those that do not target hake, is estimated to be less than 1% of landings in recent years. Therefore can be considered negligible. Due to the coronavirus disease 2019 (COVID-19) pandemic, no biological samples were available from the Canadian freezer-trawler sector in 2020 because observers were not allowed on board. However, the assessment approach used has the possibility to take into account such uncertainty.</p>	

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that timely, complete, and reliable statistics are compiled on catch and fishing effort and maintained in accordance with applicable international standards and practices, and in sufficient detail to allow sound statistical analysis for stock assessment. Such data are updated regularly and verified through an appropriate system. The use of research results as a basis for setting management objectives, reference points, and performance criteria, as well as for ensuring adequate linkage between applied research and fisheries management (e.g., adoption of scientific advice) is promoted. Analysis results are distributed accordingly as a contribution to fisheries conservation, management, and development. Examples may include stock assessment reports and other data.

**EVIDENCE:**

Basic catch and effort data are both stored electronically within the databases and in annual stock assessment reports (see for example Johnson et al. 2021). Subsistence fishery data is also reported. Minor updates to catches used in previous assessments were made based on the best available information extracted from the aforementioned databases. U.S. shore-based landings from 1986 were decreased by 33 t relative to previous assessments to reflect a change made in the PacFIN database years prior that is yet to be addressed in the data file. This was the most substantial change to U.S. shore-based historical catches; other years were changed less than 4 t. Tribal catches were not available in PacFIN for the U.S. tribal fishery at the time the data were extracted and were added to the extracted number based on information provided by the Makah tribe. With the movement towards digital fish tickets for reporting tribal catches, this should be the last year that tribal catches will need to be provided after the fact. The Makah tribe is also working on providing historical catches such that shore-based catches can be summarized separately from tribal catches since the onset of the fishery.

References:

<https://www.archipelago.ca/catch-monitoring-in-the-pacific-whiting-fishery>

http://www.pcouncil.org/wp-content/uploads/GF_FMP_FINAL_May2014.pdf

<https://pacfin.psmfc.org/>

Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

Taylor, N., Hicks, A.C., Taylor, I.G., Grandin, C. and Cox, S. 2014. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2014 with a management strategy evaluation. International Joint Technical Committee for Pacific hake. 194 p. Available at https://archive.fisheries.noaa.gov/wcr/publications/fishery_management/groundfish/whiting/2014-stock-assess.pdf.

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 4.1.2.

4.1.2.	In the absence of specific information on the stock under consideration, generic evidence based on similar stocks can be used. However, the greater the risk of overfishing, the more specific evidence is necessary to ascertain the sustainability of intensive fisheries.
Relevance:	Relevant
Evaluation Parameters	
<p>Process: <i>There is a process that allows for the use of generic evidence based on similar stocks for fisheries with low risk. The greater the risk, the more specific evidence is necessary to assess sustainability. In principle, "generic evidence based on similar stocks" should not suffice, but it may be adequate where there is low risk to the stock under consideration. In general, "low risk to that stock under consideration" would suggest that there is very little chance of the stock becoming overfished (e.g., where the exploitation rate is very low and the resilience of the stock is high). However, the evidence for low risk and the justification for using surrogate data shall come from the stock assessment itself.</i></p>	✓
<p>EVIDENCE: All management decisions are made using stock specific information, and the stock is considered to be one unit along its distribution in U.S. and Canadian waters.</p>	
<p>Current status/Appropriateness/Effectiveness: <i>Information has been utilized from generic evidence based on similar fishery situations. Based on the risk of overfishing, the information utilized is of higher precision to account for higher risks (i.e., intensive fisheries).</i></p>	✓
<p>EVIDENCE: As reported by Johnson et al 2021, the stock assessment of the Pacific hake resource covers the northeastern Pacific Ocean, including the waters of the United States and Canada. Pacific hake is a semi-pelagic schooling species distributed along the west coast of North America, generally ranging in latitude from 25°N to 55°N. It is among 18 species of hake from four genera (being the majority of the family Merlucciidae), which are found in both hemispheres of the Atlantic and Pacific Oceans (Alheit and Pitcher 1995; Lloris et al. 2005). The coastal stock of Pacific Hake is currently the most abundant groundfish population in the California Current system. Smaller populations of this species occur in the major inlets of the Northeast Pacific Ocean, including the Strait of Georgia, the Puget Sound, and the Gulf of California. The Strait of Georgia and the Puget Sound populations are genetically distinct from the coastal population (Iwamoto et al. 2004; King et al. 2012). Genetic differences have also been found between the coastal population and hake off the west coast of Baja California (Vrooman and Paloma 1977). The coastal stock is also distinguished from the inshore populations by larger size-at-age and seasonal migratory behavior.</p> <p>The coastal stock of Pacific Hake typically ranges from the waters off southern California to northern British Columbia and rarely into southern Alaska, with the northern boundary related to fluctuations in annual migration. In spring, adult Pacific Hake migrate onshore and northward to feed along the continental shelf and slope from northern California to Vancouver Island. In summer, Pacific Hake often form extensive mid-water aggregations in association with the continental shelf break, with highest densities located over bottom depths of 200-300 m (Dorn and Methot 1991; 1992).</p>	
<p>Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the absence of specific information on the stock under consideration, generic evidence based on similar stocks can be used for fisheries with low risk to that stock under consideration. However, the greater the risk of overfishing, the more specific evidence is necessary to ascertain the sustainability of intensive fisheries. Examples may include stock assessment reports and other data.</i></p>	✓
<p>EVIDENCE: Pacific hake stock assessments rely on stock-specific information, and not generic evidence on the status of Pacific hake is derived from other similar stocks. In particular, the assessment takes into account that older Pacific hake exhibit the greatest northern migration each season, with two-and three-year old fish rarely observed in Canadian waters north of southern Vancouver Island. During El Niño events (warm ocean conditions such as in 1998), a larger proportion of the stock migrates into Canadian waters, due to temperature effects (Malick et al. 2020) and possibly intensified northward transport during the period of active migration (Dorn, 1995; Agostini et al. 2006). In contrast, La Niña conditions (colder water, such as in 2001) result in a southward shift in the stock's distribution, with a much smaller proportion of the population found in Canadian waters, as seen in the 2001 survey (Figure 2). In general, warmer than average thermal</p>	

habitat conditions for mature Pacific Hake leads to higher biomass further north and lower biomass around the U.S.-Canadian border, while cooler than average conditions leads to higher biomass of immature Pacific Hake coast-wide (Malick et al. 2020). The distribution of age-1 fish also changes between years (Figure 3).

Additional information on the stock structure for Pacific Hake is available in the 2013 Pacific Hake stock assessment document (Hicks et al., 2013).

As a matter of fact the last Pacific hake assessment (Johnson et al 2021) considers all the above specific feature of the stock and is not derived from other similar stocks.

References:

Agostini, V.N., Francis, R.C., Hollowed, A., Pierce, S.D., Wilson, C.D. and Hendrix, A.N. 2006. The relationship between Pacific hake (*Merluccius productus*) distribution and poleward subsurface flow in the California Current system. *Canadian Journal of Fisheries and Aquatic Sciences* 63: 2648–2659.

Alheit, J. and Pitcher, T., eds. 1995. *Hake: Biology, fisheries and markets*. Springer, Netherlands. xxii+478 p.

Dorn, M.W. and Methot, R.D. 1991. Status of the Pacific whiting resource in 1991. Available at <http://www.pcouncil.org/groundfish/stock-assessments/by-species/pacific-whiting-hake>.

Dorn, M.W. and Methot, R.D. 1992. Status of the coastal Pacific whiting resource in 1992. Available at <http://www.pcouncil.org/groundfish/stock-assessments/by-species/pacific-whiting-hake>.

Dorn, M. 1995. The effects of age composition and oceanographic conditions on the annual migration of Pacific whiting, *Merluccius productus*. *CalCOFI Reports* 36: 97–105.

Hicks, A.C., Taylor, N., Grandin, C., Taylor, I.G. and Cox, S. 2013. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2013. International Joint Technical Committee for Pacific hake. 190 p. Available at https://archive.fsheries.noaa.gov/wcr/publications/fshery_management/groundfish/whiting/hakeassessment2013_fnal.pdf.

Lloris, D., Matallanas, J. and Oliver, P. 2005. Hakes of the world (family Merlucciidae). An annotated and illustrated catalogue of hake species known to date. *FAO Species Catalogue for Fishery Purposes*, Rome. 69 p.

Iwamoto, E., Ford, M.J. and Gustafson, R.G. 2004. Genetic population structure of Pacific hake, *Merluccius productus*, in the Pacific Northwest. *Environmental Biology of Fishes* 69: 187– 199.

Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

King, J.R., McFarlane, G.A., Jones, S.R.M., Gilmore, S.R. and Abbott, C.L. 2012. Stock delineation of migratory and resident Pacific hake in Canadian waters. *Fisheries Research* 114: 19–30.

Malick, M., Hunsicker, M., Haltuch, M., Parker-Stetter, S., Berger, A. and Marshall, K. 2020a. Relationships between temperature and Pacific hake distribution vary across latitude and life-history stage. *Marine Ecology Progress Series* 639: 185–197. doi:10.3354/meps13286.

Vrooman, A. and Paloma, P. 1977. Dwarf hake off the coast of Baja California. *California Cooperative Oceanic Fisheries Investigations Reports* 19: 67–72.

Numerical score:	Starting score	–	Number of EPs <u>NOT</u> met	x 3	=	Overall score
	10		0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance
Non-conformance Number (if applicable):						

Supporting Clause 4.2.

4.2.	An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>An observer program is present. There may be cases where collection of accurate data for research and support compliance could be established without the use of observers or a formal observer scheme (i.e., inspection scheme, enforcement, port sampling, at shore inspection, voluntary or compulsory logbooks, e-logbooks or other harvester collected data, electronic monitoring [video], or bycatch surveys). The reliability and accurateness of that system(s) would need to be verified accordingly. Note also that some fisheries observer programs are designed to collect biological data and others serve mainly as a compliance or enforcement tool. This shall be considered accordingly in the overall evaluation of this clause. Assessors shall question primarily whether the required data for fisheries management are collected or if there are important data gaps (e.g., because of the absence of an observer program).</i>		✓
EVIDENCE: An extensive on-board observer program exists in U.S. and Canada waters to cover various fisheries, including hake. Amendments to the program were introduced in 2013 to increase the statistical reliability of data collected by the program, address cost inequality among fishery participants, and expand observer coverage to previously unobserved fisheries. Electronic monitoring is being introduced to the Observer Program. Data from the observer program is used extensively in the stock assessments.		
Current status/Appropriateness/Effectiveness: <i>The data collected by the observer program is considered accurate and useful.</i>		✓
EVIDENCE: U.S. fishery has been fully rationalized with allocations in the form of Individual Fishing Quotas (IFQs) to the shore-based sector and group shares to cooperatives in the at-sea mothership and catcher-processor sectors. Starting in 1996, the Makah Indian Tribe has conducted a fishery with a specified allocation in its “usual and accustomed fishing area”. The At-Sea Hake Observer Program has been monitoring fishing vessel activity since 1975, originally monitoring foreign and joint-venture vessels. Observer coverage has been 100% on all domestic vessels since 1991 (including the 2020 fishing season, despite the COVID-19 pandemic). Shortly after the 1997 allocation agreement was approved by the PFMC, fishing companies owning catcher-processor (CP) vessels with U.S. west coast groundfish permits established the Pacific Whiting Conservation Cooperative (PWCC). The primary role of the PWCC is to distribute the CP allocation among its members to achieve greater efficiency and product quality, as well as promoting reductions in waste and bycatch rates relative to the former “derby” fishery in which all vessels competed for a feet-wide quota. The mothership (MS) fleet has also formed a cooperative where bycatch allocations are pooled and shared among the vessels. The individual cooperatives have internal systems of in-season monitoring and spatial closures to avoid and reduce bycatch of salmon and rockfish. The shore-based fishery is managed with IFQs.		
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that an observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures is established. Examples may include stock assessment, survey, observer, or other reports.</i>		✓
EVIDENCE: NWFSC Observer programs are the most comprehensive fishery dependent data collection system for total mortality estimation, protected species monitoring and discard data for stock assessments. Observer data is also used to track quotas in-season for the catch share IFQ fishery. The numerous observer program total mortality and bycatch reports are used by agency and council staff for management of federal and state fisheries on the west coast of the US. Observer program bycatch reports, data collection and research activities are also used to manage ESA listed species and fulfill Biological Opinion obligations.		

References: Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

Northwest Fisheries Science Center, 2022: At-Sea Hake Observer Program (ASHOP) Dataset - Observer Program Operations and Analysis, <https://www.fisheries.noaa.gov/inport/item/30861>

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	)	=	Overall score
	10			0				10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)								High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)								Full Conformance
Non-conformance Number (if applicable):								

Supporting Clause 4.2.1.

4.2.1.	Where necessary, fisheries management organizations and regional fisheries management organizations and other such arrangements should strive to achieve a level and scope of observer programs sufficient to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.					
Relevance:	Relevant As mentioned in 4.2, observer program for hake fishery is effective.					
Evaluation Parameters			Met?			
Process:	<i>There is a clear system that allows the observer program, or any other appropriate data gathering system as appropriate, to provide sufficient quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.</i>		✓			
EVIDENCE:	As mentioned in 4.2, observer programs are often used in US and Canada fisheries. The scope of the sampling program varies greatly by species and region depending on need. However, the Pacific hake fishery is well monitored as fishery-dependent and fishery-independent data sources are used in the assessment:					
Current status/Appropriateness/Effectiveness:	<i>The data collected by the observer program is considered accurate and useful, especially for providing quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.</i>		✓			
EVIDENCE:	Pacific hake removals, both landings and discards, are monitored annually in mid-water trawl through comprehensive on-board observer programs and dockside monitoring. The joint U.S. and Canadian integrated acoustic and trawl survey regularly monitors stock abundance. The annual stock assessment estimates spawning biomass and fishing mortality in relation to target and limit reference points taking uncertainty into account. U.S. and Canadian groundfish trawl fisheries are also well monitored as these fisheries have on-board observations as well as dockside monitoring. Detailed information on the nature and amount of incidental takes of living aquatic resources in the hake fisheries (also ETP and non-ETP marine mammals and seabirds), is collected by the At-Sea Hake Observer Program (A-SHOP) and the West Coast Groundfish Observer Program (WCGOP) operated by the NMFS. There is 100% observer coverage. A-SHOP sectors include the at sea catcher-processor and mothership catcher-vessels, while WCGOP covers the shoreside trawlers.					
Evidence Basis:	<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the observer program is established and able to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources. Examples may include stock assessment, observer, survey, or other reports.</i>		✓			
EVIDENCE:	Raw or summarized biological data collected in sampling programs has been reported in the stock assessment report in relation to quantitative estimates of total catch, discards (see: Johnson et al 2021). Detailed information on the nature and amount of incidental takes of living aquatic resources are also available in A-SHOP database.					
References:	Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p. Northwest Fisheries Science Center, 2022: At-Sea Hake Observer Program (ASHOP) Dataset - Observer Program Operations and Analysis, https://www.fisheries.noaa.gov/inport/item/30861					
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance
Non-conformance Number (if applicable):						

Supporting Clause 4.3.

4.3.	A fisheries management organization, regional fisheries management organizations or arrangements shall compile data and make them available, in a manner consistent with any applicable confidentiality requirements, in a timely manner and in an agreed format to all members of these organizations and other interested parties in accordance with agreed procedures.			
Relevance:	Relevant			
Evaluation Parameters			Met?	
Process: <i>There is a system within the regional body structure that allows for data distribution in line with confidentiality requirements.</i>			✓	
EVIDENCE: Data collected from surveys and hake fisheries are analyzed and presented in peer reviewed meetings and/or in primary literature, following rigorous scientific protocols. Data are widely available on websites and results of analyses are disseminated in a timely fashion through numerous methods, including scientific publications, and as information on the various websites, in order to contribute to fisheries conservation and management. Confidentiality of commercial fishery information is fully respected where necessary.				
Current status/Appropriateness/Effectiveness: <i>There is evidence proving that confidentiality requirements are satisfied when data is distributed to the various parties.</i>			✓	
EVIDENCE: NMFS and JTC have extensive scientific databases which include hake. NPFMC has extensive information on management of hake. These data are made widely available through websites, publications and at various publicly-attended meetings. Data on certain aspects of commercial fishing are confidential, such as individuals or individual vessels in the analysis of fishery CPUE data, depending on the number of individuals or entities involved.				
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that a fisheries management organization, regional fisheries management organizations or arrangements compile data and make them available, in a manner consistent with any applicable confidentiality requirements, in a timely manner and in an agreed format to all members of these organizations and other interested parties in accordance with agreed procedures. Examples may include reports where confidentiality requirements have been effected.</i>			✓	
EVIDENCE: Evidence of maintaining strict confidentiality is often observed at meetings when proposal seeks to place some kind of regulation on a small geographic location and cannot release catch data because three or fewer fishermen have reported catches in that area. There are some key laws and policies in place to protect confidentiality as NAO 216-100: Protection of Confidential Fisheries Statistics (see: https://www.noaa.gov/organization/administration/nao-216-100-protection-of-confidential-fisheries-statistics).				
References:	Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p. Northwest Fisheries Science Center, 2022: At-Sea Hake Observer Program (ASHOP) Dataset - Observer Program Operations and Analysis, https://www.fisheries.noaa.gov/inport/item/30861			
Numerical score:	Starting score	- (Number of EPs <u>NOT</u> met x 3) =	Overall score
	10		0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)				High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)				Full Conformance
Non-conformance Number (if applicable):				

Supporting Clause 4.4.

4.4.	States shall stimulate the research required to support policies related to fish as food.		
Relevance:	Relevant		
Evaluation Parameters			
Process:			Met?
<i>There is research to support policies related to fish as food.</i>			✓
EVIDENCE:			
U.S. supports both a Seafood Marketing Institute and Marine Science Center to stimulate research and to support and distribute the benefits of seafood in human diets.			
Current status/Appropriateness/Effectiveness:			
<i>There is evidence of this research.</i>			✓
EVIDENCE:			
States and national policies regarding seafood are guided by the Alaska Seafood Marketing Institute (ASMI), U.S. Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), and the U.S. National Institute of Health (NIH). American Seafoods Processor (ASP) is the primarily responsible for increasing the economic value of US seafood through marketing programs, quality assurance, industry training and sustainability certification. ASMI's role includes conducting or contracting for scientific research to develop and discover health, dietetic, or other uses of seafood harvested and processed in the state.			
Evidence Basis:			
<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the State stimulates the research required to support policies related to fish as food.</i>			✓
EVIDENCE:			
Fisheries policies and health policies reported in Love et al. 2017 shows that such initiative are synergistic with regard to seafood use, and provide illustrative examples (also in relation to hake) of collaboration between health and fisheries communities at different levels of the food system (federal and state policies, corporate partnerships, and civil society). The campaign "Eat Seafood, America!" is the driving message of a partnership effort aimed at helping Americans stay healthy while supporting the 2 million American workers in the seafood industry. The campaign is being coordinated by the Seafood Nutrition Partnership and supported by 36 organizations, including NOAA Fisheries.			
References:	Love et al. Agric & Food Secur (2017) Fisheries, food, and health in the USA: the importance of aligning fisheries and health. 6:16 DOI 10.1186/s40066-017-0093-9		
	https://www.fisheries.noaa.gov/topic/sustainable-seafood#eat-seafood,-america		
	https://www.americanseafoods.com/about-us		
Numerical score:	Starting score	Number of EPs <u>NOT</u> met	Overall score
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 4.5.

4.5.	There shall be sufficient knowledge of the economic, social, marketing, and institutional aspects of fisheries collected through data gathering, analysis, and research, as well as comparable data generated for ongoing monitoring, analysis, and policy formulation.
Relevance:	Relevant
Evaluation Parameters	
Process: <i>There is a system in place for collecting economic, social, marketing, and institutional knowledge of the fisheries.</i>	Met? ✓
<p>EVIDENCE: Economic and social data are collected and analyzed through a number of agencies, such as NMFS, NPFMC. An extensive report from NMFS is produced each year which provides data and analysis on a number of socioeconomic factors in U.S. fisheries, including catch volumes and values, numbers of vessels, employment, and marketing. These data, along with analyses conducted by/for NPFMC, are adequate for ongoing monitoring, analysis and policy formulation for the hake fisheries.</p>	
Current status/Appropriateness/Effectiveness: <i>These data are used for ongoing monitoring, analysis, and policy formulation.</i>	✓
<p>EVIDENCE: All participants of the West Coast Groundfish Trawl Fishery must complete an annual Economic Data Collection (EDC) form as required by regulation 50 CFR 660.114 (https://www.ecfr.gov/current/title-50/section-660.114). Data are aggregated and analyzed, the information received from fishery participants are report annually to the Pacific Fishery Management Council. The Fisheries Economics Explorer (FISHEyE) is an interactive tool for exploring, analyzing, and downloading data collected by the EDC Program about the West Coast Groundfish Trawl Catch Share Program. There are currently two modules, the Performance Metrics Module and the Whiting Module. Data available in the Performance Metrics Module are summarized by sector, and include vessel or company characteristics, costs, revenue, labor, and economic impacts. Whiting purchase and production data are summarized for catcher processors, motherships, and shorebased processors in the Whiting Module.</p> <p>Prior to the development of FISHEyE, data reports were presented to allow anyone to access information collected by the EDC Program. The most recent reports are below and other past reports are available upon request.</p> <ul style="list-style-type: none"> – Catcher Vessel Report 2009-2020; – Catcher-Processor Report 2009-2020; – Mothership Report 2009-2020; – First Receiver and Shorebased Processors Report 2009-2020. 	
<p>Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is sufficient knowledge of the economic, social, marketing, and institutional aspects of fisheries, that they are adequately researched, and that comparable data are generated for ongoing monitoring, analysis, and policy formulation. Examples may include reports on social/cultural/economic value of the resource.</i></p>	✓
<p>EVIDENCE: Various institutions have also contracted to have economic studies done and made public. Fishery managers use the data to determine whether the Catch Share program is meeting its goals of:</p> <ul style="list-style-type: none"> – Increasing the fishery's net economic benefits. – Creating individual economic stability for participants. – Providing full utilization of the trawl sector groundfish allocation. – Achieving individual accountability of catch and bycatch. <p>All data are aggregated and confidential. Aggregated data and analyses are made available to the public, fisheries managers, and specifically, the Pacific Fishery Management Council.</p>	

References: <https://www.fisheries.noaa.gov/west-coast/science-data/economic-data-collection-west-coast-groundfish-trawl-fishery>

<https://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/>

<https://www.ecfr.gov/current/title-50/chapter-VI/part-660/subpart-D/section-660.114>

<https://www.fisheries.noaa.gov/west-coast/science-data/economic-data-collection-forms>

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	)	=	Overall score
	10			0				10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)								High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)								Full Conformance
Non-conformance Number (if applicable):								

Supporting Clause 4.6.

4.6 The fisheries management organization shall investigate and document traditional fisheries knowledge and technologies—in particular those applied to small-scale fisheries—in order to assess their application to sustainable fisheries conservation, management, and development.

Relevance: Relevant

Evaluation Parameters	Met?
Process: <i>Traditional fisher knowledge has been investigated. Note that for highly developed fisheries that knowledge may already have been integrated into fisheries management.</i>	✓

EVIDENCE:

All available hake data from small and large scale fisheries, including personal use and subsistence, are considered in the stock assessment and management processes. In particular, the Pacific Coast Groundfish Fishery Management Plan uses and takes into account the traditional fisheries knowledge and technologies to develop measures for sustainable exploitation of the target stock and reduce the impact on the environment.

Current status/Appropriateness/Effectiveness: <i>There are records of the documentation of small-scale fisher practices.</i>	✓
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EVIDENCE:

NOAA Fisheries and the Pacific Fishery Management Council manage the Pacific whiting fishery on the West Coast, in U.S. federal waters (3 to 200 miles offshore) under the Pacific Coast Groundfish Fishery Management Plan (<https://www.pcouncil.org/groundfish-fishery-management-plan-and-amendments/>, 158 pages).

The Makah Tribe has an active fishery for Pacific whiting entirely within their usual and accustomed fishing grounds off the Olympic coast. Of the five sectors of West Coast groundfish fisheries covered under the Pacific Coast Groundfish Fishery Management Plan (PDF, 158 pages), the tribal sector is made up of tribal commercial fishers who have a federally recognized treaty right to fish for federally managed groundfish in their usual and accustomed fishing areas. These tribes, all located in Washington state, include the Quinault, Hoh, Quileute, and Makah. Formal allocations to these tribes exist for sablefish and Pacific whiting.

On June 23, 2021, NOAA Fisheries published a final rule for the 2021 Pacific whiting fishery under the authority of the Pacific Coast Groundfish Fishery Management Plan, the Magnuson-Stevens Fishery Conservation and Management Act, and the Pacific Whiting Act of 2006. The final rule establishes the 2021 Pacific whiting coastwide TAC of 500,000 mt following requirements in the Pacific Whiting Act after the U.S. and Canada Pacific Whiting Treaty's Joint Management Committee did not reach an agreement on the 2021 Pacific whiting coastwide TAC. The final rule also establishes the U.S. TAC, the 2021 tribal allocation of 17.5 percent of the U.S.TAC, allocations for three commercial whiting sectors, and set-asides for research and incidental mortality of Pacific whiting as shown in the table below.

2021 Pacific Whiting Harvest Specifications (mt)	
U.S. TAC	369,400
Tribal Allocation	64,645
Research and Incidental Mortality Set-Aside	750
Catcher/Processor (C/P) Coop Program	103,362
Mothership (MS) Coop Program	72,961
Shorebased IFQ Program	127,682

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fisheries management organization investigates and documents traditional fisheries knowledge and technologies—in particular those applied to small-scale fisheries—in order to assess their application to sustainable fisheries conservation, management, and development. Examples may include various fisheries reports.

**EVIDENCE:**

The U.S. specified 2020 catch target of 424,810 t was further divided among the research, tribal, catcher-processor, mothership, and shore-based sectors. After the tribal allocation of 17.5% (74,342 t), and a 1,500 t allocation for research catch and bycatch in non-groundfish fisheries, the 2020 non-tribal U.S. catch limit of 348,968 t was allocated to the catcher-processor (34%), mothership (24%), and shore-based (42%) commercial sectors. Reallocation of 40,000 t of tribal quota to non-tribal sectors on September 16 resulted in final quotas for the CP, MS, and shore-based sectors of 132,249 t, 93,352 t, and 163,367 t, respectively. Regulations do not allow at-sea processing south of 42°N latitude at any time during the year. The start of the tribal fishery (September) was considerably delayed due to the COVID-19 pandemic.

Tribal landings available at the time of 2021 assessment were 133 t. As in recent years, careful consideration was needed to accurately account for tribal landings. Ongoing efforts continue to work towards streamlining tribal catch reporting.

The Pacific Coast Groundfish Fishery Management Plan (see: <https://www.fisheries.noaa.gov/management-plan/pacific-coast-groundfish-fishery-management-plan>) has routine management measures are those that the Council determines are likely to be adjusted on an annual or more frequent basis. Experience gained from management of the Pacific Coast groundfish fishery indicates that certain measures usually require modification on a frequent basis to ensure that they meet their stated purpose with accuracy. For commercial fisheries, these measures are trip-landing limits and trip frequency limits, including cumulative limits, and notification requirements. In particular, such measures are implemented to take into account traditional fisheries knowledge and technologies (applied also by small-scale fisheries) and are used for a sustainable exploitation of the resources. In cases where protection of an overfished or depleted stock is required, the Council may impose limits that differ by gear type, which take into account the specificity of small scale fishery, or establish closed areas or seasons in accordance with traditional fisheries knowledge and technologies.

References:

Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

Numerical score:

Starting score	-	(	Number of EPs <u>NOT</u> met	)	x 3	=	Overall score
10			0				10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)

High

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)

Full Conformance

Non-conformance Number (if applicable):

Supporting Clause 4.7.

4.7	If a fisheries management organization is conducting scientific research activities in waters of another State, it shall ensure that their vessels comply with the laws and regulations of that State and international law.				
Relevance:	Relevant				
Evaluation Parameters					
Process: <i>There is a system in place to manage the conduct of research vessels operating in waters of other States.</i>			✓		
EVIDENCE: Scientific research carried out in the waters of USA and Canada, the only 2 countries involved in the science and management of this resource, is compliant with all relevant laws and regulations of those jurisdictions.					
Current status/Appropriateness/Effectiveness: <i>If a fisheries management organization is conducting scientific research activities in waters of another State, there is record of such shared research activities and they comply with required regulations.</i>			✓		
EVIDENCE: The major scientific activity for Pacific hake is the annual survey conducted by U.S. and Canada. The Joint U.S. and Canadian Integrated Acoustic and Trawl Survey (Stewart et al., 2011) has been the primary fishery-independent tool used to assess the distribution, abundance, and biology of coastal age-2+ Pacific Hake along the west coasts of the U.S. and Canada. The acoustic surveys performed in 1995, 1998, 2001, 2003, 2005, 2007, 2009, 2011, 2012, 2013, 2015, 2017, and 2019 were used in this assessment. The acoustic survey samples transects that represent all waters off the coasts of the U.S. and Canada thought to contain all portions of the age-2+ Pacific Hake stock. Age-0 and age-1 hake have been historically excluded from the survey efforts, due to largely different schooling behavior relative to older hake, concerns about their catchability by the trawl gear, and differences in expected location during the summer months when the survey takes place. Observations of age-1 hake are recorded during the survey, and an age-1 index is estimated (described below), but it is only used to fit the model in a sensitivity analysis. Fishery-independent data from the AFSC bottom trawl survey, the NWFSC bottom trawl survey, the NWFSC and Pacific Whiting Conservation Cooperative (PWCC) pre-recruit survey, and DFO surveys are available but not used in the assessment.					
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that if a fisheries management organization is conducting scientific research activities in waters of another State, it ensures that their vessels comply with the laws and regulations of that State and international law. Examples may include survey reports.</i>			✓		
EVIDENCE: Scientists from the Fishery Resource Analysis and Monitoring (FRAM) division at the NOAA Fisheries Northwest Fisheries Science Center (NWFSC) and the Pacific region of the Department of Fisheries and Oceans Canada (DFO) conducted the Joint Integrated Acoustic Survey (IAT) survey aboard the NOAA Ship Miller Freeman and the Canadian Coast Guard Ship (CCGS) W.E. Ricker, both are stern trawlers equipped for fisheries and oceanographic research, vessels comply with the laws and regulations of that State and international law . Pacific Hake (<i>Merluccius productus</i>) aggregations were targeted along the continental shelf and upper slope of the entire survey area. Reports of the surveys are available (see: https://www.fisheries.noaa.gov/west-coast/science-data/joint-us-canada-integrated-ecosystem-and-pacific-hake-acoustic-trawl-survey)					
References:	https://repository.library.noaa.gov/view/noaa/23058 https://repository.library.noaa.gov/view/noaa/19942				
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met) x 3 =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 4.8.

4.8.	Adoption of uniform guidelines governing fisheries research conducted on the high seas shall be promoted and, where appropriate, support the establishment of policies that include, inter alia, facilitating research at the international and sharing the research results with affected States.		
Relevance:	Relevant		
Evaluation Parameters			Met?
Process: <i>There is a mechanism in place to allow the development and review of guidelines governing fisheries research conducted on the high seas.</i>			✓
EVIDENCE: Coordination and sharing of hake research is accomplished through the JTC, a bilateral, international treaty based organization, composed of representatives from the USA and Canada			
Current status/Appropriateness/Effectiveness: <i>There is a record of uniform high seas research guidelines or a mechanism to create them.</i>			✓
EVIDENCE: Coordination and sharing of hake research is accomplished through the JTC, a bilateral, international treaty based organization, composed of representatives from the USA and Canada. Its mandate is research on hake biology and assessment, as well as management (allocation between regulatory areas in US and Canada, developing various harvest regulations and setting annual harvest levels) of the stocks of Pacific hake within the convention waters of both nations. Extensive annual reports from JTC show the level of research and stock assessment.			
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that adoption of uniform guidelines governing fisheries research conducted on the high seas is promoted and, where appropriate, supports the establishment of mechanisms, including, inter alia, adopting uniform guidelines to facilitate research at the international level, and encouraging such research results be shared with affected States. Examples may include survey reports, or high seas guidelines.</i>			✓
EVIDENCE: The Fisheries Engineering and Acoustic Technologies team from the Northwest Fisheries Science Center and Fisheries and Oceans Canada Pacific Region conduct the hake survey. It provides vital data to help manage the migratory coastal stock of Pacific hake. The hake survey, officially called the Joint U.S.-Canada Integrated Ecosystem and Pacific Hake Acoustic Trawl Survey, occurs every odd-numbered year. The U.S.-Canada International Hake/Whiting Treaty governs the management of the hake fishery. The treaty outlines how the Total Allowable Catch for hake is set for the entire coast.			
References:	Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p. https://repository.library.noaa.gov/view/noaa/23058 https://repository.library.noaa.gov/view/noaa/19942		
Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met
	10	)	x 3 =
			Overall score
			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 4.9.

4.9	If appropriate, the fisheries management organization and relevant international organizations shall promote and enhance the research capacities of developing countries, inter alia, in the areas of data collection and analysis, information, science and technology, human resource development, and provision of research facilities, in order for them to participate effectively in the conservation, management, and sustainable use of living aquatic resources.				
Relevance:	Not Relevant				
	This clause is not applicable because the shared stocks are not fished by one or more developing States.				
Evaluation Parameters			Met?		
Process: <i>There is a mechanism in place by which the research capacities of developing countries can be developed and enhanced. This could include, but is not limited to, the provision of personnel, equipment, funding, or cooperation on data collection and stock assessment.</i>			☐		
EVIDENCE:					
Current status/Appropriateness/Effectiveness: <i>There are recognizable examples of instances in the history of the fishery under assessment where actions by the managers of the unit of certification have promoted or enhanced the research capacity of one or more developing nations in the ways described above.</i>			☐		
EVIDENCE:					
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that if appropriate, the fisheries management organization and relevant international organizations promote and enhance the research capacities of developing States, inter alia, in the areas of data collection and analysis, information, science and technology, human resource development, and provision of research facilities, in order for them to participate effectively in the conservation, management, and sustainable use of living aquatic resources. Examples may include various data or reports.</i>			☐		
EVIDENCE:					
References:					
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10				NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					
Non-conformance Number (if applicable):					

Supporting Clause 4.10.

4.10.	Competent national organizations shall, where appropriate, render technical and financial support to States upon request and when engaged in research investigations aimed at evaluating stocks which have been previously unfished or very lightly fished.				
Relevance:	Not Relevant Not relevant because hake fisheries are fully developed.				
Evaluation Parameters					
Process: <i>There is a mechanism to allow a national organization to render technical and financial support to the State.</i>	Met? ☐				
EVIDENCE:					
Current status/Appropriateness/Effectiveness: <i>There is a record of the provided technical and financial support.</i>	Met? ☐				
EVIDENCE:					
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that competent national organizations, where appropriate, render technical and financial support to States upon request and when engaged in research investigations aimed at evaluating stocks which have been previously unfished or very lightly fished. Examples may include various data or reports.</i>	Met? ☐				
EVIDENCE:					
References:					
Numerical score:	Starting score	- (Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10				NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					
Non-conformance Number (if applicable):					

Supporting Clause 4.11.

4.11.	Relevant technical and financial international organizations shall, upon request, support States in their research efforts, devoting special attention to developing countries—in particular the least developed among them and small developing island countries.		
Relevance:	Not relevant. This clause is not relevant because there is no international management component of hake fisheries occurring within a developing country.		
Evaluation Parameters			Met?
Process:	<i>The international management component of the fishery is engaged in processes that support the fishery based in developing countries.</i>		☐
EVIDENCE:			
Current status/Appropriateness/Effectiveness:	<i>There is a record of the provided technical and financial support.</i>		☐
EVIDENCE:			
Evidence Basis:	<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that relevant technical and financial international organizations are, upon request, supporting States in their research efforts, and are devoting special attention of developing countries—in particular the least developed among them and small island developing countries. Examples may include various data or reports.</i>		☐
EVIDENCE:			
References:			
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met x 3) =	Overall score
	10		NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			
Non-conformance Number (if applicable):			

Fundamental Clause 5. Stock assessment

There shall be regular stock assessment activities appropriate for the fishery, its range, the species biology, and the ecosystem, undertaken in accordance with acknowledged scientific standards to support its optimum utilization.

Supporting Clause 5.1.

5.1.	An appropriate institutional framework shall be established to determine the applied research required and its proper use (i.e., assess/evaluate stock assessment model/practices) for fishery management purposes.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>There is an established institutional framework for fishery management purposes that determines applied research needs and use.</i>		✓
EVIDENCE: Management takes place through a Joint Management Committee (JMC), a Joint Technical Committee (JTC), and Advisory Panel (AP). Management of the coastal Pacific hake fishery is shared among the Joint Management Committee (or JMC, as established by the Agreement Between the Government of Canada and the Government of the United States of America on Pacific Hake/Whiting), who recommends the annual TAC, and the National Marine Fisheries Service (NMFS) in the US and Fisheries and Oceans Canada (DFO) in Canada. NMFS and DFO are responsible for domestic management of their country's fisheries. Both the U.S. and Canada fisheries have decision-making processes that respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.		
Current status: <i>There is evidence to substantiate that essential research for fishery management purposes is determined and carried out. This research generally includes routine stock(s) and ecosystem assessment reports. Assessors shall evaluate the specific stock assessment model/practices for each of the species under assessment and verify the technical appropriateness for use. For salmon, the assessors shall present and evaluate the methods for escapement goal development utilized to develop the annual escapement goals in Alaska (about 300). Statewide summary data for Alaska can be found in the annually released ADF&G document Summary of Pacific salmon escapement goals in Alaska with a review of escapements from [year] to [year]. The document generally presents the latest 9–10 years of salmon escapement performance in review.</i>		✓
EVIDENCE: The Joint Technical Committee authors an annual stock assessment, and provides the Joint Management Committee with annual stock assessments to inform harvest management decisions, including scientific advice on the annual potential yield of the offshore whiting resource that may be caught for that fishing year. The Joint Technical Committee includes up to scientific experts, with up to two appointed by each party and one independent member appointed by both parties. At annual meetings that typically occur in December, the JTC presents initial information about the status of the stock, and includes information about the past fishing year, often from industry members in attendance. As approved by the Joint Management Committee (JMC), the stock assessment and stock assessment review for Pacific hake previously fell under the responsibility of the Pacific Fishery Management Council (PFMC) and JTC is tasked to: 1) Propose its terms of reference for stock assessment and review (this document) for approval by the JMC. 2) Develop stock assessment criteria and methods, and design survey methods. 3) Exchange survey information, including information on stock abundance, distribution, and age composition. 4) Exchange and review relevant annual catch and biological data, including information provided by the public. 5) Provide, by no later than February 1 of each year unless otherwise directed by the JMC, a stock assessment that includes scientific advice on the annual potential yield of the Pacific hake resource that may be caught for that fishing year, taking into account uncertainties in stock assessment and stock productivity parameters and evaluating the risk of errors in parameter estimates produced in the assessment. 6) Perform other analyses that may be referred to it by the Scientific Review Group (SRG) and the JMC. The JTC is responsible for conducting a complete and technically sound stock assessment that conforms to accepted		

standards of quality and in accordance with these terms of reference.

Current status/Appropriateness/Effectiveness:



EVIDENCE:

The assessment for Pacific hake is carried out with the Stock Synthesis (SS version 3.30j) model written by Richard Methof of the National Marine Fisheries Service. SS is a statistical age-structured population modeling framework that has been applied in a wide variety of fish assessments globally. The method has generally been accepted as rigorous. SS is a state-of-the-art software that is implemented in the Automatic Differentiation Model Builder (ADMB) software developed by David Fournier. The 2018 assessment reports a single base-case model and an alternative model representing the collective work of the Joint Technical Committee. The assessment is fully Bayesian, with the models incorporating prior information on natural mortality (M) and the steepness (h) of the stock-recruit relationship, and integrating over parameter uncertainty to provide results for probabilistic interpretation. The 2018 assessment incorporated new approaches for weighting composition data and for parameterizing time-varying selectivity.

The maturity and fecundity relationships of hake were updated, and a new age-based maturity ogive was developed in the 2018 assessment. The model incorporates sources of information on catch, relative abundance (acoustic survey), age composition, growth and maturity.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that an appropriate institutional framework is established to determine the applied research required and its proper use (i.e., assess and evaluate stock assessment models or practices) for fishery management purposes. Examples may include description of the overall process of research assessment and peer review, as well as stock and ecosystem assessment reports.



EVIDENCE:

Evidence has been provided in background sections to demonstrate that the institutional framework is established to determine management strategy is achieving its objectives and that the 40:10 rule is by nature precautionary in the sense that harvest rate is reduced as stock biomass declines. Annual harvest levels are based on rigorously reviewed stock assessments and strictly follow recommendations made by the Hake Agreement Scientific Review Group, Advisory Panel, and Joint Management Committee. Since 2007, the combined US and Canadian harvests have not exceeded annual catch targets derived from applying the harvest policy, averaging 76.8% of the target.

The AP recommended and the JMC adopted a coast-wide TAC of 529,290 t for the 2020 season, demonstrating that management decisions are precautionary.

Historically the fishing intensity has been low and the biomass has been high. In 2009, spawning depletion was around 20% triggering a response of the Pacific Fisheries Management Council to initiate a rebuilding plan for Pacific Hake because the depletion level was below 25% of unfished spawning biomass (SB0). However, due to the strong 1999 year class entering the fishery the stock rebuilt and the rebuilding plan did not have to be implemented.

Further evidence that the Pacific Hake harvest strategy is effective and precautionary is based on the recent temporal progression of years (Johnson et al. 2021). The estimated spawning biomass has been below B40% from 2007-2011, and considerably above B40% from 2012-2017. The median relative fishing intensity has been below target in all years (Johnson et al. 2021). Thus recent management actions have resulted in the Pacific Hake stock being consistently in the Precautionary/Healthy Zone.

Since the Pacific Hake agreement, TACs have been set at or below harvest at the F40%, demonstrating that the application of the rules is appropriate and effective.

The performance of the harvest strategy has not been fully evaluated. However, Management Strategy Evaluation (MSE) of the Hake Agreement's harvest policy is a priority for the JMC and its advisors. The MSE is being developed as an integral part of the Hake Agreement's management and decision-making process to help inform decision making about harvest policies and research priorities.

An appropriate institutional framework shall be established to determine the applied research required and its proper use (i.e., assess/evaluate stock assessment model/practices) for fishery management purposes.

References:	Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.				
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 5.1.1.

5.1.1.	Less elaborate stock assessment methods are frequently used for small-scale or low-value capture fisheries resulting in greater uncertainty about the status of the <i>stock under consideration</i> ., A more precautionary approach to managing fisheries on such resources shall be required, including, where appropriate, a lower level of resource utilization. A record of good management performance may be considered as supporting evidence of the adequacy of the management system.				
Relevance:	Not Relevant. Because there are no small-scale or low value commercial hake fisheries this clause is not relevant.				
Evaluation Parameters			Met?		
Process:	There is a process that allows more precautionary approaches to managing fisheries (e.g., lower exploitation rates) on resources assessed through stock assessment methods that result in greater uncertainty about the state of the stock under consideration.		☐		
EVIDENCE:					
Current status/Appropriateness/Effectiveness:	There is evidence that precautionary approaches are applied to managing fisheries (e.g., lower exploitation rates) on resources assessed through stock assessment methods that result in greater uncertainty about the state of the stock under consideration.		☐		
EVIDENCE:					
Evidence Basis:	The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that with less elaborate stock assessment methods frequently used for small-scale or low-value capture fisheries, more precautionary approaches to managing fisheries on such resources are required, including where appropriate, lower level of resource utilization. Examples may include stock assessment reports and other data.		☐		
EVIDENCE:					
References:					
Numerical score:	Starting score	- (Number of EPs <u>NOT</u> met) x 3 =	Overall score
					NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					
Non-conformance Number (if applicable):					

Supporting Clause 5.1.2.

