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Oregon and Washington Pink Shrimp

MSC 2nd Re-Assessment (Oregon) MSC 1st Re-Assessment (Washington)

Public Comment Draft Report

Prepared for Oregon Trawl Commission and
Pacific Seafood Group

Certificate No: MRAG-F-0034 and MRAG-F-0045

MRAG Americas, Inc.
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Glossary

APA	Administrative Procedure Act
BRD	Bycatch reduction device
CCE	California Current Ecosystem
CEP	Coordinated Enforcement Process (OSP)
CPS	Coastal pelagic species
CPUE	Catch per unit effort
CZMA	Coastal Zone Management Act
DFO	Fisheries and Oceans Canada
DPS	Distinct population segment
E	Endangered
EEZ	Exclusive economic zone
EFH	Essential fish habitat
EIS	Environmental impact statement
ENGO	Environmental non-governmental organization
EO	Executive Order
ESA	Endangered Species Act
ESU	Evolutionarily significant unit
ETP	Endangered, threatened, or protected
FCR	Fisheries Certification Requirements (MSC)
FCMA	Fishery Conservation and Management Act
FEP	Fishery ecosystem plan
FMP	Fishery management plan
HAPC	Habitat area of particular concern
HT	Heavily trawled
IEA	Integrated Ecosystem Assessment
ITQ	Individual transferable quota
LED	Light-emitting diode
LT	Lightly trawled
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRP	Marine Resources Program
MSA	Magnuson-Stevens Fishery Conservation and Management Act or Magnuson-Stevens Act
MSC	Marine Stewardship Council
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NWFSC	Northwest Fisheries Science Center
NWIFC	Northwest Indian Fisheries Commission
OAR	Oregon Administrative Rule
OCZMA	Oregon Coastal Zone Management Association
ODFW	Oregon Department of Fish and Wildlife
OFWC	Oregon Fish and Wildlife Commission
OLE	Office of Law Enforcement (NOAA)
OPAC	Ocean Policy Advisory Council
ORS	Oregon Revised Statute
OSP	Oregon State Police
OTC	Oregon Trawl Commission
PacFIN	Pacific Fisheries Information Network
PFMC	Pacific Fishery Management Council
PRA	Paperwork Reduction Act
PSMFC	Pacific States Marine Fisheries Commission
RCA	Rockfish conservation area

RCW	Revised Code of Washington
RFA	Regulatory Flexibility Act
RIR	Regulatory impact review
ROV	Remotely operated vehicle
SLH	Sea level height
SRE	Single-rig equivalent
SREH	Single-rig equivalent hours
SST	sea surface temperature
T	Threatened
TAC	Total allowable catch
UoA	Unit of assessment
UoC	Unit of certification
USFWS	U.S. Fish and Wildlife Service
VMS	Vessel monitoring system
VPA	Virtual population analysis
WAC	Washington Administrative Code
WCGOP	West Coast Groundfish Observer Program
WDFW	Washington Department of Fish and Wildlife
WFWC	Washington Fish and Wildlife Commission
WOC	Washington, Oregon, California

1 Executive Summary

This Client Draft Report sets out the results of the Marine Stewardship Council (MSC) assessment of the Oregon and Washington pink shrimp (*Pandalus jordani*) trawl fishery against the MSC Principles and Criteria for Sustainable Fishing.

MRAG Americas was contracted in 2017, by the Oregon Trawl Commission and Pacific Seafood Group to undertake the recertification assessment of the Oregon and Washington pink shrimp trawl fisheries, which were originally certified in December 2007, and October, 2015, respectively.

There are two units of certification identified, and assessed during the recertification process:

Species:	Pink (Ocean) Shrimp (<i>Pandalus jordani</i>)
Geographical Area:	West Coast USA, Oregon, Washington, California (WOC)
Method of Capture:	Otter Trawl
Fleet:	UoC 1: Oregon permitted vessels fishing in WOC and US Exclusive Economic Zone (EEZ) waters, landing in Oregon ports and UoC 2: Washington permitted vessels fishing in WOC and US EEZ waters, landing in Washington ports.
Stock:	This certification assesses the west coast ocean shrimp stock which extends from south east Alaska to California waters. The assessment considers the health of the coast wide stock and the effects of the Oregon and Washington permitted harvests on that stock
Management System:	Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife
Client Group:	Oregon Trawl Commission, Pacific Seafood Group

The assessment was undertaken in accordance with the MSC Fisheries Certification Requirements v2.0 and using the MSC Guidance to MSC Fisheries Certification Requirements v2.0 which sets out the assessment and certification process. As a result, to date, the following steps have been undertaken:

- Announcement of the assessment
- Appointment of the recertification assessment team
- Notification on the use of the assessment tree
- Notification and undertaking of the site visit
- Production of the client draft report that describes the background to the fishery, the fishery management operation and the evaluation procedure and results
- Production of the Peer Review Report
- Response to Peer Review comments, and report revisions where necessary
- Production of the Public Comment Draft Report
- ~~• Response to stakeholder comments on the Public Comment Draft Report~~
- ~~• Review by MRAG Americas' qualified nominated Reviewer and Decision Maker~~
- ~~• Consultation on the Final Report and Determination~~
- ~~• Production of the Public Certification Report~~

The assessment of the fishery was performed by Tom Jagielo, Amanda Stern-Pirlot, and Susan Hanna, covering Principle 1 (target stock), Principle 2 (ecosystem) and Principle 3 (management) components of the MSC standard respectively. Amanda Stern-Pirlot was also the Team Leader.

A recertification site visit was conducted in Newport, Oregon during April 19 – 20th, 2017. During that time the assessment team met with scientists, fishery managers and stakeholders as well as client (Oregon Trawl Commission and Pacific Seafood Group) representatives. The

site visit for this recertification assessment was conducted in conjunction with the fourth annual surveillance audit for the Oregon fishery and second annual surveillance audit for the Washington fishery. There were no meetings requested from additional stakeholders (ENGOS) and no written submissions were received ahead of the site visit.

The following strengths and weakness were identified with respect to each Principle:

Principle 1

Strengths:

- The stock is considered healthy and the short-term outlook is positive. Studies have demonstrated that recruitment is mainly controlled by environmental factors and the effects of fishing are relatively minor.
- The shrimp fishery is being managed responsibly and adaptively. Although stock abundance is largely controlled by environmental factors, long-standing harvest strategies and management tools, and newly developed limit and target reference points provide for additional protection for recruitment and the spawning biomass under poor environmental conditions.
- The work conducted by the scientific staff responsible for the assessment of the stock and the impacts of the fishery is exemplary. Their dedication and excellent rapport with harvesters is widely recognized within the industry

Weaknesses:

- The stock assessment methodology employed for pink shrimp is innovative, and appropriate for a species where stock size is driven primarily by environmental factors. However, It has been observed that recruitment-environment correlations commonly break down as more data are accumulated (Myers, 1998). It will be important to re-visit the recruitment index periodically to ensure its continued utility as an indicator of the status of the pink shrimp stock.
- At present, the pink shrimp stock assessment is informed primarily by Oregon fishery data. Washington data collection programs are in place, and, when mature, the Washington datasets (e.g., age composition, and CPUE information), together with the long time series from Oregon, will afford a more synoptic assessment of the stock.

Principle 2

Strengths:

- There is excellent cooperation between management and harvesters resulting in continued development and implementation of measures (i.e. BRD's and LED light arrays) to minimize bycatch and impacts on non-target species and stocks, resulting in a very clean fishery with no significant bycatch.
- Research into impacts of the fishery on Pacific eulachon, an ETP species, has been rigorous and ongoing, and the fishery has been very adaptive to developments enabling a substantial decrease in eulachon catch through widespread adoption of mitigation technologies even ahead of regulatory requirements to do so.

Weaknesses:

- More long-term, quantitative information on the effects of the fishery on benthic structure is needed in order to quantify level of threat the fishery may impose on delivery of ecosystem services from these structures. Ecosystem services is what quality habitat delivers to an ecosystem in terms of cover, rearing, and foraging in order for a particular species can thrive, and be harvested by the fishery.

Principle 3

Oregon

Strengths

- The management system actively anticipates and identifies emerging conservation issues.

- The management system incorporates a strong and effective consultation process among stakeholders, management and enforcement entities.
- The management system incorporates active industry participation in the development and testing of conservation technologies.
- The management system has an FMP containing explicit short-term and long-term objectives.
- The management system provides incentives for sustainable fishing.
- The management system conducts an active research program and shares research results with shrimp managers in other states.
- Management decision-making is transparent, adaptive and responsive to changing conditions.
- The management system contains informal but effective mechanisms for resolving disputes.
- There is a high level of compliance with regulations.
- The management system is subject to regular internal performance review and has now instituted periodic external review of management policy.

Weakness

- There exists the potential for activation of latent permits and subsequent increases in effort.

Washington

Strengths

- The management system actively anticipates and identifies emerging conservation issues through active inter-state collaboration.
- The management system has a formal process to observe the legal rights of treaty Indian tribes.
- The management system incorporates a strong and effective consultation process among stakeholders, management and enforcement entities.
- The management system incorporates active industry participation in the development and testing of conservation technologies.
- The management system provides incentives for sustainable fishing.
- The management system participates collaboratively with research conducted by other state and federal entities.
- Management decision-making is transparent, adaptive and responsive to changing conditions.
- The management system contains informal but effective mechanisms for resolving disputes.
- There is a high level of compliance with regulations.
- The management system is subject to regular internal performance review and has now instituted periodic external review of management policy.

Weaknesses

- The management system lacks a formal research plan.
- There exists the potential for activation of latent permits and subsequent increases in effort.

Based on the information available to date, the Oregon and Washington Pink Shrimp Trawl Fishery achieved overall scores of 88.3 for Principle 1, and 94.3 for Principle 2. The Oregon UoA achieved a score of 95.8 for P3, and the Washington UoA achieved a P3 score of 94.0. As such, the fishery is recommended for recertification against the MSC Standard, as no indicator scored less than 60, and all average principle scores were above 80.

All conditions of certification from the previous assessment have been closed.

All comments and information presented by the peer reviewers was considered and the report revised as necessary prior to the publication of the Public Comment Draft Report (PCDR) in December of 2017.

2 Authorship and Peer Reviewers

The Oregon and Washington pink shrimp recertification assessment team consisted of three individuals: Tom Jagielo (Principle 1 Team Member), Amanda Stern-Pirlot (Team Leader and Principle 2 Team member), and Susan Hanna (Principle 3 Team Member).

Susan Hanna, Ph.D. – Dr. Hanna is professor emeritus of marine economics at Oregon State University. Her research and publications are in the areas of fishery economics, fishery management, fishery policy and property rights. She has served as a scientific advisor to the Pacific Fishery Management Council, Northwest Power and Conservation Council, National Marine Fisheries Service, National Oceanic and Atmospheric Administration and the U.S. Commission on Ocean Policy. She has been a member of the National Research Council's Ocean Studies Board and several NRC Committees. Dr. Hanna has participated in several Marine Stewardship Council assessments as both assessor and reviewer. She has been an assessment team member for Bering Sea/Aleutian Islands and Gulf of Alaska Pollock, Bering Sea/Aleutian Islands and Gulf of Alaska Pacific Cod, Bering Sea/Aleutian Islands and Gulf of Alaska Flatfish, U.S. West Coast Groundfish Trawl, and Oregon Dungeness Crab fisheries. She has reviewed the first Bering Sea/Aleutian Islands and Gulf of Alaska Pollock assessment, the first Oregon Pink Shrimp assessment, and the assessments of Fogo Island Cold Water Shrimp and Louisiana Blue Crab.

Tom Jagielo, M.Sc. – Tom has a wide breadth of experience in marine fish science and habitat studies in marine and freshwater systems. He has done consulting in quantitative fisheries science since 2008. Previously he served for 24 years with the Washington Department of Fish and Wildlife, and 6 years with the Fisheries Research Institute at the University of Washington in Seattle. He has specialized in groundfish stock assessment and survey design, to assess marine fish populations for sustainable fisheries management. He has produced groundfish stock assessments used by the Pacific Fishery Management Council, including analysis of lingcod, black rockfish, and yelloweye rockfish populations. Tom has experience working with government agencies, commercial and recreational fisheries groups, Native American tribes, community organizations, and both national and international advisory groups. He has received appointments to the Scientific and Statistical Committee of the Pacific Fishery Management Council, the Technical Subcommittee of the US-Canada Groundfish Committee, and the Pacific Coast Ocean Observation System. He has published in peer-reviewed journals and symposium proceedings, and has presented papers at national and international meetings. Tom received a B.S. degree in Biology from the Pennsylvania State University, and a M.S. degree in Fisheries from the University of Washington, where he also conducted post M.S. graduate studies in fisheries population dynamics and parameter estimation. Tom has served as an MSC Team Member or Peer Reviewer for fisheries in Europe, Australia, New Zealand and the US.

Ms. Amanda Stern-Pirlot serves as team leader for the assessment. She 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 as MSC Certification Manager, and is currently serving on the assessment team for New Zealand Orange Roughy and leading on assessment teams for Washington and California pink shrimp, and Danish plaice, fishmeal, and herring. She has worked together with other scientists, conservationists, fisheries managers and producer groups on international fisheries sustainability issues for the past 10 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 Fisheries 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.

As per the MSC requirements, two Peer Reviewers were selected by the Peer Review College to review the assessment report:

Julian Addison

Julian Addison is an independent fisheries consultant with 30 years' experience of stock assessment and provision of management advice on shellfish fisheries, and a background of scientific research on shellfish biology and population dynamics and inshore fisheries. Until December 2010 he worked at the Centre for Environment, Fisheries and Aquaculture Science (Cefas) in Lowestoft, England where he was Senior Shellfish Advisor to Government policy makers, which involved working closely with marine managers, legislators and stakeholders, Government Statutory Nature Conservation Organisations and environmental NGOs. He has also worked as a visiting scientist at DFO in Halifax, Nova Scotia and at NMFS in Woods Hole, Massachusetts where he experienced shellfish management approaches in North America. For four years he was a member of the Scientific Committee and the UK delegation to the International Whaling Commission providing scientific advice to the UK Commissioner. He has worked extensively with ICES and most recently was Chair of the Working Group on the Biology and Life History of Crabs, a member of the Working Group on Crangon Fisheries and Life History and a member of the Steering Group on Ecosystems Function. He has extensive experience of the MSC certification process primarily as a P1 team member but also as a P2 team member and team leader, undertaking MSC full assessments for the Newfoundland and Labrador snow crab fishery, the Ireland and Northern Ireland bottom grown mussel fisheries, both the Estonia and Faroe Islands Barents Sea cold water prawn fisheries, the Nephrops fishery in the Skagerrak and Kattegat, separate assessments for the Swedish, Danish and Norwegian Skagerrak and Norwegian Deep cold water prawn fishery, the Eastern Canada offshore lobster fishery and the Limfjord mussel and cockle fisheries. He has also undertaken MSC pre-assessments, numerous annual surveillance audits and has carried out peer reviews of MSC assessments in both Europe and North America of lobster, cold water prawn, razorfish, cockle and scallop fisheries. Other recent work includes a review of the stock assessment model for blue crabs in Chesapeake Bay, USA, and an assessment of three Alaskan crab fisheries under the FAO-based Responsible Fisheries Management scheme.