5.1.2	The fisheries management organization shall ensure that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, and fishery enhancement. Analysis results shall be distributed in a timely and readily understandable fashion in order that the best scientific evidence available contributes to fisheries conservation, management, and development. The fisheries management organization shall also ensure the availability of research facilities and provide appropriate training, staffing, and institution building to conduct the research.
Relevance:	Relevant
Evaluation Parameters	
Process: <i>There are organizations and processes in place to permit research into the aspects of fisheries listed in the clause.</i>	✓
EVIDENCE: Appropriate research is conducted into all aspects of fisheries by JTC and researchers from other agencies. The JMC/JTC has a research plan. Biology, ecology, physiology, and environmental science are all covered by these plans. Economic analyses and social science are conducted by NMFS, as well as by other consultants. All results of research are available to the public in readily understandable fashion. Thus the best scientific evidence is made readily available as a contribution to fisheries conservation and management. Research facilities and appropriate training are provided at a number of locations in U.S. and Canada.	
Current status/Appropriateness/Effectiveness: <i>Research is conducted into the following aspects of the fisheries: biology, ecology, technology, environmental science, economics, and aquaculture. The described types of research carried out shall result in the fishery being deemed compliant with this evaluation parameter.</i>	✓
EVIDENCE: NMFS and PBS have completed studies on environmental influences on hake distribution. The NFMS component of the project describes the northsouth summertime distribution of Hake and involves developing both descriptive and forecast models for hake distribution. The PBS component describes crossshelf summertime distribution for the central California Current, and looks at a fine scale (5km grid) distribution of Hake in relation to sea surface temperature and other variables. The NMFS and PBS study results will allow future surveys to be designed to better capture concentrations of target species from predictive models of Hake distribution based on environmental parameters. Overall, there is comprehensive knowledge of the life-history parameters for Pacific hake to conduct robust assessments and develop appropriate biological reference points. Biological samples are routinely collected on an annual basis from both domestic and joint venture fisheries in both US and Canada, as well as the fisheries independent surveys. Annual length-weight relationships are established each year for US and Canada and this information has been used in stock assessment models to convert population numbers to biomass. Mean weight at age is calculated from samples pooled from all fisheries and acoustic surveys. For the 2018 stock assessment a new age-based maturity ogive was developed using histological estimates of functional maturity from ovaries that were associated with age estimates. In recent stock assessments, natural mortality has either been fixed at 0.20, or estimated using an informative prior. The stock-recruitment function is a Beverton-Holt parameterization with a prior for steepness (h).	
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States are conducting appropriate research into the following aspects of the fisheries: biology, ecology, technology, environmental science, economics, and aquaculture. The research is disseminated accordingly. States also ensure the availability of research facilities and provide appropriate training, staffing, and institution building to conduct the research. Examples may include stock assessment, economic value, fleet reports, and other reports.</i>	✓

EVIDENCE:

A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance and other information such as environmental and socio economic information), including some that may not be directly related to the current fishery, is available (see: background section).

References:

Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

Haltuch, M., M. O’Conner, C. Holt, A.E. Punt, A.E., and E. Clarke. 2012 unpublished. Development of real-time tool for predicting the location of Pacific hake (*Merluccius productus*). NOAA-Fisheries, Northwest Fisheries Science Center. Seattle, WA.

Hamel, O.S., Ressler, P.H., R.E. Thomas, D.A. Waldeck, A.C. Hicks, J.A. Holmes, and G.W. Fleischer. 2015. Biology, fisheries, assessment and management of Pacific hake (*Merluccius productus*). In H. Arancibia (ed.). Hakes: Biology and exploitation, First Edition. John Wiley & Sons Ltd: 234-264.

Holt, C.A., A. Enson, B. Dorner, and M. Haltuch. 2012 unpublished. Predicting the spatial distribution of Pacific hake using satellite-derived data on mesoscale oceanographic features. Pacific Biological Station Nanaimo, B.C. Canada.

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	)	=	Overall score
	10			0				10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)								High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)								Full Conformance
Non-conformance Number (if applicable):								

Supporting Clause 5.2.

5.2.	There shall be established research capacity necessary to assess and monitor (1) the effects of climate or other environmental change on stocks and aquatic ecosystems, (2) the status of the stock under State jurisdiction, and (3) the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration.	
Relevance:	Relevant	
Evaluation Parameters		Met?
<p>Process: <i>There is a system that establishes the required research capacity needed to assess and monitor (1) the effects of climate or other environmental change on stocks and aquatic ecosystems; (2) the status of the stock under State jurisdiction; and (3) the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration. Please note that climate science is complex and evolving, and the system shall recognize the ability to assess and monitor these parameters over time.</i></p>		✓
<p>EVIDENCE</p> <p>The National Marine Fisheries Service maintain strong research programs to monitor the state of the stocks and effects of fishing, pollution, habitat alteration and climate change.</p> <p>The National Oceanic and Atmosphere Administration’s (NOAA) Habitat Conservation Division (HCD) responsibilities include conducting and/or reviewing environmental analyses for a large variety of activities including commercial fishing, coastal development, transportation and energy projects. The HCD focuses on activities in habitats used by federally managed fish species located offshore, nearshore, in estuaries and in freshwater areas. NOAA administers the Saltonstall-Kennedy grant program for fisheries research and development. The U.S. Fish and Wildlife Service has recognized climate change as a potential driver in aquatic systems and supports research into the possible effect. The University of Alaska’s Climate Research Center conducts basic climate research useful for understanding potential impacts on aquatic systems.</p> <p>NOAA identifies habitats essential for managed species and conserves habitats from adverse effects on those habitats. These habitats are termed “Essential Fish Habitat” or EFH, and are defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”. NMFS and regional Fishery Management Councils such as NPFMC must describe and identify EFH in fishery management plans (FMPs), minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH. Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NMFS, and NMFS must provide conservation recommendations to federal and state agencies regarding actions that would adversely affect EFH.</p>		
<p>Current status/Appropriateness/Effectiveness: <i>There is evidence to demonstrate that there is sufficient research capacity in place to assess and monitor (1) the effects of climate or other environmental change on stocks and aquatic ecosystems, (2) the status of the stock under consideration, and (2) the impacts of fishing activity, pollution, or habitat alteration.</i></p>		✓
<p>EVIDENCE:</p> <p>The number, expertise, ongoing funding provided, and research publications of state and federal agencies involved in conducting research to assess and monitor (1) the effects of climate or other environmental change on stocks and aquatic ecosystems, (2) the status of hake stocks, and (3) the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration demonstrates that there is sufficient ongoing capacity.</p>		
<p>Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is established research capacity necessary to assess and monitor (1) the effects of climate or other environmental change on stocks and aquatic ecosystems, (2) the status of the stock under State jurisdiction, and (3) the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration. Examples may include stock, ecosystem, and habitat assessment reports.</i></p>		✓

EVIDENCE:

In U.S main impacts of the fishery on key ecosystem issues can be inferred from the Ecosystem (CCE) Integrated Ecosystem Assessment (IEA) (NOAA Fisheries 2019) and Kaplan et al. (2012). Results suggest Hake mid-water trawl primarily has direct impacts on its target and bycatch species. Few indirect effects from the fleet extended through predator–prey links to other parts of the food web, but the few include increases in krill, small planktivores, large piscivorous flatfish, Dover sole, shortbelly rockfish, and shrimp.

In Canada main interactions between the fishery and these ecosystem issues can be inferred from information developed for the US fishery. These interactions have been investigated and taken into account during the IFMP (DFO 2018) development processes.

NOAA publishes Ecosystem Status Report of the US west coast (see: <https://www.pcouncil.org/documents/2020/02/g-1-a-ia-team-report-1.pdf>; https://pnwcirc.org/sites/pnwcirc.org/files/ocar3_finalweb.pdf)

For further evidence on established research capacity necessary to assess and monitor the effects of climate see also clause 7.1.2.

References:	DFO. 2018a. Pacific Region Integrated Fisheries Management Plan Groundfish, Effective February 21, 2018. Version 1.0 ftp://ftp.lgl.com/Public/For%20TTA/IFMPs/IFMP%202018-2019_Groundfish.pdf .
	Kaplan, I. C., I. A. Gray, and P. S. Levin. 2012. Cumulative impacts of fisheries in the California Current. Fish and Fisheries
	NOAA Fisheries Office of Law Enforcement (OLE). 2019a. West Coast Enforcement Division Report to the Pacific Fishery Management Council. PFMC Informational Report 2, April 2019. https://www.pcouncil.org/wp-content/uploads/2019/03/IR2_OLE_WCD-2018-TRAT-Compliance-Report_APRBB2019.pdf .
	PFMC. 2018c. California Current Integrated Ecosystem Assessment (CCIEA) California Current Ecosystem Status Report, 2018. Harvey, C., Garfield, T., Williams, G, Tolimieri, N. and Hazen, E. (eds.). Agenda Item F1.a. NMFS report 1. March 2018.

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	) x 3	=	Overall score
	10		0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance
Non-conformance Number (if applicable):						

Supporting Clause 5.3.

5.3	Management organizations shall cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources.			
Relevance:	Relevant			
Evaluation Parameters				
Process: <i>There is cooperation or interaction between international organizations to ensure optimum utilization of resource.</i>			✓	
EVIDENCE: JTM ensures that there is extensive cooperation on various aspects of research, stock assessment, and management of Pacific hake between the fisheries agencies (e.g. DFO and NMFS) of Canada and USA. There have been occasional cooperative research projects with other nations, and scientists from fishery agencies.				
Current status/Appropriateness/Effectiveness: <i>There is evidence available to substantiate that such cooperation or interaction has taken place. There is data available that substantiates cooperation activities.</i>			✓	
EVIDENCE: The bilateral agreement between the United States and Canada known as the Pacific Whiting Treaty remains the controlling framework for international management of the Pacific hake fishery. Under the agreement an annual TAC is set. The TAC is allocated to the American and Canadian fisheries according to set percentages specified in the agreement. Management takes place through a Joint Management Committee (JMC), a Joint Technical Committee (JTC), and Advisory Panel (AP) (NOAA Fisheries WC Region 2019). The decision and advisory structure is stable. Once the TAC is allocated to the United States and Canada the management of Pacific hake fisheries is conducted under the respective national jurisdictions and statutory authorities which have remained unchanged for many years. Both Canada and the U.S. have effective national legal systems that contain frameworks for cooperation and have demonstrated organized and effective coordination with other parties. In both the U.S. and Canada fisheries formal reporting to all interested stakeholders provides comprehensive information on the fishery's performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.				
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that management organizations cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources. Examples may include outputs resulting from meetings or other research.</i>			✓	
There is an extensive library of documents available explaining the processes followed for both Joint Management Committee (JMC), a Joint Technical Committee (JTC), available on their NOAA web sites (https://www.fisheries.noaa.gov/species/pacific-whiting#overview).. An example of the annual reports of JMC meeting is available here: https://www.fisheries.noaa.gov/event/pacific-hake-whiting-treaty-joint-management-committee-meeting .				
References:	https://www.gpo.gov/fdsys/pkg/USCODE-2010-title16/pdf/USCODE-2010-title16-chap89.pdf https://www.congress.gov/treaty-document/108th-congress/24			
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met x 3) =	Overall score
	10		0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)				High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)				Full Conformance
Non-conformance Number (if applicable):				

Supporting Clause 5.4.

5.4.	The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programs to improve understanding of the biology, environment, and status of transboundary, shared, straddling, highly migratory and high seas stocks.				
Relevance:	Relevant				
Evaluation Parameters					
Process: <i>The collaborative technical and research programs to improve understanding of the biology, environment, and status of transboundary aquatic stocks have been developed.</i>			✓		
EVIDENCE: As described in Clause 5.3 the Joint Technical Committee (JTC), and Advisory Panel (AP) (NOAA Fisheries WC Region 2019) develop collaborative technical and research programs to improve understanding of the biology, ecology and status of transboundary aquatic stocks.					
Current status/Appropriateness/Effectiveness: <i>There is evidence available to substantiate that such cooperation or interaction has taken place. There are data on collaborative programs to improve understanding of transboundary, shared, straddling, highly migratory or high seas stocks.</i>			✓		
EVIDENCE: The technical committees outlined above and in Clause 5.3 are very active.					
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organizations directly, or in conjunction with other States, have developed collaborative technical and research programs to improve understanding of the biology, environment, and status, of transboundary, shared, straddling, highly migratory or high seas stocks. Examples may include outputs resulting from meetings or other research.</i>			✓		
EVIDENCE: There is an extensive and up-to-date library of technical reports written by the technical committees available on NOAA web site noted in Clause 5.3.					
References:	https://www.fisheries.noaa.gov/species/pacific-whiting#overview				
Numerical score:	Starting score	- (Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 5.5.

5.5.	Data generated by research shall be analyzed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate.		
Relevance:	Relevant		
Evaluation Parameters			Met?
Process: <i>There is a process that allows analysis of research data, ensuring, where appropriate, their confidentiality.</i>			✓
EVIDENCE: Scientific data from various sources are analyzed and presented in peer reviewed meetings and/or in primary literature, following scientific protocols. Results of these analyses are disseminated in a timely fashion through numerous methods, including scientific publications, and as information on websites of various agencies, in order to contribute to hake fisheries conservation and management. Confidentiality is required by U.S. and Canada statute and data is redacted in reports when necessary. The nature of the confidentiality is sometimes determined by the number of individuals or entities contained in the dataset.			
Current status/Appropriateness/Effectiveness: <i>There is evidence data was properly analyzed. Data was published respecting, where appropriate, confidentiality agreements. The rules of confidentiality are effectively respected.</i>			✓
EVIDENCE: Data collected by scientists from the survey and hake fisheries are analyzed and presented in peer reviewed meetings and/or in primary literature, following rigorous scientific protocols. Results of these analyses are disseminated in a timely fashion through numerous methods, including scientific publications, and as information on NOAA, DFO and NPFMC websites, in order to contribute to fisheries conservation and management.			
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that data generated by research is analyzed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate. Examples may include various data or reports.</i>			✓
EVIDENCE: An example of a report that had to be redacted to ensure confidentiality is the At-Sea Hake Observer Program 2021 Sampling Manual. An example of a peer reviewed research publication is the stock assessment from Johnson et al (2021).			
References:	<p>Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.</p> <p>https://media.fisheries.noaa.gov/2021-04/A-SHOP-Manual%202021-508-compliant-updated.pdf?null.</p> <p>(NWFSC) Northwest Fisheries Science Center, At-Sea Hake Observer Program, 2021 Sampling Manual. Fishery Resource Analysis and Monitoring, At-Sea Hake Observer Program. NWFSC, 2725 Montlake Blvd. East, Seattle, Washington 98112.</p>		
Numerical score:	Starting score	Number of EPs <u>NOT</u> met	Overall score
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Fundamental Clause 6. Biological reference points and harvest control rule

The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.

Supporting Clause 6.1.

6.1.	The fishery management organization shall establish safe target reference point(s) for management. Management targets are consistent with achieving maximum sustainable yield (MSY), a suitable proxy, or a lesser fishing mortality— if that is optimal in the circumstances of the fishery (e.g., multispecies fisheries) or is needed to avoid adverse impacts on dependent predators.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process:		
A target reference point(s) or proxy has been officially established. Managers shall be able to apply technical measures to reduce fishing pressure in the event that reference points are approached or exceeded.		✓
EVIDENCE:		
Target reference points for biomass and fishing mortality (harvest rate) have been developed based on sound scientific analyses. Exploitation rates for the individual management areas are established separately to ensure that localized overfishing does not occur. The Treaty (The Agreement between the government of the United States and the government of Canada on Pacific Hake, signed at Seattle, Washington, on November 21, 2003, and entered into force June 25, 2008.) specifically identifies FSPR=40% as the default harvest rate and B40% as a point where the 40:10 TAC adjustment is triggered (see Johnson et al 2021). Estimates of the 2021 base model reference points with posterior credibility intervals are in Table 5. The medians of sustainable yields and biomass reference points are almost 9% lower than in the 2020 assessment. This is a result of increasing the effective sample size used to describe the posterior distributions of model parameters, leading to more accurate point estimates. The probability that spawning biomass at the beginning of 2021 is below B40% is $P(B_{2021} < B_{40\%}) = 17.8\%$, and of being below B25% is $P(B_{2021} < B_{25\%}) = 2.7\%$. The probability that the relative fishing intensity was above its target of 1.0 at the end of 2020 is 2.1%		
Current status/Appropriateness/Effectiveness:		
The official target reference point or proxy is consistent with achieving maximum sustainable yield (MSY), a suitable proxy, or a lesser fishing mortality—if that is optimal in the circumstances of the fishery (e.g., multispecies fisheries) or is needed to avoid severe adverse impacts on dependent predators (e.g. recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible). Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored. Furthermore, there is evidence that the target reference point/management target has been used as an objective by the management process. If there are historical instances of the reference point being approached or exceeded, managers have taken remedial action as appropriate. In the context of reference points, when data are insufficient to estimate reference points directly, other measures of productive capacity can serve as reasonable substitutes or proxies. Suitable proxies may include, for example, standardized Catch per Unit of Effort (CPUE) as a proxy for biomass; or specific levels of fishing mortality and biomass, which have proven useful in other fisheries, can be used with a reasonable degree of confidence in the absence of better-defined levels. It is important to note that the use of a proxy may involve additional uncertainty, and if so, should trigger extra precaution in setting biological reference points. For salmon, escapement goals are the equivalent of a target reference point proxy.		✓
EVIDENCE:		
The estimated target reference point is B40% or 813,000 tis greater than BMSY (SBMSY is estimated at 518,000 t). As per the Hake Agreement, the 40:10 harvest policy reduces the harvest linearly from the F40% rule when the female spawning biomass is below SB40% such that the harvest goes to zero when limit reference point, SB10%, is reached. F40% is the fishing mortality rate that would result in a 40% spawning potential ratio (SPR) or spawning biomass per recruit that is 40% of the unfished level. This SPR approach is used because the stock-recruitment relationship for Pacific Hake, along with FMSY and BMSY reference points, cannot be estimated reliably from historical data. Currently, there is a high degree of certainty that the female spawning biomass has been fluctuating around SB40% or has been above this level from 2004.		

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that target reference points have been established and are consistent with achieving MSY, a suitable proxy, or a lesser fishing mortality—if that is optimal in the circumstances of the fishery (e.g., multispecies fisheries) or is needed to avoid severe adverse impacts on dependent predators. Examples may include stock assessment reports or fishery management plans.

✓

EVIDENCE:

The annual coastwide TAC-setting process begins with a stock assessment completed by the Joint Technical Committee in January. The Scientific Review Group reviews the stock assessment at their annual meeting (February or March) and provides scientific advice, which is incorporated into the final stock assessment. The Advisory Panel and Joint Management Committee meet to review the stock assessment and to provide advice to the governments of Canada and of the United States on an annual coastwide TAC by March of each year. Once approved by the respective governments, the TAC advice is in turn implemented in accordance with each countries' laws and regulations. This process is fully based on MSY proxy reference points, allowing an exploitation level that would keep the stock at high level of biomass.

References:

Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific Hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10					10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance
Non-conformance Number (if applicable):						

Supporting Clause 6.2.

6.2.	The fishery management organization shall establish appropriate limit reference point(s) for exploitation (i.e., consistent with avoiding recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible; Appendix 1, Part 1). When a limit reference point is approached, measures shall be taken to ensure that it will not be exceeded. For instance, if fishing mortality (or its proxy) is above the associated limit reference point, actions should be taken to decrease the fishing mortality (or its proxy) below that limit reference point.
Relevance:	Relevant
Evaluation Parameters	
Process: <i>A scientifically based limit reference point or proxy has been officially established, and together with the measure to be taken, ensures the reference point(s) will not be exceeded.</i>	✓
EVIDENCE:	
<p>The stock assessment carried out to evaluate the status of the coastal Pacific Hake (or Pacific whiting, <i>Merluccius productus</i>) resource off the west coast of the United States and Canada at the start of 2021 establishes appropriate limit reference points. It represents the collaborative efforts of the official U.S. and Canadian members of the Pacific Hake/Whiting Treaty Joint Technical Committee, and others that contributed significantly</p>	
<p>As part of the DFO Sustainable Fisheries Framework, DFO (2009) defined a limit reference point as being a biomass below which serious harm is believed to be occurring to the stock, and an upper stock reference point above which the stock is considered to be healthy. These would equate to the Agreement reference points of $B_{10\%}$ and $B_{40\%}$ (the female spawning biomass being 10% and 40%, respectively, of the unfished equilibrium female spawning biomass). The probabilities of the female spawning biomass at the start of 2021 being above each of these points are $P(B_{2021} > B_{10\%}) = 100\%$ and $P(B_{2021} > B_{40\%}) = 82.2\%$ [in last year's assessment the equivalent calculation was $P(B_{2020} > B_{40\%}) = 90.1\%$], such that the stock is estimated to be in the 'healthy zone' (above the upper stock reference point of $B_{40\%}$).</p>	
<p>With respect to DFO's provisional limit reference point of $0.4B_{MSY}$ and provisional upper stock reference point of $0.8B_{MSY}$, the probabilities are $P(B_{2021} > 0.4B_{MSY}) = 100\%$ and $P(B_{2021} > 0.8B_{MSY}) = 98.5\%$ such that the stock is estimated to be in the provisional 'healthy zone'. For completeness, we note that $P(B_{2021} > B_{MSY}) = 96.0\%$</p>	
<p>Reference levels of stock status that are used by the U.S. Pacific Fisheries Management Council (PFMC) include $B_{40\%}$ and a Minimum Stock Size Threshold (MSST) of $B_{25\%}$. For 2021, the estimated posterior median relative spawning biomass is 59%, such that the spawning biomass is above $B_{40\%}$ and well above $B_{25\%}$. The probability that spawning biomass at the beginning of 2021 is above $B_{40\%}$ is $P(B_{2021} > B_{40\%}) = 82.2\%$, and of being above $B_{25\%}$ is $P(B_{2021} > B_{25\%}) = 97.3\%$.</p>	
Current status/Appropriateness/Effectiveness: <i>The stock under assessment shall not currently be overfished (see glossary) according to the best scientific evidence available. The stock is currently estimated to be on the sustainable side of this reference point (e.g., spawning stock biomass is above the limit reference point, F is below F_{lim}, etc.). F_{lim} shall not exceed F_{msy}. The limit reference point or proxy is consistent with avoiding recruitment overfishing and other severe negative impacts on the stock. There are mechanisms in place (e.g., harvest control rule or mechanism) to ensure that the level of fishing pressure is reduced if the limit reference point is approached or reached, and these mechanisms are consistent with ensuring to a high degree of certainty that the limit reference point will not be exceeded, and that actions are taken to decrease the fishing mortality (or its proxy) below that limit reference point. The level of B_{lim} should be set on the basis of historical information, applying an appropriate level of precaution according to the reliability of that information. In addition, an upper limit should be set on fishing mortality, F_{lim}, which is the fishing mortality rate that, if sustained, would drive biomass down to the B_{lim} level. It is important to clarify that for salmon, spawning escapement goals are a suitable proxy for the intent of this clause. Escapement goal performance over a 4- to 5-year period shall be considered a suitable minimum reference point for salmon management. Specific to this point, underperforming salmon stocks that do not meet their escapement goals for a sustained period (over 4–5 years) shall be appropriately managed within the stock of concern framework by the State of Alaska to ensure stocks are managed with the objective of returning them to safe biological targets.</i>	✓

EVIDENCE:

The estimated recruitments with uncertainty for each year and the overall stock recruit relationship are provided in Figure 13. Extremely large variability about the expectation and about the joint uncertainty of individual recruitment and spawning biomass pairs are evident. High and low recruitments have been produced throughout the range of observed spawning biomass. The standard deviation of the time series of median recruitment deviation estimates for the years 1970-2018, which are informed by the age compositions, is 1.75. This value is higher than, but consistent with, the base model value of 1.4. Overall the assessment showing both the extremely large variability about the year-class strengths and the lack of relationship between spawning stock and subsequent recruitment. The scatter plot also shows that the female spawning biomass is observed to be less than 20% of B0 before the recruitment would be impaired. This is consistent with the assumptions about the steepness of the Beverton-Holt stock recruitment function used in the assessment.

The Beverton-Holt function is re-parameterised in terms of the steepness parameter. Steepness is defined as the proportion of virgin recruitment (R_0) obtained when the spawner abundance is 20% of the virgin level (S_{B0}). The mean prior for steepness ($h=0.78$) is based on a meta-analysis of the family Gadidae (Myers et al. 1999), and has been used in previous hake assessments since 2007. It is well known that the higher h is, the more resilient the population is, and the more robust the stock is to harvesting.

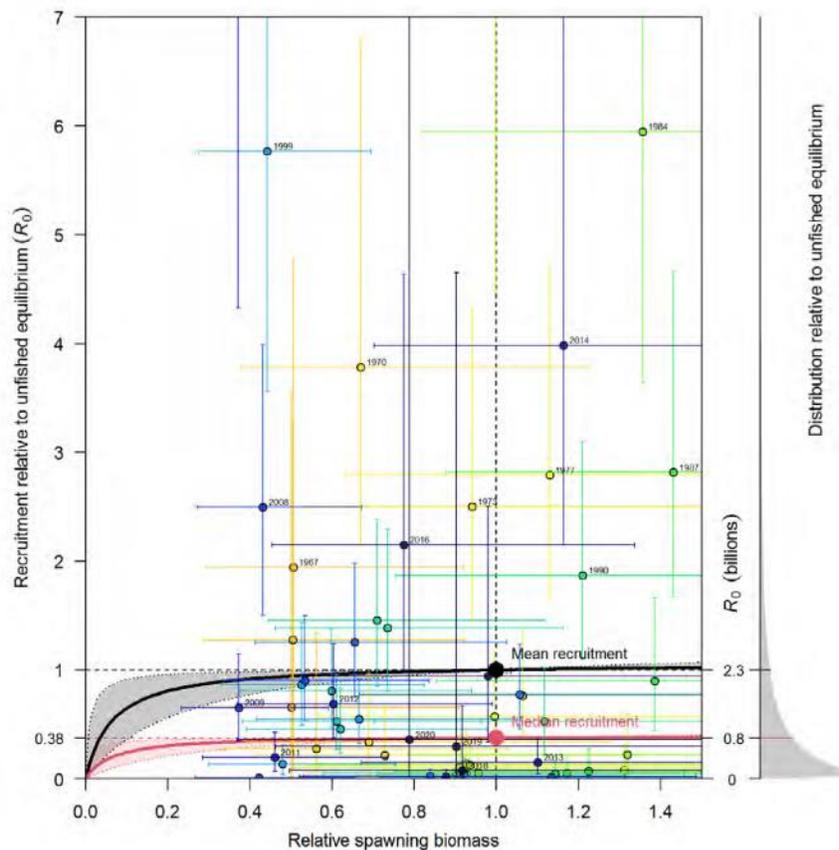


Figure 13 - Estimated stock-recruit relationship for the base model with median predicted recruitments and 95% posterior credibility intervals. Colors indicate time-period, with yellow colors in the early years and blue colors in the recent years. The thick solid black line indicates the central tendency (mean) and the red line indicates the central tendency after bias correcting for the log-normal distribution (median). Shading around stock-recruit curves indicates uncertainty in shape associated with distribution of the steepness parameter (h). The gray polygon on the right indicates the expected distribution of recruitments relative to the unfished equilibrium. Source: Johnson et al 2021.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are established safe limit reference point(s) for exploitation (i.e., consistent with avoiding recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible). When a limit reference point is approached, measures are taken to ensure that it will not be exceeded. For instance, if fishing mortality (or its proxy) is above the associated limit reference point, actions are taken to decrease the fishing mortality (or its proxy) below that limit reference point. Examples may include stock assessment reports or fishery management plans.



EVIDENCE:

The HCR for Pacific Hake is defined in Article III of the Hake Agreement between the U.S. and Canada: "...the default harvest rate shall be F-40 percent with a 40/10 adjustment". The 40:10 harvest policy is responsive to the state of the stock as it reduces the harvest linearly from the F40% rule when the female spawning biomass is below SB40% such that the harvest goes to zero when SB10% is reached. The 40:10 harvest policy provides a precautionary mechanism to reduce harvest during times when the Hake stock is low. In recent years, the total landings have not exceeded the recommended catch limit set by the harvest policy, indicating that management procedures have been effective in achieving stock management objectives. Further considerations, such as by-catch limits, have often resulted in catch targets to be set lower than the recommended catch limit. The exploitation history in terms of both the biomass (SB40%) and F-target reference points, portrayed graphically in the background section and in stock assessment document via shows that historically the fishing intensity has been low and the biomass has been high demonstrating that the harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives.

References:

Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific Hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/groundfish/whiting/whiting-treaty.pdf

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)							High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)							Full Conformance
Non-conformance Number (if applicable):							

Supporting Clause 6.3.

6.3.	Data and assessment procedures that measure the position of the fishery in relation to the reference points shall be established. Accordingly, the stock under consideration shall not be overfished (i.e., above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, and taking into account that long-term changes in productivity can occur due to natural variability and/or impacts other than fishing (Appendix 1, Part 1).
Relevance:	Relevant
Evaluation Parameters	
Process: <i>Data and assessment procedures (i.e., stock assessment process) are in place to measure the position of the fishery in relation to the target and limit reference points.</i>	Met? ✓
EVIDENCE: JTC has an extensive stock assessment program, which is necessary to monitor and measure the status of the hake stock relative to target and limit levels of exploitation and biomass. Extensive oceanographic monitoring is done in both U.S and Canada waters as part of a number of projects, in order to monitor and predict changes of stock productivity.	
Current status/Appropriateness/Effectiveness: <i>The current stock status in relation to reference points is used to determine the level of fishing permitted. The latter is commensurate with the current state of the fishery resources (i.e., close to or above target reference point and most importantly, not overfished or at or below its limit reference point or proxy), and takes into account that long-term changes in productivity can occur due to natural variability and/or impacts other than fishing. The stock is positioned at or above the target reference point. As a minimum, the stock is located above the midway point between the target and the limit reference point. It is important to clarify that, for salmon, spawning escapement goals are a suitable proxy for the intent of this clause. Escapement goal performance over a 4- to 5-year period shall be considered as a suitable minimum reference point for salmon management. Underperforming salmon stocks that do not meet their escapement goals for a sustained period (over 4– 5 years) shall be appropriately managed within the stock of concern framework by the State of Alaska to return them to safe biological targets. Assessors shall present evidence and evaluate escapement goals and escapement goal performance (i.e., met, not met) for all the wild salmon stock with a formal escapement goal in force in Alaska (about 300 annually). Overall, statewide summary data for Alaska can be found in the annually released ADF&G document Summary of Pacific salmon escapement goals in Alaska with a review of escapements from [year] to [year]. The document generally presents the latest 9–10 years of salmon escapement performance in review.</i>	
EVIDENCE: Throughout the last decade, the total coast-wide catch has tracked harvest targets reasonably well. Since 1999, catch targets have been calculated using an FSPR=40% default harvest rate with a 40:10 adjustment. This decreases the catch linearly from the catch target at a relative spawning biomass of 40%, to zero catch at relative spawning biomass values of 10% or less (called the default harvest policy in the Agreement); relative spawning biomass is the female spawning biomass divided by that at unfished equilibrium. Further considerations have often resulted in catch targets being set lower than the recommended catch limit. In the last decade, total catch has never exceeded the coast-wide quota, and harvest rates have not exceeded the FSPR=40% target. Overall, management appears to be effective at maintaining a sustainable stock size, in spite of uncertain stock assessments and a highly dynamic population. However, management has been risk averse in years when very large quotas were suggested based upon the default harvest control rule and stock assessment outputs.	
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that data and assessment procedures are installed measuring the position of the fishery in relation to the reference points. Accordingly, the stock under consideration is not overfished (i.e., it is above limit reference point or proxy) and the level of fishing permitted is commensurate with the current state of the fishery resources—maintaining its future availability and taking into account that long-term changes in productivity can occur due to natural variability and/or impacts other than fishing. Examples may include stock assessment reports or fishery management plans.</i>	

EVIDENCE:

The assessment used a Bayesian estimation approach, sensitivity analyses, and retrospective investigations to evaluate potential consequences of parameter uncertainty, alternative structural models, and historical performance of the assessment model, respectively. The JTC conducted extensive sensitivity analyses to investigate the structural uncertainty of the base model by examining the effect of changing parameter priors and assumptions. Retrospective analyses were conducted by systematically removing the terminal year’s data and estimating the parameters under the assumptions of the base model. Overall, there was little retrospective change to the relative spawning biomass trajectory up to the mid-2000s. Most retrospective change occurred in the final years of the retrospective model. Thus the assessment has been tested using a systematic exploration of the interactions among different sets of assumptions. This confirms that availability, quality, and/or adequacy of the evidence is sufficient to substantiate that data and assessment procedures are installed measuring the position of the fishery in relation to the reference points and the stock is not overfished.

References:

Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific Hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)							High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)							Full Conformance
Non-conformance Number (if applicable):							

Supporting Clause 6.4.

6.4.	Management actions shall be agreed to in the eventuality that data sources and analyses indicate that these reference points have been exceeded. Accordingly, contingency plans shall be agreed in advance to allow an appropriate management response to serious threats to the resource as a result of overfishing, adverse environmental changes, or other phenomena that may have adverse impacts on the fishery resource (Appendix 1, Part 2). Such measures may be temporary and shall be based on best scientific evidence available.
Relevance:	Relevant
Evaluation Parameters	
<p>Process: <i>There is an agreed process, system, or contingency plan in the eventuality that the data sources and analyses indicate that these reference points have been exceeded—detailing the appropriate management response to serious threats to the resource because of overfishing, adverse environmental changes, or other phenomena that may have adverse impacts on the fishery resource. Accordingly, the contingency plan/harvest control rule shall be agreed in advance to allow an appropriate management response to serious threats to the resource because of overfishing, adverse environmental changes, or other phenomena that may have adverse impacts on the fishery resource.</i></p>	Met? ✓
<p>EVIDENCE: The Pacific Coast Groundfish Fishery Management Plan (FMP) describes how the Pacific Fishery Management Council develops decisions for management of the groundfish fishery off California, Oregon and Washington. Since it was first implemented in 1982, the Council has amended the FMP numerous times in response to changes in the fishery, reauthorizations of the Magnuson-Stevens Act, and litigation. In the case of Pacific hake serious threats to the resource because of overfishing, adverse environmental changes, or other phenomena that may have adverse impacts on the fishery resource were never observed. However, the FMP overs the following measures.</p> <ul style="list-style-type: none"> – Permits and limited entry to the fishery – Certain seasons and areas are closed to fishing – Gear restrictions and area closures help reduce bycatch and impacts on habitat – Managers use annual harvest quotas to regulate the coastwide catch of Pacific whiting – There are several sectors of the U.S. whiting fishery, and managers divide allowable catch among them. Sectors include: <ul style="list-style-type: none"> ○ Non-tribal catcher boats delivering to shore-based processing facilities ○ Non-tribal catcher boats delivering to at-sea mothership processors ○ Non-tribal vessels that both catch and process the catch at sea ○ Tribal catcher boats delivering to either non-tribal shore-based or at-sea mothership processors. – The shore-based trawl fishery, which includes vessels targeting Pacific whiting, is managed under the trawl rationalization catch share program that includes: <ul style="list-style-type: none"> ○ Catch limits based on the population status of each fish stock and divided into shares that are allocated to individual fishermen or groups ○ Provisions that allow fishermen to decide how and when to catch their share ○ Total catch accounting and 100 percent observer coverage <p>In other fisheries emergency actions are implemented (see: https://www.fisheries.noaa.gov/action/emergency-action-temporarily-extend-2021-sablefish-primary-fishery)</p>	
<p>Current status/Appropriateness/Effectiveness: <i>In the eventuality that the current level of the stock has exceeded target or limit reference points, the agreed and corresponding management action (as directed by the harvest control rule or framework) shall be immediately implemented and fishing reduced or halted as necessary. The harvest control rule is effective at keeping or bringing back the stock to acceptable and safe biological levels (i.e., to avoid overfishing/ed status). Underperforming salmon stocks that do not meet their escapement goals shall be appropriately managed within the stock of concern framework by the State of Alaska.</i></p>	Met? ✓

EVIDENCE:

The management of Pacific hake includes a harvest control rule (HCR) based on the reference points described in the previous section. This HCR would trigger management actions to reduce catches below the biomass reference points. At present, the stock is above the values that would trigger the management actions outlined in the HCR. As per the Hake Agreement, the 40:10 harvest policy reduces the harvest linearly from the F40% rule when the female spawning biomass is below SB40% such that the harvest goes to zero when limit reference point, SB10%, is reached. F40% is the fishing mortality rate that would result in a 40% spawning potential ratio (SPR) or spawning biomass per recruit that is 40% of the unfished level. This SPR approach is used because the stock-recruitment relationship for Pacific Hake, along with FMSY and BMSY reference points, cannot be estimated reliably from historical data.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that management actions are agreed should data sources and analyses indicate that these reference points have been exceeded. Accordingly, contingency plans are agreed in advance for the appropriate management response to serious threats to the resource as a result of overfishing, adverse environmental changes, or other phenomena that may have adverse impacts on the fishery resource. Such measures may be temporary and are based on best scientific evidence available. Examples may include stock assessment reports or fishery management plans.

✓

EVIDENCE:

Further evidence that the Pacific hake management actions are agreed, effective and precautionary is based on the recent temporal progression of years (Johnson et al. 2021). The estimated spawning biomass has been below B40% from 2007-2011, and considerably above B40% from 2012. The median relative fishing intensity has been below target in all years (Johnson et al. 2021). Thus recent management actions have resulted in the Pacific Hake stock reverting to the Precautionary/Healthy Zone. Since the Pacific Hake agreement, TACs have been set at or below harvest at the F40%, demonstrating that the application of the rules is appropriate and effective.

From the recent MSE exercise it has been learned that the F40%-40:10 rule reduces the median average depletion of the stock to below 30% in the long-term which is less than the SB40% target level. The Pacific Hake Management Strategy Evaluation (MSE) entered a new iteration in mid 2017. Jacobsen et al (2021) documents the process implemented to conduct the MSE and provides technical documentation for a new closed-loop simulation model and scenarios developed to explore key uncertainties.

The goals of this iteration of MSE were to:

- Evaluate the performance of current hake management procedure under alternative hypotheses about current and future environmental conditions
- Better understand the effects of hake distribution and movement on both countries' ability to catch fish
- Better understand how fishing in each country affects the availability of fish to the other country in future years

The MSE process was carried out in close cooperation with JMC to develop and refine goals, objectives and performance metrics used to evaluate performance. These metrics describe performance in terms of stock status, coastwide catch, catch variability, and spatially explicit exploitation rates.

A spatially explicit (two area) operating model, with age-based movement of fish between areas was developed. Other aspects of the operating model closely resemble the current stock assessment model for Pacific hake.

The model was conditioned to the coastwide stock assessment and available country-specific data, including survey biomass, survey age compositions, and fishery age compositions. To address the three goals for the MSE four sets of scenarios to begin to explore how key uncertainties might influence future performance of the current management procedure for hake were set. These scenarios are:

- Alternative implementation scenarios that influence how much catch is removed from the stock each year
- Future climate scenarios that increase fish movement rates
- Alternative selectivity scenarios that change the age composition of catch in each country
- Survey frequency scenarios that change how often the acoustic survey is conducted

While each scenario type revealed different sensitivities and tradeoffs, the alternative implementation scenarios had the largest influence on projected stock status and catch. Of the performance metrics we examined, variability in catch was the most responsive across all the scenarios. Assessment error was influenced most by the selectivity scenarios and survey scenarios.

The technical documentation and model output demonstrate the utility of the closed loop simulation model developed for future MSE questions and applications. The scenarios explored provide a foundation of results exploring key uncertainties. However, further testing, additional scenarios, and crosses of scenario types may be necessary to more fully explore the model dynamics and to address future questions of interest from hake management bodies.

References: Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific Hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.

Jacobsen, N. S., K. N. Marshall, A. M. Berger, C. J. Grandin, and I. G. Taylor. 2021. Management Strategy Evaluation of Pacific Hake: Exploring the Robustness of the Current Harvest Policy to Spatial Stock Structure, Shifts in Fishery Selectivity, and Climate-Driven Distribution Shifts. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-168.
https://repository.library.noaa.gov/view/noaa/30919/noaa_30919_DS1.pdf.

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	)	=	Overall score
	10			0				10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)								High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)								Full Conformance
Non-conformance Number (if applicable):								

Supporting Clause 6.5.

6.5	Measures shall be introduced to identify and protect depleted stocks and those stocks threatened with depletion, and to facilitate the sustained recovery/restoration of such stocks. Also, efforts shall be made to ensure that resources and habitats critical to the well-being of such stocks, which have received adverse impacts by fishing or other human activities, are restored.
Relevance:	Relevant
Evaluation Parameters	
Process: <i>There is a process that identifies depleted stocks, resources, and habitats. A depleted stock is usually a stock, which has been overfished, the stock status is below limit reference point, and the ability of the stock to recover has been impaired.</i>	Met? ✓
EVIDENCE: Past management responses have been effective as indicated in Figure 8. Historically the fishing intensity has been low and the biomass has been high. In 2000, spawning depletion was around 20% triggering a response of the Pacific Fisheries Management Council to initiate a rebuilding plan for Pacific Hake because the depletion level was below 25% of unfished spawning biomass (SB0). However, due to the strong 1999 year class entering the fishery the stock rebuilt and the rebuilding plan did not have to be implemented (Johnson et al 2021).	
Current status/Appropriateness/Effectiveness: <i>There is evidence that where depleted or adversely impacted stocks, resources, and habitats have been identified, efforts have been made to ensure they are restored or allowed to recover (i.e., ideally within a two generations timescale). Underperforming salmon stocks that do not meet their escapement goals shall be appropriately managed within the stock of concern framework by the State of Alaska.</i>	Met? ✓
As evidenced in previous clause 6.4, adversely impacted hake stock recovered (Johnson et al. 2020).	
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that measures are introduced to identify and protect depleted stocks and those stocks threatened with depletion, and to facilitate the sustained recovery/restoration of such stocks. Also, efforts are made to ensure that resources and essential habitats critical to the wellbeing of the stocks, which have been adversely impacted by fishing or other human activities, are restored. Examples may include laws and regulations, fishery management plans, and stock assessment reports.</i>	Met? ✓
EVIDENCE: The Pacific Coast Groundfish Fishery Management Plan (https://www.fisheries.noaa.gov/management-plan/pacific-coast-groundfish-fishery-management-plan) implements gear restrictions and area closures help reduce bycatch and impacts on habitat, which are essential areas critical to the safety of the stock (see: <a href="https://www.webapps.nwfsc.noaa.gov/data/map<sup>1</sup">https://www.webapps.nwfsc.noaa.gov/data/map¹).	

¹ The FRAM Data Warehouse aims to provide a single location where users can access and download all data collected by the NOAA Northwest Fisheries Science Center (NWFSC) Fishery Resource Analysis & Monitoring (FRAM) division.