Md Golam Mustafa

Dr. Mustafa is a recognized expert on fisheries resource management, fisheries co-management, community access rights, and fisheries management policy. He brings 25 years of successful team leadership and experience with marine, coastal and inland water fisheries management. He worked closely with key government agencies, co-management communities, and other stakeholders to revise the wetland Management Policy, maintaining constructive long-term dialogue among organizations focused on wetlands policy and maintain constructive long-term dialogue among organizations focused on wetlands policy. Dr. Mustafa also has extensive experience with fisheries management tools including ecological modelling, biodiversity and impact assessments, bio-statistical analysis, and socioeconomic analysis. He designed and implemented fisheries resources monitoring and data collection systems and knows how to translate collected data into actionable programs. For example, he developed a model showing how length-based fish stock assessment can support community-based fisheries management, and applied in other co-management projects. As Scientist for the Enhanced Coastal Ecosystem project, WorldFish, Bangladesh and South Asia office, he is involved as lead Scientist – Co-Management.

He holds a PhD in Marine Fisheries Management and has published 59 papers in peer-reviewed journals on various fisheries and wetlands resources management topics. He has co-supervised 17 M.Sc Thesis in the fields of fisheries management. He is fluent in English and Bengali.

Dr. Mustafa has provided rational support for the Integrated Resources Management Plans (IRMP) for the 'Sundarbans (2010-2020) with the Forest Department; Key outcomes- Approved IRMP 2010 (Ministry of Environment and Forests, Bangladesh ratified the IRMP).

3 Description of the Fishery

3.1 Unit(s) of Assessment (UoA) and Scope of Certification Sought

3.1.1 UoA and Proposed Unit of Certification (UoC)

For Oregon:

Species:	Pink (Ocean) Shrimp (<i>Pandalus jordani</i>)
Geographical Area:	West Coast USA, Oregon, Washington, California (WOC)
Method of Capture:	Otter Trawl
Fleet:	Oregon permitted vessels fishing in WOC and US EEZ waters, landing in Oregon ports
Stock:	This certification assesses the west coast ocean shrimp stock which extends from south east Alaska to California waters. The assessment considers the health of the coast wide stock and the effects of the Oregon permitted harvests on that stock
Management System:	Oregon Department of Fish and Wildlife
Client Group:	Oregon Trawl Commission

The client group represents all Oregon permitted harvesters operating within the coastal and federal waters of the states of Washington, Oregon and California who are permitted to land in Oregon ports. Only those vessels that land in Oregon ports are eligible to access the fishery.

There are no other eligible fishers within this unit of certificate. As all harvesters permitted to land in Oregon are included.

For Washington:

Species:	Pink (Ocean) Shrimp (<i>Pandalus jordani</i>)
Geographical Area:	West Coast USA, Oregon, Washington, California (WOC)
Method of Capture:	Otter Trawl
Fleet:	Washington permitted vessels fishing in WOC and US EEZ waters, landing in Washington ports
Stock:	This certification assesses the west coast ocean shrimp stock which extends from south east Alaska to California waters. The assessment considers the health of the coast wide stock and the effects of the Washington permitted harvests on that stock
Management System:	Washington Department of Fish and Wildlife
Client Group:	Pacific Seafood Group

The fishery assessment covers all pink shrimp, *P. jordani*, landed from vessels operating in the Units of Certification until the point of landing, therefore the scope of certification ends at the point of landing. Beyond landing, any company that is part of the client group (currently Pacific Seafood Group, Ocean Gold, and Jesse's Illwaco Fish Co.) taking ownership of the product and wishing to identify it as MSC certified will need a CoC certificate. Members of the client group are listed on a schedule to the fishery certificate, which can be amended as necessary to accommodate companies joining or leaving the group. Other eligible fishers include those fishing on the certified UoA and landing in Washington State who are not members of the client group. A certificate sharing statement is published on the MSC website.

3.1.2 Final UoC(s)

(PCR ONLY)

The PCR shall describe:

- a. The UoC(s) at the time of certification.
- b. A rationale for any changes to the proposed UoC(s) in section 3.1(c).
- c. Description of final other eligible fishers at the time of certification.

(References: FCR 7.4.8-7.4.10)

3.1.3 Total Allowable Catch (TAC) and Catch Data

Table 1. TAC and Catch Data

TAC	Year	2016	Amount	n/a
UoA share of TAC	Year	2016	Amount	n/a
UoC share of TAC	Year	2016	Amount	n/a
Total green weight catch by UoC	Year (most recent)	2016	Amount	OR: 35.5 million lbs WA: 14.1 million lbs
	Year (second most recent)	2015	Amount	OR: 53.4 million lbs WA: 41.5 million lbs

3.1.4 Scope of Assessment in Relation to Enhanced Fisheries

As the candidate fishery operates on a wild stock, this section is not relevant.

3.1.5 Scope of Assessment in Relation to Introduced Species Based Fisheries (ISBF)

The candidate fishery is not considered an Introduced Species Based Fishery.

3.2 Overview of the fishery

3.2.1 History of the Fishery

Although pink shrimp were long known to occur off the Oregon and Washington coasts, the first documentation of commercial concentrations was made by exploratory cruises conducted by the Oregon Fish Commission (now ODFW) in 1951 and 1952.

In its early years small landings and lack of processing capacity kept the fishery from achieving economic viability. Three factors promoted its development as a commercial fishery. The first was a 1957 government incentive provided by the Oregon legislature, reducing the landings tax from 0.75 to 0.10 cent per pound. The second was the introduction of automatic peeling machines that replaced the slower hand peeling methods and allowed processing to become profitable. The third was the availability of larger more powerful double-rig vessels that enabled bigger catches. These combined actions spurred expansion of the Oregon fishery, first on the north coast (Washington), then following shortly after on the south coast (California) (Abramson et al., 1981).