References:	Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific Hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.				
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Fundamental Clause 7. Precautionary approach

Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty.

Supporting Clause 7.1.

7.1.	The precautionary approach shall be applied widely to conservation, management, and exploitation of ecosystems to protect them and preserve the ecosystem. This should take due account of fishery enhancement procedures, where appropriate. Absence of scientific information shall not be used as a reason for postponing or failing to take conservation and management measures. Relevant uncertainties shall be taken into account through a suitable method of risk management, including those associated with the use of introduced or translocated species.¹⁷⁵	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>There are management measures, regulations, and laws that command or direct the use of the precautionary approach (PA) for conservation, management, and exploitation of the aquatic resources under assessment. This could either take the form of an explicit commitment to the application of the PA, or be evidenced by an overarching approach applied throughout the management literature.</i>		✓
EVIDENCE: Precautionary approach-based reference points are used in the management of this stock. Scientific information and stock assessments available are at a consistently high level, and clearly provide the necessary basis for conservation and management decisions. Uncertainties are taken into account in the stock assessment process, and risk assessment is used in providing harvest options.		
Current status/Appropriateness/Effectiveness: <i>The FAO Guidelines for the PA for fisheries management (FAO CCRF 1995) advocate a comprehensive management process that includes data collection, monitoring, research, enforcement, and review. More specifically, prior identification of desirable (target) and undesirable (limit) reference points must be carried out, and measures are required that will avoid undesirable outcomes with high probability and correct them promptly should they occur. The guidelines suggest that this be achieved through rules that specify in advance what action should be taken when specified deviations from operational targets are observed (i.e., harvest control rules). Furthermore, the guidelines suggest that a management plan should not be accepted until it has been shown to perform effectively in terms of its ability to avoid undesirable outcomes (for example through simulation trials). Lastly, the absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent predator, or non-target species and their environment (https://www.sciencebase.gov/catalog/item/50538887e4b097cd4fce2446). There is evidence for the practical application of the PA for resource management and conservation. Note that the PA may be integrated into stock assessment practices, specific management measures enacted for everyday fisheries operations, or other measures. Application of the PA considers enhanced fisheries (e.g., at the policy level) where appropriate, and relevant uncertainties are considered using a suitable method of risk management (e.g., evaluation of potential impacts of increased hatchery releases on wild salmon), including that associated with the use of introduced or translocated species.</i>		✓

EVIDENCE:

The harvest strategy in place for Pacific hake is formalized through the hake treaty and consists comprehensive management process integrating the following elements: Harvest Control Rule, monitoring and data collection and provision of advice with stock assessment. Evidences are available in Johnson et al (2021) to demonstrate that the management strategy is achieving its objectives and represents a practical application of the PA that the 40:10 rule is by nature precautionary in the sense that harvest rate is reduced as stock biomass declines.

Annual harvest levels are based on rigorously reviewed stock assessments and strictly follow recommendations made by the Hake Agreement Scientific Review Group, Advisory Panel, and Joint Management Committee. Since 2007, the combined US and Canadian harvests have not exceeded annual catch targets derived from applying the harvest policy, averaging 76.8% of the target.

The considerable uncertainty in the assessment especially with regard to the uncertainty of the strength of recent year-classes was taken into consideration for setting the 2021 TAC. The AP recommended and the JMC adopted a coast-wide TAC of 565,191 t for the 2021 season, demonstrating that management decisions are precautionary.

Past management responses have been effective as indicated in Figure 8.

Historically the fishing intensity has been low and the biomass has been high. In 2009, spawning depletion was around 20% triggering a response of the Pacific Fisheries Management Council to initiate a rebuilding plan for Pacific Hake because the depletion level was below 25% of unfished spawning biomass (SB0). However, due to the strong 1999 year class entering the fishery the stock rebuilt and the rebuilding plan did not have to be implemented.

Further evidence that the Pacific Hake harvest strategy is effective and precautionary is based on the recent temporal progression of years (Johnson et al.2021; Figure 9 and Figure 10). The estimated spawning biomass has been below B40% from 2007-2011, and considerably above B40% from 2012-2020. The median relative fishing intensity has been below target in all years. Thus recent management actions have resulted in the Pacific Hake stock being consistently in the Precautionary/Healthy Zone.

Since the Pacific Hake agreement, TACs have been set at or below harvest at the F40%, demonstrating that the application of the rules is appropriate and effective.

The performance of the harvest strategy has not been fully evaluated. However, Management Strategy Evaluation (MSE) of the Hake Agreement’s harvest policy is a priority for the JMC and its advisors. The MSE is being developed as an integral part of the Hake Agreement’s management and decision-making process to help inform decision making about harvest policies and research priorities.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the PA is applied to conservation, management, and exploitation of an ecosystem to protect them and preserve the ecosystem. Examples may include stock assessment reports, fishery management plans and other documents.



EVIDENCE:

Well defined and measurable PA is applied to conservation, management, and exploitation of ecosystem and target stock to protect them and preserve the habitat. This is explicit within the fishery-specific management systems of both the U.S. and Canada.

The legal and management structure of the U.S. fisheries, the West Coast groundfish fishery, groundfish trawl rationalization program, and the Pacific whiting fishery have PA objectives contained in:

- Magnuson-Stevens Act (U.S. Dept. Commerce 2007)
- Pacific Coast Groundfish Fishery Management Plan (PFMC 2016)
- Pacific Coast Fishery Ecosystem Plan (PFMC 2013a)
- Pacific Coast Fishery Ecosystem Plan Initiatives (PFMC 2017)
- Trawl Rationalization Final EIS (PFMC 2010)
- PFMC Research and Data Needs (PFMC 2013b)
-

References:

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February 21, 2018. Version 1.0 ftp://ftp.lgl.com/Public/For%20TTA/IFMPs/IFMP%202018-2019_Groundfish.pdf.

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x	3	) =	Overall score
	10			0				10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)								High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)								Full Conformance
Non-conformance Number (if applicable):								

Supporting Clause 7.1.1.

7.1.1.	In implementing the PA, the fishery management organization shall take into account, <i>inter alia</i>, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality, the impact of fishing activities (including discards) on non-target and associated or dependent predators, and environmental and socioeconomic conditions.
Relevance:	Relevant.
Evaluation Parameters	
Process: <i>There is a system in place under which the potential uncertainties listed above can be examined and taken into account during the decision-making process.</i>	Met? ✓
<p>EVIDENCE: The Pacific Hake HCR adopted by the Hake Agreement originates from Amendment 11 of the Magnuson-Stevens Act national standards guidelines. The F40% target catch level for Hake is explicitly risk averse, taking into account uncertainty of the production capacity of Hake corresponds to greater caution in setting target catch levels. The main uncertainty taken into account is the uncertainty in year class strength.</p> <p>Detailed information on the nature and amount of the impact of fishing activities on non-target and associated or dependent predators, and environmental and socioeconomic conditions for the midwater hake fisheries (as well as ETP and non-ETP marine mammals and seabirds), is collected by the At-Sea Hake Observer Program (A-SHOP) and the West Coast Groundfish Observer Program (WCGOP) operated by the NMFS to implement and apply a precautionary approach.</p>	
<p>Current status/Appropriateness/Effectiveness: <i>There is evidence to demonstrate that in the fishery under assessment, uncertainties considered include those associated with the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities (including discards) on non-target and associated or dependent predators, as well as environmental and socio-economic conditions.</i></p>	 ✓
<p>EVIDENCE: The current status of target stock is thoroughly discussed in background section. When the West Coast Groundfish Trawl Catch Share Program was put in place in 2011, the Pacific Fishery Management Council required also the collection of economic data to monitor the changes and distribution of economic benefits. Using data collected from industry members, the Economic Data Collection (EDC) program provides information on whether the goals of the Catch Share Program have been met and helps meet requirements of the Magnuson-Stevens Act for catch share program evaluation.</p> <p>In term of non target species, there is 100% observer coverage of the fishery. A-SHOP sectors include the at sea catcher-processor and mothership catcher-vessels, while WCGOP covers the shoreside trawlers. The total non-hake catch by all sectors was less than 0.7 percent of the weight of hake catch in the fishery, most (61-94%) of which were retained (see Table below).</p> <p>Seabird mortalities caused by striking trawl warps or the data transponder cable (a.k.a. 3rd wire) have been recorded in similar at-sea processing fleets in both Alaska and the Southern Hemisphere. Observations of seabird cable strikes by fisheries observers are rare because observer duties prevent them from being present for the majority of strikes. Seabird carcasses are rarely recovered from such strikes because the carcass sinks to the ocean floor or the injured bird leaves the area, and thus carcasses are not captured by the net or cables.</p> <p>The latest available reports on marine mammals interaction with this fishery covers the period 2016 – 2021, and shows fishery interactions with California sea lions, Steller sea lions, elephant seals, harbor seals, and Dall’s porpoise (Jannot et al. 2018, 2021). It suggests marine mammals are rarely taken incidentally in the US mid-water trawl Hake fishery with no observed mortality of any marine mammal in the midwater hake fishery since the last update of this report.</p> <p>As this is a pelagic trawl fishery, the only encountered habitat is pelagic, and bottom contact is infrequent. As part of EFH considerations, the Council adopts mitigation measures directed at the adverse impacts of fishing on groundfish EFH.</p> <p>The Pacific Groundfish FMP’s Amendment 24 designated ecosystem component species (species that are not</p>	

actively managed, targeted, or generally retained), and Amendment 25 added several lower trophic level species to that list. Consistent with the objectives of the PFMC’s FMPs and FEP, Amendment 25 prohibits development of directed commercial fisheries of these species until and unless the PFMC has had adequate opportunity to assess relevant scientific information and consider potential impacts on existing fisheries, fishing communities, and the greater marine ecosystem.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in implementing the PA, the fishery management organization takes into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities (including discards) on non-target and associated or dependent species, as well as environmental and socio-economic conditions. Examples may include stock assessment reports, fishery management plans and other documents.



EVIDENCE:

The evidence is sufficient to substantiate that JMC is using all the necessary tools to manage the Pacific hake fisheries implementing precautionary management. Since 2015, NOAA released reports summarizing economic information for the sector (The full reports are available online at www.nwfsc.noaa.gov/edc).

2012-2016 catches in the US at-sea Pacific hake fishery (in metric tons) are presented below by species. Included are all species/groups comprising at least 0.01% of the average catch. Target species is highlighted green, primary spp yellow and secondary spp orange. Source At-sea hake observer program available in Stern-Pirlot et al (2019).

Species	2012	2013	2014	2015	2016	Average	Average % of catch
Pacific Hake	93,865	130,563	165,305	96,148	173,821	131,940	99.3%
Squid Unidentified	94	234	159	110	176	155	0.12%
Spiny Dogfish Shark	178	97	60	97	194	125	0.09%
Jack Mackerel	14	90	71	92	238	101	0.08%
Yellowtail Rockfish	43	269	42	86	62	101	0.08%
Widow Rockfish	79	31	56	35	187	78	0.06%
Brown Cat Shark	14	41	35	51	57	40	0.03%
Ragfish	17	7	29	65	48	33	0.03%
Rougheye/Blackspotted Rockfish	54	18	6	22	30	26	0.02%
Splitnose Rockfish	20	26	20	15	43	25	0.02%
Arrowtooth Flounder	5	15	11	66	10	21	0.02%
Pacific Mackerel	3	0	39	39	18	20	0.01%
Sablefish	5	13	16	12	28	15	0.01%
Shortspine Thornyhead	2	22	20	11	11	13	0.01%
American Shad	3	12	18	4	7	9	0.01%
Grenadier Unidentified	0	0	1	0	40	8	0.01%
Salmon Shark	2	5	8	7	17	8	0.01%
Medusafish	0	0	3	18	15	7	0.01%

Seabird Interactions with the Catcher-Processor Trawl Fleet Targeting Hake off the U.S. West Coast. PowerPoint presentation to the Pacific Seabird Group, February is available at this link: http://pacificwhiting.org/images/msc_audit_9/P2_5_2_Gladics_PSG_2020213_SeabirdCableStrikes_FINAL_noVideo.pdf

Updated reports are available, reporting seabird and green sturgeon bycatch in U.S. West Coast fisheries through 2018. There have been no significant trends in encounters with any species of seabird, including endangered albatrosses, between 2012 and 2018 in any hake fishing sector (see tables 13 through 15 in Jannot et. al. 2021).

Regarding marine mammals, data from 2015-2019 shows low levels of interaction (Jannot et. al. 2022; see background section of this report).

On the topic of bird bycatch, In collaboration with Oregon Sea Grant, the Pacific hake fleet has completed a study designed to detect and quantify cryptic seabird bycatch in its fishery. This project, led by Amanda Gladics, created standardized seabird observation protocols and electronic monitoring systems to collect data on seabird behavior, incidence, type, and severity of interactions, as well as what activities (such as setting or hauling back the net, towing, etc) were associated with different events. Ms. Gladics presented the assessment team with a summary of results to date (Gladics et al. 2021).

The project resulted in a realization that the midwater hake trawl fishery is likely posing a relatively low risk to endangered albatrosses and other seabirds, thus trailing different methods for mitigation has been somewhat deprioritized, though it is ongoing within the industry.

Regarding endangered eulachon smelt, total fleetwide estimated bycatch in U.S. West Coast groundfish fisheries increased from 68 eulachon in 2017, to 782 eulachon in 2018, and 3,121 eulachon in 2019. The increase in bycatch parallels recent increases in adult abundance estimates of eulachon. In 2018, the five-year geometric mean of eulachon bycatch in U.S. West Coast groundfish fisheries was 28 percent and 14 percent of the precautionary (1,602) and reinitiation (3,204) thresholds, respectively. In 2019, bycatch was about 30 percent of the precautionary (1,205) and 15 percent of the reinitiation (2,411) threshold. Therefore, these thresholds were not exceeded in 2018 or 2019 (PFMC 2021).

There are no other notable trends in endangered species bycatch in this fishery as evidenced during the site visit.

Remarkably, the offshore hake fishery was able to be fully prosecuted with its usual 100% observer coverage during the 2021 season, despite the COVID-19 pandemic.

Through various assessments and plans (i.e., stock assessments, CCIEAs, environmental impact statements, FEPs, and FMPs), the PFMC considers different aspects of the overall ecosystem. It is clear that the hake fishery impacts on the ecosystem are taken seriously, that appropriate research is being developed, and that the research outputs are taken into account in the consideration of management actions. These assessments and plans consider the fishery impact on the overall ecosystem and take management steps to protect the ecosystem (e.g., closed areas, amendments).

References:

Gladics, A.J., V. Tuttle, T. Good, J. Jannot. 2021. Understanding and preventing seabird interactions with the Catcher-Processor Trawl Fleet Targeting Hake off the U.S. West Coast. PowerPoint presentation to the West Coast Whiting Trawl Seabird Cable Strike Meeting, December 10, 2021.

Jannot, J. E., K. A. Somers, V. J. Tuttle, J. Eibner, K. E. Richerson, J. T. McVeigh, J. V. Carretta, N. C. Young, and J. Freed (2022) Marine Mammal Bycatch in U.S. West Coast Groundfish Fisheries, 2002–19. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-176.

Jannot, J. E., A. Wuest, T. P. Good, K. A. Somers, V. J. Tuttle, K. E. Richerson, R. S. Shama, and J. T. McVeigh. 2021. Seabird Bycatch in U.S. West Coast Fisheries, 2002–18. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-165.

PFMC. 2021c. Groundfish Endangered Species Workgroup Report. Agenda Item G.4.a. GESW Report 1. June 2021.

Stern-Pirlot, A., M. Stocker, and S. Hanna. 2019. MSC Final Report and Determination for US and Canada Pacific Hake Mid-water Trawl Fishery MSC 2nd Re-assessment. MRAG Americas, Inc., Suite 202-8950 Martin Luther King St. N, St Petersburg, FL 33702, USA. 162 p.
(http://pacificwhiting.org/images/msc_audit_9/MRAG_Hake_2nd_Reassessment_PCR_FINAL_Nov2019.pdf)

Numerical score:	$\text{Starting score} - (\text{Number of EPs NOT met} \times 3) = \text{Overall score}$		
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 7.1.2.

7.1.2. In the absence of adequate scientific information, appropriate research shall be initiated in a timely fashion.											
Relevance:	Relevant.										
Evaluation Parameters											
Process: <i>There is a process that identifies weaknesses in the scientific information available to fishery management organizations, and initiates additional research as necessary. The primary focus of this requirement is the status of the stocks under consideration.</i>	✓										
EVIDENCE: The Pacific hake is clearly an information-rich fishery. However, in the past showed to have the capacity to respond to unknown factors as they may arise (e.g. impacts of climate change). The management agency responsible has the capacity to identify research gaps and initiate specific studies in case needed.											
Current status/Appropriateness/Effectiveness: <i>There is evidence that such a process has been applied in the case of the fishery under assessment, including examples of initiated research. Depending on the situation, appropriate research or further analysis of the identified risk is initiated in a timely fashion.</i>	✓										
EVIDENCE: The performance of the Pacific hake harvest strategy in evaluated every year in the framework of the stock assessment report (Johnson et al. 2021). The stock assessment reports clearly list research and data needs to be considered in the following assessment, There are many research projects that have improved the stock assessment for Pacific Hake and lead to improved biological understanding and decision-making.											
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the absence of adequate scientific information, appropriate research is initiated in a timely fashion. Examples may include various data or scientific reports.</i>	✓										
EVIDENCE: The main evidence of the availability of a system that in the absence of adequate scientific information has developed appropriate research in a timely fashion is the Management Strategy Evaluation (MSE) created for Pacific hake fishery. The MSE of the Hake Agreement’s harvest policy was a priority for the JMC and its advisors. The MSE is being developed as an integral part of the Hake Agreement’s management and decision-making process to help inform decision making about harvest policies and research priorities. It is clear that the MSE process has been developed in the last decade for Pacific hake and now is a complex system which can take also into account climate change and environmental factors (Jacobsen et al., 2021). The goals of this iteration of the MSE were to: <ul style="list-style-type: none"> – Evaluate the performance of current hake harvest policy under alternative hypotheses about current and future environmental conditions. – Better understand the effects of hake distribution and movement on the ability of both countries (the United States and Canada) to catch fish. – Better understand how fishing in each country affects the availability of fish to the other country in future years. 											
References:	Jacobsen, N. S., K. N. Marshall, A. M. Berger, C. J. Grandin, and I. G. Taylor. 2021. Management Strategy Evaluation of Pacific Hake: Exploring the Robustness of the Current Harvest Policy to Spatial Stock Structure, Shifts in Fishery Selectivity, and Climate-Driven Distribution Shifts. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-168. Johnson, K.F., A.M. Edwards, A.M. Berger and C.J. Grandin. 2021. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2021. Prepared by the Joint Technical Committee of the U.S. and Canada Pacific Hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada. 269 p.										
Numerical score:	<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Starting score</td> <td style="text-align: center;">– (</td> <td style="text-align: center;">Number of EPs <u>NOT</u> met</td> <td style="text-align: center;">x 3) =</td> <td style="text-align: center;">Overall score</td> </tr> <tr> <td style="text-align: center;">10</td> <td></td> <td style="text-align: center;">0</td> <td></td> <td style="text-align: center;">10</td> </tr> </table>	Starting score	– (Number of EPs <u>NOT</u> met	x 3) =	Overall score	10		0		10
Starting score	– (Number of EPs <u>NOT</u> met	x 3) =	Overall score							
10		0		10							
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)											
High											
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)											
Full Conformance											

Non-conformance Number (if applicable):

Supporting Clause 7.2.

7.2.	<p>In the case of new or exploratory fisheries, the fishery management organization shall adopt, as soon as possible, cautious conservation and management measures, including, <i>inter alia</i>, catch limits and effort limits. Such measures should remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment should be implemented. Management measures should, if appropriate, allow for the gradual development of the fisheries.</p>		
Relevance:	<p>Not relevant. This clause is only applicable for new or exploratory fisheries.</p>		
Evaluation Parameters			
Met?			
Process:	<p><i>For new or exploratory fisheries, there is a process that allows immediate application of the PA, including catch and effort limits, and the possible adverse impact of such fisheries on the long-term sustainability of the stocks.</i></p>		
EVIDENCE:			
Current status/Appropriateness/Effectiveness:	<p><i>There is evidence that catch and effort limits have been implemented, and other management measures, including the assessment of possible adverse impacts, have been performed for these fisheries.</i></p>		
EVIDENCE:			
Evidence Basis:	<p><i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the case of new or exploratory fisheries, the fishery management organization adopts, as soon as possible, cautious conservation and management measures, including, inter alia, catch and effort limits. Such measures remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment are implemented. Management measures should, if appropriate, allow for the gradual development of the fisheries. Examples may include various data or scientific reports.</i></p>		
EVIDENCE:			
References:			
Numerical			
score:	Starting	Number of EPs <u>NOT</u>	Overall
	score	met	score
	10	- (	NA
		x 3) =	

8.4 Section C: Management Measures, Implementation, Monitoring, and Control

Fundamental Clause 8. Management measures

Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.

Supporting Clause 8.1.

8.1.	Conservation and management measures shall be designed to ensure the long-term sustainability of fishery resources at levels which promote optimum utilization, and are based on verifiable and objective scientific and/or traditional, fisher, or community sources.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>The process by which management measures are developed for the fishery utilizes the best scientific evidence available, including traditional sources where these are verifiable, and also considers the cost-effectiveness and social impact of potential new measures. The assessment team shall provide evidence for the main type of management measures present in the fishery. Some of the main examples may include (but are not limited to) legal gear specifications, permit requirements, observer requirements, reporting requirements, limited access, vessel license limitations, size limits, sex restrictions, total allowable catch, in season adjustments, fishing seasons, geographical registrations areas, bycatch reduction devices, gear modification, minimizing waste and ghost fishing, closed waters, catch limits for other fisheries, and bycatch management.</i>		✓
EVIDENCE:		
<p>Under the US-Canada Pacific Hake Treaty annual TAC recommendations are the responsibility of the Joint Management Committee (JMC), comprising equal numbers of US and Canadian members. The Joint Technical Committee (JTC) authors an annual stock assessment to inform harvest management decisions of the JMC, including scientific advice on the annual potential yield of the offshore whiting resource that may be caught for that fishing year. The Scientific Review Group (SRG) provides independent peer review of the Joint Technical Committee's work. The Advisory Panel (AP) comprises industry representatives, who review scientific advice and management of the fishery and provide advice on Total Allowable Catch to the Joint Management Committee (NOAA Fisheries 2021b). The stock assessment and TAC setting use the best available scientific information available in accordance with National Standard 2 of the MSA, in a process described in Section B.</p> <p>The Pacific Fishery Management Council (PFMC) has no formal role in the TAC setting process, it reviews the results of the JMC process annually in April and may advise NMFS on JMC recommendations. After the TAC is set the PFMC manages the Pacific whiting fishery under the Pacific Coast Groundfish FMP using a suite of management measures described in 6.4.1.</p> <p>which includes:</p> <ul style="list-style-type: none"> • at-sea set asides to accommodate incidental catch of typical non-target species • 100% monitoring (i.e., observers or electronic monitoring) on MS CVs • prohibition of discarding for MS CVs, • 100% monitoring (i.e., observers or electronic monitoring) for SS CVs • two NMFS-observers on all catcher-processors and mothership processors • regulations for depth-based closures to control bycatch inseason and/or if Chinook salmon bycatch is running above levels proscribed in the BiOp • Permits and limited entry to the fishery. • Certain seasons and areas are closed to fishing • Gear restrictions and area closures help reduce bycatch and impacts on habitat. • Annual harvest quotas to regulate the coastwide catch of Pacific whiting (NOAA Fisheries 2022b) 		

Managers divide allowable catch among four sectors of the Pacific hake fishery:

- Non-tribal catcher boats delivering to shore-based processing facilities.
- Non-tribal catcher boats delivering to at-sea mothership processors.
- Non-tribal vessels that both catch and process the catch at sea.
- Tribal catcher boats delivering to either non-tribal shore-based or at-sea mothership processors.

The shore-based trawl fishery, which includes vessels targeting Pacific whiting, is managed under the trawl rationalization catch share program that includes:

- Catch limits based on the population status of each fish stock and divided into shares that are allocated to individual fishermen or groups.
- Provisions that allow fishermen to decide how and when to catch their share.
- Total catch accounting and 100 percent observer coverage.

In 2011 Amendments 20 and 21 to the Groundfish FMP implemented the rationalization of the Pacific Coast groundfish fishery. The Trawl Rationalization Program (TRat) changed how the sectors in the Pacific hake fishery operated. The mothership sector, in which catcher vessels make at-sea deliveries to motherships for processing, was established as a coop. The catcher-processor sector continued as a coop. Nontribal trawlers making landing onshore fished under a system of individual species quotas by vessel. The Tribal sector managed its allocation using trip limits (PFMC 2020q)

The Pacific Whiting Conservation Cooperative was established in 1997 by fishing companies owning trawlers in the catcher/processor sector of the fishery. The C/P Coop allocates its catch quota among cooperative members to allow them to use the quota more efficiently. The Whiting Mothership Cooperative (M/S Coop) cooperative formed in March 2011 comprises 34 trawl limited entry catch vessel permits endorsed for operation in the mothership sector (PWCC 2021; McQuaw 2021).

Amendment 20 required the mothership and catcher/processor coops to submit an annual report to NMFS by March 31 each year, before a coop permit is issued for that year. The annual coop report contains information about the previous year's fishery, the details of which are described in 6.4.1 (PFMC 2021f).

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The MS Coop agreement includes measures to prevent exceeding allowable levels of catch and bycatch (McQuaw 2021). Details are provided in 6.4.1

National Standard 1 of the MSA requires that conservation and fisheries management measures prevent overfishing while achieving optimal yield on a continuing basis. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the U.S. fishing industry (50 CFR 600.310 2016).

The determination of optimum yield (OY) is a decisional mechanism for resolving the MSA's multiple purposes and policies, implementing an FMP's objectives and balancing the various interests that comprise the national welfare. OY is based on MSY or on MSY as it may be reduced by social, economic or ecological factors. OY and the conservation and management measures proposed to achieve it must prevent overfishing (PFMC 2020q).

In establishing OYs for west coast groundfish, including Pacific hake, the FMP uses the interim step of calculating overfishing limits (OFLs), acceptable biological catches (ABCs), and annual catch limits (ACLs) for major stocks or management units (groups of species). OFL is the MSY harvest level associated with the current stock abundance. ABC is a threshold below the OFL, which accounts for scientific uncertainty in the estimate of OFL. ACL is a harvest specification set at or below ABC and is intended to prevent overfishing. The ACLs are established to achieve OY in the fishery. The OY for a stock or stock complex is the longterm average of the stock's ACLs. More details of this process are presented in 6.4.1.

Measures for regulating the Pacific hake fisheries are found in the Federal Code of Regulations (50 CFR 660.131 2200). The NMFS West Coast Region maintains a website that provides detailed information about on-going management and research activities related to the hake fishery (NOAA Fisheries 2022a).

Current status/Appropriateness/Effectiveness:

There is evidence that the overall framework of management measures in place is effective at achieving the long-term optimum yield, which is defined by the FAO as “the harvest levels for a species that achieves the greatest overall benefits, including economic, social and biological considerations.” If the stock has been maintained above the limit reference point, this shall be taken as evidence that management measures are effective in avoiding overfishing.



Excerpted from Fundamental Clause 6, Section B:

The estimated target reference point is B40% or 813,000 t greater than BMSY (SBMSY is estimated at 518,000 t). As per the Hake Agreement, the 40:10 harvest policy reduces the harvest linearly from the F40% rule when the female spawning biomass is below SB40% such that the harvest goes to zero when limit reference point, SB10%, is reached. F40% is the fishing mortality rate that would result in a 40% spawning potential ratio (SPR) or spawning biomass per recruit that is 40% of the unfished level. This SPR approach is used because the stock-recruitment relationship for Pacific Hake, along with FMSY and BMSY reference points, cannot be estimated reliably from historical data. Currently, there is a high degree of certainty that the female spawning biomass has been fluctuating around SB40% or has been above this level from 2004.

8.1. Conservation and management measures shall be designed to ensure the long-term sustainability of fishery resources at levels which promote optimum utilization, and are based on verifiable and objective scientific and/or traditional, fisher, or community sources.

National Standard 1 of the MSA requires that conservation and fisheries management measures prevent overfishing while achieving optimal yield on a continuing basis (MSA 2007).

In establishing OYs for west coast groundfish, including Pacific hake, the FMP describes the interim step of calculating overfishing limits (OFLs), acceptable biological catches (ABCs), and annual catch limits (ACLs) for major stocks or management units (groups of species). OFL is the MSY harvest level associated with the current stock abundance. ABC is a threshold below the OFL, which accounts for scientific uncertainty in the estimate of OFL. ACL is a harvest specification set at or below ABC and is intended to prevent overfishing. The ACLs are established to achieve OY in the fishery. The OY for a stock or stock complex is the long-term average of the stock’s ACLs (PFMC 2020q).

The NMFS and PFMC set OFL, ABC, ACL and OY to manage the Pacific hake fishery, based on targets, limits, and pre-defined harvest control rules (HCRs), as well as overall ecosystem considerations. The biomass of Pacific hake has been maintained well above the limit reference points, and thus management measures are effective in avoiding overfishing and ensuring sustainability.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that conservation and management measures are designed to ensure the long-term sustainability of fishery resources at levels which promote optimum utilization, and are based on verifiable and objective scientific and/or traditional, fisher, or community sources. Examples may include reports, fishery management plans, regulations, or other management measures.



EVIDENCE:

The MSA sets out the standards (e.g. optimal use and avoiding overfishing) which are followed in the management of the Pacific hake fishery. The availability and quality of evidence is sufficient to substantiate that conservation and management measures are designed for long term sustainability and based on objective science.

References:	PFMC 2020q; PFMC 2021f; PWCC 2021; McQuaw 2021; PWCC 2021; 50 CFR 600.310 2016; 50 CFR 660.131 2200; NOAA Fisheries 2021b; 2022a; MSA 2007				
Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	) x 3 =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 8.1.1.

8.1.1.	When evaluating alternative conservation and management measures, the fishery management organization shall consider their cost-effectiveness and social impact.		
Relevance:	Relevant.		
Evaluation Parameters			
Process:			
<i>The process by which management measures are developed for the fishery allows for consideration of the cost effectiveness and social impact of potential new or modified management measures.</i>	✓		
EVIDENCE:			
<p>The PFMC Groundfish FMP recognizes the need to balance many competing uses of marine resources and different social and economic goals for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. It includes social and economic characteristics of the fishery as an element in the FMP. Section 6.2.3 is a Socioeconomic Framework that addresses occasions when the Council will recommend management actions to address certain social or economic issues in the fishery. Examples of management issues with a social or economic basis include resource allocation, seasons, or landing limits based on market quality and timing, safety measures, and prevention of gear conflicts among others.</p> <p>Utilization and Economics and Social factors comprise 12 of the 17 objectives of the Groundfish FMP. FMPs must examine the social and economic importance of fisheries to communities potentially affected by management measures. Appendix A of the Groundfish FMP contains information in support of management, including a section on Social and Economic Characteristics of the fishery</p> <p>National Standard 8 of the MSA requires that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that are based upon the best scientific information available (MSA 2007).</p>			
Current status/Appropriateness/Effectiveness:			
<i>There is evidence for the consideration of the cost-effectiveness and social impact of potential new or modified management measures.</i>			✓
EVIDENCE:			
<p>Harvest levels for each groundfish species or species group that are set by the Council for a new fishing year are based on the best biological, ecological, and socioeconomic information available, and follow a rigorous and public peer-reviewed process.</p> <p>For the trawl groundfish IFQ program specifically, Amendment 20 is motivated by the long-term goal of capacity rationalization that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch. This goal is supported by 8 measurable objectives that are long-term in their implementation: a system of total catch accounting, profitable, and efficient fishery, reduction of bycatch and discard mortality and the minimization of ecological</p>			

impacts, avoidance of adverse effects on communities and other fisheries, promotion of measurable economic and employment benefits, provision of quality product and increased safety.

A five-year review of the trawl catch shares program was conducted in 2016. A report was published in 2017 (PFMC and NMFS 2017). The review evaluated a number of cost-effectiveness and social impacts aspects of the program, including 1. Changes in the net benefits to the nation 2. Financial outcomes for fishery participants 3. Distribution of cost, revenues, effort, and net benefits among fishery participants 4. Changes in utilization rates of available fish species under the catch share program. Social factors are embedded in discussions of these major categories.

Socio-economic considerations are included in the PFMC Fishery Ecosystem Plan (FEP) (PFMC 2021e). FEP Initiative 3 is the Climate and Communities Initiative, combining the socioeconomic effects of fisheries and the effects of climate variability and change on managed fish stocks. To achieve a more holistic modeling approach, NMFS intends both ecosystem and socioeconomic drivers to be incorporated into stock assessments, where appropriate. Since the development of the original Pacific Coast FEP there have been advances in the use of ecosystem information as the supporting context for west coast stock assessments.

The Annual Ecosystem Status Report (ESR) for the California Current Ecosystem includes contextual information on a range of biophysical and socioeconomic indicators:

- Chapter 4 Fishery Landings, Revenue and Activity
- Chapter 5 Human Wellbeing.

Report Appendices encompass a number of social and economic indicators:

- State-By-State Fishery Landings and Revenues
- Potential for Spatial Interactions Among Ocean-Use Sectors
- Social Vulnerability of Fishing-Dependent Communities
- Fleet Diversification Indicators for Major West Coast Ports
- Fishery Revenue Concentration Fisheries Participation Networks (PFMC 2022g)

Appendix A of the Groundfish FMP contains information in support of management, including a section on Social and Economic Characteristics of the fishery (PFMC 2020q).

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact are considered. Examples may include reports, fishery management plans, regulations or other management measures.</i>	✓
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EVIDENCE:
The quality of the evidence is sufficient to substantiate that cost effectiveness and social impact are considered by the PFMC.

References:	NOAA Fisheries 2021b; 2022a; PFMC 2020q; PFMC 2021e; 2021f; 2022g; McQuaw 2021; PWCC 2021; 50 CFR 600.310 2016; MSA 2007; PFMC and NMFS 2017
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Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10				10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 8.1.2.

8.1.2. Responsible fisheries management organizations shall adopt and implement measures necessary to ensure the management of bycatch and reduction of discards as part of fisheries management (1) in accordance with the PA, as reflected in Article 6 of the UN Fish Stocks Agreement, and as set out in Article 6.5 and 7.5 of the Code; (2) in accordance with the responsible use of fish as set out in the Code; and (3) based on the best scientific evidence available, taking into account fishers’ knowledge.

Relevance: Relevant.

Evaluation Parameters

Process:

The responsible fisheries management organizations has adopted and implemented effective measures necessary to ensure the management of bycatch and reduction of discards as part of fisheries management.

EVIDENCE:

Objective 11. of the Pacific Coast Groundfish FMP is to:

Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality. (PFMC 2020q)

Section 6.5 of the FMP details a bycatch mitigation program that includes bycatch of groundfish, non-groundfish ETP species and measures to reduce bycatch and bycatch mortality. It describes long term closed areas for bycatch mitigation.

NMFS summarizes habitat impacts, and bycatch in its description of the Pacific hake harvest (NOAA Fisheries 2022a):

- Mid-water trawling has minimal impact on habitat and low incidental catch of other species.
- Fishermen follow a number of regulations to reduce potential bycatch in the fishery.
 - Mesh on the narrow, back end (codend) of their nets must be at least 3 inches to prevent bycatch of small fish.
 - Regulations restrict where fishermen may harvest Pacific whiting to reduce bycatch of Chinook salmon.
 - Each sector’s catch is restricted by limits on bycatch of Chinook salmon and depleted rockfish species.
 - There is 100 percent observer monitoring on at-sea processors and catcher vessels.

Pacific hake industry organizations have developed operational measures to reduce bycatch:

The MS Coop agreement includes measures to prevent exceeding allowable levels of catch and bycatch:

- precautionary closures of past bycatch hotspots
- night fishing restrictions
- fleet relocation triggers and fleet to fleet reporting
- required test tows upon relocation to a new fishing area
- in-season “hot spot” closure authority
- seasonal apportionments (pools) of whiting and bycatch allowances
- sanctions against vessels exceeding a bycatch rate within a seasonal pool (McQuaw 2021)

Minimizing incidental catch is also a stated priority for the CP sector cooperative (CP coop). The CP coop uses methods similar to the MS coop to prevent and respond to bycatch of species of concern, for example Chinook salmon. Because the CP coop has a relatively small number of participants (ten vessels and three companies in 2020 (PWCC 2021)), communication among the fleet and fleet managers is fluid and ongoing. Daily catch data reports produced by Sea State provide the necessary information to assess and respond to bycatch events as they arise, for example, by identifying and avoiding hotspot areas (McQuaw 2021; PWCC 2021).

Current status/Appropriateness/Effectiveness:

There is evidence of adoption and implementation of effective measures to ensure the management of bycatch and reduction of discards as part of fisheries management (1) in accordance with the PA, as reflected in Article 6 of the UN Fish Stocks Agreement, and as set out in Article 6.5 and 7.5 of the Code; (2) in accordance with the responsible use of fish as set out in the Code; and (3) based on the best scientific evidence available, taking into account fishers' knowledge. Please note that traditional knowledge should be verifiable. The strategy to ensure the management of bycatch and reduction of discards as part of fisheries management is being implemented successfully (e.g., there is a well-known track record of consistently setting conservative bycatch limits based on quality information and advice about bycatch); or bycatch is minimized to the greatest extent possible, especially for vulnerable species such as sharks, seabirds, turtles, and marine mammals, through mitigation measures that have been shown to be highly effective (e.g., observer coverage and procedures, bycatch caps, utilization measures, full catch accounting, on-deck techniques, avoidance mechanisms and gear technology, etc.). Also, the fishery is not a leading cause of a high level of mortality for any species of concern (e.g., not a Category I fishery for marine mammal bycatch as designated by the National Marine Fisheries Service).

In 2020 the PFMC adopted and NMFS implemented two management measures for rockfish bycatch and salmon bycatch. The following text on 2020 bycatch management is excerpted verbatim from Waldeck (2022), with in-text citations added.

Rockfish Bycatch Management: For the at-sea sectors (CP and MS) canary rockfish, darkblotched rockfish, Pacific ocean perch, and widow rockfish were managed as true set asides (that is, without automatic authority to close fishery if set aside amounts were attained or exceeded). NMFS and the Council have the ability to take in-season action to address conservation concerns if warranted. In the shoreside sector, rockfish bycatch is managed via individual fishing quota held by fishery participants.

For 2021-2022 whiting fisheries set-aside amounts developed by industry in collaboration with the PFMC were implemented by NMFS as part of the specifications and management measures rulemaking. NMFS does not anticipate the need to take action based on performance against whiting fishery set asides. However, NMFS and PFMC maintain the authority to take in-season action if warranted (Waldeck 2022).

New salmon bycatch mitigation measures were adopted in the 2019-2020 groundfish specifications to satisfy mandates in the December 2017 ESA Salmon BiOp (USFWS 2017; NOAA Fisheries 2017a). The measures include:

- Automatic for NMFS to (1) close the whiting fishery when it exceeds (or is projected to exceed) 14,500 Chinook or close the non-whiting fishery when it exceeds (or is projected to exceed) 9,000 Chinook; and (2) after (1) happens, the sector that remains open is closed if that sector exceeds (or is projected to exceed) its threshold (that is, 11,000 Chinook for whiting or 5,500 Chinook for non-whiting). The goal is to ensure that the overall 20,000 Chinook threshold is not exceeded by the groundfish fishery.
- A new bycatch reduction area (BRA) at the 200-fm depth contour. Council and NMFS monitor salmon bycatch rates inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector – whiting IFQ fishery, CP sector, MS sector, and non-whiting midwater trawl sector. If 200-fm BRA implemented, vessels would be prohibited from using midwater trawl gear to target either whiting or non-whiting groundfish in waters shoreward of the 200-fm depth contour, but would still be allowed to fish in waters seaward of 200-fm. This action only applies to non-tribal midwater trawl vessels.

In October 2020, NMFS published the proposed rule for additional measures adopted by the Council (50 CFR 660 2020d). The final rule was published in February 2021 (50 CFR 660 2020e). The new measures include items necessary for access to the 3,500 Chinook salmon “reserve,” including fishery cooperative annual Salmon Mitigation Plans (SMP) that may be submitted to NMFS and detail measures used to manage salmon bycatch. The SMP provides a nexus to a NMFS management action (that is, approval of the SMP) that is necessary for a sector to use the Chinook salmon reserve amount (that is, the 3,500 Chinook available above the 11,000 Chinook threshold for the whiting fishery).

Another new measure, Block Area Closures (BACs), may also be used if NMFS determines a sector of the whiting fishery is catching too much salmon then NMFS may implement a sector specific spatial closure that is more discrete than closing at 200 fathoms coastwide (Waldeck 2022).

Each of these measures received scientific review within the Pacific Fishery Management Council system to determine whether the best scientific information available has been used in their development. Fishers’ knowledge enters at both the development and review stages through advisory committee membership and public comments at Council meetings and in response to proposed rules posted in the Federal Register.

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the responsible fisheries management organizations have adopted and implemented effective measures necessary to ensure the management of bycatch and reduction of discards as part of fisheries management. Examples may include stock assessment, bycatch or other ecosystem assessment reports.</i>		✓
EVIDENCE: The availability and adequacy of evidence is sufficient to substantiate that PFMC and NMFS are managing bycatch and discards as standard part of fisheries management.		
References:	PFMC 2020q; McQuaw 2021 ; PWCC 2021; Waldeck 2022; NOAA Fisheries 2017a; USFWS 2017; 50 CFR 660 2020d; 2020e	
Numerical score:	Starting score - (Number of EPs <u>NOT</u> met x 3) = Overall score	
	10	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)		High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)		Full Conformance
Non-conformance Number (if applicable):		

Supporting Clause 8.2

8.2.	The fishery management organization shall prohibit dynamiting, poisoning, and other similar destructive fishing practices.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>There are management measures, or regulations, or laws that prohibit destructive fishing practices.</i>	✓	
EVIDENCE: Management regulations prohibit destructive fishing practices. As listed in the PFMC Groundfish FMP, the only legal gear types authorized for the commercial harvest of groundfish are trawls, pots (traps), longlines, hook-and-line (mobile or fixed) and setnets (gillnets and trammel nets). The only legal gear type for commercial harvest of Pacific hake is midwater (pelagic) trawl (PFMC 2020q; 50 CFR 660.130 2022).		
Current status/Appropriateness/Effectiveness: <i>The regulations or laws effectively prohibit dynamiting, poisoning, and other similar destructive fishing practices.</i>		✓
EVIDENCE: No destructive gears such as dynamite or poison are permitted, nor is there any evidence that such gears are being used illegally.		

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization prohibits dynamiting, poisoning, and other similar destructive fishing practices. Examples may include laws, fishery management plans, regulations, and enforcement data.</i>		✓
EVIDENCE: Evidence is sufficient to substantiate that the fishery management organization prohibits dynamiting, poisoning, and other similar destructive fishing practices		
References:	PFMC 2020q; 50 CFR 660.130 2022	
Numerical score:	Starting score	Overall score
	10	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)		High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)		Full Conformance
Non-conformance Number (if applicable):		

Supporting Clause 8.3

8.3. The fishery management organization shall seek to identify domestic parties having a legitimate interest in the use and management of the fishery. When deciding on use, conservation, and management of the resource, due recognition shall be given, where relevant, in accordance with national laws and regulations, to the traditional practices, needs, and interests of indigenous people and local fishing communities which are highly dependent on these resources for their livelihood. Arrangements shall be made to consult all the interested parties and gain their collaboration in achieving responsible fisheries.

Relevance:	Relevant
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Evaluation Parameters	Met?
Process: <i>There is a process that allows for identifying and consulting with domestic parties (giving due recognition where relevant, in accordance with national laws and regulations, to the traditional practices, needs, and interests of indigenous people and local fishing communities which are highly dependent on these resources for their livelihood) having a legitimate interest in the use and management of the fisheries resource.</i>	✓

EVIDENCE:

Management authorities, responsibilities and interactions are clearly defined through the MSA Section 302. Under the MSA, the PFMC recommends management actions to the National Marine Fisheries Service (NMFS) for approval. Ultimate decision authority is placed with the Secretary of Commerce. These management authorities are clearly defined in law and are functional.

PFMC structure and function is clearly defined through the MSA and through PFMC Statement of Organization, Practices and Procedures. The US Fish and Wildlife Service, the US Coast Guard, the Pacific States Marine Fisheries Commission, the US Department of State and the Alaska Department of Fish and Game are cooperating but non-voting agencies on the PFMC. Interactions between state and federal authorities, and among Federal entities, are well coordinated and effective. The Pacific Coast Groundfish Fishery FMP enables formal consultations and coordination with state fisheries in Washington, Idaho, Oregon and California.

The Council process involves different types of consultations with the four member states through state agencies, Council appointees, advisory committee membership, and meetings. The process of state participation in the formulation of management measures encourages complementary approaches between federal and state approaches.

Executive Order 13175 (2000) requires regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes. The Secretary recognizes the sovereign status and co-manager role of Indian tribes over shared Federal and tribal fishery resources. The

MSA specifies a seat on the PFMC for a representative of an Indian tribe with Federally-recognized fishing rights from California, Oregon, Washington, or Idaho.

The U.S. government formally recognizes the four Washington coastal tribes (Makah, Quileute, Hoh, and Quinault) have treaty rights to fish for groundfish. In general terms, the quantification of those rights is 50% of the harvestable surplus of groundfish available in the tribes' usual and accustomed (U & A) fishing areas. Each of the treaty tribes has the discretion to administer their fisheries and to establish their own policies to achieve program objectives (U.S. v. State of Washington 1974; 1994; Washington v. William M. Daley 1999).

Current status/Appropriateness/Effectiveness:

In accordance with national laws and regulations, there is evidence that domestic parties having a legitimate interest in the use and management of the fishery (as described above) have been identified and encouraged to collaborate in the fisheries management process.



EVIDENCE:

The Council meets five times a year according to a pre-announced schedule. During the period of COVID restrictions meetings have been conducted remotely with full public access. Notice of meetings is made through the Federal Register. Meeting agendas are widely distributed before each meeting and accessible on the PFMC website. Most Council meetings take six days, with individual advisory body meetings occurring during the course of the week. All meetings are open to the public, except for a brief closed session in which the Council deals with personnel, administrative, or litigation issues.

PFMC meetings are attended by PFMC members, members of the Council's SSC, GMT, GAP and other advisory committees, PFMC staff, the NMFS Regional Administrator, fishery stakeholders, environmental NGOs, community representatives and the general public consistent with the Administrative Procedures Act and NEPA. Public comment is invited for all items on the Council's agenda except those addressed in closed session (personnel and litigation matters). The public is also invited to provide comments to the PFMC in writing and is not required to attend the PFMC meeting to submit comments. Meeting locations rotate among member state cities. Advisory bodies also meet at various times between Council meetings and concurrent with Council meetings. All advisory committee meetings are public (PFMC 2021c).

The PFMC provides a range of opportunities for stakeholder input into management required by federal statute and implemented through its standard operating procedures. The PFMC newsletter provides a summary listing of issues to be discussed at the upcoming meeting. Dates and locations of meetings are published in advance. Names and contact information for PFMC staff and members of the Council, SSC, GMT and GAP are provided to the public. In addition, the NMFS Western Region office and Northwest Fisheries Science Center maintain websites containing information on the trawl groundfish IFQ program, information about the rulemaking process and the status of fisheries, and access to the fishery information base.

The PFMC website provides a range of information resources designed to help navigate the Council process. Examples of rules, procedures and how to effectively provide public comments through letters and testimony at meetings is provided (PFMC 2022a; 2022b; 2022e).

The PFMC website describes several additional procedures that enable the engagement of stakeholders, the distribution of information, and the provision of public comment. These include consultation among agencies, universities and stakeholders on needed research and scientific information, public review and comment of data and analysis, public attendance and comment periods at advisory body meetings, representation on advisory bodies and the Council, Council newsletter, blogpost, twitter feed, public review periods for regulations and FMP amendments, agency responses to review comments, and opportunity for legal challenges to Council actions (PFMC 2021c; 2022a; 2022f; 2022i)

processors fish within a voluntary cooperative; the amendment establishes provisions to strengthen this cooperative (PFMC 2020q).

Amendment 21 was approved in 2010 and establishes long-term allocations between the trawl and nontrawl sectors of the groundfish fishery; establishes a short-term allocational split between the shoreside whiting and non-whiting fishery, necessary for implementation of the individual fishing quota (IFQ) program (established through Amendment 20); establishes darkblotched rockfish, Pacific ocean perch and widow rockfish allocations among the at-sea trawl and shoreside trawl sectors (later removed by Amendment 21-4); identifies the need for initial set-asides for the at-sea trawl sectors; and establishes a Pacific halibut bycatch allowance to be provided to the trawl fishery in the form of individual bycatch quota (established through Amendment 20) (PFMC 2020q).

Each of the FMP amendments was supported by accompanying research assessing fleet capacity. Routine monitoring and ongoing reporting requirements of fishery sectors ensure regular updating on all fishing operations.

At the federal level, the US National Plan of Action for the Measurement of Fishing Capacity (NOAA Fisheries 2004) discusses a number of methods for capacity measurement and assessment. NMFS has published a procedural guide for the review of catch share programs. The guidance document is reviewed every five years. It also provides guidance on the assessment of fishing capacity subsequent to the implementation of a catch share program (NOAA Fisheries 2017b).

Current status/Appropriateness/Effectiveness:

There is evidence of the size of fleet capacity, and of data describing fishing operation, and that the mechanisms described above are successful at maintaining the effective fishing capacity of the unit of certification at a level commensurate with the sustainable use of the resource. Management mechanisms, which restrict the application of fishing capacity, such as quotas, shall be considered valid mechanisms in relation to this parameter. The core emphasis of this requirement is to ensure that exploitation is sustainable. Assessment teams should ensure that fisheries are within catch limit recommendations to determine whether excess capacity is having an effect on resource overexploitation.

✓

EVIDENCE:

A system of total and individual quotas that are quantitatively defined, regularly monitored and effectively enforced, in combination with capacity reductions that reduce fishing pressure, provide positive incentives to prevent overfishing and promote recovery of rebuilding stocks. Capacity reduction is often one objective of implementing a catch share program.

Management mechanisms such as TACs and quota allocations regulate the catch and amount of fishing effort applied to Pacific hake. The PFMC routinely makes adjustments to management measures as conditions change throughout a season, for example monitoring total catch information throughout the season to determine the relationship between catch at a given point in time and an ACL/ annual OY.

In addition, A number of bycatch control measures apply to participants in the Pacific whiting fishery work in conjunction with the ITQ program elements to promote sustainable exploitation of the resource.

- Salmon bycatch limits with automatic closure of the fishery if exceeded
- Bycatch reduction areas
- Block area closures if salmon bycatch rates exceeds defined levels
- FMP provisions for the use of sanctuaries, marine protected areas (MPAs) and the protection of Habitat Areas of Particular Concern (HAPC)

The offshore fleets (CP and MS coops) have adopted measures designed to further restrict bycatch, including:

- precautionary closures of past bycatch hotspots
- night fishing restrictions
- fleet relocation triggers and fleet to fleet reporting
- required test tows upon relocation to a new fishing area
- in-season “hot spot” closure authority
- seasonal apportionments (pools) of whiting and bycatch allowances
- sanctions against vessels exceeding a bycatch rate within a seasonal pool (McQuaw 2021; PWCC 2021)

The routine groundfish management cycle provides extensive points of review of groundfish fishing sustainability. Review of compliance with habitat protection measures is included in these reviews. In addition, Amendment 20 requires a regular review of the trawl ITQ program to ensure that it does not contribute to unsustainable fishing. The review mandates under Amendment 20 include catch limits, ownership concentration and program performance (PFMC 2021f). These are in conformance with the federal guidance on the review of catch share programs (NOAA Fisheries 2017b).

8.4. Where excess capacity exists, mechanisms shall be established to reduce capacity to levels commensurate with sustainable use of the resource. Fleet capacity operating in the fishery shall be measured and monitored. The fishery management organization shall maintain, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations and a record of all authorizations to fish allowed by them.

Evidence of past actions taken by the PFMC to reduce excess fishing capacity are described in the section above. The catch shares program implemented by Amendment 20 to the groundfish FMP is in itself a market mechanism to respond to resource limitations through further capacity reductions.

Section 6.9.5 of the groundfish FMP is Capacity Reduction Data Collection, and is a forward-facing recognition of the potential future need to further reduce fishing capacity in the groundfish fleet.

The current condition of the groundfish fisheries of the Washington, Oregon, and California region is such that further reduction of the LE fleet may be required in the near future. Research and monitoring programs may need to be developed and implemented for the fishery so that information required in a capacity reduction program is available. Such data should indicate the character and level of participation in the fishery, including (1) investment in vessel and gear; (2) the number and type of units of gear; (3) the distribution of catch; (4) the value of catch; (5) the economic returns to the participants; (6) mobility between fisheries; and (7) various social and community considerations. [Amendment 18, 19, 20]

Evidence Basis:
The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fleet capacity operating in the fishery is monitored and measured, and statistical data on all fishing operations allowed is updated and maintained. Where excess capacity exists, mechanisms are established to reduce capacity to levels commensurate with sustainable use of the resource. Examples may include fleet reports or other documents or reports.



EVIDENCE:
 The evidence provided above substantiates the fleet capacity is monitored and measured, and mechanisms exist to reduce capacity should it be excess to sustainable resource levels.

References: NOAA Fisheries 2017b; PFMC 2020q; 2021f; McQuaw 2021; PWCC 2021

Numerical score:	Starting score	-	(	Number of EPs NOT met	x	3	) =	Overall score
	10			0				10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low) High

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC) Full Conformance

Non-conformance Number (if applicable):

Supporting Clause 8.4.1.

8.4.1.	Studies shall be promoted that provide an understanding of the costs, benefits, and effects of alternative management options designed to rationalize fishing, especially options relating to excess fishing capacity and excessive levels of fishing effort.
Relevance:	Relevant
Evaluation Parameters	
Process: <i>There is a need and a process that allows, as appropriate, for studies to understand the costs, benefits, and effects of alternative management options designed to rationalize fishing.</i>	Met? ✓
Summary of Evidence	
<p>The National Environmental Policy Act (NEPA): requires environmental impact assessments of federal actions and compliance with other laws and executive orders. One category of the required assessment is the effect of proposed alternative actions on the socioeconomic environment (EPA 2022).</p> <p>Economic analyses are required to meet the regulatory impact review (RIR) requirements of Presidential Executive Order 12866 (1993). In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other 9 advantages, distributive impacts; and equity), unless a statute requires another regulatory approach.</p> <p>Economic analyses are required under the Regulatory Flexibility Act (RFA). The purpose of the RFA is to establish as a principle agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. The initial (IRFA) and final (FRFA) analyses on proposed and final actions are designed to assess the impacts that various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize adverse impacts (NOAA Fisheries 2007).</p> <p>Economic analyses are also required, to varying degrees, under the MSA, the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and other applicable laws. For example, section 303(a)(9) of the Magnuson-Stevens Act requires a Fishery Impact Statement (FIS). This includes an analysis of the effects of a proposed action on participants in the fishery and on fishing communities (MSA 2007).</p>	
Current status/Appropriateness/Effectiveness: <i>There is evidence for studies conducted on alternative management options designed to rationalize fishing.</i>	✓

Three amendments to the Pacific Coast Groundfish FMP in particular relate to limiting capacity and rationalizing fishing. Other FMP amendments have contained measures to refine various aspects of the trawl rationalization program.

Amendment 6 (1992) established a license limitation (limited entry) program intended to address overcapitalization by restricting further participation in groundfish trawl, longline, and trap fisheries (PFMC 2020q).

Amendment 15 (2008) implemented a limited entry program for the three non-tribal sectors of the Pacific whiting fishery (shore-based, catcher/processor, mothership) off the coast of Washington, Oregon, and California. Its purpose was to address Pacific Coast Groundfish FMP conservation and socioeconomic issues in the shoreside, catcher/processor, and MS sectors of the Pacific whiting fishery by requiring vessels to qualify for an additional license to participate in a given sector, based on their historical participation. It was an interim measure replaced by Amendment 20 (PFMC 2020q).

Amendment 20 (2010) established the groundfish trawl rationalization program. Under this program, groundfish LE trawl vessels making shoreside deliveries are managed with individual fishing quotas. Motherships and associated catcher-vessels in the at-sea Pacific whiting sector are managed under a system of regulated cooperatives. Pacific whiting catcher-processors fish within a voluntary cooperative; the amendment establishes provisions to strengthen this cooperative. (PFMC 2021f)

Each amendment contained a set of alternative actions analysed against the preferred action. As an example, the final environmental impact statement for amendment 20 includes in addition to the NEPA analysis, a regulatory impact review and initial regulatory flexibility analysis. (PFMC and NMFS 2010)

8.4.1. Studies shall be promoted that provide an understanding of the costs, benefits, and effects of alternative management options designed to rationalize fishing, especially options relating to excess fishing capacity and excessive levels of fishing effort.

Each of the FMP amendments described in the section above were accompanied by analyses of the cost, benefits and effects of alternative management actions, as required by the suite of federal laws and executive orders described in the first section of 8.4.1.

Biennial Harvest Specifications and Management Measures are subjected to an Environmental Assessment and Regulatory Impact Review, as are potential changes in assessment methodologies (PFMC 2020o; 2020p).

The mandated five-year reviews of catch share programs are programmatic analyses of the costs, benefits and effects of the implemented program. The review of the Trawl Rationalization Program implemented by Amendment 20 was conducted in 2017.

On implementation of Amendment 20 in 2011, NMFS collected both baseline and annual socioeconomic data to judge the effectiveness of the Catch Share Program for the 5-Year Review, and collected data annually thereafter, as required under the MSA. To aid in reviewing and refining the Catch Share Program, the Council appointed the Community Advisory Board (CAB) to provide the perspective of fishing communities on Program performance and potential improvements. The Council approved the review in November 2017, identifying a range of potential follow-on actions to refine and enhance the program. A similar review will be conducted every five years (50 CFR 660 2019d; 2019e; PFMC and NMFS 2017)

Section 6.9.5 of the groundfish FMP is Capacity Reduction Data Collection, and is a forward-facing recognition of the potential future need to further reduce fishing capacity in the groundfish fleet (PFMC 2020q).

<p>Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that studies are promoted that provide an understanding of the costs, benefits, and effects of alternative management options designed to rationalize fishing, especially options relating to excess fishing capacity and excessive levels of fishing effort. Examples may include various evaluation or reports on fishing rationalization.</i></p>	✓
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EVIDENCE:

The evidence is sufficient to substantiate that analyses have been conducted to understand the costs, benefits and effects of alternative rationalization options.

References: EPA 2022; Executive Order 12866 1993; NOAA Fisheries 2007; MSA 2007; 50 CFR 660 2019d; 2019e; PFMC and NMFS 2010; 2017; PFMC 2020q; 2021f

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)							High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)							Full Conformance
Non-conformance Number (if applicable):							

Supporting Clause 8.5.

8.5.	<p>Technical measures regarding the stock under consideration shall be taken into account, where appropriate, in relation to fish size, mesh size, gear, closed seasons or areas, areas reserved for particular (e.g., artisanal fisheries), and protection of juveniles or spawners.</p>	
Relevance:	<p>Relevant.</p>	
Evaluation Parameters		Met?
<p>Process: <i>The management system has taken into account technical measures, where and as appropriate (i.e., some fisheries do not have the requirement for a minimum fish size), to the fishery and stock under assessment, in relation to fish size, mesh size, gear, closed seasons, closed areas, areas reserved for particular (e.g., artisanal) fisheries, and protection of juveniles or spawners.</i></p>		<p>✓</p>
<p>EVIDENCE:</p> <p>The management system has technical measures in relation to fish size, fishing gear, closed seasons, closed areas, areas reserved for particular (e.g. artisanal) fisheries, and protection of juveniles or spawners.</p> <p>Pacific hake are managed under the Pacific Coast Groundfish Fishery Management Plan (PFMC 2020q) using a series of technical measures:</p> <ul style="list-style-type: none"> • Permits and limited entry to the fishery. • Annual quotas • Closed seasons • Closed areas • Gear restrictions • Bycatch reduction <p>These are described in detail in the following section.</p>		
<p>Current status/Appropriateness/Effectiveness: <i>Technical measures are related to sustainability objectives, ensuring sustainable exploitation of the target species, and minimizing the potential negative impacts of fishery activities on non-target species, ETP species, and the physical environment.</i></p>		<p>✓</p>

EVIDENCE:

There have been numerous technical measures aimed at reducing waste and discards in the Pacific hake fishery, and to ensure that the resources are harvested sustainably. These include Seasons, closed areas, gear regulations, observer coverage requirements, bycatch restrictions and protected species regulations.

Specific examples include:

Seasons

The Pacific hake fishery takes place between May-and the end of the calendar year or when sector allocations are attained. (Waldeck 2022).

Closures

Rockfish Conservation Areas, or RCAs, are depth-based closed areas. The RCA boundaries are lines that connect a series of latitude and longitude coordinates and are intended to approximate particular depth contours. RCA boundaries are different depending on what types of fishing gear are being used. RCA boundaries are likely to differ between the northern and southern areas of the coast. RCA boundaries are also likely to change seasonally, and may also be changed during the year through inseason actions. The RCA boundaries are set primarily to minimize incidental catch of overfished rockfish, by eliminating fishing in areas at locations and at times when those overfished species are likely to co-occur with more healthy target stocks of groundfish.

Block Area Closures (BAC) are areas of federal waters that may be closed to groundfish bottom trawl fishing if NMFS determines a sector of the whiting fishery is catching too much salmon then NMFS may implement a sector- specific spatial closure that is more discrete than closing at 200 fathoms coastwide. Areas will be bounded on the north and south by a line of latitude or the EEZ boundary, and on the east and west by boundary lines that approximate depth contours. BACs, when implemented, would have restrictions very similar to those of the trawl RCA. NOAA Hake site and Waldeck 2022).

Bycatch Reduction Area (BRA) at the 200-fm depth contour. The PFMC and NMFS monitor salmon bycatch rates inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector (Waldeck 2022)

Essential Fish Habitat Conservation Areas (EFHCA) are habitats that are necessary to the species for spawning, breeding, feeding, or growth to maturity of groundfish species. Boundaries are set by regulation. Some EFH that is especially important ecologically or particularly vulnerable to degradation may be further designated as “habitat areas of particular concern” (HAPC) to provide additional focus for conservation efforts (50 CFR 660.11 2022; 50 CFR 660.75 through 660.79 2022).

Gear regulation

Midwater (pelagic) trawl gear is the only gear allowed for vessels participating in the primary whiting season. Chafing gear is used in the midwater trawl fishery to protect codends from abrasion, wear and damage caused by repeated contact with the stern ramp and trawl alley of the vessel. The sides and bottom of the codend are the areas most likely to be abraded by contact with the vessel. After a several year process of development and analysis of alternative regulations and potential impacts related to the use of chafing gear, the Council voted in 2018 to remove restrictions on the use of chafing gear, and codend mesh size and configuration in the interest of improving operating flexibility and efficiency. Section 6.2.2 describes the decision sequence and regulatory analyses pertaining to this final decision. As of January 1, 2019, midwater trawl gear has the following requirements (50 CFR 660 2018a)

- No mesh size restrictions except the first 20 feet behind footrope or headrope must have bare ropes with 16 inches minimum mesh
- Mesh size is measured as the distance between opposing knots or corners in knotless webbing

- Codends may be single-wall or double-walled
- Chafing gear can be used to create the double-walled codend
- No restrictions on the use and configuration of chafing gear
- Vessels may have any type of groundfish bottom trawl (small or large footrope) or midwater trawl gear onboard simultaneously or successively on the same trip except:
- Between 42° N. lat. and 40°10' N. lat. and shoreward of the trawl RCA, vessels may have SFFT, midwater trawl, and large footrope trawl gear on board simultaneously or successively on the same trip. Vessels are prohibited from carry any other type of small footrope trawl gear in this area.
- Vessels may only declare one type of trawl gear at a time • Vessels may fish with both groundfish bottom trawl gear and midwater trawl gear on the same fishing trip as long as a new declaration is made before fishing with a new gear
- Vessels may make declarations from sea and do not have to return to port to do so as long as the new declaration is made before fishing with a new gear
- Vessels must keep and land catch from different gears separate by gear type

For shorebased vessels:

- Vessels may fish in multiple IFQ management areas on a single trip
- Vessels may record catch from multiple areas on the same fish ticket
- Vessels may cross management lines on a single tow.
- Vessels must record the number of tows in a management area. Catch will be prorated based on the ratio of tows.
- Vessels may bring a new haul on board before the previous haul has been stowed, but catch from hauls cannot mix until the observer has had an opportunity to complete the required sampling protocols and all protocols in the specific Vessel's Monitoring Plan have been followed.

Observer coverage: The Pacific hake fishery has 100 percent observer coverage and total catch accounting

Bycatch

A number of bycatch control measures apply to participants in the Pacific hake fishery work in conjunction with the ITQ program elements to promote sustainable exploitation of the resource.

- Salmon bycatch limits with automatic closure of the fishery if exceeded
- Bycatch reduction areas
- Block area closures if salmon bycatch rates exceeds defined levels
- FMP provisions for the use of sanctuaries, marine protected areas (MPAs) and the protection of Habitat Areas of Particular Concern (HAPC)

The offshore fleets (CP and MS coops) have adopted measures designed to further restrict bycatch, including:

- precautionary closures of past bycatch hotspots
- night fishing restrictions
- fleet relocation triggers and fleet to fleet reporting
- required test tows upon relocation to a new fishing area
- in-season "hot spot" closure authority
- seasonal apportionments (pools) of whiting and bycatch allowances
- sanctions against vessels exceeding a bycatch rate within a seasonal pool (McQuaw 2021; PWCC 2021)

Protected Species

It is unlawful to retain any prohibited or protected species unless authorized. Prohibited and protected species must be returned to the sea as soon as practicable with a minimum of injury when caught and brought on board.

In cases of protected species mortality, requirements are in place for handling, reporting and disposition.

Protected Species Handling:

- Whole animals must be labeled with the vessel name, E-fish ticket number, and landing date.

- Whole animals must be kept frozen or iced until transferred or disposal instructions are given.

Reporting requirements:

- All albatross must be reported to the USFWS as soon as possible
- Marine mammals and sea turtles must be reported to NMFS as soon as possible
- Green sturgeon must be reported on the E- fish ticket and to NMFS within 72 hours after the completion of the offload
- Eulachon must be recorded on E-fish ticket
- Remaining seabirds must be reported to catch monitor before disposal

Disposition:

- All Albatross: transfer to USFWS
- Sea turtles: transfer to NMFS
- Green sturgeon: transfer to NMFS
- Marine mammals: instructions given when reported
- No part of a protected species may be retained for personal use
- No part of a protected species may reach commercial markets (PFMC 2020q; NOAA Fisheries 2022c)

An example of protected species regulations may be found in 50 CFR 660. 21 (2019), in which detailed requirements of the Seabird Avoidance Program are listed.

8.5.	Technical measures regarding the stock under consideration shall be taken into account, where appropriate, in relation to fish size, mesh size, gear, closed seasons or areas, areas reserved for particular (e.g., artisanal fisheries), and protection of juveniles or spawners.				
Evidence Basis:			✓		
<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that technical measures regarding the stock under consideration are taken into account, where appropriate, in relation to fish size, mesh size, gear, closed seasons, closed areas, areas reserved for particular (e.g., artisanal) fisheries, and protection of juveniles or spawners. Examples may include fishery management plans, regulations or various other reports.</i>					
EVIDENCE:					
The availability and quality of evidence is sufficient to substantiate that technical measures are taken into account and widely used in the Pacific hake fishery.					
References:	50 CFR 660 2018a; 50 CFR 660. 21 2019; 50 CFR 660.11 2022; 50 CFR 660.75 through 660.79 2022; <u>McQuaw 2021</u> ; <u>PWCC 2021</u>				
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	) x 3 =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 8.5.1.

8.5.1	Appropriate measures shall be applied to minimize catch, waste, and discards of non-target species (both fish and non- fish species), and impacts on associated, dependent, or endangered species.		
Relevance:	Relevant.		
Evaluation Parameters	Met?		

<p>Process: <i>There is a mechanism by which management measures are developed to minimize the catch, waste and discarding of non-target species and the impact of the fishery on associated, dependent, and ETP species. This system shall include the development of specific management objectives.</i></p>	✓
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As documented in Supporting Clause 8.5, a number of management measures and operational practices are in place in the Pacific hake fishery to minimize the catch, waste and discarding of non-target species and the impact of the fishery on associated, dependent, and ETP species.

In addition, the Pacific Coast Groundfish Management Plan contains specific objectives related to non-target species and the impact of the fishery on associated, dependent, and ETP species (PFMC 2020q):

- Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.
- Objective 11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

8.5.1 Appropriate measures shall be applied to minimize catch, waste, and discards of non-target species (both fish and non- fish species), and impacts on associated, dependent, or endangered species.

<p>Current status/Appropriateness/Effectiveness: <i>There are measures in place to minimize catch, waste, and discards of nontarget species (both fish and non-fish species). These measures are considered effective at achieving the specific management objectives described in the process parameter. There are measures in place to minimize impacts on associated, dependent, or endangered species. These measures are considered effective at achieving the specific management objectives described in the process parameter.</i></p>	✓
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Several Amendments to the FMP are implementation examples of the specific FMP objectives related to non-target species and the impact of the fishery on associated, dependent, and ETP species (PFMC 2020q):

Amendment 19 (2006) revised the definition of groundfish EFH, identified habitat areas of particular concern (HAPCs), and describes management measures intended to mitigate the adverse effects of fishing on EFH. This amendment supplants the definition of EFH added to the FMP by Amendment 11.

Amendment 23 (2010) incorporated new National Standard 1 guidelines to prevent overfishing. These new National Standard 1 guidelines were developed in response to the Magnuson-Stevens Act re-authorization of 2006 which mandated an end to overfishing.

Amendment 24 (2015) designated some species as Ecosystem Component Species and incorporated a variety of technical changes to the FMP.

Amendment 25 (2015) added a suite of lower trophic level species to the FMP's list of ecosystem component (EC) species, consistent with the objectives of the Council's FMPs and its Fishery Ecosystem Plan. It prohibited future development of directed commercial fisheries for the suite of EC species shared between all four FMPs until and unless the Council has had an adequate opportunity to both assess the scientific information relating to any proposed directed fishery and consider potential impacts to existing fisheries, fishing communities, and the greater marine ecosystem.

Amendment 28 (2019) modified the configuration of EFH Conservation Areas (EFHCAs) that are closed to groundfish bottom trawl fishing in order to protect EFH, closed waters deeper than 3,500 meters to bottom contact fishing gear, opened the trawl RCA to bottom trawl fishing off Oregon and California, and created a framework to consider and implement more flexible area closures with block area closures.

Amendment 29 (2020) designated shortbelly rockfish as an ecosystem component species and removed the formal allocations of lingcod south of 40°10' N lat., petrale sole, widow rockfish, and Minor Slope Rockfish south of 40°10' N lat. from the FMP.

In 2011 Amendments 20 and 21 to the Pacific Coast Groundfish Fishery Management Plan (PCGFMP) established the Trawl Rationalization (TRat) Program, replacing trip and landing limits with fixed allocations for limited entry trawl participants in the form of individual quota shares for the shorebased trawl fleet (shoreside IFQ program) and cooperative programs for the at-sea mothership (MS coop program) and catcher/processor (CP coop program) fleets. The TRat program fundamentally changed the incentive structure of fishing. The fishing focus shifted from maximizing catch to maximizing the utilization of catch and minimizing bycatch. At-sea and shoreside monitoring was required for 100% of trips and landings of midwater trawl vessels. The program showed rapid success in reducing bycatch (50 CFR 660 2014a; NMFS 2018).

Between 2011 and 2018 the Council and its advisory committees engaged in an extensive process of development and analysis of TRat program refinements that would eliminate gear regulations that might no longer be necessary to achieve reductions in bycatch. Considerations include regulations on trawl codend mesh size, configuration and chafing gear. The process is described in detail in Section 6.2.2. One of the issues considered was mesh "blinding" from the use of double-walled codends and the potential for increased bycatch. The potential impact of mesh size on bycatch from the use of smaller mesh and chafing gear was also analyzed, as was the potential impact of chafing gear on bottom habitats. The conclusions of these analyses and the rationales for the regulatory change are presented in 6.2.2.

In 2018 the Council, given the improved status of a number of overfished stocks and continuing success in reducing bycatch, proposed new gear regulations intended to provide flexibility to TRat program vessels in the configuration and use of fishing gear. For midwater trawl gear, the Council proposed eliminating restrictions on: minimum mesh size, except for the first 20 ft. behind the foot rope or head rope; chafing gear placement and double-walled codends (50 CFR 660 2018a).

8.5.1	Appropriate measures shall be applied to minimize catch, waste, and discards of non-target species (both fish and non- fish species), and impacts on associated, dependent, or endangered species.		
Evidence Basis:	<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that appropriate measures are applied to minimize catch, waste and discards of non-target species (both fish and non-fish species), and impacts on associated, dependent, or endangered species. Examples may include various stock and ecosystems assessment reports.</i>		✓
EVIDENCE:	The availability and adequacy of the evidence is sufficient to substantiate that appropriate measures are taken to minimize catch, waste and discards of non-target fish.		
References:	PFMC 2020q		
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met x 3) =	Overall score
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 8.6

8.6	Fishing gear shall be marked in accordance with the State’s legislation in order that the owner of the gear can be identified. Gear marking requirements shall take into account uniform and internationally recognizable gear marking systems.		
Relevance:	Relevant		
Evaluation Parameters			Met?
Process:	<i>There is regulation for gear marking.</i>		✓
EVIDENCE:	Federal regulations exist requiring marking of fixed gear. No regulations require the marking of pelagic trawl gear.		
Current status/Appropriateness/Effectiveness:	<i>Fixed gear is marked according to national legislation, and lost fixed gear can be identified back to owner.</i>		
EVIDENCE:	<p>Fixed gear is marked according to federal regulations, which state:</p> <p>(1) Limited entry fixed gear (longline, trap or pot) must be marked at the surface and at each terminal end, with a pole, flag, light, radar reflector, and a buoy.</p> <p>(2) A buoy used to mark fixed gear must be marked with a number clearly identifying the owner or operator of the vessel. The number may be either:</p> <p>(i) If required by applicable state law, the vessel's number, the commercial fishing license number, or buoy brand number; or</p> <p>(ii) The vessel documentation number issued by the USCG, or, for an undocumented vessel, the vessel registration number issued by the state. (50 CFR 660.219 2022)</p>		

Regulations pertaining to vessel marking in the Pacific hake fishery are established by NMFS as prescribed in the annual management measures for Pacific whiting published in the Federal Register (50 CFR 660 2021).

There is no regulation requiring the marking of pelagic trawl gear. However there are strong economic incentives to avoid gear damage and loss and its occurrence is rare. There is minimal gear loss of pelagic trawl in Pacific hake fisheries, given that the reduced bottom contact from trawl doors greatly reduces snagging and subsequent loss of trawls on the seabed. Gear loss is therefore an extremely rare event and when it happens is known and reported. Midwater trawl gear is expensive and every effort is made by vessel captains and crew to avoid snagging or if snagging does occur, to retrieve the gear with as little damage as possible (Nowak 2022).

As a tool to avoid gear loss, vessels use seabed mapping software that provides them with real-time data about seabed conditions.

Fishing gear loss was included in 2021 NMFS study of fishing effort in the 2002-2019 U.S. Pacific Coast Groundfish Fisheries. It found that observed gear loss was least common in trawl fisheries. In shoreside bottom trawl fleets, gear loss occurred on ~0.1% of observed hauls annually and was never observed in shoreside midwater trawl fleets. On average, in at-sea midwater fleets, 0.02% of hauls lost gear annually, with a maximum of less than 0.2%. (Somers et al. 2021)

Evidence Basis:
The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fishing gear is marked in accordance with State’s legislation in order that the owner of the gear can be identified. Gear marking requirements take into account uniform and internationally recognizable gear marking systems. Examples may include various fleet reports and regulations.

EVIDENCE:
 The evidence is sufficient to substantiate that fishing gear is marked in accordance with State’s legislation. Fixed gear is marked according to federal regulations. There are no regulations requiring marking of pelagic trawl gear in the Pacific hake fishery.

Regulations pertaining to vessel and gear markings in the Pacific hake fishery are established in NMFS regulations, as prescribed in the annual management measures published in the Federal Register. There is no evidence that indicates gear marking is not being followed or is ineffective.

References: 50 CFR 660 2021; 50 CFR 660.219 2022; Nowak 2022; Somers et al. 2021

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10		0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance
Non-conformance Number (if applicable):						

Supporting Clause 8.7

8.7. The fishery management organization and relevant groups from the fishing industry shall measure performance and encourage the development, implementation, and use of selective, environmentally safe, and cost-effective gear, technologies, and techniques that are sufficiently selective as to minimize catch, waste, discards of non-target species (both fish and non-fish species), and impacts on associated or dependent predators. The use of fishing gear and practices that lead to discarding the catch shall be discouraged, and the use of fishing gear and practices that increase survival rates of escaping fish shall be promoted. Inconsistent methods, practices, and gears shall be phased out accordingly.

Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>The management system and relevant groups from the fishing industry have encouraged the development of technologies and operational methods to reduce waste and discard of the target species. Relevant groups includes fishers, processors, distributors, and marketers. There are mechanisms in place by which the selectivity, environmental impact, and cost-effectiveness of gears included in the unit of certification are measured.</i>		✓
EVIDENCE: Considerable attention has been given to the use of technologies and operational methods to reduce waste and discard of Pacific hake Midwater (pelagic) trawl gear is the only gear allowed for vessels participating in the primary whiting season. As previously described, NMFS streamlined regulations for vessels fishing with groundfish bottom and midwater trawl gear in 2019 after realizing success with the Pacific Coast Groundfish Fishery’s Trawl Rationalization Program and improved status of a number of overfished stocks. Issues such as the effect of mesh blinding and chafing gear on bycatch were among those analyzed, and are summarized in 6.2.2. The final rule which revises and eliminates restrictions on groundfish bottom and midwater trawl gear used in the Pacific Coast Groundfish Fishery’s Trawl Rationalization Program published on December 3, 2018 (50 CFR 660 2018a). As of January 1, 2019, midwater trawl gear has the following requirements: <ul style="list-style-type: none"> • No mesh size restrictions except the first 20 feet behind footrope or headrope must have bare ropes with 16 inches minimum mesh • Mesh size is measured as the distance between opposing knots or corners in knotless webbing • Codends may be single-wall or double-walled • Chafing gear can be used to create the double-walled codend • No restrictions on the use and configuration of chafing gear • Vessels may have any type of groundfish bottom trawl (small or large footrope) or midwater trawl gear onboard simultaneously or successively on the same trip except: • Between 42° N. lat. and 40°10’ N. lat. and shoreward of the trawl RCA, vessels may have SFFT, midwater trawl, and large footrope trawl gear on board simultaneously or successively on the same trip. Vessels are prohibited from carry any other type of small footrope trawl gear in this area. • Vessels may only declare one type of trawl gear at a time • Vessels may fish with both groundfish bottom trawl gear and midwater trawl gear on the same fishing trip as long as a new declaration is made before fishing with a new gear • Vessels may make declarations from sea and do not have to return to port to do so as long as the new declaration is made before fishing with a new gear • Vessels must keep and land catch from different gears separate by gear type For shorebased vessels: <ul style="list-style-type: none"> • Vessels may fish in multiple IFQ management areas on a single trip • Vessels may record catch from multiple areas on the same fish ticket • Vessels may cross management lines on a single tow. • Vessels must record the number of tows in a management area. Catch will be prorated based on the ratio of tows. • Vessels may bring a new haul on board before the previous haul has been stowed, but catch from hauls cannot mix until the observer has had an opportunity to complete the required sampling protocols and all protocols in the specific Vessel’s Monitoring Plan have been followed. (50 CFR 660 2018a) 		

Current status/Appropriateness/Effectiveness:

Such technologies and operational methods have been implemented. The methods in use are effective in reducing waste and discards of the non-target species. There is evidence that the gears used in the fishery are appropriate, in terms of selectivity, environmental impact, and cost-effectiveness, as assessed by the responsible scientific authority of the fishery. Methods shall be considered successful if there is evidence that the fishery under assessment is not causing significant risk of overfishing to non-target species.

EVIDENCE:

A number of bycatch control measures apply to participants in the Pacific whiting fishery work in conjunction with the ITQ program elements to reduce waste and discard of non-target species.

- Salmon bycatch limits with automatic closure of the fishery if exceeded
- Bycatch reduction areas
- Block area closures if salmon bycatch rates exceed defined levels
- FMP provisions for the use of sanctuaries, marine protected areas (MPAs) and the protection of Habitat Areas of Particular Concern (HAPC)

The offshore fleets (CP and MS coops) have adopted measures designed to further restrict bycatch, including:

- precautionary closures of past bycatch hotspots
- night fishing restrictions
- fleet relocation triggers and fleet to fleet reporting
- required test tows upon relocation to a new fishing area
- in-season “hot spot” closure authority
- seasonal apportionments (pools) of whiting and bycatch allowances
- sanctions against vessels exceeding a bycatch rate within a seasonal pool (McQuaw 2021; PWCC 2021).

In addition, the 2019 changes in gear regulations described above and discussed in 6.2.2 were intended to provide flexibility to TRat program vessels in the configuration and use of fishing gear. The expectation was that greater flexibility would foster innovation and allow for more optimal harvest operations, while staying within regulated bycatch limits.

There is no evidence that the Pacific hake fishery causes significant of overfishing to non-target species. The measures in place with the ultimate authority for automatic closure of the fishery if bycatch levels exceed a defined amount prevent overfishing of non-target species.

8.7. The fishery management organization and relevant groups from the fishing industry shall measure performance and encourage the development, implementation, and use of selective, environmentally safe, and cost-effective gear, technologies, and techniques that are sufficiently selective as to minimize catch, waste, discards of non-target species (both fish and non-fish species), and impacts on associated or dependent predators. The use of fishing gear and practices that lead to discarding the catch shall be discouraged, and the use of fishing gear and practices that increase survival rates of escaping fish shall be promoted. Inconsistent methods, practices, and gears shall be phased out accordingly.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization and relevant groups from the fishing industry measure performance and encourage the development, implementation, and use of selective, environmentally safe, and cost effective gear, technologies and techniques, that are sufficiently selective as to minimize catch, waste, discards of non-target species (both fish and non-fish species), and impacts on associated or dependent species. Examples may include various reports, regulations, or other data.



EVIDENCE:

The availability and adequacy of the evidence is sufficient to substantiate that PFMC and NMFS apply regulations and the fishing industry uses selective and environmentally safe gear to minimize by-catch.

References: 50 CFR 660 2018a; McQuaw 2021; PWCC 2021

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 8.8

8.8.	Technologies, materials, and operational methods or measures—including, to the extent practicable, the development and use of selective, environmentally safe, and cost effective fishing gear and techniques—shall be applied to minimize the loss of fishing gear, the ghost fishing effects of lost or abandoned fishing gear, pollution, and waste.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>There has been development of technologies, materials, and operational methods that minimize the loss of fishing gear, the ghost fishing effects of lost or abandoned fishing gear, and a system to minimize pollution and waste.</i>		✓
EVIDENCE: Operational methods and gears regulated in the Pacific hake fisheries minimize the loss of fishing gear. As described in Supporting Clause 8.6, pelagic trawl gear is extremely expensive and every effort is made by vessel captains and crew to avoid snagging or if snagging does occur, to retrieve the gear with as little damage as possible, and the ghost fishing effects of lost or abandoned fishing gear are minimal (Nowak 2022).		
Current status/Appropriateness/Effectiveness: <i>Technologies, materials, and operational methods that minimize the loss of fishing gear and ghost fishing by lost or abandoned gear are applied whenever appropriate. Also, these measures are effective in minimizing, to the extent practicable, pollution and waste.</i>		✓
EVIDENCE: No fixed gears such as gillnets are permitted, by regulation, in the Pacific hake fishery. Thus there is no ghost fishing from these forms of fishing gear in the hake fisheries. As well, there is minimal gear loss in the main gear used in Pacific hake fisheries (pelagic trawl), given that the reduced bottom contact from trawl doors greatly reduces snagging and subsequent loss of trawls on the seabed. Vessels also use seabed mapping software that provides them with real-time data about seabed conditions. Federal regulation defines the allowable fishing gear in the Pacific hake fishery as pelagic trawl. Evidence provided by fishing fleets indicates that lost fishing gear is minimal. Fishing gear loss was included in 2021 NMFS study of fishing effort in the 2002-2019 U.S. Pacific Coast Groundfish Fisheries. It found that observed gear loss was least common in trawl fisheries. In shoreside bottom trawl fleets, gear loss occurred on ~0.1% of observed hauls annually and was never observed in shoreside midwater trawl fleets. On average, in at-sea midwater fleets, 0.02% of hauls lost gear annually, with a maximum of less than 0.2%. (Somers et al. 2021).		
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that technologies, materials, and operational methods or measures—including, to the extent practicable, the development and use of selective, environmentally safe, and cost-effective fishing gear and techniques—are applied to minimize the loss of fishing gear, the ghost fishing effects of lost or abandoned fishing gear, pollution, and waste. Examples may include various regulations, data, and reports.</i>		✓

EVIDENCE:

The availability and adequacy of evidence is sufficient to substantiate measures are applied to minimize loss of fishing gear.

References Nowak 2022; Somers et al. 2021

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x	3	)	=	Overall score
	10			0					10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)

High

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)

Full Conformance

Non-conformance Number (if applicable):

Supporting Clause 8.9

8.9.	The intent of fishing selectivity and fishing impacts-related regulations shall not be circumvented by technical devices. Information on new developments and requirements shall be made available to all fishers.		
Relevance:	Relevant		
Evaluation Parameters			
Process: <i>There is a system that makes available information on new developments and requirements to all fishers to avoid circumvention of fishing regulations.</i>			Met? ✓
EVIDENCE:			
<p>Fishery regulations for Pacific hake and other groundfish fisheries managed by the PFMC are extremely detailed with regard to the configuration of acceptable gear for use in each fishery, as well as how to deal with impacts on fishery resources and other users due to gear selectivity and fishing. Information on gear regulations, including any and all amendments or modifications, as well as on gear technology is readily available to fishers and the general public through the websites of NPFMC, NOAA/NMFS, enforcement and industry organizations, and through various meetings, mailouts, etc. Fishing gear is regulated and monitored through these agencies, and data on compliance is recorded and published.</p> <p>Given the level of observer coverage and fishery enforcement it would be extremely difficult to circumvent these regulations, and even if such a situation occurred, the regulatory and management system would be able to effectively respond.</p>			
Current status/Appropriateness/Effectiveness: <i>The adopted methods are successful and effective and fishing regulations are made known to the participants. Enforcement data are highlighting significant violations.</i>			✓

EVIDENCE:

There is no evidence that regulations involving gear selectivity in the Pacific hake fisheries are being circumvented either by omission, or through the illegal use of gear technology. Advancements or developments in gear are made widely available to fishers through websites and public meetings and other forms of communication. NMFS publishes a series of Compliance Guides for commercial fishermen, vessel owners, limited entry permit owners, quota share permit owners, and shore-based and at-sea processors (NOAA Fisheries 2022c).