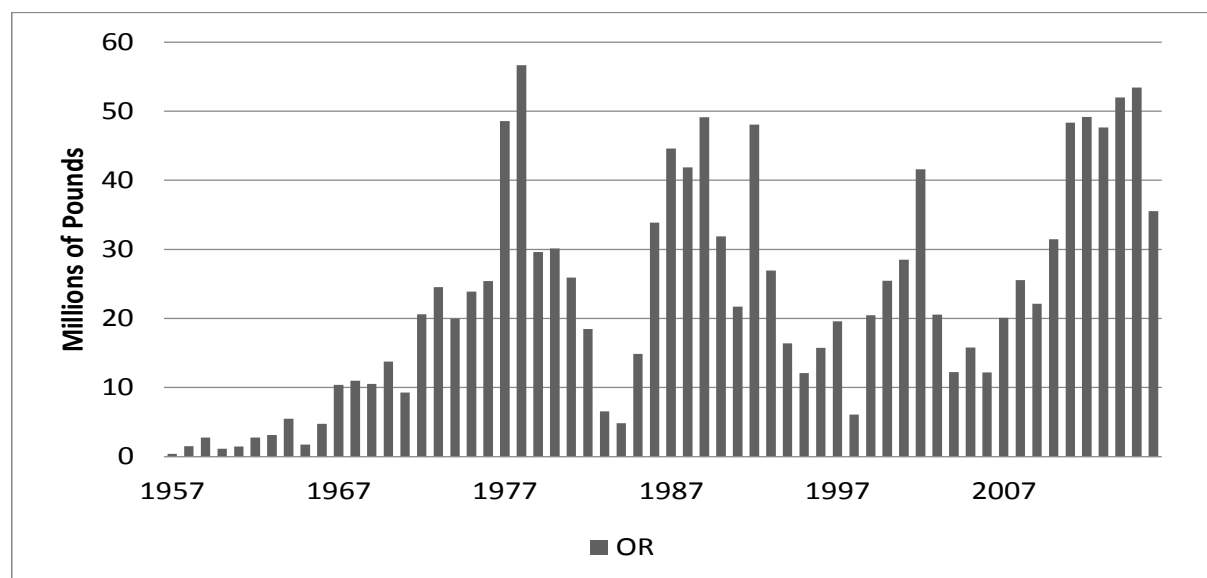


Figure 1. Pink shrimp landings (millions of pounds) in Oregon ports, 1957-2016. (Source: Groth 2017b)

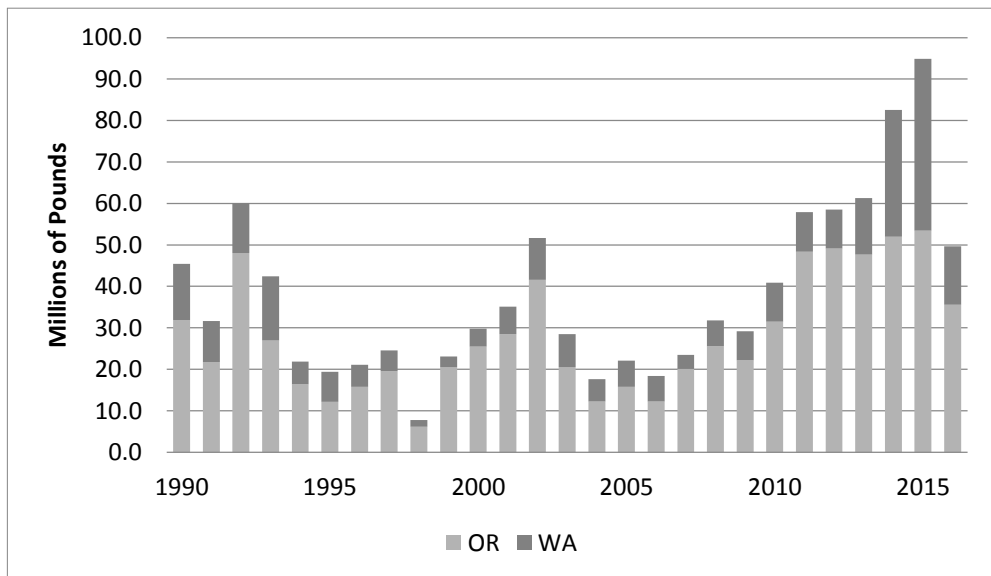


Figure 2. Pink shrimp landings (millions of pounds) in Oregon and Washington ports, 1990-2016. (Source: Groth, 2017b; Wargo, 2017a)

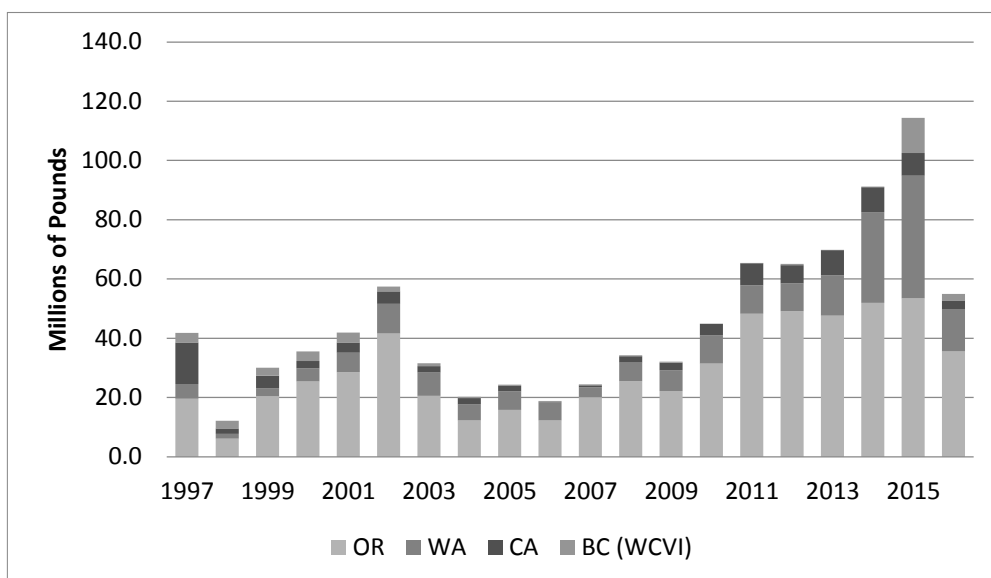


Figure 3. Pink shrimp landings (millions of pounds) in Oregon, Washington, California, and British Columbia (West Coast Vancouver Island), 1997-2016. (Source: Groth, 2017b; Wargo, 2017a, Clark, 2017).

From its 1957 origin through its first ten years, the Oregon shrimp fishery produced fairly low levels of landings (Figure 1), varying between 2.5 and 5.5 million pounds. By 1967 pink shrimp had become an important commercial fishery. All known pink shrimp grounds were accessible to the fleet and all major Oregon ports had shrimp processing facilities. Double-rigged trawls allowed larger catches. Favorable market conditions and high abundance levels for the ensuing five years led to increases in effort and continuing increases in the volume of shrimp landed. In 1972 the Oregon Fish and Wildlife Commission (OFWC) responded to the increase in landings and a concern for protecting spawning females by restricting the shrimp season to the period April 1 to October 15 (Abramson et al., 1981).

The 1970's saw legislative actions taken at the federal level that would have a large impact on state fisheries like Oregon pink shrimp. The 1973 Congressional "Eastland Resolution" committed the federal government to providing "all support necessary" to strengthen the US fishing industry (Heinz Center, 2000). This was followed in 1976 by the passage of the Fishery

Conservation and Management Act (FCMA), which extended US fisheries jurisdiction to 200 miles offshore and established the system of eight regional fishery management councils that is still in place. The Pacific Fishery Management Council (PFMC) was charged with managing fisheries off the coasts of Washington, Oregon, and California. Under the FCMA (later amended and renamed the Magnuson-Stevens Fishery Conservation and Management Act or Magnuson-Stevens Act) and in conjunction with federal capital assistance programs, West Coast fishing capacity expanded dramatically in both number of vessels and harvest efficiency (Young, 2001).

In 1977 a combination of high abundance, strong markets and favorable weather led to another increase in shrimp landings, and a record 48 million pounds was delivered to twenty Oregon processors. Whereas the early fleet had used semi-balloon style trawl gear, by the mid-70s many vessels were using a high-opening box trawl that increased catch efficiency. Improvements in electronics, including navigation equipment and depth sounders, allowed expansion of fishing grounds. Other gear improvements and greater fishing experience also contributed to increased fishing efficiency. The resulting fishery profits combined with government capacity assistance programs led to large-scale investment in new fishing vessels during this period (Abramson, 1981; ODFW, 2012g).