The PFMC is advised by a committee of Enforcement Consultants (EC) on the enforceability of proposed management actions and their effect on safety at sea. The EC includes one representative each from the U.S. Coast Guard, 11th District; U.S. Coast Guard, 13th District; National Marine Fisheries Service, West Coast Division, Office of Law enforcement; Washington Department of Fish and Wildlife, Oregon State Police, and California Department of Fish and Wildlife. The EC meets in conjunction with each Council meeting and provides real-time feedback to the Council of any enforcement issues that arise (PFMC 2022d). In addition, as described in Supporting Clause 11.2 federal and state enforcement organizations provide annual reports to the PFMC detailing the number and type of violation.

From the federal enforcement perspective the Pacific hake fishery continues to be a well-managed fishery with a highly regulated and observed fleet considered to be one of the most compliant with regulations. Overlapping observation systems at sea and shoreside (observer coverage, electronic monitoring and VMS) as well as systems in place to cover accidental catch overages, create a degree of oversight in the fishery that decreases the amount of enforcement time required. The number of reported violations has remained relatively stable in recent years, due in part to good cooperation from the industry. Most boardings in 2020 and 2021 resulted in either no observed violations or minor violations that were immediately corrected, for example a QS permit not on board during initial dockside boarding but placed on board before boarding was complete (Busch 2022).

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the intent of fishing selectivity and fishing impacts-related regulations is not circumvented by technical devices. Information on new developments and requirements is made available to all fishers. Examples may include various data and reports.

**EVIDENCE:**

The availability and quality of the evidence is sufficient to substantiate that the intent of fishing selectively is not circumvented by technical devices made available to members of the fishing industry.

References:

NOAA Fisheries 2022c; PFMC 2022d; Busch 2022

8.9.	The intent of fishing selectivity and fishing impacts-related regulations shall not be circumvented by technical devices. Information on new developments and requirements shall be made available to all fishers.			
Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met x 3) =	Overall score
	10			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)				High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)				Full Conformance
Non-conformance Number (if applicable):				

Supporting Clause 8.10

8.10	Assessment and scientific evaluation shall be carried out on the impacts of habitat disturbance on the fisheries and ecosystems prior to the commercial-scale introduction of new fishing gear, methods, and operations. Accordingly, the impacts of such introductions shall be monitored.		
Relevance:	Not relevant. This clause is not applicable as no new gears have been introduced in the past 3 years.		
Evaluation Parameters			Met?
Process:	<i>New gear has been recently introduced on a commercial scale within the last 3 years, or there is a plan to introduce new gear in the foreseeable future.</i>		
EVIDENCE:			
Current status/Appropriateness/Effectiveness:			
<i>An appropriate assessment of potential impacts has been carried out. There is evidence to suggest that the assessment is adequate to support habitat conservation and fishery management purposes. Additionally, there is a monitoring regime in place.</i>			
EVIDENCE:			
Evidence Basis:			
<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that assessment and scientific evaluation is carried out on the implications of habitat disturbance impact on the fisheries and ecosystems prior to the commercial-scale introduction of new fishing gear, methods, and operations. Accordingly, the effects of such introductions are monitored. Examples may include various regulations, data, and reports.</i>			
EVIDENCE:			
References:			
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met x 3) =	Overall score
	10		NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			
Non-conformance Number (if applicable):			

Supporting Clause 8.11

8.11.	International cooperation shall be encouraged for research programs involving fishing gear selectivity, fishing methods and strategies, dissemination of the results of such research programs, and the transfer of technology.
<p>Process: <i>There is a system of international information exchange to allow knowledge to be shared.</i></p> <p>The Pacific Whiting Treaty (Treaty) provides a mechanism for and encourages international cooperation in research on hake population status. Membership on the Joint Management Committee of the Treaty and its advisory bodies (Scientific Review Group, Joint Technical Committee, Advisory Panel) represents both Canada and the US. This committee structure and the joint work conducted by them promotes a process of ongoing information exchange between scientists of the two countries (NOAA Fisheries 2021b).</p> <p>The Research plan for hake falls under the Treaty. The plan is reviewed once a year by the advisory committees, with advice provided to the JMC.</p> <p>The Joint U.S.-Canada Integrated Ecosystem and Pacific Hake Acoustic Trawl Survey is conducted every two years by the Fisheries Engineering and Acoustic Technologies team from the NOAA Fisheries Northwest Fisheries Science Center and Fisheries and Oceans Canada Pacific Region. The survey provides data in support of the stock assessment (NOAA Fisheries 2022m).</p> <p>An ongoing Management Strategy Evaluation (MSE) led by the NWFSC is conducted in collaboration with the JMC, SRG, JTC and AP.</p> <p>The JMC has outlined five principles to inform development of the MSE (Waldeck 2022):</p> <ul style="list-style-type: none"> • P.1 Manage the Pacific Whiting resource utilizing the best available science in a precautionary and sustainable manner. • P.2 Maintain a healthy stock status across a range of recruitment events and consider total allowable catch levels that spread the harvest of strong cohorts over multiple years. • P.3 Manage the fishery resource in a manner that aims to provide the best long-term benefits to the Parties. • P.4 Manage the fishery to ensure that each country has the opportunity to receive the intended benefits contemplated in the treaty. • P.5 These management principles are dynamic and shall be reviewed annually by the JMC and the AP to ensure they remain valid. 	
<p>Current Status/Appropriateness/Effectiveness: There is evidence for international information exchange, such as meeting records or other information.</p> <p>Evidence of the international information exchange taking place under the Pacific Whiting Treaty can be found in published reports and meeting minutes. The stock assessment, research plan, trawl survey and MSE described in the Process section above are all accompanied by meeting records and reports (cf. NOAA Fisheries 2021b; NOAA/DFO 2021; Johnson et al. 2021; Marshall et al. 2020; Jacobsen et al. 2020a; 2020b; JMC 2020a,2020b,2020c).</p>	
<p>Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that international cooperation is encouraged for research programs involving fishing gear selectivity, fishing methods and strategies, dissemination of the results of such research programs, and the transfer of technology. Examples may include various data and reports.</i></p>	
<p>✓</p>	
<p>EVIDENCE: The availability and adequacy of the evidence is sufficient to substantiate that international research in Pacific hake is encouraged and endemic under the US-Canada Pacific Whiting/Hake Treaty.</p>	

References:	NOAA Fisheries 2021b; 2022m; Waldeck 2022		
Numerical score:	Starting score	Number of EPs <u>NOT</u> met	Overall score
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 8.12

8.12 The fishery management organization and relevant institutions involved in the fishery shall collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies, and on the behavior of target and non-target species regarding such fishing gear—as an aid for management decisions and with a view to minimizing non-utilized catches.

Relevance:	Relevant
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Evaluation Parameters	Met?
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Process: <i>There is collaborative research into fishing gear selectivity, fishing methods, and strategies.</i>	✓
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EVIDENCE:

The collaborative US/Canada research on Pacific hake is described in Supporting Clause 8.11.

The 2017 USFWS BiOp for non-salmon ESA-listed species includes an Incidental Take Statement mandating a series of Reasonable and Prudent Measures (RPM) to minimize seabird take. RPM2 states: “NMFWS shall minimize the risk of short-tailed albatross interacting with trawl cables. Because short-tailed albatross are vulnerable to striking aerial trawl cables, particularly in the catcher-processor fleet.” (USFWS 2017; NOAA Fisheries 2017a).

The terms and conditions associated with RPM2 include conducting research to document the extent of seabird take (specifically short-tailed albatross) associated with trawl gear and implementing measures to minimize the potential for short-tailed albatross interactions with trawl gear.

In 2019 collaborative university-industry research was conducted on seabird bycatch in West Coast at-sea hake fisheries. Project objectives were:

4. Enhance seabird-dable strike data collection
5. Test candidate seabird bycatch mitigation techniques
6. Conduct effective industry outreach and engagement to advance best practices of bycatch prevention in the at-sea hake fleet (Gladics 2019; Gladics et al. 2020).

Research continued in 2020 with three objectives:

4. Document interactions
 - a. Hard strikes
 - b. mortalities
5. Identify higher risk conditions
6. Test mitigation options

Results from the 2020 research conducted under operational fishing conditions are described in Gladics et al. 2021.

Current status/Appropriateness/Effectiveness: <i>There is evidence of such research, and the results have been applied accordingly in fisheries management.</i>	✓
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EVIDENCE:

The Joint U.S.-Canada Integrated Ecosystem and Pacific Hake Acoustic Trawl Survey is conducted every two years by the Fisheries Engineering and Acoustic Technologies team from the NOAA Fisheries Northwest Fisheries Science Center and Fisheries and Oceans Canada Pacific Region. The survey provides data in support of the annual stock assessment.

An ongoing Management Strategy Evaluation (MSE) led by the NWFSC is conducted in collaboration with the JMC, SRG, JTC and AP. The JMC has outlined five principles to inform development of the MSE (Waldeck 2022).

Ongoing collaborative university-industry research is being conducted on seabird bycatch in West Coast at-sea hake fisheries (Gladics et al. 2021). This research is in support of the federal Seabird Avoidance Program, the purpose of which is to minimize interactions between fishing gear and seabird species, including short-tailed albatross (*Phoebastria albatrus*) (50 CFR 660.21)

8.12 The fishery management organization and relevant institutions involved in the fishery shall collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies, and on the behavior of target and non-target species regarding such fishing gear—as an aid for management decisions and with a view to minimizing non-utilized catches.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization and relevant institutions involved in the fishery collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies, and on the behavior of target and non-target species in relation to such fishing gear—as an aid for management decisions and with a view to minimizing non-utilized catches. Examples may include various data and reports.



EVIDENCE:

The quality and adequacy of evidence is sufficient to substantiate that the Pacific Hake/Whiting Treaty is making fisheries management decisions based on collaborative research to implement effective fishing gear and to reduce fishing gear impact on non-target species.

References: USFWS 2017; NOAA Fisheries 2017a; Gladics 2019; Gladics et al. 2020; Gladics et al. 2021.

Numerical score:	Starting score	–	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
	Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
	Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance
	Non-conformance Number (if applicable):						

Supporting Clause 8.13

8.13 Where appropriate, policies shall be developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures. The fishery management organization shall ensure that, when selecting the materials to be used in the creation of artificial reefs, as well as when selecting the geographical location of such artificial reefs, the provisions of relevant international conventions concerning the environment and the safety of navigation are observed.

Relevance: Not relevant.
This clause is not relevant as there is no use of artificial structures.

Evaluation Parameters	Met?
Process: <i>There is a mechanism in place for identifying potential for increasing stock populations and enhancing fishing opportunities through the use of artificial structures. This mechanism ensures that where artificial structures are deemed appropriate, environmental protection, safety, and navigation are considered in their application.</i>	

EVIDENCE:

Artificial reefs are not used in the US West Coast EEZ.

Current status/Appropriateness/Effectiveness:

This mechanism has been applied to the stocks under consideration, resulting in the conclusion to either use artificial structures, or that artificial structures are inappropriate. Care has been taken in the selection of materials to use in constructing artificial reefs, the selection of sites for their deployment, and to ensure that relevant conventions concerning the environment and the safety of navigation have been observed.

EVIDENCE:**Evidence Basis:**

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that where appropriate, policies are developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures. The fishery management organization shall also ensure that, when selecting the materials to be used in the creation of artificial reefs, as well as when selecting the geographical location of such artificial reefs, the provisions of relevant international conventions concerning the environment and the safety of navigation are observed. Examples may include various laws, data and reports.

EVIDENCE:**References:**

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x	3	)	=	Overall score
	10								NA

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)

Non-conformance Number (if applicable):

Fundamental Clause 9. Appropriate standards of fishers' competence

Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards, guidelines and regulations.

Supporting Clause 9.1.

9.1.	States shall advance, through education and training programs, the education and skills of fishers and, where appropriate, their professional qualifications. Such programs shall take into account agreed international standards and guidelines.
Relevance:	Relevant.
Evaluation Parameters	Met?
Process: <i>There are implemented education programs for fishers (e.g., health and safety, fisheries management framework, rule and regulation, etc.).</i>	✓
EVIDENCE:	
Several training programs and materials exist for West Coast fishers. These include:	
<ul style="list-style-type: none"> • USCG training nodules, videos, in-person courses and information bulletins on commercial fishery regulations, vessel stability, safety at sea, among other topics • USCG Dockside Safety Exams • Collaborative Oregon State University and University of Washington first aid and safety training • NMFS Compliance Guides covering a wide range of topics in the West Coast groundfish fishery and trawl catch share program. 	

Current status/Appropriateness/Effectiveness:

These programs are effective in training fishers, in line with international standards and guidelines.

**EVIDENCE:**

The programs are effective in training fishers in line with international standards and guidelines.

The USCG maintains a website called FishSafeWest.Info that includes a range of training nodules, videos and information bulletins on commercial fishery regulations, vessel stability, safety at sea, among other topics. In-person courses are conducted in ports throughout the west coast region (USCG 2022).

All commercial fishing vessels that operate beyond 3 nautical miles from the territorial sea baseline are mandated to have and successfully complete a Dockside Safety Exams. On successful completion of the Dockside Safety Exam the vessel is issued a decal with an expiration date 2 years from the date issued. Commercial fishing vessels carrying NMFS observers are required to have a valid decal issued within the last 2 years (USCG 2022).

Sea Grant Programs in Oregon and Washington have partnered to develop a new training program for the next generation of fishermen. Called FFAST: Fishermen First Aid & Safety Training, the program will involve two full days of interactive safety training. Conducted through a combination of lectures and hands-on scenario training, in the classroom and on vessels. In late 2021 a meeting was held with industry members to discuss the curriculum. Health and safety at sea was identified as a priority topic within the industry (Oregon State University 2022).

NMFS Compliance Guides for the West Coast groundfish fishery are educational materials directed at commercial fishermen, vessel owners, limited entry permit owners, quota share permit owners, and shore-based and at-sea processors. They include:

- 2021 Pacific Whiting Harvest Specifications and 2021 Tribal Allocation
- Salmon Bycatch Minimization Measures 2021
- Amendment 29 and the 2021-22 Harvest Specifications and Commercial and Recreational Management Measures
- Vessel Movement, Monitoring, and Declaration Management
- 2020 Harvest Specifications and Management Measures for Pacific Whiting, Cowcod, and Shortbelly Rockfish Final Rule
- 2019–2020 Biennial Harvest Specifications for Pacific Coast Groundfish
- Compliance Guide for Commercial Fisherman off Washington, Oregon, and California under Amendment 28
- Seabird Bycatch Minimization Measures
- Streamlined regulations for vessels fishing with groundfish bottom and midwater trawl gear
- Revised Compliance Guide for Cost Recovery in the Pacific Coast Groundfish Trawl Rationalization Program
- Compliance Guide for Ownership Interest Forms and Review of Qualifying Data
- Compliance Guide for Observer and Catch Monitor Provider Permitting Process in the Pacific Coast Groundfish Fishery April 2015
- Observer Safety: Compliance Guide for Observer Providers and Vessels in the Pacific Coast Groundfish Fishery April 2015
- Divestiture of Excess Quota Shares: Small Entity Compliance Guide
- Small Entity Compliance Guide explaining updated gear regulations in the groundfish fishery including revisions to the chafing
- Compliance Guide for the Pacific Coast Groundfish Trawl Rationalization Program Improvement and Enhancement Rule
- General Provisions Affecting the Pacific Whiting IFQ Fishery: Small Entity Compliance Guide
- Compliance Guide Pacific Coast Groundfish Regulations: Joint Registration, the Limited exemption to the Own-Hold rules, and other measures
- Small Entity Compliance Guide Pacific Coast Groundfish Essential Fish Habitat Conservation Area Closures and Gear Prohibitions
- Small Entity Compliance Guide for New Regulations Prohibiting Commercial Vessels from Directly Fishing for Unfished Forage Fish

EVIDENCE: The availability and quality of the evidence is sufficient to substantiate that training and education provides skills to improve West Coast fishers' professional qualifications.

References:	NOAA Fisheries 2022c; U.S.C.G. 2022; Oregon State University 2022		
Numerical score:	Starting score	Number of EPs <u>NOT</u> met	Overall score
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

- Compliance Guide for the Pacific Coast Groundfish Fishery Vessel Monitoring Program (NOAA Fisheries 2022c)

Supporting Clause 9.2

9.2.	States, with the assistance of relevant international organizations, shall endeavor to ensure, through education and training, that all those engaged in fishing operations be given information on the most important provisions of the FAO CCRF (1995), as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations.
Relevance:	Relevant
Evaluation Parameters	
Process:	<p data-bbox="94 512 1409 583"><i>There are relevant measures of the FAO CCFR and other applicable environmental and other standards being exposed to fishers for their training.</i></p>
Met?	✓
<p data-bbox="94 590 272 617">EVIDENCE:</p> <p data-bbox="94 623 1531 856">The management and regulatory systems of the Pacific Hake/Whiting Treaty and the Pacific Fishery Management Council are fully consistent with the principles of the FAO CCFR and other environmental standards. In compliance with the CCRF the United States has developed National Action Plan over four areas of concern highlighted in the CCRF: the conservation and management of sharks; reducing the incidental catch of seabirds in longline fisheries; the management of fishing capacity; and preventing, deterring, and eliminating illegal, unreported, and unregulated fishing. NOAA Fisheries maintains a webpage on the CCRF, with links to each of the four U.S. National Plans of Action (United Nations 1995; NOAA Fisheries 2022n).</p> <p data-bbox="94 890 1531 1056">As one example, The National Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing was implemented in 2003. Subsequently, the Maritime Security and Fisheries Enforcement Act (S.11269) was signed into law on December 20, 2019 as part of the National Defense Authorization Act. The Act addresses illegal, unreported and unregulated (IUU) fishing, giving federal agencies more tools to protect maritime security, lawful fishing and the global seafood supply chain (PFMC 2020k).</p> <p data-bbox="94 1094 1531 1192">,Section 3551 of the Act requires the establishment of an Interagency Working Group to strengthen maritime security and combat IUU fishing. The working group was formed in 2020, comprising twenty-one federal agencies with chair and deputy chair positions rotating among NOAA, the U.S. Department of State, and the U.S. Coast Guard (Maritime SAFE 2020).</p> <p data-bbox="94 1230 1531 1362">All management discussions and regulatory outcomes governing the Pacific hake fisheries are available on the Treaty, PFMC and NMFS websites, and the results of any changes are widely discussed and communicated. NMFS and the PFMC engage in outreach to fishers and industry personnel, providing current regulatory information and guidance to promote compliance and responsible fisheries.</p>	
<p data-bbox="94 1440 630 1470">Current status/Appropriateness/Effectiveness:</p> <p data-bbox="94 1476 1409 1625"><i>These programs are effective in training fishers, in line with international standards, guidelines, and key CCRF principles. The presence of general training programs for fishermen (e.g., health and safety, fisheries management framework, rule and regulation, etc.) shall be evidence that the key principles of the CCRF have been filtered down from management to fishermen. Furthermore, the existence of laws and regulation with which fishermen are compliant demonstrate further compliance to this clause.</i></p>	
Met?	✓

EVIDENCE:

All rules and regulations governing Pacific hake fisheries, including those dealing with responsible fishing methods, are readily available on NMFS and PFMC websites. In addition, federal and state enforcement agencies and the USCG maintain close communication with the fishing industry through written materials, online notices, and in-person contacts. The general characterization of industry-enforcement relations in the Pacific hake fishery is collaborative and positive. From the federal enforcement perspective, the Pacific hake fishery continues to be a well-managed fishery with a highly regulated and observed fleet considered to be one of the most compliant with regulations (Busch 2022).

Communication between members of the industry and enforcement is enhanced by active enforcement coordination between federal and non-federal agencies. Joint Enforcement Agreements (JEA) authorizing state marine conservation law enforcement officers, who have an extensive on-the-ground presence, to interact with industry members in the enforcement of federal laws and regulation. In addition to daily personal interactions on the water, docks, and in processing facilities, enforcement contacts harvesters and industry personnel at organized events, including trade shows, and responded to email and telephone inquiries, providing current regulatory information and guidance to promote compliance and responsible fisheries (Busch 2022).

9.2. States, with the assistance of relevant international organizations, shall endeavor to ensure, through education and training, that all those engaged in fishing operations be given information on the most important provisions of the FAO CCRF (1995), as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States, with the assistance of relevant international organizations, endeavor to ensure, through education and training, that all those engaged in fishing operations be given information on the most important provisions of the FAO CCRF, as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations. Examples may include various data, websites.

✓

EVIDENCE:

The quality and availability of evidence is sufficient to ensure that education and training for fishers on the intent of the FAO CCRF.

References: United Nations 1995; PFMC 2020k; Maritime SAFE 2020; Busch 2022; NOAA Fisheries 2022n

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10					10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance
Non-conformance Number (if applicable):						

Supporting Clause 9.3.

9.3. The fishery management organization shall, as appropriate, maintain records of fishers which shall, whenever possible, contain information on their service and qualifications, including certificates of competency, in accordance with their State’s laws.

Relevance: Relevant.

Evaluation Parameters

Met?

Process:
There is a system to collect and maintain fisher records.

✓

EVIDENCE:

There is a comprehensive system in place to collect and maintain fishermen records. Data on fishers is held in a number of agencies. Depending on the type of license, application processes require individuals to register information for qualification requirements.

Every individual operating or assisting in the operation of any commercial fishing gear or fishing boat must have a commercial fishing license or crewmember license. Every member of the crew on a commercial fishing boat must be licensed (NOAA Fisheries 2022o).

Licenses are required for any boat, vessel, or floating craft used in taking of food fish or shellfish for commercial purposes. Depending on where the vessel fishes, vessel licenses may be either state or federal.

The NOAA Fisheries West Coast Groundfish Permit Office provides online resources to allow business owners and individuals to apply for permits and to renew existing permits. Registration is required to protect information and privacy, in order to submit required information to the Permit Office. Permits required to participate in the shorebased IFQ Program include Vessel Account Registration, Trawl Rationalization Ownership Interest, and First Receiver Site License. Permits required to participate in the At-Sea whiting cooperative sector include Catcher/Processor Cooperative Permit and Mothership Cooperative Permit (NOAA Fisheries 2022o).

The USCG also maintains records and issues credentials on licenses for crewmembers, including engineers, captains, mates, deckhands, etc. The USCG provides information on federal requirements for commercial fishing vessels online (U.S.C.G. 2022).

Current status/Appropriateness/Effectiveness:

These records are considered accurate and effective for management purposes.



EVIDENCE:

Certain information on Pacific fishers has been compiled through the Pacific Fisheries Information Network (PacFIN), although not all is publicly available as some information is confidential. Detailed data on the number and location of West Coast fishers, vessels, permits issued, etc. can be found in the economic section of the annual SAFE documentation (PSMFC 2022c).

The records are considered accurate. They are a necessary component of routine fishery monitoring and for the effective functioning of the Pacific hake quota share program.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization maintains, as appropriate, records of fishers which, whenever possible, contain information on their service and qualifications, including certificates of competency, in accordance with their national laws. Examples may include various data or reports.



EVIDENCE:

The evidence is sufficient to substantiate that the fishery management organizations maintain complete records of fishers and their qualifications.

References:

NOAA Fisheries 2022o; U.S.C.G. 2022; PSMFC 2022c

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x	3	)	=	Overall score
	10								10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)									High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)									Full Conformance
Non-conformance Number (if applicable):									

Fundamental Clause 10. Effective legal and administrative framework

An effective legal and administrative framework shall be established, and compliance ensured, through effective mechanisms for monitoring, surveillance, control, and enforcement for all fishing activities within the jurisdiction.

Supporting Clause 10.1.

10.1.	Effective mechanisms shall be established for fisheries monitoring, surveillance, control, and enforcement measures including, where appropriate, observer programs, inspection schemes, and vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question. This could include relevant traditional, fisher, or community approaches, provided their performance could be objectively verified.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process:		
<i>There are clear mechanisms established for fisheries monitoring, surveillance, control, and enforcement.</i>	✓	
EVIDENCE:		
<p>There are mechanisms established for fisheries monitoring, surveillance, control and enforcement. These mechanisms include:</p> <p>The NOAA Fisheries Office of Law Enforcement OLE works in cooperation with state and federal partners to identify and investigate incidents at sea, on the borders and in critical habitat The state marine conservation law enforcement agencies (California Department of Fish and Wildlife; Oregon Department of Fish and Wildlife; Washington Department of Fish and Wildlife) enforce state enforcement priorities under state funding and authorities. Federal partners like the U.S. Coast Guard, Customs and Border Protection, U.S. Fish and Wildlife Service, and the Environmental Protection Agency also work with the OLE. At all levels, the enforcement approach is to focus on outreach and education to help the fishing industry understand the rationale for regulations and prevent or minimize infractions (NOAA Fisheries 2022d).</p> <p>OLE agents/officers have the option to provide a written warning for minor offences however, these are taken into account for repeat offenders. More serious offences can be dealt with by a summary settlement, i.e. a violation which is not contested and results in a ticket which may include a discounted fine, thus allowing the violator to quickly resolve the case without incurring legal expenses. Thereafter, an offence is referred to NOAA's Office of General Counsel (OGC) for Enforcement and Litigation which can impose a sanction on the vessels permit or further refer the case to the US Attorney's Office for criminal proceedings. Penalties may range from severe monetary fines, boat seizure and/or imprisonment. The MSA has an enforcement policy section that details these "remedies for violations" (60 CFR 600.740. 2022)</p> <p>The USCG is the primary agency for at-sea fisheries enforcement. The USCG objectives are to prevent encroachment into the US EEZ, ensure compliance with domestic fisheries regulations, ensure compliance with international agreements and high seas fishing regulations. The 11th and 13th Coast Guard Districts covers the West Coast EEZ. If the USCG detect a fisheries infringement they gather evidence and hand over the investigation to the OLE (Busch 2022).</p>		
Current status/Appropriateness/Effectiveness:		✓
<p><i>These mechanisms are effective, and include effective observer programs, inspection schemes, and vessel monitoring systems where appropriate for the type of fishery under assessment. Monitoring, surveillance, control, and enforcement mechanisms can be considered effective if they are sufficiently broad to cover the entirety of the unit of certification, there is evidence that rules and regulations are consistently enforced, and there is no evidence of frequent or widespread violation of fishery regulations. This could include relevant traditional, fisher, or community approaches, provided their performance could be objectively verified. With respect to fisheries on the high seas, the legal obligations of UNCLOS and UNFSA have particular relevance. Evidence of the performance of the legal framework can be derived from assessing conformance with requirements covering compliance and enforcement. Specifically, the assessment team shall document the general level/type of fisheries controls (e.g., number of boarding's, reprimands) and the respective level of fisheries violations (e.g., %) on a yearly basis.</i></p>		
EVIDENCE:		
Monitoring:		

The Trawl Catch Share Program requires vessels participating in the Shorebased IFQ program to have observer coverage at all times the vessel is at sea. The West Coast Region Observer Program (WCROP) places NOAA Fisheries-trained observers aboard fishing vessels. Fisheries observers are deployed under the authority of the Marine Mammal Protection Act, the Endangered Species Act, and the Magnuson-Stevens Fishery and Conservation Management Act primarily to monitor the incidental capture of marine mammals, sea turtles, and seabirds. Observers also record details on fishing activity, gear configuration, and the catch and disposition of target and non-target fish species. The observers are employed by private third-party companies (NOAA Fisheries 2022e).

Under the trawl rationalization program the Catcher/Processor (C/P) and Mothership (MS) Cooperatives are required to submit an annual report of the prior year’s fishery to the PFMC and NMFS. Among the required elements of the reports are two that relate to monitoring and enforcement: 1. a description of the method used by the coop to monitor performance of cooperative vessels that participation the fishery; 2. A description of any actions taken by the coop in response to any vessels that exceed their allowed catch and bycatch (50 CFR 660 2021).

All coop vessels carry observers to monitor and account for catch of Pacific hake, non-target species and prohibited species. Observers report each vessel’s catch on a daily basis to the NMFS OP. In addition, both the C/P and MS coops contract with the third-party Sea State Inc to monitor catch. All coop members provide waivers allowing Sea State access to the NMFS observer data and VMS location data. Sea State uses the data to produce daily reports to coop members and managers. The reports are used to monitor target catch against the sector allocation as well as to identify levels and location of bycatch by vessel and by fleet. Bycatch data are monitored to identify bycatch “hotspot” areas and ensure that species’ set asides are not exceeded (McQuaw 2021; PWCC 2021).

Enforcement:

Enforcement data are summarized in the annual “TRat” (Trawl Rationalization) report presented annually to the PFMC detailing enforcement effort, investigations, and violations (PFMC 2021b). The USCG also produces an annual report of at-sea enforcement, detailing numbers of fishery boardings and TRat related violations. (USCG 2021).

A continuing issue with enforcement data has been the level of aggregation across fishery sectors and the consequent inability to isolate sector-specific data on compliance assistance and enforcement investigations. OLE is making an effort to isolate the shoreside sector in the data and hopes to be able to report by sectors next year (Busch 2021).

Within these data limitation, the 2020 OLE enforcement data for all sectors shows the following federal investigations:

RCA/EFH Incursion:	2
NO VMS or VMS non-reporting:	0
VMS Declaration:	3
At-Sea Discard:	1
Prohibited Species/Catch Sorting	6
Fishing in Deficit	1
Permit	1
Observer/Catch Monitoring	14
Record Keeping/Economic Data	7

Of these 35 investigations, 10 remain open and 25 were resolved in the following dispositions:

Notice of Violation (NOVA)	1
Summary Settlement	5
Written Warning	3
Compliance Assistance	16

(PFMC 2021b)

The 2020 U.S Coast Guard data for all groundfish vessels, including IFQ and open access, show:

Commercial Groundfish Boardings	58 (includes 9 trawlers)
TRat Related Violations	2

(PFMC 2021b)

From the federal enforcement perspective the Pacific hake fishery is a well-managed fishery with a highly regulated and observed fleet considered to be one of the most compliant with regulations. Overlapping observation systems at sea and shoreside (observer coverage, electronic monitoring and VMS) as well as systems in place to cover accidental catch overages, create a degree of oversight in the fishery that decreases the amount of enforcement time required. The number of reported violations has remained relatively stable in recent years, due in part to good cooperation from the industry. Most boardings in 2020 and 2021 resulted in either no observed violations or minor violations that were immediately corrected, for example a QS permit not on board during initial dockside boarding but placed on board before boarding was complete (Busch 2022).

10.1. Effective mechanisms shall be established for fisheries monitoring, surveillance, control, and enforcement measures including, where appropriate, observer programs, inspection schemes, and vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question. This could include relevant traditional, fisher, or community approaches, provided their performance could be objectively verified.

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that effective mechanisms are established for fisheries monitoring, surveillance, control, and enforcement measures including, where appropriate, observer programs, inspection schemes, and vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question. This could include relevant traditional, fisher or community approaches, provided their performance could be objectively verified. Examples may include rules and regulations, enforcement reports.</i>	✓
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References:	50 CFR 600.740 2022; NOAA Fisheries 2022d; 2022e; Busch 2022; NOAA Fisheries 2022e; McQuaw 2021; PWCC 2021; USCG 2021; PFMC 2021b.
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EVIDENCE:

Monitoring, surveillance, control, and enforcement mechanisms cover the entirety of the unit of certification. There is evidence that rules and regulations are consistently enforced, and there is no evidence of frequent or widespread violation of fishery regulations.

10.1.	Effective mechanisms shall be established for fisheries monitoring, surveillance, control, and enforcement measures including, where appropriate, observer programs, inspection schemes, and vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question. This could include relevant traditional, fisher, or community approaches, provided their performance could be objectively verified.				
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					0

Supporting Clause 10.2.

10.2.	Fishing vessels shall not be allowed to operate on the stock under consideration in question without specific authorization.		
Relevance:	Relevant		
Evaluation Parameters			
Process:	There is a mechanism or system established to maintain a record of fishing authorizations.		
	Met?		
	✓		

EVIDENCE:

A comprehensive system is established to maintain a record of fishing authorizations.

All U.S. commercial fishing vessels are required by state laws to be in possession of a current fishing or landing permit from the appropriate state agency in order to land groundfish in the Washington, Oregon, and California area. Federal Limited Entry (LE) permits authorize fishing within limits and restrictions specified for those permits. In the event that a Federal fishing or access permit is required, failure to obtain and possess such a Federal permit will be in violation of the FMP (PFMC 2020q; NOAA Fisheries 2022o).

The trawl rationalization program applies to vessels holding trawl-endorsed groundfish LE permits (and mothership processors registered to mothership permits). The program replaces most cumulative landing limits (in both whiting and non-whiting shoreside LE trawl sectors) with individual fishing quotas. Under the Magnuson-Stevens Act, “an ‘individual fishing quota’ means a Federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by a person.”

Under the trawl rationalization program the Catcher/Processor (C/P) and Mothership (MS) Cooperatives are required to submit an annual report of the prior year’s fishery to the PFMC and NMFS in order to renew their permits. Among the required elements of the reports are two that relate to monitoring and enforcement: 1. a description of the method used by the coop to monitor performance of cooperative vessels that participation the fishery; 2. A description of any actions taken by the coop in response to any vessels that exceed their allowed catch and bycatch (50 CFR 660 2021a).

Current status/Appropriateness/Effectiveness:

This mechanism is effective for maintaining updated records of fishing authorizations and ensuring fishing vessels operate with appropriate authorization.



EVIDENCE:

The permitting system is comprehensive and enforceable. It is effective in ensuring updated records of authorized fishery participation. Fishing permits are a fundamental component of the fishery enforcement system and fishing without a valid permit is a violation.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fishing vessels are not allowed to operate on the stock under consideration in question without specific authorization. Examples may include various data.



EVIDENCE:

The evidence is sufficient to substantiate that fishing vessels are not allowed to operate on the stock under consideration in question without specific authorization.

References:

PFMC 2020q; NOAA Fisheries 2022o; 50 CFR 660 2021a

Numerical score:

Starting score

Number of EPs NOT met

Overall score

10

0

10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)

High

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)

Full Conformance

Non-conformance Number (if applicable):

0

Supporting Clause 10.3.

10.3. States involved in the fishery shall, in accordance with international law, and within the framework of fisheries management organizations or arrangements, cooperate to establish systems for monitoring, control, surveillance, and enforcement of applicable measures with respect to fishing operations and related activities in waters outside the States jurisdiction.

Relevance:	Not relevant.		
	The Pacific hake fishery occurs entirely within the federal EEZ.		
Evaluation Parameters			
Process:			
	<i>There is a mechanism or system established to conduct enforcement operations outside the State's jurisdiction.</i>		
EVIDENCE:			
Current status/Appropriateness/Effectiveness:			
	<i>transboundary, shared, straddling, highly migratory or high seas, then the Standard need only be concerned with the effectiveness and suitability of the monitoring, surveillance, control, and enforcement activities at the States level for the fishery of which the unit of certification is a part. If the unit of certification is part of a States fleet fishing on a transboundary, shared, straddling, highly migratory or high seas stock, then it is still likely to be the effectiveness and suitability of the monitoring, surveillance, control, and enforcement activities at the States level that shall be assessed. If the unit of certification covers all the fishing on the stock under consideration, then the monitoring, surveillance, control, and enforcement of all of the States fleets is of concern and shall be assessed (to ensure full consideration of total fishing mortality on the stock under consideration).</i>		
EVIDENCE:			
Evidence Basis:			
	<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States involved in the fishery do, in accordance with international law, and within the framework of fisheries management organizations or arrangements, cooperate to establish systems for monitoring, control, surveillance, and enforcement of applicable measures with respect to fishing operations and related activities in waters outside their States jurisdiction. Examples may include enforcement reports.</i>		
EVIDENCE:			
References:			
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met x 3) =	Overall score
	10		NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			
Non-conformance Number (if applicable):			

Supporting Clause 10.3.1.

10.3.1.	Fishery management organizations which are members of or participants in fisheries management organizations or arrangements, shall implement internationally agreed measures adopted in the framework of such organizations or arrangements and consistent with international law to deter the activities of vessels flying the flag of non-members or non-participants engaging in activities that undermine the effectiveness of conservation and management measures established by such organizations or arrangements. In that respect, port States shall also proceed, as necessary, to assist other States in achieving the objectives of the FAO CCRF (1995), and should make known to other States details of regulations and measures they have established for this purpose without discrimination for any vessel of any other State.		
Relevance:	Not relevant.		
	The Pacific hake fishery occurs entirely within the federal EEZ.		
Evaluation Parameters			
Process:			
	<i>There are regulations established against vessels flying the flag of non-member or non-participant States, which may engage in activities that undermine the effectiveness of conservation and management measures established by fisheries management organizations.</i>		
Met?			

EVIDENCE:																			
Current status/Appropriateness/Effectiveness: <i>These measures are effective in deterring such practices.</i>																			
EVIDENCE:																			
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organizations which are members of or participants in fisheries management organizations or arrangements implement internationally agreed measures adopted in the framework of such organizations or arrangements and consistent with international law to deter the activities of vessels flying the flag of non-members or non-participants engaging in activities which undermine the effectiveness of conservation and management measures established by such organizations or arrangements. In that respect, port States also proceed, as necessary, to achieve and to assist other States in achieving the objectives of the FAO CCRF, and make known to other States details of regulations and measures they have established for this purpose without discrimination for any vessel of any other State. Examples may include enforcement or other reports.</i>																			
EVIDENCE:																			
References:																			
Numerical score:	<table border="1"> <tr> <td>Starting score</td> <td>-</td> <td>(</td> <td>Number of EPs <u>NOT</u> met</td> <td>x</td> <td>3</td> <td>)</td> <td>=</td> <td>Overall score</td> </tr> <tr> <td>10</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Starting score	-	(Number of EPs <u>NOT</u> met	x	3)	=	Overall score	10								
Starting score	-	(Number of EPs <u>NOT</u> met	x	3)	=	Overall score											
10																			
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)																			
NA																			
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)																			
NA																			
Non-conformance Number (if applicable):																			

Supporting Clause 10.4.

10.4.	Flag States shall ensure that no fishing vessels are entitled to fly their flag, fish on the high seas or in waters under the jurisdiction of other States, unless such vessels have been issued with a Certificate of Registry and have been authorized to fish by the competent authorities. Such vessels shall carry on board the Certificate of Registry and their authorization to fish.
Relevance:	<p>Not relevant.</p> <p>The Pacific hake fishery occurs entirely within the federal EEZ.</p>
Evaluation Parameters	
Met?	
Process:	<i>There are foreign vessels fishing in State's EEZ. State's EEZ vessels do not fish in high seas or in another State's EEZ.</i>
EVIDENCE:	
Current status/Appropriateness/Effectiveness: <i>These vessels have been issued with a Certificate of Registry and they are required to carry it on board.</i>	
EVIDENCE:	
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the flag State ensures that no fishing vessels are entitled to fly their flag, fish on the high seas or in waters under the jurisdiction of other States, unless such vessels have been issued with a Certificate of Registry and have been authorized to fish by the competent authorities. Such vessels shall carry on board the Certificate of Registry and their authorization to fish. Examples may include various laws, regulations, and other data or reports.</i>	
EVIDENCE:	
References:	

Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10					NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						
Corresponding Conformance Level: (10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						
Non-conformance Number (if applicable):						

Supporting Clause 10.4.1.

10.4.1.	Fishing vessels authorized to fish on the high seas or in waters under the jurisdiction of a State other than the flag State shall be marked in accordance with uniform and internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels.					
Relevance:	Not relevant. The Pacific hake fishery occurs entirely within the federal EEZ.					
Evaluation Parameters						Not relevant.
Process:	<i>There are foreign vessels fishing in State's EEZ. State's EEZ vessels do not fish in high seas or in another State's EEZ.</i>					
EVIDENCE:						
Current status/Appropriateness/Effectiveness: <i>Foreign vessels authorized to fish in the State's EEZ or its vessels fishing in another State's EEZ have been marked accordingly to international guidelines.</i>						
EVIDENCE:						
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fishing vessels authorized to fish on the high seas or in waters under the jurisdiction of a State other than the flag State, are marked in accordance with uniform and internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels. Examples may include various laws, regulations, and other data or reports.</i>						
EVIDENCE:						
References:						
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10					NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						
Non-conformance Number (if applicable):						

Fundamental Clause 11. Framework for Sanctions

There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.

Supporting Clause 11.1.

11.1.	States laws of adequate severity shall be in place that provide for effective sanctions.
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Relevance:	Relevant
Evaluation Parameters	
Process: <i>The system of States laws is of adequate severity to provide for effective sanctions.</i>	Met? ✓
EVIDENCE:	
<p>The MSA provides four options for penalizing violations. In ascending order of severity:</p> <ol style="list-style-type: none"> 1. Issuance of a citation, usually at the scene of the offence. 2. Assessment by the Administrator of a civil money penalty. 3. For certain violations, judicial forfeiture action against the vessel and its catch. 4. Criminal prosecution of the owner or operator for some offences. <p>It shall be the policy of NMFS to enforce vigorously and equitably the provisions of the MSA by utilizing that form or combination of authorized remedies best suited in a particular case to this end (MSA 2007).</p> <p>OLE agents/officers have the option to provide a written warning for minor offences however, these are taken into account for repeat offenders. More serious offences can be dealt with by a summary settlement, i.e. a violation which is not contested and results in a ticket which may include a discounted fine, thus allowing the violator to quickly resolve the case without incurring legal expenses. Thereafter, an offence is referred to NOAA's Office of General Counsel (OGC) for Enforcement and Litigation which can impose a sanction on the vessels permit or further refer the case to the US Attorney's Office for criminal proceedings. Penalties may range from severe monetary fines, boat seizure and/or imprisonment. The MSA has an enforcement policy section (50 CFR 600.740 2022) that details these "remedies for violations".</p> <p>NOAA's Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA, including the MSA. The policy is designed to ensure that civil administrative penalties and permit sanctions are: (1) assessed in a fair and consistent manner; (2) appropriate for the gravity of the violation; (3) sufficient to deter both individual violators and the regulated community as a whole from committing violations; (4) eliminate economic incentives for noncompliance; and (5) expeditiously achieve and maintain compliance (NOAA 2019).</p> <p>Penalties and permit sanctions are based on two criteria: (1) A "base penalty" calculated by reflective of the gravity of the violation and the culpability of the violator, adjusted to reflect the particular circumstances of the specific violation; (2) an additional amount added to the base penalty to recoup the proceeds of any unlawful activity and any additional economic benefit of noncompliance (NOAA 2019).</p> <p>The schedule of penalties specific to the MSA assigns a particular "offense level" to each violation, ranging from I to VI. It also considers four levels of culpability, ranging from unintentional to intentional. The proper penalty range is determined by using the offense level and the alleged violator's degree of culpability to find a penalty box within the appropriate matrix. Under the MSA penalties range from \$2,500 for an unintentional written warning, to the MSA statutory maximum of \$189,427. Penalties are adjusted annually for inflation (NOAA 2019).</p> <p>Separate penalty schedules exist for all statutes enforced by NOAA, including the National Marine Sanctuaries Act, the Endangered Species Act, the Marine Mammal Protection Act, the Lacey Act, the Northern Pacific Halibut Act, and the Antarctic Marine Living Resources Convention Act (NOAA 2019).</p> <p>Criminal penalties, including fines (up to \$200,000), vessel forfeiture and imprisonment (up to 10 years) are authorized under Section 309 of the MSA (MSA 2007).</p>	

Current status/Appropriateness/Effectiveness: <i>There is evidence to substantiate that States laws are of adequate severity to provide for effective sanctions. The evidence here includes largely (a) whether laws set out effective penalty provisions and the courts respond in a manner that deters further or repeat offenses, (b) the views of the industry, other stakeholders, and the general public, and (c) the outcomes and associated trends of the enforcement efforts when measured against appropriate performance indicators.</i>	✓
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EVIDENCE:

West Coast groundfish enforcement data are aggregated across fishery sectors preventing the isolation of sector-specific data on compliance assistance and enforcement investigations. However, the overall number of violations is low and has remained relatively stable in recent years. According to the Assistant Director of the West Coast Division NOAA OLE, this is due in part to good cooperation from the industry. Most boardings in 2020 and 2021 resulted in either no observed violations or minor violations that were immediately corrected, for example a QS permit not on board during initial dockside boarding but placed on board before boarding was complete (Busch 2022).