Pink shrimp landings in Oregon and Washington (1990-2016) are shown in Figure 2, and historical landings for Oregon, Washington and British Columbia (1997-2016) are contrasted in Figure 3. The expansion of fishing effort and the accompanying decline in catch per unit effort (CPUE) in the pink shrimp fishery prompted coast-wide concern among both fishing industry and state management agencies. In 1981, the states working through the PFMC developed a draft Fishery Management Plan (FMP) for the ocean shrimp fishery off Oregon, Washington, and California. The idea of the FMP was to be compliant with the national standards specified in the Fishery Conservation and Management Act and to introduce coast-wide uniformity of regulations across the three states. Since the shrimp fishery occurs primarily in the federal Exclusive Economic Zone (EEZ) it was thought that a federal plan would best serve the public interest as well as provide a broadened base of support for needed research (Abramson et al., 1981).

The draft FMP evaluated five alternative management strategies in the context of potential Council jurisdiction, and a sixth in the context of state implementation of the plan. Based on cost considerations, as well as a perceived potential for the three states to collaborate in the management of their pink shrimp fisheries, the PFMC recommended foregoing a federal FMP in favor of coordinated management by the three states. The states subsequently agreed on coordinated management measures, for example timing of seasons and limited entry programs, to control fishing effort. The Pacific States Marine Fisheries Commission (PSMFC) and state agencies have continued to work together to address emerging fisheries resource and management issues. Formal agreements between the states have been implemented through Memoranda of Understanding (MOU) and/or reciprocal rule making (TAVEL Certification, 2007).

By the early 2000s several actions taken to protect overfished groundfish stocks had a direct impact on the Oregon pink shrimp fishery. Strict groundfish retention limits on rebuilding groundfish stocks were implemented in the shrimp fishery. The limits were put in place for a season with the option of mid-season changes. As a means to reduce incidental catch, to the extent possible, the shrimp fishery adopted bycatch reduction devices (BRDs). After having partial season requirements for the use of BRDs in 2001 and 2002, the use of BRDs has been permanently required for all pink shrimp trawlers since 2003 (Oregon Administrative Rule 635-005-0190, cited in ODFW, 2004).

Rockfish Conservation Areas (RCAs), large area closures implemented in 2002 to protect rebuilding groundfish stocks, included restrictions on the use of trawl gear (NMFS NWR, 2012). By 2004 shrimpers were required by NMFS to file a declaration report in advance of fishing in any RCA. In 2003 the OFWC adopted a related requirement that any vessel fishing commercially for food fish or shellfish must cooperate with Federal or ODFW fishery observers

and accommodate observers on request, or face potential boat license sanctions including loss of the boat license (OAR 635-006-0140, cited in ODFW, 2004).

In 2003, a voluntary federal buyout instituted for trawl vessel permits removed almost half the capacity of the west coast trawl fleet. The buyback program was funded as a loan to the trawl sector to be repaid through the assessment of a landings tax (NMFS, 2004). As part of this program the Oregon shrimp fishery was lent \$2,228,844 and agreed to repayment through a voluntary assessment rate of 4.65% of landed value. The loan balance [as of November 2011] was fully paid off in April 2012 by the Oregon shrimp fishery and in late 2013 by the Washington fishery (Oregon Trawl Commission, 2017).

The OR and WA pink shrimp fishery is linked to the West Coast groundfish fishery through multiple use vessels and multiple permit ownership. Many groundfish fishermen also hold permits for, and fish in, the Oregon pink shrimp as well as the Dungeness crab fishery. Even as the trawl permit buyback reduced the total number of shrimp permits that can be fished, more recent changes in the West Coast groundfish management affect the potential activation of dormant pink shrimp permits. An individual transferable quota (ITQ) program was implemented for the West Coast groundfish trawl fishery in 2011. Under the program the mechanism used to allocate total quotas changed from bimonthly trip limits to individual quota shares. With quota shares, vessels owners have greater flexibility to time their groundfish landings in ways that permit greater participation in the pink shrimp fishery.

3.2.2 The Fleet and Gear

The Oregon pink shrimp fleet comprises trawl vessels ranging in length from 38 to 105 ft with an average length of 65 ft. Most vessels fish with double-rigged box trawl gear. All vessels are required to use bycatch reduction devices when targeting pink shrimp (NWFSC, 2012, ODFW, 2012g).

Vessels fish at depths between 75 and 125 fathoms on mud and mud-sand substrate. Fishing takes place in daylight when shrimp are more concentrated near the bottom. Fishers often collaborate to find areas of highest densities and largest size shrimp. At-sea handling of the catch consists of emptying the trawl net codends into a hopper, conveying, sorting, and packing on ice for transport to port. Onshore processing consists of cooking and mechanically peeling the shrimp. Most product is frozen for export (ODFW 2012g; Pettinger 2012).

Figure 4 shows the number of vessels landing pink shrimp into Oregon and Washington ports between 1990-2016. No recreational or treaty tribal fisheries exist for pink shrimp.

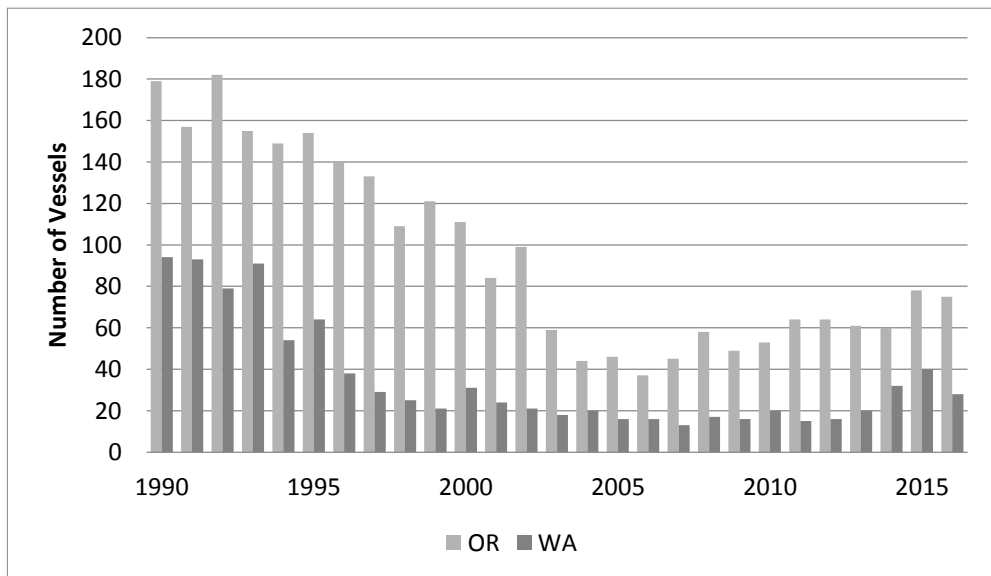


Figure 4. Number of vessels making landings in Oregon and Washington ports, 1990-2016. (Source: Groth, 2017b; Wargo, 2017a) Note: Vessel counts are not additive as some vessels make landings in both States.

Shrimp price and abundance play important roles in determining fleet size in the pink shrimp fishery. The average ex-vessel price for shrimp in 2011 was \$0.51/lb, an increase over previous years. Abundance was high (ODFW, 2012). In 2011, sixty-four vessels participated in the Oregon fishery, an increase from fifty-three vessels in 2010. Several vessels that hadn't participated in recent years re-entered the fishery in response to either favorable shrimp prices or the increased flexibility afforded by the groundfish trawl ITQ program (ODFW, 2012). A small number of Oregon vessels landed product in California (2-3) and Washington (4-5) in 2011 (Pettinger, 2012). Total ex-vessel of value the 2011 Oregon shrimp landings was \$24,610,852 (ODFW, 2012).