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States laws of adequate severity are in place that provide for effective sanctions. Examples may include various laws, regulations, and other data or reports.</i>	✓
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EVIDENCE:

The evidence is sufficient to substantiate that laws of adequate severity are in place that provide for effective sanctions.

References:	MSA 2007; 50 CFR 600.740 2022; Busch 2022; NOAA 2019				
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	) x 3 =	Overall score
	10		0		10
	Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)				High
	Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)				Full Conformance
	Non-conformance Number (if applicable):				0

Supporting Clause 11.2.

11.2. Sanctions applicable to violations and illegal activities shall be adequate in severity to be effective in securing compliance and discouraging violations wherever they occur. Sanctions shall also be in force to affect authorization to fish and/or to serve as masters or officers of a fishing vessel in the event of noncompliance with conservation and management measures.

Relevance:	Relevant
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Evaluation Parameters	Met?
Process: <i>The system of sanctions in place is sufficiently severe to deter violations and illegal activities. The system shall be considered adequate in severity if the potential sanctions include fines, suspension or withdrawal of permission to fish, and confiscation of catch or equipment.</i>	✓

EVIDENCE:

Violations of fishing regulations result in strict penalties that can include fines, suspension of permit, imprisonment and seizure of catch, gear and/or vessel

The NOAA Office of General Counsel posts the West Coast Region Summary Settlement and Fix-it Schedule which describes violations and penalties associated with them for all fisheries in the Region. It also includes a sliding scale of penalty for repeat offences, i.e. increasing penalties for, ‘first’, ‘second’ and ‘third’ violations (NOAA 2022e).

For Pacific hake, violation categories include groundfish regulations, TRat Program, Marine Mammal Protection Act and Endangered Species Act.

NOAA Office of General Counsel also posts a Penalty Policy and Schedules Page with, links to a number of related documents. Enforcement Decisions and Orders made by Administrative Law Judges, NOAA Administrators, District Courts, and Circuit and Supreme Courts (NOAA 2022f; 2022g).

11.2. Sanctions applicable to violations and illegal activities shall be adequate in severity to be effective in securing compliance and discouraging violations wherever they occur. Sanctions shall also be in force to affect authorization to fish and/or to serve as masters or officers of a fishing vessel in the event of noncompliance with conservation and management measures.

Current status/Appropriateness/Effectiveness:

There is evidence to substantiate that sanctions for violations of regulations (e.g., suspension, withdrawal, or refusals of fishing permit or of the right to fish) are adequate in severity to secure compliance and discourage violations.



EVIDENCE:

NOAA Fisheries OLE, USCG and state fish and wildlife agencies enforce fishery regulations in a collaborative coordinated system.

A schedule of penalties, described in 11.1, is severe enough to deter violations as evidenced by the high levels of compliance in the Pacific hake fishery. Complementing the penalty schedule, the collaborative style used by enforcement and the direct engagement with fishers contributes to ongoing and effective communication between the two sectors. Additionally, management under a catch-share system removes many of the incentives to violate the rules, and the detailed accounting system associated with permitted observed fishing on catch shares removes much of the possibility for violation.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that sanctions applicable in respect of violations and illegal activities are adequate in severity to be effective in securing compliance and discouraging violations wherever they occur. Sanctions are in force that affects authorization to fish and/or to serve as masters or officers of a fishing vessel, in the event of non-compliance with conservation and management measures. Examples may include various laws, regulations, and other data or reports.



EVIDENCE:

Evidence is sufficient to substantiate that regulations and penalties of adequate severity are in place that provide for effective sanctions.

References: NOAA 2022e; 2022f; 2022g

Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10		0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)						High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)						Full Conformance

Supporting Clause 11.3.

11.3.	Fisheries management organizations shall ensure that sanctions for IUU fishing by vessels and, to the greatest extent possible, nationals under its jurisdiction are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. This may include the adoption of a civil sanction regime based on an administrative penalty scheme. Fisheries management organizations shall ensure the consistent and transparent application of sanctions.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>The system of sanctions in place are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. This may include the adoption of a civil sanction regime based on an administrative penalty scheme. The fisheries management organization also ensures the consistent and transparent application of sanctions.</i>		✓
EVIDENCE: All commercial catch of Pacific hake is monitored through a mandatory system of 100% observer coverage and catch monitoring. As described in Supporting Clauses 11.1 and 11.2, a comprehensive sanction and penalty regime is in place of sufficient severity to prevent IUU fishing		
Current status/Appropriateness/Effectiveness: <i>There is evidence to substantiate that sanctions for violations of regulations are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. Sanctions are applied transparently and consistently across the board.</i>		✓
EVIDENCE: Evidence provided in Supporting Clauses 11.1 and 11.2 substantiates that sanctions for violations are severe and remove benefits of violation from any offender. There is no evidence of IUU fishing; comprehensive catch and landing controls, as well as at-sea enforcement prevent IUU fishing on Pacific hake. If it did exist sanctions in place for licensed fishery violations would also reasonably be expected to apply to IUU fishing. Sanctions are applied transparently, as for example in the NOAA General Counsel Enforcement Decisions and Orders (NOAA 20222g).		
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fisheries management organization ensures that sanctions for IUU fishing by vessels and, to the greatest extent possible, nationals under its jurisdiction are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. This may include the adoption of a civil sanction regime based on an administrative penalty scheme. The fisheries management organization also ensures the consistent and transparent application of sanctions. Examples may include various laws, regulations, and other data or reports.</i>		✓
EVIDENCE: The evidence is sufficient to substantiate that sanctions for IUU fishing are of sufficient severity to serve as an effective deterrent.		

11.3.	Fisheries management organizations shall ensure that sanctions for IUU fishing by vessels and, to the greatest extent possible, nationals under its jurisdiction are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. This may include the adoption of a civil sanction regime based on an administrative penalty scheme. Fisheries management organizations shall ensure the consistent and transparent application of sanctions.				
References:	NOAA 2022g				
Numerical score:	Starting score	- (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full =; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					0

Supporting Clause 11.4.

11.4.	Flag States shall take enforcement measures towards fishing vessels entitled to fly their flag, which have been found by the State to have contravened applicable conservation and management measures. The State shall, where appropriate, make the contravention of such measures an offense under national legislation.				
Relevance:	Not relevant No foreign vessel is licensed to fish within the West Coast EEZ.				
Evaluation Parameters					
Process: <i>If applicable, the system of enforcement measures is effective for foreign vessels fishing in the State's EEZ or for its vessels fishing in high seas or in another State's EEZ.</i>					
Current status/Appropriateness/Effectiveness: <i>There is evidence to substantiate enforcement action in these cases (i.e., boarding, violations).</i>					
EVIDENCE:					
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that flag States take enforcement measures with fishing vessels entitled to fly their flag if the vessels have been found by the State to have contravened applicable conservation and management measures. These enforcement measures will include, where appropriate, making the contravention of such measures an offense under national legislation. Examples may include various laws, regulations, and other data or enforcements reports.</i>					
EVIDENCE:					
References:					
Numerical score:	Starting score	- (Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10				NA
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					
Non-conformance Number (if applicable):					

8.5 Section D: Serious Impacts of the Fishery on the Ecosystem

Fundamental Clause 12. Impacts of the fishery on the ecosystem

Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.

Supporting Clause 12.1.

12.1.	The fishery management organization shall assess the impacts of environmental factors on target stocks and associated or dependent species in the same ecosystem, and the relationship among the populations in the ecosystem.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>There is a process that allows assessment and monitoring of environmental factors (e.g., climatic, oceanographic) on target and associated species in the same ecosystem, and that assess the relationships between species in the ecosystem.</i>		✓
EVIDENCE:		
<p>The PFMC publishes an annual Ecosystem Status Report (available here: https://www.pcouncil.org/annual-california-current-ecosystem-status-report/), produced by the NMFS California Current Integrated Ecosystem Assessment team. This report documents the ongoing assessment and monitoring of environmental factors potentially affecting the Pacific hake and other commercially fished stocks, as well as other components of the ecosystem, such as non-target species, endangered species, and habitats. For example, the 2021-2022 report (PFMC 2022) tracks indicators such as climate and ocean conditions, snowpack, streamflow and stream temperature, forage availability, salmon returns, sea lion pups, seabird productivity, algal blooms, fishery landings, among others. The annual process of collecting and reporting trends in these ecosystem indicators is sufficient evidence that this process parameter is met.</p>		
Current status/Appropriateness/Effectiveness: <i>There is evidence that assessments have been conducted to determine the impacts of environmental factors on the target and associated or dependent species (to the stock) in the same ecosystems, and on the relationships among these species. The results of these studies are in sufficient detail to allow informed management of the fishery. This requirement is intended to provide information about the current understanding of the overall marine ecosystem structure and relationships among the various species, coupled with environmental monitoring. More information about the effects of the fishery on specific ecosystem components (e.g., associated bycatch and ETPs species interactions, gear-habitat disturbance, ecosystem and food-webs impacts, etc.) are assessed in the following clauses of this section.</i>		✓
EVIDENCE:		
<p>As above, the NMFS California Current Integrated Ecosystem Assessment team tracks and reports on several indicators allowing a comprehensive understanding of the overall marine ecosystem structure and relationships among various species, as well as environmental monitoring (see PFMC 2022). The report has been produced annually for the past 10 years, providing a good understanding of status and trends, enabling the determination of the impact of environmental factors on the target and associated dependent species and their relationships. This information is used by scientists and the PFMC to make harvest and other fishery management decisions, thus meeting this parameter.</p>		
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization assesses the impacts of environmental factors on target and other species belonging to the same ecosystem or associated with or dependent upon the target species, and the relationship among the populations in the ecosystem. Examples may include various stock and ecosystems assessment reports.</i>		✓
<p>Again, as evidenced by sampling locations and methods used in tracking the ecosystem status indicators reported in e.g. PFMC (2022), the team has determined that the availability, quality and adequacy of evidence is sufficient to substantiate that the fishery management organization assesses the impacts of environmental factors and use that evidence to make harvest and other fishery management decisions, thus meeting this parameter.</p>		

References:	PFMC (2022g). 2021-2022 California Current Ecosystem Status Report. Agenda Item H.2.a CCIEA Team Report 1. March 2022.				
Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		10		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 12.2.

12.2.	<p>The most probable adverse impacts from human activities, including fishery effects on the ecosystem/environment, shall be assessed and, where appropriate, addressed and or/corrected, taking into account available scientific information and local knowledge. This may take the form of an immediate management response or a further analysis of the identified risk. In this context, full consideration should be given to the special circumstances and requirements in developing fisheries, including financial and technical assistance, technology transfer, training, and scientific cooperation. In the absence of specific information on the ecosystem impacts of fishing on the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk, the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures.</p> <p>Note. Clause 12.2 is a non-scoring clause with no associated Evaluation Parameters.</p>
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Supporting Clause 12.2.1.

12.2.1.	<p>The fishery management organization shall consider the most probable adverse impacts of the unit of certification on main associated species (Appendix 1, Part 3 and 7), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) shall be monitored and shall not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action shall be taken.</p>
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Relevance:	Relevant
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Evaluation Parameters	Met?
<p>Process: <i>There is a process that accounts for the most probable adverse impacts of the unit of certification on main associated species. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on such impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk, the more generic evidence based on similar fishery situations, then, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP or bycatch of nontarget fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear–habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.</i></p>	✓

EVIDENCE:
The offshore Pacific whiting/hake fleet has 100% observer coverage and commensurate full catch and discard accounting for all target and non-target species. The inshore catch shares fleet uses a combination of Electronic Monitoring and catch monitors to achieve the same full catch/discard accounting. The NWFSC maintains the FRAM Data Warehouse, wherein observed catches and discards are reported for all fisheries in the Pacific groundfish FMP and others. This data is reviewed

and used by fisheries managers to determine risks and, if needed, management responses. An example in this fishery is the management response to large increases in shortbelly rockfish catches, discovered through the at-sea monitoring process. Though they are still a very minor species in the offshore hake catch composition, shortbelly rockfish have been encountered in increasing numbers in recent years, with an order of magnitude increase between 2016 and 2017 and staying at this level through 2020. This is due to increased incidence of “lightning strike” tows in which large numbers of shortbelly are caught in single tows when fishing for hake. This is partially explained through large shortbelly rockfish recruitment events and a consequent expansion of the population range further north from its usual concentration off central California. In order to avoid exceeding the ACL for shortbelly, the PFMC opted to increase the ACL for 2020 from 500 mt to 3,000 mt (still well below the 4,000 mt ABC), and beginning in 2021, to classify shortbelly as an “ecosystem component” species, where no ACL is applicable (PFMC 2019).

Current status/Appropriateness/Effectiveness:

*There is evidence that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on **main** associated species (e.g. recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible), by assessing and, where appropriate, addressing and/or correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action is taken. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.*



EVIDENCE:

As stated above, catches (landings and discards, as well as encounters with birds and other endangered species) are well monitored in both the offshore and inshore fleets through the observer and Electronic Monitoring programs.

The following table shows the catch composition in the US Pacific hake midwater trawl fishery from 2016 to 2020. According to RFM definitions, all non-hake catches are not assessed as main or minor, because they fall outside of the top 95% of catches by weight, with hake comprising 98.1% of the catch (NWFSC 2021, FRAM Data Warehouse). However, the table below, obtained from the FRAM Data Warehouse, demonstrates that the fishery has the data needed to consider the most probable adverse impacts of the hake fishery. In addition, the groundfish stock assessment team at the NWFSC maintains a regular schedule of full stock assessments for commercially targeted groundfish, and these use the best scientific evidence available to advise the PFMC on harvest specifications in line with the National Standards. Evidence demonstrates that the hake fishery does not threaten any non-target species with serious risk of extinction, recruitment overfishing, or other detrimental impacts.

Species	2016	2017	2018	2019	2020	Total	%oftotal
Pacific Hake	259,578	349,302	312,637	312,878	287,722	1,522,119	98.10%
Yellowtail Rockfish	551.9	1,583.2	1,278.9	1,605.5	1,746.2	6,765.7	0.44%
Widow Rockfish	427.1	1,449.1	1,075.3	1,106.0	754.3	4,811.8	0.31%
Spiny Dogfish Shark	377.9	241.5	1,348.7	987.3	291.3	3,246.8	0.21%
Jack Mackerel	395.0	878.3	271.0	1,101.8	562.2	3,208.3	0.21%
American Shad	152.8	438.8	352.3	434.6	714.2	2,092.7	0.13%
Shortbelly Rockfish	25.0	293.8	471.7	597.8	388.0	1,776.3	0.11%
Squid Unid	193.8	217.1	158.4	122.1	157.9	849.4	0.05%
Sablefish	33.7	251.8	189.5	258.0	104.6	837.5	0.05%
Pacific Mackerel	20.6	158.7	127.8	177.8	163.6	648.6	0.04%
Splitnose Rockfish	74.4	120.8	205.7	132.9	26.2	560.0	0.04%
Darkblotched Rockfish	20.8	72.7	146.1	148.9	109.1	497.6	0.03%
Pacific Ocean Perch	38.1	73.7	102.5	160.8	109.7	484.9	0.03%
Canary Rockfish	7.5	80.8	199.8	93.0	87.3	468.4	0.03%
Rougheye/Blackspotted Rockfish	45.3	40.6	163.8	134.6	71.1	455.4	0.03%
Pacific Herring	2.9	42.1	96.1	209.9	63.8	414.9	0.03%

King of the Salmon	152.5	32.7	44.6	105.7	60.2	395.7	0.03%
Brown Cat Shark	62.5	36.3	141.0	80.3	31.6	351.7	0.02%
Shortspine Thornyhead	22.4	29.0	71.0	58.6	23.7	204.7	0.01%
Arrowtooth Flounder	21.5	24.4	62.2	49.8	11.1	168.9	0.01%
Walleye Pollock	2.6	22.2	11.7	82.3	11.1	130.0	0.01%
Ragfish	47.9	16.1	36.4	12.5	16.4	129.3	0.01%
Chilipepper Rockfish	6.1	63.9	13.4	25.6	0.4	109.4	0.01%
Rex Sole	8.1	8.5	31.0	34.0	5.7	87.3	0.01%

Evidence Basis:
The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on main associated species, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these nontarget species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.



EVIDENCE:
 Please see above. There are no main associated species according to RFM definitions, however, the quality and quantity of evidence needed to determine this, and detect trends and manage any change, is sufficient to meet this evaluation parameter.

References:	Pacific Fishery Management Council 2019a. 2020 Harvest Specifications for Cowcod and Shortbelly Rockfish – Final Action. Agenda Item H.4 Situation Summary, November 2019. https://www.pcouncil.org/documents/2019/10/agenda-item-h-4-situation-summary-2020-harvest-specifications-for-cowcod-and-shortbelly-rockfish-final-action.pdf/		
	NWFSC FRAM Data Warehouse: https://www.webapps.nwfsc.noaa.gov/data/map		
Numerical score:	Starting score	Number of EPs NOT met	Overall score
	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 12.2.2.

12.2.2. The fishery management organization shall consider the most probable adverse impacts of the unit of certification on *minor* associated species (Appendix 1, Part 3 and 7), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) shall be monitored and shall not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action shall be taken.

Relevance: Relevant

Evaluation Parameters Met?

Process:

There is a process that accounts for the most probable adverse impacts of the unit of certification on minor associated species. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on such impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations (proxies), then, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP or bycatch of non-target fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear-habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.



EVIDENCE:

The table in supporting clause 12.2.1, generated from observer and EM data from the NWFSC FRAM Data Warehouse is sufficient to determine there are no minor associated species according to RFM definitions (only species comprising the top 95% of catch by weight are considered). Thus, this clause is only relevant to the extent that the data collection systems and management procedures are adequate to detect any change in catch composition in the event that any of these species does become a minor or main associated species or is experiencing fishery related impacts from the hake fishery that require a management response. This parameter is met.

Current status/Appropriateness/Effectiveness:

There is evidence that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on minor associated species, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action is taken. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.



EVIDENCE:

The table in supporting clause 12.2.1, generated from observer and EM data from the NWFSC FRAM Data Warehouse is sufficient to determine there are no minor associated species according to RFM definitions (only species comprising the top 95% of catch by weight are considered). Thus, this clause is only relevant to the extent that the data collection systems and management procedures are adequate to detect any change in catch composition in the event that any of these species does become a minor or main associated species or is experiencing fishery related impacts from the hake fishery that require a management response. This parameter is met.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on minor associated species, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target stocks with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.



EVIDENCE:

The table in supporting clause 12.2.1, generated from observer and EM data from the NWFSC FRAM Data Warehouse is sufficient to determine there are no minor associated species according to RFM definitions (only species comprising the top 95% of catch by weight are considered). Thus, this clause is only relevant to the extent that the data collection systems and management procedures are adequate to detect any change in catch composition in the event that any of these species does become a minor or main associated species or is experiencing fishery related impacts from the hake fishery that require a management response. This parameter is met.

References:

NWFSC FRAM Data Warehouse: <https://www.webapps.nwfsc.noaa.gov/data/map>

Numerical score:

Starting score

– (

Number of EPs NOT met

x 3) =

Overall score

	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 12.2.3.

12.2.3.	There shall be outcome indicator(s) consistent with achieving management objectives for non-target species (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible).		
Relevance:	Relevant		
Evaluation Parameters			
Process:	<i>There is a process to set outcome indicator(s) consistent with achieving management objectives for non-target species (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible).</i>		Met? ✓
EVIDENCE: Although this fishery encounters a very small quantity of non-target species relative to the quantity of targeted hake caught, for all stocks managed through the PFMC process which are managed under the Pacific Groundfish Fisheries Management Plan (FMP; PFMC 2020) there are “outcome indicators” consistent with achieving management objectives. These include harvest strategies, control rules, reference points, consideration of traditional fishing rights, sector allocations, and all the concomitant reporting and monitoring requirements, enabling the achievement of management objectives such as avoiding overfishing. For “ecosystem component” non-target species, there is no specification of reference points and OFLs, ABCs, and ACLs. However these are monitored to the extent that if any new pertinent scientific information becomes available (e.g., catch trends, vulnerability, etc.) to determine changes in their status or their vulnerability to the fishery. For this classification, such species should:			
<ol style="list-style-type: none"> 1. Be a non-target species or stock; 2. Not be determined to be subject to overfishing, approaching overfished, or overfished; 3. Not be likely to become subject to overfishing or overfished, according to the best available information, in the absence of conservation and management measures’ and 4. Not generally be retained for sale or personal use (PFMC 2016a). 			
Therefore, there is a process to set indicators, and several indicators in place such as catches and abundance trends, and if any of the above conditions for ecosystem species classification are called into question, there is a review and possible redesignation of these stocks as individually managed within the FMP.			
Current status/Appropriateness/Effectiveness:			
<i>There is evidence that outcome indicator(s) consistent with achieving management objectives for non-target species (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible) have been achieved. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.</i>			✓
EVIDENCE: Stock assessment reports for all non-target FMP species are available, and none of these stocks in the hake catch composition are on the overfished list (PFMC 2020 Appendix F). Hence, for FMP species the outcome indicators consistent with sustainable harvests and avoidance of overfishing, are being met. For non-FMP “ecosystem component” species, there is evidence that these indicators are also being met. For instance, based on steadily increasing catches and higher market values, in 2015, the PFMC redesignated big skate as an individual stock ‘in the fishery’ and thus removed it from the EC portion of the FMP, and established biomass-based reference points and harvest controls.			
Evidence Basis:			
<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicator(s) consistent with achieving management objectives for non-target species (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible). Examples may include fishery management reports, and stock or ecosystems assessment reports.</i>			✓

EVIDENCE:

As stated previously, stocks in the FMP are monitored and assessed with sufficient regularity to substantiate the effectiveness of reference points and harvest controls with the objective of maintaining stocks at healthy levels. Catch and abundance trends of all species, even ecosystem component species, are monitored with sufficient frequency to detect changes prompting management actions to maintain them at healthy levels in line with the objectives of the MSA.

References:

PFMC (2020). Pacific Coast Groundfish Fishery Management Plan for the California, Oregon and Washington groundfish fishery. August 2020.

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)							High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)							Full Conformance
Non-conformance Number (if applicable):							

Supporting Clause 12.2.4.

12.2.4. The fishery management organization shall consider the most probable adverse impacts of the unit of certification on ETP species (Appendix 1, Part 4 and 7), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge.

Relevance:

Relevant

Evaluation Parameters

Met?

Process:

There is a process that accounts for the most probable adverse impacts of the unit of certification on ETP species. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on such impacts of fishing for the unit of certification, generic evidence based on similar fishery situations (proxies) can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP or bycatch of non-target fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear-habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.

✓

EVIDENCE:

The same process as described above for non-target species is followed for ETP species in terms of accounting for interactions, serious injuries or mortalities from the fishery. The ESA (United States 1983), signed on 1973, provides for the conservation of species that are endangered or threatened and the conservation of the ecosystems on which they depend. NOAA has jurisdiction over endangered and threatened marine species and works with the U.S. Fish and Wildlife Service (USFWS) to manage ESA-listed species. Generally, NOAA manages marine species, while USFWS manages land and freshwater species.

Section 4(f) ESA directs NOAA’s National Marine Fisheries Service (NMFS) to develop and implement recovery plans for threatened and endangered species. NMFS Office of Law Enforcement works with the U.S. Coast Guard and other partners to enforce and prosecute ESA violations ([NOAA](#)).

Recovery plans for ESA-listed species must include: (1) a description of site-specific management actions necessary to conserve the species or populations; (2) objective, measurable criteria which, when met, will allow the species or populations to be removed from the endangered and threatened species list; and (3) estimates of the time and funding required to achieve the plan’s goals. Each ESA-listed species has a recovery plan, and regular updates on progress toward recovery.

When a species is listed as endangered it is illegal to “take” (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. However, Section 10 of the ESA allows NOAA Fisheries Service to issue permits for incidental take (Incidental Take Statements; ITS), with the requirement of a conservation plan to minimize and mitigate impacts to the affected species.

Section 7(a)(2) of the ESA requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a federal agency may affect species listed as threatened or endangered, that agency is required to consult with either NOAA’s National Marine Fisheries Service (NMFS) or the USFWS, depending upon the species that may be affected. In instances where NMFS or USFWS are themselves proposing an action that may affect listed species, the agency must conduct intra-service consultation.

The product of a formal consultation is a biological opinion (BiOp) that determines if the action is likely to jeopardize the continued existence of any ESA-listed species or result in the destruction or adverse modification of critical habitat. If an opinion determines that the proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat, it must include a “reasonable and prudent alternative (RPA)” that avoids the likelihood of jeopardy or adverse modification or otherwise indicate that to the best of the agency’s knowledge, there are no RPAs. If the analysis concludes with a determination that the proposed action is not likely to jeopardize a listed species or destroy or adversely critical habitat and incidental take of listed species is reasonably certain to occur, then the biological opinion includes an incidental take statement (ITS) with the anticipated level of take of the listed species and “reasonable and prudent measures (RPM)” to avoid and minimize the take.

Current status/Appropriateness/Effectiveness: <i>There is evidence that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on ETP species (e.g. negatively impacting rebuilding efforts), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these impacts are monitored and do not impede, slow, or reduce likelihood of recovery of the species to target levels (or other planned outcomes). If such impacts arise, effective remedial actions are taken.</i>	✓
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EVIDENCE:
The Pacific Hake fishery encounters ESA-listed populations of Chinook salmon, short-tailed albatross, some marine mammals (protected by the MMPA), and pacific Eulachon.

Short-tailed albatross
The USFWS 2017 BiOp for non-salmon ESA-listed species interactions in the Pacific Coast Groundfish Fishery concluded that it is not likely to jeopardize the continued existence of short-tailed albatross (USFWS 2017), though some takes are expected to occur. Therefore, the Incidental Take Statement (page 48) mandates a series of Reasonable and Prudent Measures, including: "RPM 2. NMFS shall minimize the risk of short-tailed albatross interacting with trawl cables. Because short-tailed albatross are vulnerable to striking aerial trawl cables, particularly in the catcher-processor fleet, The Terms and Conditions specific to RPM 2 states, "T&C1 for RPM2 --To minimize the risk of short-tailed albatross interacting with trawl cables, NMFS shall: a) Continue to conduct research that investigates the extent of take associated with trawl gear and new or improved management actions that minimize take as a result of interactions with trawl gear in the PCGF. In collaboration with Oregon Sea Grant, the Pacific hake fleet has completed a study designed to detect and quantify cryptic seabird bycatch in its fishery (Gladics 2019). This project, led by Amanda Gladics, created standardized seabird observation protocols and electronic monitoring systems to collect data on seabird behavior, incidence, type, and severity of interactions, as well as what activities (such as setting or hauling back the net, towing, etc) were associated with different events. Ms. Gladics presented the assessment team with a summary of results to date (Gladics 2021). The project resulted in a realization that the midwater hake trawl fishery is likely posing a relatively low risk to endangered albatrosses and other seabirds, thus trailing different methods for mitigation has been somewhat deprioritized, though it is ongoing within the industry. The only known short-tailed albatross take in a Pacific Coast Groundfish Fishery was reported in the Limited Entry sablefish longline fishery off the Oregon coast in 2011, with 69 total observations reported between 2012 and 2019 (Good et. al. 2021). The other 68 observations were short-tailed albatrosses feeding on discarded catch, bait floating free or on hooks (in the case of the hook and line observations) or other interactions not resulting in mortality. Of these, none were attributed to the midwater trawl fleet. Other sightings have also been reported, a handful of which were in the shoreside or mothership catcher vessel

hake fisheries, but sightings are classified as such because the birds are not interacting with the fishing vessels in any way when spotted (Good et. al. 2021, Table 4).

Pacific salmon

Regarding salmon, in December 2017 the NMFS completed a new BiOp related to impacts of the Pacific coast groundfish fishery on ESA-listed salmon. The BiOp requires the NMFS to act to avoid exceeding thresholds of Chinook salmon bycatch, including fishery closure. It also requires the NMFS and PFMC to review and develop mechanisms to prevent exceeding Coho salmon thresholds. (Waldeck 2020)

These requirements were previously met through a delay in the primary hake season by area, prohibition of at-sea processing by area, trip limit restrictions by area and depth, and limits on the percentage of shore-based allocation to be taken by time and area.

New implementation measures designed to meet the BiOp requirements were added in 2020. Salmon Bycatch Management: New salmon bycatch mitigation measures were adopted in the 2019-2020 groundfish specifications to satisfy mandates in the December 2017 ESA Salmon BiOp (NOAA Fisheries 2017). The measures include:

- Automatic for NMFS to (1) close the whiting fishery when it exceeds (or is projected to exceed) 14,500 Chinook or close the non-whiting fishery when it exceeds (or is projected to exceed) 9,000 Chinook; and (2) after (1) happens, the sector that remains open is closed if that sector exceeds (or is projected to exceed) it's threshold (that is, 11,000 Chinook for whiting or 5,500 Chinook for non-whiting). The goal is to ensure that the overall 20,000 Chinook threshold is not exceeded by the groundfish fishery.
- A new bycatch reduction area (BRA) at the 200-fm depth contour. Council and NMFS monitor salmon bycatch rates inseason. If bycatch rates exceed those considered in the BiOp, the Council and NMFS can take inseason action to implement the BRA for any midwater trawl sector – whiting IFQ fishery, CP sector, MS sector, and non-whiting midwater trawl sector. If 200-fm BRA implemented, vessels would be prohibited from using midwater trawl gear to target either whiting or non-whiting groundfish in waters shoreward of the 200-fm depth contour, but would still be allowed to fish in waters seaward of 200-fm. This action only applies to non-tribal midwater trawl vessels.

In October 2020, NMFS published the proposed rule for additional measures adopted by the Council (50 CFR 660 2020e). The final rule was published in February 2021 (50 CFR 660 2020f). The new measures include items necessary for access to the 3,500 Chinook salmon “reserve,” including fishery cooperative annual Salmon Mitigation Plans (SMP) that may be submitted to NMFS and detail measures used to manage salmon bycatch. The SMP provides a nexus to a NMFS management action (that is, approval of the SMP) that is necessary for a sector to use the Chinook salmon reserve amount (that is, the 3,500 Chinook available above the 11,000 Chinook threshold for the whiting fishery).

Another new measure, Block Area Closures (BACs), may also be used if NMFS determines a sector of the whiting fishery is catching too much salmon then NMFS may implement a sector specific spatial closure that is more discrete than closing at 200 fathoms coastwide (Waldeck 2022).

Marine Mammals and other ETP

The latest available report covers the period 2002 – 2019 (Janot et. al. 2022), and shows fishery interactions with California sea lions, Steller sea lions, elephant seals, harbor seals, and Pacific white-sided dolphin and Dall’s porpoise, between 2015 and 2019. Details are given in Tables 12-14 in the background section. Table 15 shows the population status of each encountered marine mammal stock. None are ESA listed, nor considered “strategic,” since the total fishery related serious injuries and mortalities are low relative to Potential Biological Removal (PBR).

Regarding Pacific eulachon, in the offshore and inshore midwater trawl hake sectors, between 2015 and 2019 there have been between 56 and 1,088 individual eulachon estimated as caught annually. In 2019, the most recent year with data, there approximately five times more eulachon caught than in any other previous recent year, although mortalities are still

extremely low at just over 1,000 individuals. This increase in eulachon bycatch in the hake fishery corresponds with a large increase in eulachon abundance starting in 2019 (Gustafson et al 2021).

There has been no observed or estimated green sturgeon bycatch in the hake fishery since 2006 (Richerson et al. 2021).

Similarly, no leatherback sea turtles were observed as bycatch in any US West Coast groundfish fishery in the period between 2015 and 2019 (Benson et al 2021).

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on ETP species, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target stocks with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action are taken. Examples may include various stock and ecosystems assessment reports.



EVIDENCE:

The evidence available is up-to-date, and sufficient to substantiate that the fisheries management organization considers the most probable adverse impacts of the fishery under assessment on ETP species. The relevant evidence is described above, detailed in the background to this report, and provided in the references section.

References:

Jannot, J. E., K. A. Somers, V. J. Tuttle, J. Eibner, K. E. Richerson, J. T. McVeigh, J. V. Carretta, N. C. Young, and J. Freed (2022) Marine Mammal Bycatch in U.S. West Coast Groundfish Fisheries, 2002–19. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-176.

Benson, Scott, Fahy, Christina, Jannot, Jason, and Jason Eibner (2021). Leatherback Sea Turtle Bycatch in the U.S. West Coast Groundfish Fisheries 2022-2019. NMFS Report 5, PFMC Agenda Item G.4.a. June 2021

Good, Thomas P., Jannot, Jason E., Ward, Eric, and Christa Colway (2021). Estimated Short-tailed Albatross Bycatch in the U.S. West Coast Groundfish Fisheries, 2002-2019. NWFSC, NMFS. May 24, 2021.

Gustafson, Richard, Richerson, Kate, Somers, Kayleigh, Tuttle Vanessa, Jannot, Jason and Jon McVeigh. Observed and Estimated Bycatch of Eulachon in 2022-2019 U.S. West Coast Groundfish Fisheries. NMFS Report 2, PFMC Agenda Item G.4.a. June 2021

Richarson, K, Jannot, J.E., McVeigh, J., Somers, K., Tuttle, V. and S. Wang (2021). Observed and Estimated Bycatch of Green Sturgeon in 2022-2019 U.S. West Coast Groundfish Fisheries. NWFSC, NMFS. June 2021.

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)							High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)							Full
Non-conformance Number (if applicable):							

Supporting Clause 12.2.5.

12.2.5.	There shall be outcome indicator(s) consistent with achieving management objectives seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification and any associated enhanced fishery activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.		
Relevance:	Relevant		
Evaluation Parameters			Met?
Process: <i>There is a process in place that allowing creation of effective outcome indicators seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification and any associated enhanced fishery activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.</i>			✓
EVIDENCE: Where feasible and appropriate, allowable take levels are set for ETP species, which can be considered as outcome indicators seeking to ensure ETP species are protected. This is the case for Pacific salmon in the Pacific hake fishery (see above for details). There are other examples of take limits being set for ESA-listed species, though not pertinent to the unit of assessment here (e.g. eulachon catch limits in the west coast shore based groundfish fishery). All ESA recovery strategies contain metrics and establish thresholds required to de-list or down-list a stock or population. These can also be considered as outcome indicators.			
Current status/Appropriateness/Effectiveness: <i>There is evidence for established outcome indicators (e.g., in a fishery management plan or other regulation) seeking to ensure that ETP species are protected (through States or international regulations) from adverse impacts resulting from interactions with the unit of certification and any associated enhanced fishery activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored. Overall, fishing activity does not impede, slow, or reduce likelihood of recovery of the species to target levels or other planned outcomes. Management objectives shall be achieved accordingly. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.</i>			✓
EVIDENCE: The example of an established “outcome indicator” most relevant to the hake fishery are the take limits and the management of impacts from the hake fishery on ESA-listed runs of Pacific salmon. These are described in detail under 12.2.4.			
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicators seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification and any associated enhanced fishery activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible. Examples may include fishery management plans, or stock and ecosystems assessment reports.</i>			✓
EVIDENCE: See above and Supporting Clause 12.2.4.			
References:			
Numerical score:	Starting score 10	– (Number of EPs <u>NOT</u> met 0)	x 3) = Overall score 10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 12.2.6.

12.2.6. The fishery management organization shall consider the most probable adverse impacts of the unit of certification on habitats (Appendix 1, Part 5 and 7), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge.

Relevance: Relevant

Evaluation Parameters **Met?**

Process:
There is a process that accounts for the most probable adverse impacts of the unit of certification on habitats. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on such impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP species or bycatch of non-target fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear–habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.

✓

EVIDENCE:
 As this is a pelagic trawl fishery, the most commonly encountered habitat is pelagic, and bottom contact is infrequent. In the US, as part of Essential Fish Habitat (EFH) considerations, the Council adopts mitigation measures directed at the adverse impacts of fishing on groundfish EFH.

Current status/Appropriateness/Effectiveness:
There is evidence that the fishery management organization considers the most probable adverse impacts of the unit of certification on habitats, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, if these impacts are likely to be irreversible or very slowly reversible, effective remedial action is taken (please see Appendix 1 part 5, noting specifically the 3 habitat assessment elements, and part 7 for cumulative effects evaluation). Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.

✓

EVIDENCE:
 As this is a pelagic trawl fishery, the most commonly encountered habitat is pelagic, and bottom contact is infrequent. In the US, as part of EFH considerations, the Council adopts mitigation measures directed at the adverse impacts of fishing on groundfish EFH. Principal among these are closed areas to protect sensitive habitats. There are three types of closed areas: bottom trawl closed areas, bottom contact closed areas, and a bottom trawl footprint closure. The 34 bottom trawl closed areas are closed to all types of bottom trawl fishing gear. The bottom trawl footprint closure closes areas in the EEZ between 1,280 meters (700 fathoms) and 3,500 meters (1,094 fathoms), which is the outer extent of groundfish EFH. The 17 bottom contact closed areas are closed to all types of bottom contact gear intended to make contact with bottom during fishing operations, which includes fixed gear, such as longline and pots. In the most recent EFH process, the PFMC and NMFS did not feel it was necessary to exclude mid-water trawling to protect essential fish habitat. Section B.1. of the Pacific Coast Groundfish FMP (PFMC 2020) describes the assessment methodology for groundfish EFH, and Appendix C provides the effects of fishing on West Coast groundfish EFH and current conservation measures.

Evidence Basis:
The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on habitats, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.

✓

EVIDENCE:
 EFH on the West Coast is identified in fishery management plans (FMPs) developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce. EFH descriptions are comprised of text and maps. EFH maps complement text descriptions and spatially depict the area identified as EFH under an FMP off the West Coast. Section

B.1. of the Pacific Coast Groundfish FMP (PFMC 2020q) describes the assessment methodology for groundfish EFH, and Appendix C provides the effects of fishing on West Coast groundfish EFH and current conservation measures.

References:	PFMC (2020q) Appendix B and C.				
Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 12.2.7.

12.2.7. There shall be knowledge of the essential habitats for the *stock under consideration* and potential fishery impacts on them. Impacts on essential habitats, and on habitats that are highly vulnerable to damage by the fishing gear involved, shall be avoided, minimized, or mitigated. In assessing fishery impacts, the full spatial range of the relevant habitat shall be considered, not just the part of the spatial range that is potentially affected by fishing.

Relevance:	Relevant
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Evaluation Parameters	Met?
<p>Process: <i>There is a mechanism in place by which the potential impacts of the fishery upon habitats essential to the stock under consideration and on habitats that are highly vulnerable to damage are identified. This or a similar mechanism shall also be in place to identify habitats that are highly vulnerable to fishery activities by the unit of certification. The information provided by these mechanisms shall be used to produce specific management objectives related to avoiding significant adverse impacts on habitats. The knowledge of the habitats in question can therefore include relevant traditional, fisher, or community knowledge, provided its validity can be objectively verified (i.e., the knowledge has been collected and analysed through a systematic, objective, and well-designed process, and is not just hearsay). When identifying highly vulnerable habitats, their value to ETP species shall be considered, with habitats essential to ETP species being categorized accordingly.</i></p>	✓

EVIDENCE:

The mechanism by which the potential impacts of the fishery upon habitats essential to the hake stock and on vulnerable habitats is primarily the EFH process (see <https://www.pcouncil.org/groundfish-fishery-management-plan-and-amendments/>). In addition, long the West Coast, the Pacific Fishery Management Council identifies habitats that fall within “Habitat Areas of Particular Concern” (HAPC) and recommends these to NOAA Fisheries consistent with the Magnuson-Stevens Act. HAPCs are considered high priority areas for conservation, management, or research because they are important to ecosystem function, sensitive to human activities, stressed by development, or are rare. These areas provide important ecological functions and/or are especially vulnerable to degradation and can be designated based on either specific habitat types or discrete areas. HAPCs are a discrete subset of EFH, The HAPC designation does not automatically confer additional protections or restrictions upon an area, but they help to prioritize and focus conservation efforts. Although these habitats are particularly important for healthy fish populations, other EFH areas that provide suitable habitat functions are also necessary to support and maintain sustainable fisheries and a healthy ecosystem.

HAPCs have been identified under the Pacific Coast Groundfish Fishery Management Plan (FMP) as follows:

Estuaries, Canopy Kelp, Seagrass, Rocky Reefs, and other “areas of interest” (see <https://www.fisheries.noaa.gov/west-coast/habitat-conservation/habitat-areas-particular-concern-west-coast> for details)

As this is a pelagic trawl fishery, the most commonly encountered habitat is pelagic, and bottom contact is infrequent. In the US, as part of EFH considerations, the Council adopts mitigation measures directed at the adverse impacts of fishing on groundfish EFH. Principal among these are closed areas to protect sensitive habitats.

Current status/Appropriateness/Effectiveness: <i>Successful management measures have been developed and are in place to achieve the objectives described in the process parameter.</i>	✓
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EVIDENCE:
In the US, as part of EFH considerations, the Council adopts mitigation measures directed at the adverse impacts of fishing on groundfish EFH. Principal among these are closed areas to protect sensitive habitats. There are three types of closed areas: bottom trawl closed areas, bottom contact closed areas, and a bottom trawl footprint closure. The 34 bottom trawl closed areas are closed to all types of bottom trawl fishing gear. The bottom trawl footprint closure closes areas in the EEZ between 1,280 meters (700 fathoms) and 3,500 meters (1,094 fathoms), which is the outer extent of groundfish EFH. The 17 bottom contact closed areas are closed to all types of bottom contact gear intended to make contact with bottom during fishing operations, which includes fixed gear, such as longline and pots. In the most recent EFH process, the PFMC and NMFS did not feel it was necessary to exclude mid-water trawling to protect essential fish habitat. Section B.1. of the Pacific Coast Groundfish FMP (PFMC 2020) describes the assessment methodology for groundfish EFH, and Appendix C provides the effects of fishing on West Coast groundfish EFH and current conservation measures.

Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is knowledge of the essential habitats for the stock under consideration and potential fishery impacts on them. Impacts on essential habitats and on habitats that are highly vulnerable to damage by the fishing gear involved are avoided, minimized, or mitigated. In assessing fishery impacts, the full spatial range of the relevant habitat is considered, not just the part of the spatial range that is potentially affected by fishing. Examples may include various regulations, data, and reports.</i>	✓
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EVIDENCE:
EFH on the West Coast is identified in fishery management plans (FMPs) developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce. EFH descriptions are comprised of text and maps. EFH maps complement text descriptions and spatially depict the area identified as EFH under an FMP off the West Coast. Section B.1. of the Pacific Coast Groundfish FMP (PFMC 2020q) describes the assessment methodology for groundfish EFH, and Appendix C provides the effects of fishing on West Coast groundfish EFH and current conservation measures.

References: PFMC (2020q) Appendix B and C.

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)							High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)							Full Conformance
Non-conformance Number (if applicable):							

Supporting Clause 12.2.8

12.2.8.	There shall be outcome indicator(s) consistent with achieving management objectives for avoiding, minimizing, or mitigating the impacts of the unit of certification on essential habitats for the <i>stock under consideration</i> and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification.				
Relevance:	Relevant				
Evaluation Parameters			Met?		
Process: <i>There is a mechanism in place that allows the establishment of outcome indicator(s) consistent with achieving management objectives for avoiding, minimizing, or mitigating impacts on essential habitats for the stock under consideration and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification.</i>			✓		
EVIDENCE: The Council adopts mitigation measures directed at the adverse impacts of fishing on groundfish EFH. The process of designating EFH and, within EFH, HAPCs, is an appropriate mechanism allowing the establishment of “outcome indicators” consistent with achieving management objectives for avoiding, minimizing or mitigating impacts on essential habitats and those highly vulnerable to damage by fishing gear (see https://www.pcouncil.org/groundfish-fishery-management-plan-and-amendments/). The principle management measure among these are closed areas to protect sensitive habitats. There are three types of closed areas: bottom trawl closed areas, bottom contact closed areas, and a bottom trawl footprint closure. However, since the hake fishery uses midwater trawl gear and has been deemed unlikely to adversely impact sensitive habitats, no specific avoidance measures have been adopted for this fishery.					
Current status/Appropriateness/Effectiveness: <i>Successful outcome indicators and management measures have been developed and are in place to achieve the objectives described in the process parameter.</i>			✓		
EVIDENCE: The EFH and HAPC processes and consequent designation of closed areas and adoption of other management measures to protect essential and otherwise sensitive habitats constitute successful outcome indicators and management measures to achieve the objectives described in the process parameter. See 12.2.7 for further details on EFH and HAPCs.					
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicator(s) consistent with achieving management objectives for avoiding, minimizing, or mitigating impacts on essential habitats for the stock under consideration and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification. Examples may include various regulations, data, and reports.</i>			✓		
EVIDENCE: Evidence provided through the regular (5-year) EFH and HAPC processes is sufficient to support the indicators and management measures described in this set of supporting clauses. The processes are carried out frequently, and adjustments and amendments to the groundfish FMP are made where appropriate (Amendment 28 is the most recent example relevant to the groundfish fishery: https://www.pcouncil.org/actions/amendment-28-pacific-coast-groundfish-essential-fish-habitat-rockfish-conservation-area-modifications-and-magnuson-act-discretionary-closures/).					
References:					
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 12.2.9

12.2.9.	The fishery management organization shall consider the most probable adverse impacts of the fishery under assessment on the ecosystem (Appendix 1, Part 6), by assessing and, where appropriate, addressing and or/correcting them, taking into account available scientific information and local knowledge.	
Relevance:	Relevant	
Evaluation Parameters		Met?
<p>Process: <i>There is a process that accounts for the most probable adverse impacts of the unit of certification on the ecosystem. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on the ecosystem impacts of fishing for the unit of certification, generic evidence based on similar fishery situations (proxies) can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations, then, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP species or bycatch of non-target fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear–habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.</i></p>		✓
<p>EVIDENCE: A Fisheries Ecosystem Plan team was formed by the PFMC in 2013 (PFMC 2013). The FEP is intended in part to provide “management policies that coordinate Council management across its Fishery Management Plans (FMPs) and the California Current Ecosystem (CCE).” For FMP policies, the FEP is needed to “identify and prioritize research needs and provide recommendations to address gaps in ecosystem knowledge and FMP policies, particularly with respect to the cumulative effects of fisheries management on marine ecosystems and fishing communities.” For this purpose, Appendix A to the FEP (the “Ecosystem Initiatives” appendix) is reviewed annually by the PFMC. The Ecosystem Initiatives Appendix is separate from the FEP and may be modified without the Council having to also modify the FEP or reconsider its contents. The Council has an annual process for reviewing the ecosystem initiatives and assessing whether changes are needed to Appendix A, or whether analyses are needed to provide background work for new ecosystem initiatives.</p> <p>Overall, this process accounts or the most probable adverse impacts of the unit of certification (indeed all fishery related impacts) on the ecosystem.</p>		
<p>Current status/Appropriateness/Effectiveness: <i>There is evidence that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on the ecosystem (e.g. food-webs effects), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these impacts are likely to be irreversible or very slowly reversible; or effective remedial action shall be taken. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored. There are policies in place (e.g., harvest control rules) that are effective at protecting ecosystem functioning and accounting for species’ ecological role, and precautionary and effective spatial management is used (e.g., to protect spawning areas, prevent localized depletion, and protect important foraging areas for predators of fished species) if applicable.</i></p>		✓

EVIDENCE:

As above, the NMFS California Current Integrated Ecosystem Assessment team tracks and reports on several indicators allowing a comprehensive understanding of the overall marine ecosystem structure and relationships among various species, as well as environmental monitoring (see PFMC 2022). The report has been produced annually for the past 10 years, providing a good understanding of status and trends, enabling the determination of the impact of environmental factors on the target and associated dependent species and their relationships. This information is used by scientists and the PFMC to make harvest and other fishery management decisions, thus meeting this parameter.

Evidence Basis:
The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on the ecosystem, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target stocks with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.



EVIDENCE:
 The evidence basis for ecosystem-based and other management decisions in the PFMC system is extremely high. In relation to this specific supporting clause, as described above under 12.1, the NWFSC produces a California Current Ecosystem Status report annually, tracking several indicators of ecosystem health. Fish stock and habitat assessments are produced with sufficient frequency to detect issues that require management action. When such issues are detected, management action is taken. Examples of this in the context of ecosystem impacts of fisheries are given above.

References: PFMC (2022g). 2021-2022 California Current Ecosystem Status Report. Agenda Item H.2.a CCIEA Team Report 1. March 2022.

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	)	x 3	=	Overall score
	10			0				10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low) High

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC) Full Conformance

Non-conformance Number (if applicable):

Supporting Clause 12.2.10.

12.2.10. There shall be outcome indicator(s) consistent with achieving management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhanced activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. Any modifications to the habitat for enhancing the stock under consideration must be reversible and not cause serious or irreversible harm to the natural ecosystem’s structure, processes, and function.

Relevance: Relevant

Evaluation Parameters **Met?**

Process:
There is a process to allow for drafting effective outcome indicator(s) consistent with achieving management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. There is also a process that states modifications to the habitat for enhancing the stock under consideration are reversible and do not cause serious or irreversible harm to the natural ecosystem’s structure, processes, and function.



EVIDENCE:

The PFMC publishes an annual Ecosystem Status Report (available here: <https://www.pcouncil.org/annual-california-current-ecosystem-status-report/>) , produced by the NMFS California Current Integrated Ecosystem Assessment team. This report documents the ongoing assessment and monitoring of environmental factors potentially affecting the Pacific hake and other commercially fished stocks, as well as other components of the ecosystem, such as non-target species, endangered species, and habitats. For example, the 2021-2022 report (PFMC 2022g) tracks indicators such as climate and ocean conditions, snowpack, streamflow and stream temperature, forage availability, salmon returns, sea lion pups, seabird productivity, algal blooms, fishery landings, among others. Although this process EP is asking about management objectives seeking to minimize the impact of the fishery on the ecosystem, and not the other way around, there is a feedback loop here that must be acknowledged and recognized in terms of how it functions in this context. The indicators of ecosystem health and trends are tracked, and management responds if something requires response. Sometimes the response is related to the fishery management plan—for example the prohibiting of targeting forage fish species. The annual process of collecting and reporting trends in these ecosystem indicators and following the Fishery Ecosystem Plan (as discussed under 12.2.9) is sufficient evidence that this process parameter is met.

Current status/Appropriateness/Effectiveness:

There is evidence for outcome indicator(s) consistent with achieving management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. Any modifications to the habitat for enhancing the stock under consideration are reversible and do not cause serious or irreversible harm to the natural ecosystem’s structure, processes, and function. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.



EVIDENCE:

Using the above-described process, the first initiative under this plan was completed in 2015, resulting in several forage fish species becoming “ecosystem components” of the four PFMC Fishery Management Plans, with directed fishing prohibited on these without further research and the development of specific FMPs for these species. One of the forage species included is eulachon smelt, an ESA listed species. A similar Comprehensive Ecosystem-Based Amendment 1 (CEBA 1) was recently implemented in all the PFMC’s fisheries management plans (including groundfish), adding a number of forage and other species that are caught by all fisheries on the west coast to the ecosystem component list and prohibiting directed commercial fishing upon them. Therefore, there is evidence that the fishery management organization considers the most probable adverse impacts.

Thus far, there has been no specific action or initiatives relative to the Pacific hake fishery and there are none listed as candidates presently. There is one candidate initiative related to long-term effects of PFMC harvest policies on age- and size-distributions in managed stocks (including hake), which, if implemented, could help the PFMC maintain broad age and size distributions in managed fish stocks.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicator(s) consistent with achieving management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. Any modifications to the habitat for enhancing the stock under consideration are reversible and do not cause serious or irreversible harm to the natural ecosystem’s structure, processes, and function. Examples may include various regulations, data, and reports.



EVIDENCE:

Again, as evidenced by sampling locations and methods used in tracking the ecosystem status indicators reported in e.g. PFMC (2022), the team has determined that the availability, quality and adequacy of evidence is sufficient to substantiate that the fishery management organization assesses the impacts of the fishery on the ecosystem and use that evidence to make fishery management decisions, such as through the Fishery Ecosystem Plan team and initiative process, thus meeting this parameter.

References:

PFMC (2022g). 2021-2022 California Current Ecosystem Status Report. Agenda Item H.2.a CCIEA Team Report 1. March 2022.

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10		0			10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)	High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)	Full Conformance
Non-conformance Number (if applicable):	

Supporting Clause 12.2.11.

12.2.11. The fishery management organization shall consider the most probable adverse human impacts on the stock/ecosystem under consideration, by assessing and, where appropriate, addressing and or/correcting them, taking into account available scientific information and local knowledge.

Relevance:	Relevant
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Evaluation Parameters	Met?
<p>Process: <i>There is a process that accounts for the most probable adverse impacts of the unit of certification on the ecosystem. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on the ecosystem impacts of fishing for the unit of certification, generic evidence based on similar fishery situations (proxies) can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures.</i></p>	✓

EVIDENCE:
 A Fisheries Ecosystem Plan team was formed by the PFMC in 2013 (PFMC 2013). The FEP is intended in part to provide “management policies that coordinate Council management across its Fishery Management Plans (FMPs) and the California Current Ecosystem (CCE).” For FMP policies, the FEP is needed to “identify and prioritize research needs and provide recommendations to address gaps in ecosystem knowledge and FMP policies, particularly with respect to the cumulative effects of fisheries management on marine ecosystems and fishing communities.” For this purpose, Appendix A to the FEP (the “Ecosystem Initiatives” appendix) is reviewed annually by the PFMC. The Ecosystem Initiatives Appendix is separate from the FEP and may be modified without the Council having to also modify the FEP or reconsider its contents. The Council has an annual process for reviewing the ecosystem initiatives and assessing whether changes are needed to Appendix A, or whether analyses are needed to provide background work for new ecosystem initiatives.

Overall, this process accounts for the most probable adverse impacts of the unit of certification (indeed all fishery related impacts) on the ecosystem.

The PFMC publishes an annual Ecosystem Status Report (available here: <https://www.pcouncil.org/annual-california-current-ecosystem-status-report/>), produced by the NMFS California Current Integrated Ecosystem Assessment team. This report documents the ongoing assessment and monitoring of environmental factors potentially affecting the Pacific hake and other commercially fished stocks, as well as other components of the ecosystem, such as non-target species, endangered species, and habitats. For example, the 2021-2022 report (PFMC 2022) tracks indicators such as climate and ocean conditions, snowpack, streamflow and stream temperature, forage availability, salmon returns, sea lion pups, seabird productivity, algal blooms, fishery landings, among others.

<p>Current status/Appropriateness/Effectiveness: <i>There is evidence that the fishery management organization considers the most probable adverse human impacts of the unit of certification on the ecosystem, by assessing and, where appropriate, addressing and or/correcting them, taking into account available scientific information and local knowledge. Accordingly, these impacts are likely to be irreversible or very slowly reversible; if so, effective remedial action shall be taken. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.</i></p>	✓
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EVIDENCE:
 Using the above-described process, the first initiative under this plan was completed in 2015, resulting in several forage fish species becoming “ecosystem components” of the four PFMC Fishery Management Plans, with directed fishing prohibited on these without further research and the development of specific FMPs for these species. One of the forage species included is eulachon smelt, an ESA listed species. A similar Comprehensive Ecosystem-Based Amendment 1 (CEBA 1) was recently implemented in all the PFMC’s fisheries management plans (including groundfish), adding a number of forage and other species that are caught by all fisheries on the west coast to the ecosystem component list and prohibiting directed commercial fishing upon them. Therefore, there is evidence that the fishery management organization considers the most probable adverse impacts.

Thus far, there has been no specific action or initiatives relative to the Pacific hake fishery and there are none listed as candidates presently. There is one candidate initiative related to long-term effects of PFMC harvest policies on age- and size-distributions in managed stocks (including hake), which, if implemented, could help the PFMC maintain broad age and size distributions in managed fish stocks.

As above, the NMFS California Current Integrated Ecosystem Assessment team tracks and reports on several indicators allowing a comprehensive understanding of the overall marine ecosystem structure and relationships among various species, as well as environmental monitoring (see PFMC 2022). The report has been produced annually for the past 10 years, providing a good understanding of status and trends, enabling the determination of the impact of environmental factors on the target and associated dependent species and their relationships. This information is used by scientists and the PFMC to make harvest and other fishery management decisions.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on the ecosystem, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target stocks with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.



EVIDENCE:

Again, as evidenced by sampling locations and methods used in tracking the ecosystem status indicators reported in e.g. PFMC (2022), the team has determined that the availability, quality and adequacy of evidence is sufficient to substantiate that the fishery management organization assesses the impacts of the fishery on the ecosystem and use that evidence to make fishery management decisions, such as through the Fishery Ecosystem Plan team and initiative process, thus meeting this parameter.

The evidence basis for ecosystem-based and other management decisions in the PFMC system is extremely high. In relation to this specific supporting clause, as described above under 12.1, the NWFSC produces a California Current Ecosystem Status report annually, tracking several indicators of ecosystem health. Fish stock and habitat assessments are produced with sufficient frequency to detect issues that require management action. When such issues are detected, management action is taken. Examples of this in the context of ecosystem impacts of fisheries are given above.

References:

<https://www.pcouncil.org/fep-initiatives/>

PFMC (2022g). 2021-2022 California Current Ecosystem Status Report. Agenda Item H.2.a CCIEA Team Report 1. March 2022.

NOAA Fisheries (2021d). Fisheries Off West Coast States; Comprehensive Ecosystem-Based Amendment 1; Amendments to the Fishery Management Plans for Coastal Pelagic Species, Pacific Coast Groundfish, U.S. West Coast Highly Migratory Species, and Pacific Coast Salmon. Accessed at: <https://www.fisheries.noaa.gov/action/fisheries-west-coast-states-comprehensive-ecosystem-based-amendment-1-amendments-fishery>

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 12.3.

12.3. The role of the *stock under consideration* in the food web shall be considered, and if it is a key prey species³²³ in the ecosystem, management objectives and measures shall be in place to avoid severe adverse impacts on dependent predators.

Relevance: Relevant

Evaluation Parameters	Met?
<p>Process: <i>There is a mechanism in place by which the role of the stock under consideration in the food web is assessed and monitored, and its relative importance as a prey species is determined. If the species is considered by the fisheries management organization to be an important prey species, there shall be specific management objectives relating to minimizing the impacts of the fishery on dependent predators. The FAO Guidelines require that all sources of fishing mortality on the stock under consideration are taken into account (whether or not it is a prey species) in assessing the state of the stock under consideration, including discards, unobserved mortality, incidental mortality, unreported catches, and catches in other fisheries.</i></p>	✓

EVIDENCE:
 An ecosystem model for the California Current Ecosystem’s food web and oceanography was carried out by researchers from NOAA Fisheries, NWFSC, and academic partners (Brand et. al. 2007) using the Atlantis ecosystem modelling package. This model considers hake as its own functional group due to its commercial importance and large biomass. This model assessed the role of the stock under consideration and confirmed that Pacific hake is not a “key prey species” in the ecosystem. Ecosystem indices and relative stock abundances are regularly monitored. Although ecosystem food webs are generally relatively stable (i.e. they do not need to be assessed very regularly), climate change has the potential to change this, and its impacts are likewise being monitored.

<p>Current status/Appropriateness/Effectiveness: <i>Management measures have been developed and are in place to achieve the management objectives described in the process parameter, and there is evidence to demonstrate that they are successful to this end. If the species under assessment is not considered to be a key prey species, then this parameter shall be considered fulfilled.</i></p>	✓
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EVIDENCE:
 The species under assessment is not a key prey species, hence this parameter is fulfilled.

<p>Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the role of the stock under consideration in the food web is considered, and if it is a key prey species in the ecosystem, objectives and management measures are in place to avoid severe adverse impacts on dependent predators. Examples may include various stock and ecosystem assessment reports.</i></p>	✓
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EVIDENCE:
 The ecosystem model by Brand et. al. (2007) and ongoing ecosystem monitoring (PFMC 2022, for example) provide sufficient evidence to substantiate that the role of the Pacific hake stock in the ecosystem is considered when making management decisions.

References:

Brand, E.J., I.C. Kaplan. C.J. Harvey, P.S. Levin, E.A. Fulton, A.J. Hermann, and J.C. Field. 2007. A spatially explicit ecosystem model of the California Current’s food web and oceanography. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-84, 145 p.

PFMC (2022g). 2021-2022 California Current Ecosystem Status Report. Agenda Item H.2.a CCIEA Team Report 1. March 2022.

Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10		0			10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low) High

Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC) Full Conformance

Non-conformance Number (if applicable):

Supporting Clause 12.4.

12.4.	There shall be outcome indicator(s) consistent with achieving management objectives seeking to avoid severe adverse impacts on dependent predators resulting from the unit of certification fishing on a stock under consideration that is a key prey species³³⁶.				
Relevance:	Not Relevant				
Evaluation Parameters					
Process: <i>There is a mechanism in place that allows the establishment of outcome indicator(s) consistent with achieving management objectives seeking to avoid severe adverse impacts on dependent predators resulting from the unit of certification fishing on a stock under consideration that is a key prey species³³⁷. Mortality in Alaska is usually accounted for all removals of given species. The state and federal fish accounting systems operate in depth and make an explicit effort to document all removals to confirm with regulations in force. The assessors shall ensure that all removals are accounted for in the system (fish ticket, eLandings) for stock assessment and management purposes.</i>			✓		
EVIDENCE: The stock under consideration is not a key prey species.					
Current status/Appropriateness/Effectiveness: <i>There is evidence that outcome indicators and management measures have been developed, are in place, and have succeeded in achieving the objectives described in the process parameter.</i>			✓		
EVIDENCE: NA					
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicator(s) consistent with achieving management objectives seeking to avoid severe adverse impacts on dependent predators resulting from the unit of certification fishing on a stock under consideration that is a key prey species. Examples may include various stock and ecosystems assessment reports.</i>			✓		
EVIDENCE: NA					
References:	Brand, E.J., I.C. Kaplan, C.J. Harvey, P.S. Levin, E.A. Fulton, A.J. Hermann, and J.C. Field. 2007. A spatially explicit ecosystem model of the California Current's food web and oceanography. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-84, 145 p.				
Numerical score:	Starting score	- (Number of EPs <u>NOT</u> met) x 3 =	Overall score
	10		0		10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)					High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)					Full Conformance
Non-conformance Number (if applicable):					

Supporting Clause 12.5.

12.5.	States shall introduce and enforce laws and regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).				
Relevance:	Relevant				
Evaluation Parameters					
Process:			Met?		
<i>The appropriate regulations have been implemented.</i>			✓		
EVIDENCE:					
<p>MARPOL 73/78 consists of six separate Annexes, each set out regulations covering the various sources of ship-generated pollution. Annex I and II are mandatory for all signatory nations to MARPOL while Annexes III, IV, V and VI are optional.</p> <p>Currently, the U.S. is signatory to Annexes I, II, III, V and VI. Annexes I, II, V and VI have been incorporated into U.S. law by the Act to Prevent Pollution from Ships (APPS) and implemented within 33 USC 1901 and 33 CFR 151. The U.S. incorporates Annex III by the Hazardous Materials Transportation Act (HMTA) implemented within 46 USC 2101 and 49 CFR 171 -174 and 176. Although the U.S. has not ratified Annex IV, the U.S. has equivalent regulations for the treatment and discharge standards of shipboard sewage – the Federal Water Pollution Control Act (FWPCA) as amended by the Clean Water Act and implemented by 33 USC 1251 and 33 CFR 159.</p>					
Current status/Appropriateness/Effectiveness:					
<i>These regulations and their enforcement are effective and in line with the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).</i>			✓		
EVIDENCE:					
<p>The regulations implemented by the US Coast Guard and in the Federal Register directly incorporate the relevant annexes to which the US is signatory. The US Coast Guard has authority to enforce these regulations, and has developed guidance and policies enabling them to do so. For example, CG-3PV Policy Letter 06-09 instructs Coast Guard officers in the correct enforcement of MARPOL Annex I, related to oil pollution from ships (USCG 2006).</p>					
Evidence Basis:					
<i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the State has introduced and enforces laws and regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78). Examples may include various regulations, data, and reports.</i>			✓		
EVIDENCE:					
<p>As above, there is a direct link between the MARPOL treaty and it’s mandatory annexes for signatories, and the implementing legislation within the US government. This is fully and transparently documented, and available from the US Coast Guard on the internet, here: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Commercial-Vessel-Compliance/Domestic-Compliance-Division/MARPOL/</p>					
References:					
<p>United States Coast Guard. CG-PV Policy Letter 06-09 (2006). Subject: Implementation of the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78; Annex I Revised. 16711/MARPOL Annex I. Distributed December 22 2006</p> <p>USCG MARPOL website: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Commercial-Vessel-Compliance-Division/MARPOL/</p>					
Numerical score:	Starting score	– (Number of EPs <u>NOT</u> met	x 3) =	Overall score
	10		0		10

Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)	High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)	Full Conformance
Non-conformance Number (if applicable):	

Supporting Clause 12.6.

12.6.	Research shall be promoted on the environmental and social impacts of fishing gear especially on the impact of such gear on biodiversity and coastal fishing communities.	
Relevance:	Relevant	
Evaluation Parameters		Met?
Process: <i>Research is promoted on the environmental and social impacts of fishing gear and its impacts on biodiversity and coastal fishing communities, as applicable to the fishery.</i>		✓
EVIDENCE: A Fisheries Ecosystem Plan team was formed by the PFMC in 2013 (PFMC 2013). The FEP is intended in part to provide “management policies that coordinate Council management across its Fishery Management Plans (FMPs) and the California Current Ecosystem (CCE).” For FMP policies, the FEP is needed to “identify and prioritize research needs and provide recommendations to address gaps in ecosystem knowledge and FMP policies, particularly with respect to the cumulative effects of fisheries management on marine ecosystems and fishing communities .” For this purpose, Appendix A to the FEP (the “Ecosystem Initiatives” appendix) is reviewed annually by the PFMC. The Ecosystem Initiatives Appendix is separate from the FEP and may be modified without the Council having to also modify the FEP or reconsider its contents. The Council has an annual process for reviewing the ecosystem initiatives and assessing whether changes are needed to Appendix A, or whether analyses are needed to provide background work for new ecosystem initiatives.		
Current status/Appropriateness/Effectiveness: <i>There is evidence for this research, and is it considered appropriate for overall fisheries management purposes.</i>		✓
EVIDENCE: The “Climate and Communities” Initiative was completed in 2019 (https://www.pcouncil.org/actions/climate-and-communities-initiative/) . The purpose of this initiative is to help the Council, its advisory bodies, and the public to better understand the effects of near-term climate shift and long-term climate change on our fish, fisheries, and fishing communities and identify ways in which the Council could incorporate such understanding into its decision making. The work led the PFMC to embark on climate change scenario planning. The goal of a cross-FMP Climate and Communities Initiative is to consider, develop, and implement strategies for improving the flexibility and responsiveness of our management actions to near-term climate shift and long-term climate change, and strategies for increasing the resiliency of our managed stocks and fisheries to those changes. This approach should better support West Coast fishing communities that depend on marine fishery resources. Specifically pertaining to midwater trawl gear and its impacts on biodiversity and coastal fishing communities, research through this and the EFH process is considered appropriate for overall fisheries management purposes		
Evidence Basis: <i>The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that research is promoted on the environmental and social impacts of fishing gear especially the impact of such gear on biodiversity and coastal fishing communities. Examples may include various regulations, data, and reports.</i>		✓

EVIDENCE: The data underpinning the development of relevant research is adequate to substantiate it (e.g. Brand et. al. 2006, PFMC 2021h, PFMC 2022g)			
References:	Brand, E.J., I.C. Kaplan. C.J. Harvey, P.S. Levin, E.A. Fulton, A.J. Hermann, and J.C. Field. 2007. A spatially explicit ecosystem model of the California Current’s food web and oceanography. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-84, 145 p.		
	PFMC (2022g). 2021-2022 California Current Ecosystem Status Report. Agenda Item H.2.a CCIEA Team Report 1. March 2022.		
	PFMC(2021h). Ad Hoc Climate and Communities Core Team Report on the Climate and Communities Initiative. Agenda Item H.a. CCCT Report 1. September 2021.		
Numerical score:	Starting score	– (	Number of EPs <u>NOT</u> met
	10	)	x 3 =
			Overall score
			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			Full Conformance
Non-conformance Number (if applicable):			

Supporting Clause 12.7.

12.7.	The fishery management organization shall make use, where appropriate, of Marine Protected Areas (MPAs). The general objectives for establishing MPAs shall include ensuring sustainability of fish stocks and fisheries, and protecting marine biodiversity and critical habitats.		
Relevance:	Relevant		
Evaluation Parameters			Met?
Process:	<i>There is a process available for the consideration of MPAs as appropriate, as a tool for management.</i>		✓
EVIDENCE: On the Pacific Coast, the EFH process is the primary means through which MPAs are considered as a means to protect Habitat Areas of Particular Concern (HAPCs) and other essential fish habitat. The PFMC has a process for regular review and modification of their EFHs. After completion of a periodic EFH review in 2014, the PFMC determined that the consideration of changes to groundfish EFH was warranted given new information (e.g., substrate type, species rebuilding numbers) and initiated a process to develop alternatives. A multi-year process of reviewing and modifying EFHCAs and RCAs as part of the Amendment 28 to the groundfish FMP concluded in 2019, with some slight changes to EFH and area closures. More broadly, a US federal policy (via Executive Order 14008) calls for the US to conserve at least 30 percent of US lands and waters by 2030 (the 30x30 goal). In the marine environment, establishment of MPAs is a key tool for this, though it has been recognized that the goal of “conservation” does not equate to “preservation” or “protection,” so the answer in the marine context includes, but is not limited to, MPAs. Although the EO does not define the level of conservation that would be applied to measure progress toward the 30x30 goal, federal agencies have initiated their own processes toward achieving this goal.			
Current status/Appropriateness/Effectiveness: <i>There shall be evidence for the use of MPAs, if appropriate (e.g. if they are employed MPAs as part of suite of management tools), as a tool for effective management with the general objectives of ensuring sustainability of fish stocks and fisheries, and protecting marine biodiversity and critical habitats.</i>			✓

EVIDENCE:

As part of EFH considerations, the Council adopts mitigation measures directed at the adverse impacts of fishing on groundfish EFH. Principal among these are closed areas to protect sensitive habitats. There are three types of closed areas: bottom trawl closed areas, bottom contact closed areas, and a bottom trawl footprint closure. The 34 bottom trawl closed areas are closed to all types of bottom trawl fishing gear. The bottom trawl footprint closure closes areas in the EEZ between 1,280 meters (700 fathoms) and 3,500 meters (1,094 fathoms), which is the outer extent of groundfish EFH. The 17 bottom contact closed areas are closed to all types of bottom contact gear intended to make contact with bottom during fishing operations, which includes fixed gear, such as longline and pots. In the most recent EFH process, the PFMC and NMFS did not feel it was necessary to exclude mid-water trawling to protect essential fish habitat. All bottom trawl closures can be considered equivalent to MPAs of some description.

Regarding MPAs in contribution toward EO 14008, currently, 26% of marine waters are within an MPA of some description, with 23% of marine waters as prohibited areas for commercial fishing (noting the vast majority are in the Pacific Islands region). Three percent of US waters are in fully protected MPAs prohibiting all forms of resource extraction.

Evidence Basis:

The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization has made use, where appropriate, of MPAs. The objectives of establishing MPAs are ensuring sustainability of fish stocks and fisheries, and protecting marine biodiversity and critical habitats. Examples may include various regulations, data, and reports.



EVIDENCE:

Extensive data are available on habitat types, including vulnerable ones. The locations of these habitats are known across the UoA’s managed area (i.e., the EEZ), which is an appropriate level of detail for the UoA’s scale and intensity. A great deal of information is also known about the nature and vulnerability of these habitats, including recoverability and composition. The fishing footprint and effort data cover 2011-2015, which help determine those habitats vulnerable to fishing impacts and those habitats needing protection (NMFS 2015) e.g. through designating MPAs.

Through the inventorying process necessary under EO14008, a comprehensive and interactive map of protected areas and their specific designations and associated rules throughout US waters has been developed and is available here: <https://marineprotectedareas.noaa.gov/gallery/understanding-area-based-mgmt-in-us-waters.html>

References: <https://www.regulations.gov/document/EPA-HQ-OPPT-2021-0202-0012>

Numerical score:	Starting score	-	(	Number of EPs <u>NOT</u> met	x 3	) =	Overall score
	10			0			10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)							High
Corresponding Conformance Level: (10 = Full; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)							Full Conformance
Non-conformance Number (if applicable):							

9. Non-conformances and Corrective Actions

No non-conformances were raised as a result of this assessment.

A minor NC was initially raised on Supporting Clause 12.2.4 due to out-of-date information on mammal interaction data during the client/peer review draft. A new report (Jannot et al 2022) was published

before the publication of the Public Comment Report which fully addressed the issue thereby removing the NC.

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<https://www.regulations.gov/document/EPA-HQ-OPPT-2021-0202-0012>

11. Appendices

Appendix 1: Peer Reviewer Reports and Team Responses

As required by the RFM program, two external peer reviewers were selected to provide reviews of the present report. Reviewers are chosen based on their technical expertise pertaining to the fishery under evaluation, as well as the RFM program fisheries standard. The two peer reviewers in this case are Dr. Wesley Toller (Independent Consultant), and Dr. Jim Andrews (Independent Consultant). The peer reviews and assessment team responses are given below, however they are unattributed to their respective reviewer.

Peer Reviewer 1

PR comment		MRAG Americas Response
<p>General: In my opinion the assessment team has done a very thorough job of reviewing the Pacific hake fishery against RFM program requirements. I concur with their overarching conclusion that the fishery meets the RFM Standard. Below I provide specific comments, observations, and suggestions on the assessment report.</p>		
Section	Comment	
3 Executive Summary	Ok	Thank you. No response needed.
3.1 Assessment Team Details	Ok	Thank you. No response needed.
3.2 Applicable Program Documents	Report should consistently identify that v2.1 of RFM Standard was used for the assessment.	Thank you, we have checked and made this consistent throughout

4 Certificate Holder Applicant Details	Ok	Thank you. No response needed.
5 Units of Assessment and Certification	Re “All eligible fishery participants”: Does the UOC/UOA encompass all four hake sectors? <ul style="list-style-type: none"> • Non-tribal catcher boats delivering to shore-based processing facilities. • Non-tribal catcher boats delivering to at-sea mothership processors. • Non-tribal vessels that both catch and process the catch at sea. • Tribal harvesters 	[Checking with Dan]
5.1 Units of Assessment	Ok	Thank you. No response needed.
6 Background to the Fishery		
6.1 Species Biology	Comment: The authors have made excellent and extensive use of citations. This is appropriate to the scope and breadth of the assessment. However, it would be helpful to include a bibliography for those references cited in the Background (Section 6) and also where not already provided for in Sections A-D.	Thank you, we have included an overall references section in the report.
2.1 Stock Assessment Activities	Ok	Thank you. No response needed.
2.2 Historic Biomass and Removals in the Fishery	Ok	Thank you. No response needed.
2.3 Reference points and harvest control rules	Ok	Thank you. No response needed.
2.4 Ecosystem considerations	Ok	Thank you. No response needed.
2.5 Management of Pacific hake and precautionary approach	Ok	Thank you. No response needed.
2.6 Fishery data	Ok	Thank you. No response needed.
6.2 Fishery Location and Methods	Ok	Thank you. No response needed.
6.2.1 Area of Fishery Operation	Ok	Thank you. No response needed.
6.2.2 Fishing Methods	Ok	Thank you. No response needed.
6.3 Fishery Management History and Organization	Ok	Thank you. No response needed.
6.3.1 International Management	Ok	Thank you. No response needed.
6.3.2 U.S. Domestic Management	Ok	Thank you. No response needed.
6.4 Management Measures and Regulations	Ok	Thank you. No response needed.
6.4.1 Management Measures	Ok	Thank you. No response needed.
6.4.2 Regulations	Ok	Thank you. No response needed.
6.5 Other Management Issues	Ok	Thank you. No response needed.
6.6 Economic Value of the Fishery	Ok	Thank you. No response needed.
7 Assessment Process	Ok	Thank you. No response needed.
7.1 Scoring	Ok	Thank you. No response needed.
7.1.1 Evaluation Parameters	Ok	Thank you. No response needed.

7.1.2 Numerical Scoring based on Evaluation Parameters	Ok	Thank you. No response needed.
7.1.3 Confidence Ratings and Non-conformances	Ok	Thank you. No response needed.
7.1.4 Overall Assessment Scoring	Ok	Thank you. No response needed.
7.2 Consultation Meetings	Note: Max Stocker is listed as an assessor among meeting attendees but he is not identified as an MRAG assessment team member in 3.1.	Thank you. Clarification was made to indicate this was a joint site visit for RFM and MSC, and Max (and others) who were only involved in the MSC portion have been so noted.
8 Summary of Assessment Outcomes	Ok	Thank you. No response needed.
8.1 Assessment Outcomes by Clause	Ok	Thank you. No response needed.
Table 11	No mention in the report of RFM Standard Section 13 - fisheries that utilize enhancement techniques. Perhaps include in Table 11 to confirm that Section 13 does not apply to the Pacific hake UOA?	Thank you. A note has been added to the caption of Table 11, and an additional row with this information.
8.2 Certification Recommendation	Ok. Agree with the team's recommendation	Thank you. No response needed.
8.3 Certification Determination	Ok, determination is pending.	Thank you. No response needed.
9 Assessment Outcomes	Ok	Thank you. No response needed.
Topics that will trigger immediate assessment failure	Section 9: confidence levels are not indicated in the table.	Thank you for noticing this. They have been added. All high confidence
Section A: The Fisheries Management System		
Fundamental Clause 1. Structured and legally mandated management system		
Supporting Clause 1.1	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 1.2	Agree with scoring. Unclear why there is a reference to salmon migration in the "Evidence Basis" evaluation parameter.	Thank you for catching this. The salmon reference was an undeleted clause left in the template. It is now deleted.
Supporting Clause 1.2.1.	Agree with rationale and scoring.	
Supporting Clause 1.3.	SC 1. 3 evaluation parameter "Current Status": Should rationale also address the matter of the USA and Canada's inability to reach agreement on annual TAC setting in recent years (2020, 2021)?	Thank you. Information on the 2020-2021 TAC setting has been added to SC 1.3 and to subsequent SC's.
Supporting Clause 1.3.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 1.4.	Agree with the team's determination that SC 1.4 is not relevant.	Thank you. No response needed.
Supporting Clause 1.4.1	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 1.5.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 1.6.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 1.6.1.	Agree with the team's determination that SC 1.6.1 is not relevant to the US Pacific hake fishery.	Thank you. No response needed.
Supporting Clause 1.7.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 1.8	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 1.9	Agree with the team's determination that SC 1.9 is not relevant. But it may also be worth confirming that the US Pacific hake fishery does not occur in high seas.	Thank you. This confirmation has been added to the evidence section.

Fundamental Clause 2. Coastal area management frameworks		
Supporting Clause 2.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 2.1.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 2.1.2.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 2.2.	Agree with scoring. Rationale for Evidence Basis & Current Status: Should this section also identify records of consultations with fishers by CZM agencies. This could cover concerns over developments like offshore windfarms or oil platforms that may potentially impact on the Pacific hake fishery.	Thank you for the suggestion. New information on stakeholder consultation for the proposed wind energy development offshore Oregon has been included in the Current Status Section as an additional example of consultations.
Supporting Clause 2.3.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 2.4.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 2.5.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 2.6.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 2.7.	Agree with rationale and scoring.	Thank you. No response needed.
Fundamental Clause 3. Management objectives and plan		
Supporting Clause 3.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 3.1.1	Agree with scoring. For evaluation parameter “Current Status”: Why include shortbelly rockfish in a section on ETP species protection? It is not clear to me that species-level accounts are needed here because the focus of SC 3.1.1 is on ETP management objectives. Such detailed info could go in SC 12.2.4. But if species-level accounts are required, then the team should also list the main/potential ETP species interactions (e.g., Chinook salmon, euldachon, sea turtles, ST albatross, and marine mammals).	Thank you. Information on shortbelly rockfish has been removed from this section. Information on “other applicable law” protecting ETP species has been added. An example of salmon bycatch regulations designed to address ESA recovery plans is provided.
Supporting Clause 3.1.2	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 3.1.3	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 3.2.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 3.2.2.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 3.2.3	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 3.2.4.	SC 3.2.4 is missing the evaluation parameter “Current Status”	Thank you. The section has been added.
Section B: Science & Stock Assessment Activities, and the Precautionary Approach		
Fundamental Clause 4. Fishery data		
Supporting Clause 4.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 4.1.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 4.1.2.	Agree with scoring. For the evaluation parameter “Evidence Basis”: Pacific hake stock assessments rely on stock-specific information, not generic evidence derived from other stocks. Perhaps the rationale should emphasize this point as well?	Thank you. The rationale was modified to evidence that the assessment is carried out specifically for hake.
Supporting Clause 4.2.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 4.2.1.	Disagree with the team’s determination that SC 4.2.1 is not relevant. In my view, the team should score the “level and scope of the observer program” insofar as it is necessary to understand how existing hake observer programs provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources. Though I do agree it will be somewhat redundant with the rationale presented in SC 4.2.	Thank you the clause has been scored accordingly.

Supporting Clause 4.3.	Agree with rationale and scoring. Existing arrangements are clearly adequate to ensure confidentiality. The rationale should cite some of the key laws/policies (e.g., NAO 216-100: Protection of Confidential Fisheries Statistics).	Thank you. The rationale was modified as suggested.
Supporting Clause 4.4.	Agree with scoring. Unclear why a reference is made to Alaskan seafood.	Thank you. The reference to Alaska has been removed.
Supporting Clause 4.5.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 4.6.	Agree with scoring but would note that the rationale largely describes the process of catch allocation to tribes; not the use of traditional fisher knowledge by fishery management organizations.	Thank you. The rationale was modified as suggested.
Supporting Clause 4.7.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 4.8.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 4.9.	Agree with the team’s determination that SC 4.9 is not relevant to the Pacific hake fishery.	Thank you. No response needed.
Supporting Clause 4.10.	Agree with the team’s determination that SC 4.10 is not relevant to the Pacific hake as the fishery is fully developed.	Thank you. No response needed.
Supporting Clause 4.11.	Agree with the team’s determination that SC 4.11 is not relevant to the Pacific hake fishery.	Thank you. No response needed.
Fundamental Clause 5. Stock assessment		
Supporting Clause 5.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 5.1.1.	Agree with the team’s determination that SC 5.1.1 is not relevant to the Pacific hake as the fishery is neither small-scale nor of low commercial value.	Thank you. No response needed.
Supporting Clause 5.1.2.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 5.2.	Agree with scoring. However, some of the rationale seems to pertain more to Bering Sea/Gulf of Alaska ecosystems than to the California Current Ecosystem and the coastal Pacific hake stock.	Thank you. The reference to Alaska was removed.
Supporting Clause 5.3.	Agree with scoring. Unclear why the team’s rationale makes reference to “reassessment” and NPAFC.	Thank you. The rationale was modified as requested.
Supporting Clause 5.4.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 5.5.	Agree with rationale and scoring.	Thank you. No response needed.
Fundamental Clause 6. Biological reference points and harvest control rule		
Supporting Clause 6.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 6.2.	-	
Supporting Clause 6.3.	-	
Supporting Clause 6.4.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 6.5.	Agree with rationale and scoring.	Thank you. No response needed.
Fundamental Clause 7. Precautionary approach		
Supporting Clause 7.1.	SC 7.1 evaluation parameter “Evidence Basis” refers to the “offshore Pacific hake” which implies it is a distinct stock from the single “Coastal Stock” of Pacific hake described in the UoC and Introduction (pp. 11-12). Please clarify.	Thank you. The rationale was modified as requested.
Supporting Clause 7.1.1.	-	
Supporting Clause 7.1.2.	Disagree with the team’s determination that SC 7.1.2 is not relevant to the Pacific hake fishery. Noted that hake is already an information-rich fishery. But having an ability to respond to unknowns as they may	Thank you the clause has been scored accordingly.

	arise (e.g. impacts of climate change) is central to adaptive/precautionary management. Do the management agencies have processes in place to identify research gaps as they may arise and to initiate research in response to those needs?	
Supporting Clause 7.2.	Agree with the team’s determination that SC 7.2 is not relevant to Pacific hake as the fishery is neither new nor exploratory.	Thank you. No response needed.
Section C: Management Measures, Implementation, Monitoring, and Control		
Fundamental Clause 8. Management measures		
Supporting Clause 8.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.1.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.1.2.	SC 8.1.2 is missing the evaluation parameter “Current Status”.	Thank you. This section has been added.
Supporting Clause 8.2	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.3	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.4	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.4.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.5.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.5.1	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.6	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.7	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.8	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.9	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.10	Agree with the team’s determination that SC 8.10 is not relevant to the Pacific hake as no new gears have been introduced to the fishery in the past three years.	Thank you. No response needed.
Supporting Clause 8.11	SC 8.11 missing the evaluation parameter “Process” and only partial “Current Status”.	Thank you for pointing this out. These sections have been added.
Supporting Clause 8.12	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 8.13	Agree with the team’s determination that SC 8.13 is not relevant to the Pacific hake fishery.	Thank you. No response needed.
Fundamental Clause 9. Appropriate standards of fishers’ competence		
Supporting Clause 9.1.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 9.2	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 9.3.	Agree with rationale and scoring.	Thank you. No response needed.
Fundamental Clause 10. Effective legal and administrative framework		
Supporting Clause 10.1.	Evaluation parameter “Current Status”: per RFM scoring guide, shouldn’t the assessment team give more detail on enforcement statistics (e.g., number of boardings and number of fisheries violations per year)? Otherwise, agree with rationale and scoring.	Thank you. This information has been added.
Supporting Clause 10.2.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 10.3.	Agree with the team’s determination that SC 10.3 is not applicable because the fishery under consideration does not occur outside the U.S. EEZ.	Thank you. No response needed.
Supporting Clause 10.3.1.	Agree with the team’s determination that SC 10.3.1 is not applicable.	Thank you. No response needed.
Supporting Clause 10.4.	Agree with the team’s determination that SC 10.4 is not applicable.	Thank you. No response needed.
Supporting Clause 10.4.1.	Agree with the team’s determination that SC 10.4.1 is not applicable.	Thank you. No response needed.
Fundamental Clause 11. Framework for Sanctions		
Supporting Clause 11.1.	Agree with rationale and scoring.	Thank you. No response needed.