Also influencing patterns of shrimp fishing activity are processor-imposed trip limits on the size of landings. Variability exists among individual processors, but most processors keep shrimp vessels on rotations of 5-9 days and limit them according to the plant's daily processing capacity. Processor trip limits may change within a season (Pettinger, 2012; Jones, 2012 pers. comm.).

Fleet effort, measured in number of trips and hours fishing, is variable. Over the past decade (2007-2016), the number of trips ranged from 585 to 1283 in Oregon, and from 145 to 911 in Washington (Figure 5). From 2011-2016, hours of fishing ranged from 32,600 to 47,900 in Oregon, and from 9,400 to 39,600 in Washington (Figure 6).

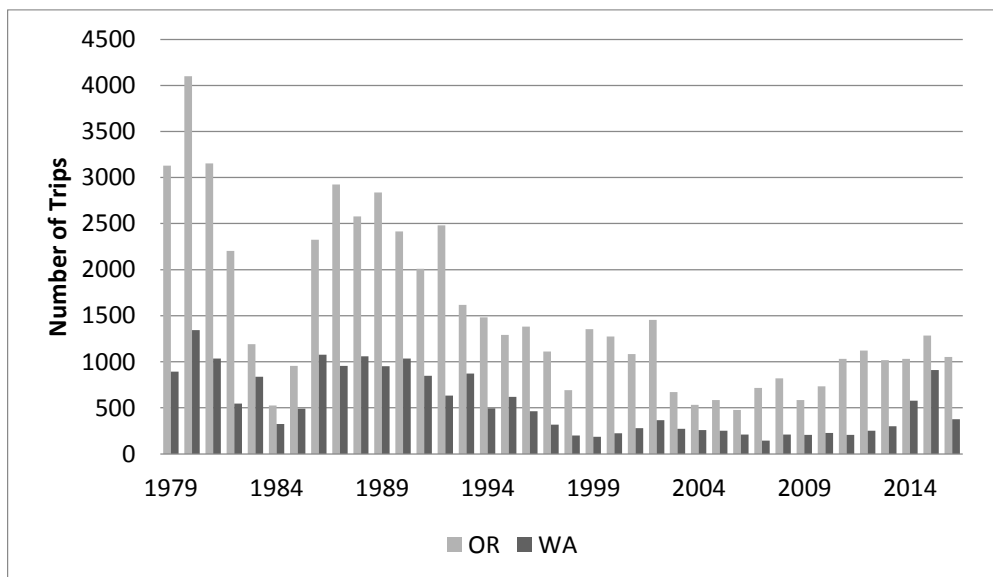


Figure 5. Annual number of trips landing pink shrimp in Oregon and Washington ports, 1979-2016. (Source: Groth 2017b, Wargo 2017b)

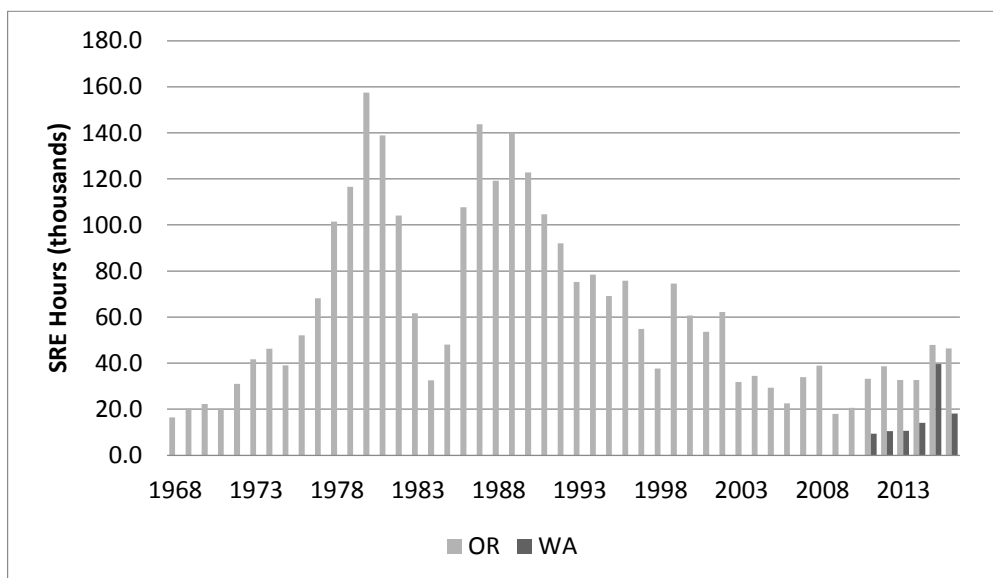


Figure 6. Fishing effort for pink shrimp landed in Oregon, 1968-2016, and Washington, 2011-2016. Note: 1000's of single-rig equivalent (SRE) hours: 1SRE hour = (1 double rig hourX1.6). (Source: Groth, 2017b; Wargo, 2017c)

3.2.3 Harvest Controls

The fishery is managed through a variety of input controls, including mandatory commercial fishing vessel licenses, limited entry shrimp fishing permits, season limits, maximum count per pound, bycatch reduction devices and incidental catch limits.

- All commercial fishing vessels used in the state must hold a current Commercial Fishing Boat License (OAR, 2012a).
- All vessels landing pink shrimp in Oregon ports must have a pink shrimp vessel permit. These are limited in number to a maximum of 138 (ORS 508.880, ORS 508.886, ORS 508.904, ORS 508.907, Pettinger, 2017 pers. comm.).
- Open seasons in effect from April 1st to October 31st of each calendar year keep fishing off spawning aggregations during the closed seasons (ORS 506.129, 1975; OAR 2012b).
- The regulation specifying a maximum 160 count per pound [for landings exceeding 3000 pounds] provides a disincentive to fish on small shrimp (OAR 2012c).
- Rigid-grate bycatch reduction devices (BRD's) are required on all nets (OAR 2012d). BRDs have significantly reduced the amount of bycatch in the fishery. Smaller quantities of bycatch reduce the time spent sorting on deck, lowering the time and costs of fishing.
- Limits on incidental catch of finfish, with a few exceptions for abundant stocks, are small (OAR, 2012e). However, the required use of BRDs and the sequential restrictions in allowable BRD bar spacing (to .75" effective April 2012) have reduced bycatch to such an extent as to render the incidental catch limits irrelevant (OAR, 2012d; ODFW, 2012).
- Vessels fishing and landing in California ports are required to fish with a minimum trawl mesh size of 1 3/8" mesh size. Oregon and Washington do not have a mesh size requirement for the pink shrimp fishery.

All commercial landings are assessed a fee (5% of landed value) that is dedicated to the Commercial Fisheries Fund. All Fund monies are appropriated to the OFWC for the administration and enforcement of the commercial fishing laws and for the management, propagation, research, habitat improvement and other activities that protect, maintain or enhance the food fish resource (ORS 508.326, 1991). The pink shrimp fishery funds its representation through the Oregon Trawl Commission through an additional assessment of 0.5% of the landed value of shrimp (ORS 508.505).

The fishery is managed under a restricted vessel permit system, enacted by the Oregon State Legislature in 1979 (ORS 508.886, 1979). The 2003 trawl permit buyout reduced the number of available Oregon shrimp permits to 138 (Pettinger, 2017). In 2016, 75 of these permits were fished, leaving 63 permits dormant (ODFW, 2017). Permits may be transferred under specified conditions (ORS, 508.907).

As part of the 2003 trawl permit buyout members of the pink shrimp fleet received a federal loan to pay for permits to be removed from the fishery. The fleet assessed itself a loan repayment rate of 4.65%, which was paid off in April of 2012 for OR and late 2013 for WA.

3.3 Principle One: Target Species Background

3.3.1 The Target Species

a. Fishery resources and life history

Distribution of the target species, ocean or pink shrimp - *Pandalus jordani*, extends from the Aleutian Islands in Alaska to southern California. Pink shrimp are generally found in mud-

sand habitat at depths ranging from about 40 to 450 m. Throughout the range, beds with commercial concentrations, in depths of about 100 to 200 m, support fisheries from Vancouver, British Columbia, Canada south to Point Arguello, California (Collier and Hannah, 2001). Oregon, being the center of distribution, has historically yielded over 80% of U.S. landings (Gallagher et al., 2003).

Like most pandalid shrimp, *Pandalus jordani* are protandrous hermaphrodites, beginning life as males and, later, changing sex to become females. The time spent at each life stage (larvae, juvenile males, mature males and females) varies by location and population density (Charnov and Hannah, 2002; Hannah and Jones, 2016c). Individuals may change sex sooner (early-maturing females) or even bypass the male phase entirely (primary females). Densities of primary females are higher when population levels are low.

The life span of pink shrimp is up to 4 years. Natural mortality is high, variable by year class and has been related to predator abundance (Hannah, 1995). Pink shrimp are responsive to fishing pressure and there is evidence that growth increases with higher fishing pressure and lower densities (Hannah and Jones 2016c).

Mating occurs during September and October when females begin extruding eggs (external fertilization). Females carry the eggs (about 1,000 to 3,000) in a clutch under the abdomen between the pleopods (Hannah et al., 1995). Hatching occurs during late March to early May and the pelagic larval phase lasts about 2.5 to 3 months. Juvenile male shrimp occur in increasingly deeper water as they develop and begin to appear in commercial catches by late summer (Collier and Hannah, 2001).

Shrimp grow by periodically shedding their exoskeletons through a process called moulting. Growth rates and age/size of sex change for ocean shrimp are variable by area, sex and year class (Dahlstrom, 1970). There tends to be rapid growth during spring and summer and slower growth over the winter. The growth rate decreases as the shrimp age and, during the ovigerous period from fall to spring, females do not grow at all. As shrimp undergo moulting, no permanent body structures are retained, and age determination using conventional techniques is impossible. Rather, an analysis of length data that incorporates the animal's sex and maturity condition is used to determine age.

Migratory behavior of pink shrimp is primarily passive, associated with ocean currents, summer winds and upwelling (Hannah, 1993). Nightly vertical migrations take place as shrimp move off the bottom into the water column to feed (Pearcy, 1970). These vertical migrations may also assist with movement and dispersal of shrimp by alongshore currents; as they migrate vertically, they become more exposed to currents.

Oceanographic factors explain most of the variation in recruitment and, subsequently, the abundance of adults. Recruitment has been negatively correlated with April sea level height and it has been inferred that, when winter-like current conditions extend into the spring beyond the average timing of transition, newly released shrimp larvae are advected to the north away from favorable habitat. Furthermore, strong periods of upwelling may result in shrimp larvae being advected offshore and also away from favorable habitat (Hannah, 1993; 1995; 1999; 2010; 2011).

Pink shrimp are prey for several groundfish species, and some are thought to have a significant impact on natural mortality rates of shrimp. In particular, shrimp mortality is related to the abundance of age-2 Pacific whiting, *Merluccius productus* (Hannah, 1995).

b. Status of stocks as indicated by stock assessments, including a description of the assessment methods, standards, and stock indicators, biological limits, etc.

Stock Assessment Methodology. Using a time-series of annual catch and age composition data collected from Oregon fishery landings, a stock reconstruction is periodically conducted to estimate the historical survival of each cohort through age 3, and the number of age 1

shrimp in the population. The stock reconstruction is done using a separable Virtual Population Analysis (VPA) with time-varying selectivity (two time periods) of age-1 recruits (Hannah and Jones 2014; 2016c).

Studies of the population dynamics of pink shrimp off the coast of Oregon have concluded that the survival of larvae is influenced strongly by environmental conditions associated with upwelling conditions and currents, and recruitment is not demonstrably related to spawning biomass (Hannah 2010; Hannah and Jones 2014; Hannah and Jones 2016c, Groth, Blume et al. 2017). Specifically, ODFW has found that recruitment has been correlated with Sea Level Height (SLH). By relating the historical time series of age 1 shrimp numbers (estimated from the VPA) to a measure of SLH in their larval year, an index has been established to forecast recruitment of age-1 shrimp for the next year's fishery (Hannah and Jones 2014; 2016c). This pre-recruit abundance index fits historical data well and is presently used to provide annual pre-season predictions of pink shrimp recruitment (Hannah and Jones 2014, 2016; Groth et al. 2017).

Additional empirical monitoring of stock status off Oregon and Washington includes annual examination of trends in: 1) age, size and sex composition of landings, 2) catch per unit effort (CPUE) measured as both Single Rig Equivalents (SRE) and average catch per trip, and 3) the geo-spatial distribution of pink shrimp catches from fishery logbook data (Groth et al. 2017, Wargo et al. 2017). In Oregon, ODFW compares and evaluates these against historical data and indicators of Biological Concern listed in the draft shrimp Fishery Management Plan (FMP) (Abramson et al., 1981). Briefly, the points of concern were: 1) long-term increases in count-per-pound; 2) long-term decrease in average age of females or increase in primary females; 3) long-term decrease in catch with equal or increased effort; 4) long-term decrease in productive shrimp grounds and; 5) indication of two year-class failures over a three-year period (Abramson et al., 1981).

Biological Limits. Traditional measures of stock status compare the current spawning population biomass to estimates of the stock in an unfished condition, or measures of B_{msy} , and make use of spawner-recruit relationships (Mace 1993). This approach is not appropriate for pink shrimp populations, because stocks are driven primarily by environmental conditions and thus the spawner recruit relationship is not meaningful. Furthermore, fishery independent estimates of biomass are not available. Given these constraints, ODFW has developed an innovative input control rule that reduces the fishery's impact on egg-bearing females whenever there is in-season evidence that spawning biomass may be very low, but significant uncertainty remains (Hannah and Jones 2014; 2016c). The control rule takes into account both oceanic conditions in the larval year, as well as fishery catch rates during the year of age-1 recruitment as in-season indicators of stock status. Specifically, the control rule uses: 1) a time series of April-January SLH (measured at Crescent City, CA) during the larval year as a pre-season indicator of pink shrimp stock status, and 2) the fishery average June catch per trip (as a proxy for the standing stock biomass of shrimp in a given year). This control rule is incorporated into a draft management plan (Hannah and Jones 2016b) slated for formal approval in late 2017 (Groth et al. 2017).

Under the control rule, a June catch-per-trip value of less than 12,500 lbs (the "target") is the catch level that signals the need for some additional precautionary management of shrimp spawning stock biomass; when June catch per trip drops below this level, the ocean shrimp season will be closed October 15th and will not reopen until April 15th of the following year. When there are indications of a more severe stock decline, the "limit" action level is reached and fishing is suspended. This will be the case when the mean Crescent City SLH from April of the year prior to January of the current year exceeds 7.5 ft and June catch per-trip in the current year drops below 10,000 lbs. When these two conditions coincide, the shrimp trawl fishery will be closed as soon as possible for the remainder of the season and not re-opened until April 15th of the following year (Hannah and Jones 2016b).