Supporting Clause 11.2.	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 11.3	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 11.4	Agree with the team’s determination that SC 11.4 is not applicable as no foreign vessel is licensed to fish within the U.S. West Coast EEZ.	Thank you. No response needed.
Section D: Serious Impacts of the Fishery on the Ecosystem		
Fundamental Clause 12. Impacts of the fishery on the ecosystem		
Supporting Clause 12.1	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.2.1	Agree with rationale and scoring. The team presents a bycatch species profile (by weight) for the Pacific hake fishery and correctly determines that there are no “main” associated species according to RFM definitions.	Thank you. No response needed.
Supporting Clause 12.2.2	Agree with rationale and scoring. The team presented a bycatch species profile (by weight) in SC 12.2.1 for the Pacific hake fishery and correctly determined that there are no “minor” associated species according to RFM definitions.	Thank you. No response needed.
Supporting Clause 12.2.3	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.2.4	Agree with rationale and scoring. The team gives a thorough account of ETP considerations relating to seabirds and Chinook salmon. Could the team provide a brief explanation as to why fishery management agencies do not consider the Pacific hake fishery to have adverse impacts on other ETPs which the fishery might potentially interact with (e.g., eulachon, sea turtles, marine mammals)?	Thank you. Additional text has been provided in the status box pertaining to mammals, eulachon and other ETP. It was noted in so doing that data pertaining to mammal interactions is old, and thus the evidence basis EP has been considered to be not met, and a minor NC raised.
Supporting Clause 12.2.5	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.2.6	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.2.7	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.2.8	Agree with rationale – mid-water trawls have minimal habitat impact. But evaluation parameters “Current Status” and “Evidence Basis” are left blank and therefore a score cannot be obtained. Perhaps refer back to SC 12.2.6 and 12.2.7 as evidence of meeting EPs?	Thank you, this omission has been corrected, and additional information related to the HAPC process has also been added.
Supporting Clause 12.2.9	Evaluation parameter “Process” seems to be blank. This may be a glitch with the template? Also, EP considerations about “bait” should not be applicable to the Pacific hake fishery.	Thank you for pointing this out. Indeed, a glitch in the template with errant rows making their way in. The content has been moved and extra rows removed so everything is completed.
Supporting Clause 12.2.10	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.2.11	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.3	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.4	Agree with the team’s determination that SC 12.4 is not relevant as there is evidence that Pacific hake is not a key prey species.	Thank you. No response needed.
Supporting Clause 12.5	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.6	Agree with rationale and scoring.	Thank you. No response needed.
Supporting Clause 12.7	Agree with the team’s overall conclusion but it might be worthwhile to also identify non-Council processes for establishing MPAs. Could refer to the current federal inventory of MPAs	Thank you for this reference. We have added it to the justifications in 12.7 regarding MPAs.

Peer Reviewer 2

Assessment team responses to the comments of Peer Reviewer 2 are given in-line using red color.

Summary and Recommendations

Full Summary of Comments

Background Section

Peer Review Comments:

This is a peer review report for the first full assessment of the US Pacific Whiting / Hake midwater trawl fishery against the Responsible Fishery Management (RFM) fishery standard (hereafter the “Standard”).

The assessment team have concluded that the fishery should be certified. I agree, but this conclusion is not presently supported by the information that is presented in the report nor the scoring rationales for the Supporting Clauses of the Standard.

In my detailed comments on each Supporting Clause I have set out the basis for this conclusion, and below have set out some overarching comments.

The background section of this report provides a description of the fishery, summary of information available about the target stock, stock assessment and harvest controls in place for this stock. The team’s scoring of these aspects of the fishery against the relevant Supporting Clauses is in general appropriate and adequately justified.

In other areas there are some very significant shortcomings and omissions from the descriptive section of the report and indeed the Supporting Clause scoring rationales which need to be addressed in order to support the conclusions drawn. The key areas are:-

- a) **Unilateral TAC** – since a lot of this assessment hinges on the implementation of the US-Canada hake/whiting treaty, the implications of the failure to reach agreement under the terms of the treaty and to set unilateral TACs for one (or more) recent years seems to require
 - a. More elaboration, both in terms of why this happened and what its long-term implications might be; and
 - b. Evaluation under one or more of the clauses of the Standard (the word “unilateral” does not appear anywhere after page 34 of the document; scoring is set out in page 71 onwards)
- b) **Non-target species** – it is not until the reader arrives at page 236 of a 259 page document in the rationale for Supporting Clause 12.2.1 that it is possible to determine which species other than *Merluccius productus* are caught in the fishery. It was both frustrating to read the report without this information, and frustrating to find that after writing copious comments about the absence of such information that it was in fact in the report towards the very end. Could I suggest that this information is moved to the descriptive section of the report – it would provide much needed context.

- c) **Observer program** – it is my understanding that data on catches of hake and non-target species (including endangered, threatened and protected species) is gathered by the US observer program and that NMFS operate an At-Sea Hake Observer Program (A-SHOP) which covers the freezer-trawlers and motherships; and a West Coast Groundfish Observer Program (WCGOP) which covers trawlers. Neither program nor the scope of the observer tasks are explained in this report. This is an unfortunate omission since it would add to the clarity of the report and better justify the scoring. This information is on the internet here: <https://www.fisheries.noaa.gov/west-coast/fisheries-observers/west-coast-groundfish-and-sea-hake-observer-data-collection-quality>
- d) **ETP species** - although it is clear from the NOAA website that ETP species are monitored by the A-SHOP and WCGOP observers, there is absolutely no information anywhere in this report which provides information about the nature, magnitude or significance of ETP species interactions. It is clear (from text on page 60) that there are concerns about interactions with albatrosses; and this assessment team should be aware of this issue - I note that the MSC certification report produced by MRAG and some of the same authors as this assessment for the US-Canada hake trawl fishery states that:

“Seabird mortalities caused by striking trawl warps or the data transponder cable (a.k.a. 3rd wire) have been recorded in similar at-sea processing fleets in both Alaska and the Southern Hemisphere. Observations of seabird cable strikes by fisheries observers are rare because observer duties prevent them from being present for the majority of strikes. Seabird carcasses are rarely recovered from such strikes because the carcass sinks to the ocean floor or the injured bird leaves the area, and thus carcasses are not captured by the net or cables.”

The scoring of ETP species in the MSC report states that:-

“Short-tailed, Black-footed, and Laysan albatrosses are all ACAP listed ETP birds with the potential to interact with this fishery. Of these, black-footed albatross were the only species observed taken on at-sea catcher processor vessels with between one and five BFALs recorded during 2010-2015. The most frequently caught non albatross species on these vessels were northern fulmars, followed by gulls. Very rarely, one to a few individuals of nine other taxa were observed taken annually on at-sea catcher processor vessels (Jannot et al 2018a). Since 2016, observers have spent 15 minutes per day observing cables for seabird strikes on at-sea hake catcher-processor vessels. Observers monitored over 500 hauls for almost 150 hours of observation time, during which they observed 120 strikes. Observers classified 30/120 strikes as "hard" meaning they had the potential to cause mortality. There were 12 observed hard strikes of black-footed albatross. When expanded to the total amount of daytime tows in the fleet, NMFS estimated that there were likely 738 hard strikes of BFAL in the fleet in 2016. Using a conservative estimate of 12% mortality for hard strikes obtained from the scientific literature, NMFS estimated that of the 738 hard strikes of BFAL, 85 resulted in mortality. Observers only recovered two BFAL carcasses in 2016 that could be verified as cable strikes, indicating the cryptic nature of cable strike mortality. In 2017 and 2018, observers continued to collect data on seabird cable strikes and NMFS is collaborating with industry to develop workable solutions to reduce cable-strike mortality (Jannot et al. 2017). Although this species is still of conservation concern, according to the American Bird Conservancy, its population trend is increasing and major fishing threats in the Pacific are identified as longline and drift gillnet fisheries (ABC 2019).”

The contrast between the level of detail in that report and this one is striking – the former clearly describes the observer programme, its findings, and considers the impact of the fishery on ETP species, whilst the latter does not. This information is highly relevant to the RFM assessment, and was readily accessible to MRAG. Its omission is to the detriment of this assessment in many areas, and this deficiency should be rectified.

Thank you. More information pertaining to ETP interactions has been added to the report, and non-target species information has been added to the background section.

Some general comments that apply to the background section are:-

- a) **Section numbering** – it would be helpful to extend the section numbering beyond “level 3” to make it easier to make comments on the background section.
- b) **Page numbering** – from page 69 onwards there are no page numbers, which makes it hard to identify passages of text. Please amend. **Amended**
- c) **COVID-19**: there is reference in several parts of the text, especially with regard to observer coverage (§2.5 (p27 & 28), §6.2.2 (p33), pages 55-56). Given that COVID-19 has affected observer coverage, compliance monitoring, stock assessment and administration of all fisheries globally, it would perhaps be appropriate to include a distinct section of the report which details how these parts of the fishery have been affected and the consequences for this assessment.
- d) **Assessment Outcomes** – there are no ticks or crosses to show that outcome of the assessment of destructive fishing practices, IUU fishing etc. in the unnumbered table at the start of section 9. **Amended**

Some general comments that apply to the Supporting Clause section are:-

- a) **Completeness is an issue** – for several Supporting Clauses the scoring rationale is omitted for one or more Evaluation Parameters (this is a particular issue for the Supporting Clauses under Fundamental Clause 12). This is a quality control issue for MRAG to address. **Thank you for bringing this to our attention. The tables have been cleaned up and the omissions completed. This and the problem under point b) below were indeed due to issues with this somewhat unwieldy template.**
- b) **Relevance of the rationales to their Supporting Clause is inconsistent** – in several instances the team seem to have answered a different question to the one posed by the Supporting Clause that they are addressing. This is clearly an issue for the experts in the assessment team to address. I have mentioned this in my comments where it is an obvious issue. **See above.**

The comments made here are extensive. I hope that they are helpful and enable the team to revise the report so that the scoring is adequately justified and will eventually support the conclusion that this fishery should be certified. If the team require clarification on any of the comments made here please do not hesitate to contact me. **The assessment team wishes to thank the Peer Reviewer for his thorough and thoughtful comments.**

A.	The Fishery Management System
1.	There shall be a structured and legally mandated management system based upon and respecting International, National and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.

Peer Review Comments:

Overall comment – the fact that a unilateral TAC has been set in at least one recent year is not even mentioned here. Scoring evidence throughout this Fundamental Clause repeatedly refers to the US-Canada Treaty.

For example, Supporting Clause 1.1 contains this text:-

“Pacific hake is a transboundary stock managed through the Pacific Hake/Whiting Treaty, formally named the Agreement Between the Government of the United States of America and the Government of Canada on Pacific Hake/Whiting of 2003. Under the agreement an annual TAC is established with fixed shares of the TAC allocated to each of the Parties: United States 73.88%; Canada 26.12% (NOAA 2021b).”

However on page 34 it is stated that:-

*“The Agreement establishes U.S. and Canadian shares of the coast-wide total allowable catch (TAC) at 73.88% and 26.12%, respectively, and this distribution has been adhered to since 2005. **A bilateral agreement on the coast-wide TAC could not be reached in 2020, resulting in catch targets being set unilaterally for the first time since the inception of the Agreement** (Johnson et al. 2021; Edwards et al. 2022).”* [My emphasis]

On the basis of this evidence at least one of the EPs here should score less than the perfect 10 that they have all attained.

Supporting Clause 1.1: see comments above – I struggle to see how a score of 10 is justified by the evidence available. The “current status” of the international agreement in particular does not seem to be adequately met. **Thank you. The “current Status” text has been expanded to include evidence of recent Treaty function. A more detailed description of actions taken under the Treaty in 2020-2022 has been added to 6.3.1.**

Supporting Clause 1.2: the scoring is appropriate.

Supporting Clause 1.2.1: again, there is no reference to the unilateral TAC awarded last year, which is surely relevant to the scoring, again under the “Current Status” EP. **Thank you for pointing out this omission. Text has been added to provide evidence of effective continuing implementation during the two years without an agreement on a coastwide TAC.**

It is stated that the TRat program is reviewed on a 5 year cycle. The last review was in 2016. It is now 2022. What is the status of the current 5-year review? It is underway? **The Council plans to initiate the review in Fall 2022. Text to this effect has been added to the “Process” section of 1.2.1.**

Supporting Clause 1.3: again, there is no reference to the unilateral TAC awarded last year, which is surely relevant to the scoring, again under the “Current Status” EP. **Thank you. Information about the continued functioning of the Treaty committees in the absence of a joint agreement on TAC has been added to the “Current Status” section.**

Supporting Clause 1.3.1: again, there is no reference to the unilateral TAC awarded last year, which is surely relevant to the scoring under the “Current Status” EP. **Thank you. This omission has been remedied in the “Current Status” section.**

Supporting Clause 1.4: agree that this is not relevant.

Supporting Clause 1.4.1: I would have considered that this was also not relevant; however the scoring is appropriate.

Supporting Clause 1.5: again, there is no reference to the unilateral TAC awarded last year, which is surely relevant to the scoring under the “Current Status” EP. **Thank you. Text has been added to the “Current Status” section to describe the level of activity and engagement under the Treaty during the 2020-2021 absence of a coastwide TAC.**

Supporting Clause 1.6: the scoring is appropriate.

Supporting Clause 1.6.1: agree that this is not relevant.

Supporting Clause 1.7: the scoring is appropriate.

Supporting Clause 1.8: the scoring is appropriate.

Supporting Clause 1.9: agree that this is not relevant.

2.	Management organizations shall participate in coastal area management institutional frameworks, decision-making processes and activities related to the fishery and its users, in support of sustainable and integrated resource use, and conflict avoidance.
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Peer Review Comments:

Supporting Clause 2.1: the scoring is not fully justified. It should explicitly and clearly refer to the provision made for coastal communities and in particular the tribal catch allocation. **Thank you. A description of how provisions are made for coastal communities and tribes has been added to the “Current Status” section.**

Supporting Clause 2.1.1: again the scoring is predicated on the fact that “*Management of the coastal stock of Pacific whiting is accomplished through a bilateral agreement between the United States and Canada, known as the Pacific Whiting Treaty (NOAA Fisheries 2021b).*”

Something (unspecified) is broken in this management system, such that unilateral TACs were set by the US and Canada recently. The scoring rationale should at the very least mention this, and arguably the “Evidence” EP is not met.

Thank you. Evidence of international cooperation under the Treaty continuing during the two-year period when no coastwide TAC agreement was reached has now been added to the “Current Status” section.

Supporting Clause 2.1.2: the scoring is appropriate.

Supporting Clause 2.2: the scoring is appropriate.

Supporting Clause 2.3: the scoring is appropriate.

Supporting Clause 2.4: the scoring is appropriate.

Supporting Clause 2.5: the scoring is appropriate.

Supporting Clause 2.6: the scoring is appropriate.

Supporting Clause 2.7: the scoring is appropriate.

3. Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.

Peer Review Comments:

Overall comment: it is not clear to me why, if the US-Canada Treaty is relevant to Fundamental Clauses 1 & 2, which it must be because the team has referred to it in some of the scoring rationales, it is not mentioned here at all.

This is particular relevant to the current situation where the US and Canada have set unilateral TACs for this stock, and it would therefore seem that the management objectives of the Treaty are not being implemented through rules and actions as they have been in the past (though it is noted that the unilateral TAC uptake was such that the long-term Treaty objectives were not compromised).

Again, the “Perfect 10” scoring for all Supporting Clauses does not seem to be warranted, and a revision of the scoring that takes into account of the failure of the US and Canada to reach agreement under the Treaty would be more appropriate.

Supporting Clause 3.1: see comments above – if the US-Canada Treaty was relevant to Supporting Clauses 1.1 and 2.1.1, it is surely relevant here and the scoring should reflect the fact that the parties did not implement the requirements of the Treaty in 2021. The scoring presented is only justified if the international management dimension is ignored, which does not seem appropriate (and if it is appropriate, should be explained in some way).

Thank you for noting this omission. Information on management objectives under the Pacific Whiting Treaty have been added to the “Process” and “Current Status” sections.

Supporting Clause 3.1.1: the scoring is appropriate.

Supporting Clause 3.1.2: a significant omission from the scoring rationale is that the fishery is required to use only mid-water trawls (see §6.2.2), which serves to minimise habitat impacts and is perhaps the most important management measure in place in this regard. **Thank you. The omission has been remedied in the “Process” and “Current Status” sections.**

Supporting Clause 3.1.3: the scoring is appropriate.

Supporting Clause 3.2.1: see comments above – there is no mention of the US-Canada hake / whiting Treaty nor any acknowledgement that the management measures associated with that Treaty were not in place in 2021. This should at the very least be mentioned, and considered in

some detail on the “Process” EP, with potential scoring effects. **Thank you. Information has been added to the “Process” section to indicate why fishing capacity is not addressed under the Pacific Whiting Treaty.**

Supporting Clause 3.2.2: the scoring is appropriate.

Supporting Clause 3.2.3: Note that the text stating that “*The interests of fishers, including those engaged in subsistence, small-scale, and artisanal fisheries shall be taken into account.*” is missing from the draft report.

Although the scoring is justified there are significant omissions here, notably that there is an explicit division of the US catch since 1997 into tribal (17.5%) and non-tribal (82.5%) allocations (see page 27).

Thank you. Information specific to tribal interests has been added to the “Current “Status” section.

Supporting Clause 3.2.4: in the draft report I have been provided with there is no rationale provided for the Current Status / Appropriateness / Effectiveness Evaluation Parameter. It is not possible to fully evaluate the appropriateness of the scoring, but based on the Process EP rationale it appears appropriate. **Thank you for pointing out the omission. Text has now been added to the “Current Status” section.**

B.	Science, Stock Assessment Activities and the Precautionary Approach
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4.	There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.
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Peer Review Comments:

Overall Comment: it is clear from the descriptive text in the report that vast amounts of data are gathered about the fishery. However there are some key shortcomings in these data which may (or may not) be significant and which should be reflected in the scoring. These are reflected in the paragraph on page 15 of the report which states:-

In the last stock assessment, the terms catch and landings are used interchangeably. Estimates of discard within the target fishery are included, but discarding of Pacific hake in non-target fisheries is not. Discard from all fisheries, including those that do not target hake, is estimated to be less than 1% of landings in recent years. [...] Due to the coronavirus disease 2019 (COVID-19) pandemic, no biological samples were available from the Canadian freezer-trawler sector in 2020 because observers were not allowed on board.

The key issues here are:-

- a) Discarding – what is the significance of the not having discard data from the other fisheries? (This is probably trivial, but this should be the team’s conclusion and not mine).
- b) Covid – what is the significance of the impact on Canadian biological sampling? (Again, probably trivial but needs to be formally addressed)

Although this clause focuses on the target species, some of the supporting clauses test whether there are data available for non-target species. The report mentions measures that are in place for

other species (such as various rockfish species, page 57), but it is not clear (until page 236 of the report) whether these are actually caught in the fishery.

I can also see no information from the observer program about monitoring of incidental catches being included in the work scope of observers – the only clear reference to such issues is with regard to bird interactions (pages 60-61), which suggest a paucity of information. Again, some clarity would be helpful.

Thank you for the comment. The team added in clause 4.2.1 the information to clarify the issues on discards and incidental catches of living aquatic resources. In relation to COVID the team is not aware that the observer program had a significant impact of both US and Canadian observer programme in relation to the target stock.

Supporting Clause 4.1: the existing rationale is incorrect (see comments above). There are uncertainties in some aspects of the data. These are probably insignificant in terms of the perception of stock status, but the “Evidence” statement is not an accurate reflection of the description provided elsewhere in the report. I do not see, however, that there is any risk that the EP requirements are not met.

Thank you for the comment. The rationale of current status the team added a clarification about the issue related to discarding and covid19.

Supporting Clause 4.1.1: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 4.1.2: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 4.2: see quotation above – the scoring rationale should mention the effect of Covid-19 on the Canadian observer and biological sampling program (noting also that in 2020 observers were not allowed to board Canadian freezer trawler vessels – see page 28 of the report). The descriptive text also reports changes to the US observer program in response do Covid-19 (page 56) that are relevant here. Finally, a minor but amusing typo – I think it should be “*The mothership (MS) fleet...*” and not “*feet*”.

Thank you for the comment. The rationale of current status the team added a clarification about the issue related to discarding and covid19.

Supporting Clause 4.2.1: I disagree that this is not relevant. This Supporting Clause examines whether the observer program is “...*sufficient to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.*”

As noted above, there are no data presented in the report about the catch of non-target species or how the observer program seeks to provide information about this. I feel it would be more appropriate to score this Supporting Clause and to provide this information.

Thank you for the comment. The clause 4.2.1 is now scored. However, Section B is not intended to make reference to non-target species. Therefore, the data on non-target species are not presented in this section.

Supporting Clause 4.3: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 4.4: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 4.5: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 4.6: the scoring rationale appears to completely miss the point here. This SC looks at “*traditional fisheries knowledge and technologies...in order to assess their application to sustainable fisheries conservation...*”. The Evidence EP rationale provides no information to show that “*Traditional fishery knowledge has been investigated.*” – all that is states is that hake data (i.e. removals) are used in the stock assessment and management process. This theme is continued in the remaining EPs.

The rationale for this SC should be entirely revised and aligned with the issues that are under scrutiny here. As it stands, the score awarded is not adequately justified.

Thank you for the comment. The rational has been modified.

Supporting Clause 4.7: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 4.8: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 4.9: I agree that this is not relevant.

Thank you, no response needed.

Supporting Clause 4.10: I agree that this is not relevant.

Thank you, no response needed.

Supporting Clause 4.11: I agree that this is not relevant.

Thank you, no response needed.

5.	To support its optimum utilization, there shall be regular stock assessment activities appropriate for the fishery resource—its range, the species biology, and the ecosystem—all undertaken in accordance with acknowledged scientific standards
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Peer Review Comments:

Overall Comment: As for the previous Fundamental Clause it is clear that there is a huge amount of data available. For most of the Supporting Clauses this is used to good effect, but in a few cases the team does not appear to have fully addressed the issue under examination. Overall the scoring seems appropriate, but revision of some of the scoring rationales is necessary to justify the conclusion.

Supporting Clause 5.1: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 5.1.1: I agree that this is not relevant.

Thank you, no response needed.

Supporting Clause 5.1.2: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 5.2: the rationale does not do justice to the work that is reported elsewhere in the report. In particular:-

- Process EP: no information is presented in the rationale to show that there is a system with research capacity to assess and monitor “*..ecosystem changes resulting from fishing activity, pollution or habitat alteration.*” [My emphasis]. The role of NOAA in conducting and reviewing EAs is not a demonstration of this (unless this can be shown to be a relevant activity).
- Current status / Appropriateness / Effectiveness EP: the evidence presented here is inadequate, and should include some “for example” studies, and also name the institutions that provide the research capacity.
- Evidence Basis EP: as for the first EP, the evidence does not cover the full breadth of this SC, and only considers how the impacts of fishing on the ecosystem have been evaluated.

The evidence presented in the earlier, descriptive, part of the report would seem to support the score awarded, but the scoring rationale by itself does not and requires substantial revision to do so.

Thank you for the comments. The rationale has been modified to show how research activities are carried out also to consider the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration.**Supporting Clause 5.3:** the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 5.4: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 5.5: the scoring is appropriate.

Thank you, no response needed.

6.	The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes, allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.
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Peer Review Comments:

Overall comment: it is clear that the combination of the US-Canada Treaty and the Pacific Coast Groundfish Fishery Management Plan provide reference points and harvest control rules that are appropriate for this fishery and that fully meet the requirements of this Fundamental Clause. Specifically:-

Supporting Clause 6.1: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 6.2: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 6.3: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 6.4: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 6.5: the scoring is appropriate.

Thank you, no response needed.

7.	Management actions and measures for the conservation of stock and the aquatic environment shall be based on the precautionary approach. Where information is
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deficient, a suitable method using risk assessment shall be adopted to take into account uncertainty.

Peer Review Comments:

Overall comment: the scoring here should take account, where relevant, of the impact of the fishery on non-target species. There is no mention of the non-target species in the descriptive text, nor consideration given where relevant here. This is an important omission that needs to be addressed.

I note that in the references for Supporting Clause there is a letter from DFO to MRAG in connection with a Marine Stewardship Council (MSC) condition of certification for Rougheye Rockfish **Thank you, this has been removed.**

Supporting Clause 7.1: the scoring is appropriate.

Thank you, no response needed.

Supporting Clause 7.1.1: the rationale focusses entirely on the target stock. This rationale would be appropriate for Supporting Clause 7.1 but not here. There is no mention in the rationale of how the PA is applied to impacts on non-target species (listed on page 236). There is, however, a description of management measures in the PFMC in section 6.4.1 of the report which provides for real-time closures in the event that rockfish or Chinook salmon catch limits are met; elsewhere (page 53) there is a description of rockfish conservation areas (RCAs). Neither are mentioned here, though this may be because the hake catch is more than 95% of the total catch and therefore these species are neither “main” nor “minor” – in which case it should be explicitly stated here (or ideally at an earlier point in the report) that non-target species are not assessed here.

I would ask the team to have a little more sympathy for the readers (and particularly the Peer Reviewers) by including more information about catch composition and the conclusions that have been drawn about what does or does not need to be assessed rather earlier in the report.

Thank you for the comment. The team worked to add the information on non-target species. The team would like to stress the great sympathy toward the PRs, who for sure helped in drafting a much better and complete report.

Supporting Clause 7.1.2: I agree that this is not relevant.

Thank you. According to the other PR clause has been scored to provide

Supporting Clause 7.2: I agree that this is not relevant.

Thank you, no response needed.

C. Management measures, implementation, monitoring, and control

8. Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable use of the fishery and based upon verifiable evidence and advice from available scientific and objective, traditional sources.

Peer Review Comments:

Overall comment: a key issue that has not been examined here is that of “blinding” of the cod-end mesh, which seems to be a risk of the technical measures allowing double-walled cod ends. By “blinding” I mean that the construction of the cod-end results in a misalignment of the meshes so that although the mesh of both walls meets the mesh size requirement, the effective mesh size of the two combined meshes is smaller than this (i.e. one mesh “blinds” the mesh of the other).

Evidence of “blinding” would be provided in a comparison of the catch size composition of vessels fishing single or double walled cod ends. The risk for the fishery is that double walled codends would catch more small fish, which could be detrimental to the stock.

Finally, has the team considered why the use of chafers is permissible in midwater trawls? My understanding is that chafers are used to protect the belly of the net from seabed damage, and the option of using them for midwater trawls is not clear to me unless seabed contact is likely to occur.

Supporting Clause 8.1: the scoring is appropriate. The summary of the management regime duplicates §6.4.1 of the report. It would perhaps be appropriate to simply cross-refer to that section and provide a short precis here. **Done.**

Please note that there is some strange formatting / duplication in the scoring table, with the text of the Supporting Clause duplicated part way through the rationale for the second EP.

Thank you, this has been fixed.

Supporting Clause 8.1.1: the scoring is appropriate.

Supporting Clause 8.1.2: the scoring is appropriate. Please note that there is again some inappropriate formatting / repetition of the SC text part way through the table.

Supporting Clause 8.2: the scoring is appropriate.

Supporting Clause 8.3: the scoring is appropriate.

Supporting Clause 8.4: the scoring is appropriate. Again some repetition in the table. Was the intention to repeat the first row at the start of each page?

Supporting Clause 8.4.1: the scoring is appropriate. Repetition of the header row in the table again.

Supporting Clause 8.5: see comments about mesh “blinding” above – in at least one of the Supporting Clauses the team should consider the possible effect of double walled cod ends on gear selectivity. **Thank you. The issue of mesh blinding is discussed in Section 6.2.2 as one factor analysed during the consideration of changes in chafing gear regulations. Section 6.2.2. is**

referenced in the “Current Status” section. A summary of the conclusions about mesh blinding is now included on 8.5.1.

Supporting Clause 8.5.1: see comments about mesh “blinding” above – in at least one of the Supporting Clauses the team should consider the possible effect of double walled cod ends on gear selectivity and hence their relevant to minimising waste. Thank you. Text has been added to the “Current Status” section to describe the analysis of mesh blinding and other issues associated with the changes in gear regulations, with reference to the more detailed discussion in 6.2.2.

Supporting Clause 8.6: my feeling is that this SC is not relevant for mobile gear.

Supporting Clause 8.7: see comments above about “blinding” of meshes when double walled cod ends are used. This should also be considered here. Thank you. Reference to this issue has been added to the “Process” section.

Supporting Clause 8.8: the scoring is appropriate.

Supporting Clause 8.9: see comments above about “blinding” of meshes when double walled cod ends are used. This should also be considered here. Thank you for the comment. Since the 2019 change in regulations, full flexibility is accorded in the use of mesh size, chafing gear and double-walled codends, so the use of double walled codends to create smaller effective mesh size would be legal. The rationales are explained in 6.2.2, but stated briefly they all come down to the recognition that under a system of individual and cooperative quota limits, 100% observation and full catch accounting, the incentives are to innovate to stay away from bycatch or unmarketable or protected species, which represent only costs to fishing vessels.

Supporting Clause 8.10: I agree that this is not relevant.

Supporting Clause 8.11: the scoring is appropriate.

Supporting Clause 8.12: the scoring is appropriate.

Supporting Clause 8.13: I agree that this is not relevant.

9.	Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards, guidelines, and regulations.
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Peer Review Comments:

Supporting Clause 9.1: the scoring is appropriate.

Supporting Clause 9.2: the scoring is appropriate.

Supporting Clause 9.3: the scoring is appropriate.

10. An effective legal and administrative framework shall be established and compliance ensured through effective mechanisms for monitoring, surveillance, control, and enforcement for all fishing activities within the jurisdiction.

Peer Review Comments:

Supporting Clause 10.1: the scoring would be appropriate if it was supported by some evidence of the number of transgressions (if any) associated with the certified fleet and operators. This information does not appear to be presented in the report. **Thank you. Compliance data have been added to the “Current Status” section.**

Supporting Clause 10.2: the scoring is appropriate.

Supporting Clause 10.3: I agree that this is not relevant.

Supporting Clause 10.3.1: I agree that this is not relevant.

Supporting Clause 10.4: I agree that this is not relevant.

Supporting Clause 10.4.1: I agree that this is not relevant.

11. There shall be a framework for sanctions of adequate severity to support compliance and discourage violations and illegal activities.

Peer Review Comments:

Overall comment: there is ample evidence in the report that the US fishing fleet is subject to regulation and legislation that provides sanctions. The rationales provided here are not, however, adequate to demonstrate explicitly what the nature of these sanctions are, and that they have the severity required by the Supporting Clauses. As it stands, the scoring is not adequately supported by the rationales. These should be revised to include more detail about the nature and magnitude of the sanctions.

Supporting Clause 11.1: it is clear that a range of laws are in place, but there is no explanation of how the severity of sanctions are adequate – indeed the scale of sanctions (maximum fine / permit suspension etc) is not stated. This information must be available and should be stated in the rationale to justify the score awarded. **Thank you. Information on sanctions policy and schedule of penalties has been added to the “Current Status” section.**

Supporting Clause 11.2: again, there is no actual statement of the severity of the sanctions available or their nature (e.g. fines, suspension of permits or other sanctions). **Reference to information in 11.1 has been added.**

Supporting Clause 11.3: again, there is no actual statement of the severity of the sanctions available or their nature (e.g. fines, suspension of permits or other sanctions). This is compounded by the following statement: *“Evidence provided in Supporting Clauses 11.1 and 11.2 substantiates that sanctions for violations are severe and remove benefits of IUU fishing from any offender.”* As already noted, neither SC11.1 nor 11.2 provide this evidence. **Evidence has now been added to 11.1.**

Finally, the second EP requires that “*Sanctions are applied transparently and consistently across the board.*” Where is the evidence of this for IUU fisheries? This is something of a Catch-22 in that if there is no IUU fishing, the evidence won’t exist – however the team should address this explicitly by (for instance) demonstrating that sanctions are applied to other offences under the same legislation and that there is thus a legitimate expectation that the same sanctions would apply to IUU fishing. **Thank you for this comment. Language to that effect has been added to the “Current Status” section.**

Supporting Clause 11.4: I agree that this is not relevant.

D.	Serious Impacts of the Fishery on the Ecosystem
12.	Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.
<p>Peer Review Comments:</p> <p>Overall comment: ETP species!!! Thank you. More complete information regarding ETP species interactions has been added to the background section and where relevant under fundamental clauses in this section.</p> <p>Supporting Clause 12.1: the scoring is appropriate.</p> <p>Supporting Clause 12.2: I note that this is not a scoring clause.</p> <p>Supporting Clause 12.2.1: great to see (at last) some evidence that species other than <i>M. productus</i> are caught by the fishery. It would have been much nicer to see this information far earlier in the report however. Thank you, this information has been added to the background section of the report.</p> <p>It is evident from these data that there are no “main” associated species <i>sensu</i> Appendix 1 Part 3 of RFM v2.1. The scoring and rationale is appropriate for these species.</p> <p>Supporting Clause 12.2.2: it is evident that there are no “minor” associated species <i>sensu</i> Appendix 1 Part 3 of RFM v2.1. The scoring and rationale is appropriate for these species.</p> <p>Supporting Clause 12.2.3: the evidence presented for the Process EP states that there are outcome indicators set for stocks managed through the PFMC process. The table presented in SC 12.2.1 lists over 20 non-target species. There is no indication which of these 20+ species are managed under the PFMC either here or elsewhere in the report; nor which of them are “ecosystem component” species subject to a lower level of monitoring. Because of these omissions, it is impossible for the reader to evaluate whether there is evidence that the EP requirements are met. For those species with ABCs / OFLs / ACLs, are these currently met? For those species lacking them, what do their trends show?</p>	

With regard to the Current Status EP, it is reassuring that none of the species caught in the fishery are in Appendix F of the PFMC. However the text presented for big skate (its redesignation as an individual stock rather than an “ecosystem component”) has no relevance to the issue being tested here, which is whether or not the outcome indicators for relevant species are being achieved and whether impacts are reversible. This is more relevant for the final EP.

With regard to the Evidence EP, the claims made here that “...stocks in the FMP are monitored and assessed with sufficient regularity to substantiate the effectiveness of reference points and harvest controls with the objective of maintaining stocks at healthy levels.” may very well be true, but no evidence is presented here, elsewhere in the report, nor in the single supporting document (the PFMC, which is a management plan and not a report of current stock status for any of the species caught by the fishery) to show this.

Overall, the evidence presented for this Supporting Clause is not adequate to justify the score awarded, and more information is needed to justify the scoring outcome.

Supporting Clause 12.2.4: it is indicated that the only ETP species that may interact with the fishery are Chinook salmon, short tailed albatross, and some marine mammals. Information is presented to indicate that interactions with all of these species are being addressed by the management process.

A significant omission here and elsewhere in the report are any numerical data describing the magnitude and frequency of ETP species interactions. As noted in the overall comments at the start of the review, it is clear from other publications that these data exist, and this omission can therefore be easily addressed by the team.

This omission is a particular issue for the final “Evidence Basis” EP, where the team have essentially just restated the requirements of the RFM Standard rather than presenting any actual evidence. The only evidence presented in the report is anecdotal: Amanda Gladics met with the team and presented data (not reported here) about albatross interactions; and in the case of Chinook salmon is in fact absent from the scoring rationale. If the report contained actual numerical data, then this would make the case that this EP is met; as it stands, there is no evidence in this report to demonstrate this and the scoring is not therefore justified.

Thank you for this comment. Significant revisions to the this supporting clause have been made, including the enumeration of ETP species interactions. As a consequence, the “evidence basis” EP has been scored down in relation to data on marine mammal interactions, as it is outdated, and, consequently, a minor NC has been raised.

Supporting Clause 12.2.5: the scoring rationales presented here do not adequately address the Evaluation Parameters.;

The rationale for the “Process” EP bears no relation or cross-reference to that in the preceding Supporting Clause where there is a description of the management response to short tailed albatross. This is relevant here, and certainly more relevant to the fishery than the text about eulachon, which even the team conceded in the rationale is “*not pertinent*” to the Unit of Assessment.

The Current Status EP focuses entirely on salmon impacts – some reference to the work that has been done on seabird interactions and sea mammal monitoring is necessary to justify the score here.

The Evidence basis scoring rationale refers back to SC 12.2.4 and is therefore deficient for exactly the same reasons – there are no data in this report that describe the level and significance of interactions with any of the ETP species mentioned.

Again, a substantial revision is needed to present sufficient information to justify the score awarded.

Thank you. Revisions have been made, mostly to 12.2.4 and referenced in 12.2.5, but the team was trying here to stay true to the SC, which is specifically asking about “outcome indicators” pertaining to ETP status. That’s why the focus here is on catch limits or PBRs where they exist, because this is what we consider as “outcome indicators” in this context. Otherwise, this SC is identical to the preceding one.

Supporting Clause 12.2.6: the scoring is appropriate since this is a pelagic fishery and habitat impacts are therefore trivial.

Supporting Clause 12.2.7: the scoring is appropriate since this is a pelagic fishery and habitat impacts are therefore trivial.

Supporting Clause 12.2.8: the rationales are incomplete and the score is therefore not justified. There is no text at all for either the Current Status or Evidence EPs.

The text that is presented (for the Process EP) does not address the issue tested by the Supporting Clause, which is that “*There shall be outcome indicators...*”; there is no mention of any outcome indicators in the rationale. To be quite honest I would be inclined to question the relevance of this Supporting Clause to the fishery in question.

The omissions require attention, and the text that is already provided should be revised so that it is relevant to the issues tested here.

All this said, a score of 10 would ultimately seem appropriate for this fishery given that it only interacts with pelagic habitats.

Thank you. Text has been added where it was previously omitted. Again, the concept of “outcome indicators” within the management system to ensure protection of habitats is admittedly difficult to conceptualize, but we justified including closed areas, and designated EFH and HAPCs here, as they are designated and monitored based on indicators of importance and health.

Supporting Clause 12.2.9: the scoring is incomplete and the score is therefore not justified. There is no text presented for the Process ETP.

Again, the text that is presented here does not address the issue tested by this Supporting Clause which is that:-

“The fishery management organization shall consider the most probable adverse impacts of the fishery under assessment on the ecosystem (Appendix 1, Part 6), by assessing and, where appropriate, addressing and or/correcting them, taking into account available scientific information and local knowledge.” [My emphasis]

The rationale that is presented for the “Current Status” and “Evidence Basis” EPs considers the exact opposite – the impacts of the ecosystem on the hake fishery, rather than *vice-versa*. No text is provided for the “Process” EP.

The omission of any rationale for the “Process” EP requires attention, and the text that is already provided should be revised so that it is relevant to the issues tested here (in this regard, please note my comments for Supporting Clause 12.2.11, which appears to have a rationale that is more relevant to this Supporting Clause).

Thank you. We’ve brought much of the rationale from 12.2.11 up to this SC, in response to the peer reviewer’s feedback that we had reversed the subject and object in our rationale.

Supporting Clause 12.2.10: although a scoring rationale is presented for each EP in this, case, the rationales are again back-to-front: they consider the impact of the ecosystem on the fished stock, and not vice-versa (except for the Evidence Basis EP, but this erroneously considers that the evidence already presented (about impacts of the ecosystem on the fishery) are in fact evidence of the impact of the fishery on the ecosystem, which is not a tenable argument).

The rationales all require revision to address the issue tested in this Supporting Clause in order to justify the score awarded (again, see my comments on 12.2.11 below).

Again, we have a situation where the concept of “outcome indicators” in relation to ecosystem management objectives for the fishery in question, or the fishery management system, are difficult to define. Hence the team’s focus on indicators of ecosystem health that are tracked, and which, when anomalies are discovered, bear upon fishery management decisions where appropriate. The rationale has been amended to make this connection more overt.

Supporting Clause 12.2.11: I am now starting to wonder if there is an editing error at play here. The text presented here seems to be more relevant to the preceding Supporting Clauses (12.2.9 & 12.2.10) than it does here.

The text presented here describes how a Fisheries Ecosystem Plan team was formed in 2013 to *“identify and prioritize research needs and provide recommendations to address gaps in ecosystem knowledge and FMP policies, particularly with respect to the cumulative effects of fisheries management on marine ecosystems and fishing communities.”*

This is great – but completely irrelevant for this Supporting Clause, which asks that management considers *“...consider the most probable adverse human impacts on the stock/ecosystem under consideration...”*, and not vice-versa.

I must ask the team to yet again reconsider the relevance of the scoring rationales presented here to this Supporting Clause. The current text is not relevant and does not support the score awarded.

We recognize this is the language under SC 12.2.11, but then, when looking at the specific language in the EDs, the phrase is repeatedly “...the most probable adverse impacts of the unit of certification on the ecosystem” so the evidence and justifications here address these EDs, which we believe it directly does, as that is the stated intent and function of the Fishery Ecosystem Plan. We agree that this makes this supporting clause fairly redundant to SC 12.2.9

Supporting Clause 12.3: the scoring is appropriate.

Supporting Clause 12.4: I agree that this is not relevant.

Supporting Clause 12.5: the scoring is appropriate.

Supporting Clause 12.6: there are a number of issues that the team must address to justify the score awarded.

Process EP: the text presented only partially addresses the issue under consideration. No evidence is presented to show how the social impacts of fishing gear on coastal fishing communities has been researched. **The team struggled to understand how fishing gear can have an impact on coastal fishing communities, or even how it could be researched. So we took the view that as long as there is a process in place to consider the effect of fishing activities on coastal communities, that was sufficient for this EP, mainly because, if gear somehow could have an impact, this could be examined within this process.**

Current Status EP: the only evidence presented here concerns the effect of climate change on fisheries and communities. Although an important issue, this has no relevance to this Supporting Clause and should be included elsewhere in the report. No information is presented about the environmental or social impacts of the fishery on biodiversity or coastal communities.

Evidence Basis EP: the rationale states that *“The data underpinning the development of relevant research is adequate to substantiate it”*. This is teleological, it neither means nor proves anything.

Supporting Clause 12.7: the scoring is appropriate. There are, however, no References cited in support of the scoring.

13.	Where fisheries enhancement is utilized, environmental assessment and monitoring shall consider genetic diversity and ecosystem integrity.
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Peer Review Comments:

This is not an enhanced fishery so the decision not to score this Fundamental Clause and the Supporting Clauses is appropriate.