Current Status of the Stock. Our understanding of the current stock status is informed by 1) the SLH-Recruitment index, 2) the inputs to the new control rule (SLH, and average June catch per trip, 3) size-age composition of the fishery landings, 4) historically tracked changes in fishery CPUE (lbs/SRE-hour), and 5) the geo-spatial distribution of pink shrimp catches,

The SLH-Recruitment index was most recently updated in 2016 (Hannah and Jones 2016c) (Figure 7). The high level of larval survival in 2013 is evident, and this cohort made up much of the 2014 and 2015 catch. Recruitment in 2014 and 2015 was expected to be low, but 2016 is expected to be higher (Groth et al 2017).

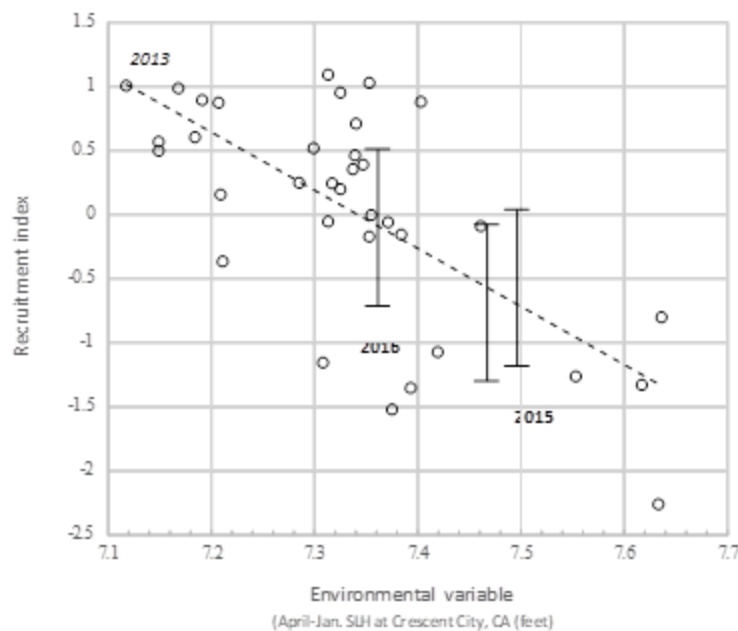


Figure 7. SLH-Recruitment index, relating Sea Level Height (SLH) at Crescent City, CA in the larval year, to subsequent recruitment of age-1 pink shrimp to the fishery in Oregon.(Source: Groth et. Al. 2017)

The average catch per trip in June (Figure 8), and the larval year SLH (Figure 9) have shown positive indications for pink shrimp stock status in recent years. June catch per trip has been well above the target value of 12,000 lbs/trip, and SLH has been below the limit index value (7.5).

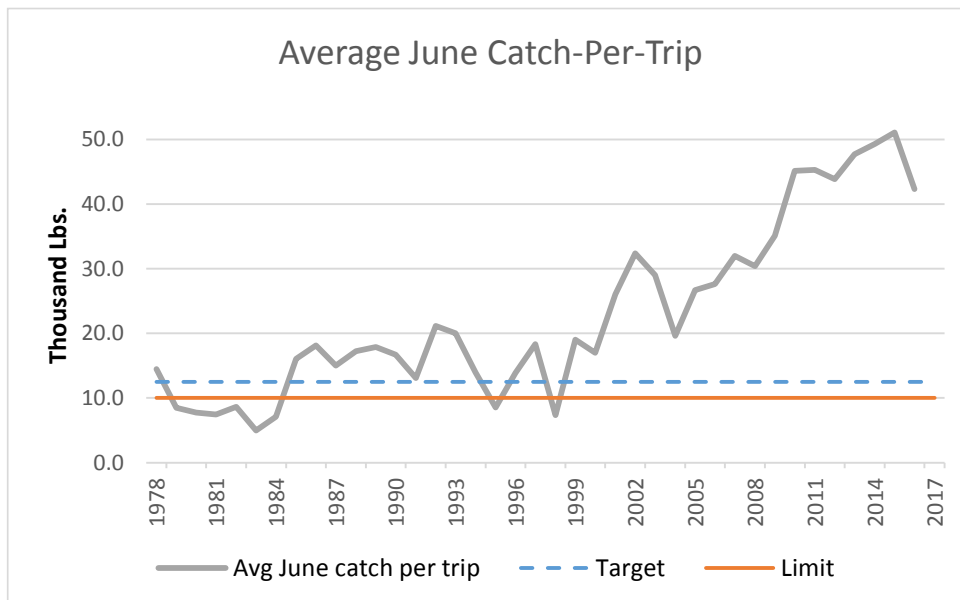


Figure 8. Average June catch per trip in the Oregon fishery 1978-2016, showing proposed target (12,000 lbs/trip.) and limit (10,000 lbs/trip) values.(Source: Groth, 2017b)

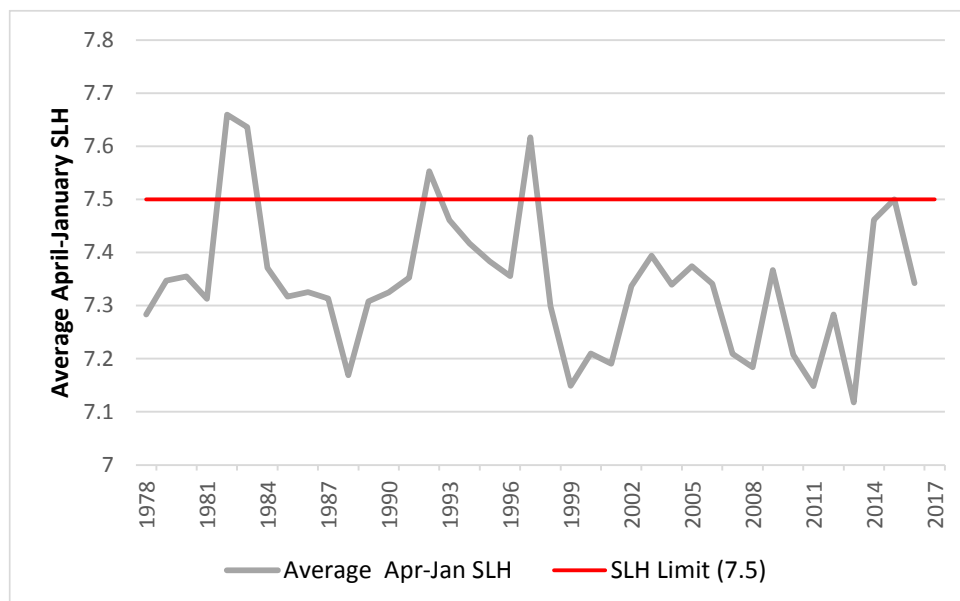


Figure 9. Average (larval year) April-January Sea Level Height (SLH) at Crescent City, CA 1978-2016, showing proposed limit value (7.5). (Source: Groth, 2017b)

The size-age composition of the fishery landings for 2015 and 2016 is shown in Figure 10. In 2015, age 1 shrimp were less prevalent than usual, and age 2 shrimp were a major part of catch (one of the most abundant year classes on record). In 2016, age 1 shrimp were a large part of the catch, and age 2 shrimp were a small part, given the weak recruitment of 2014. These data, together with the SLH-Recruitment index, indicate moderate to strong year-classes to support the fishery in the near future. (Groth et. Al. 2017).

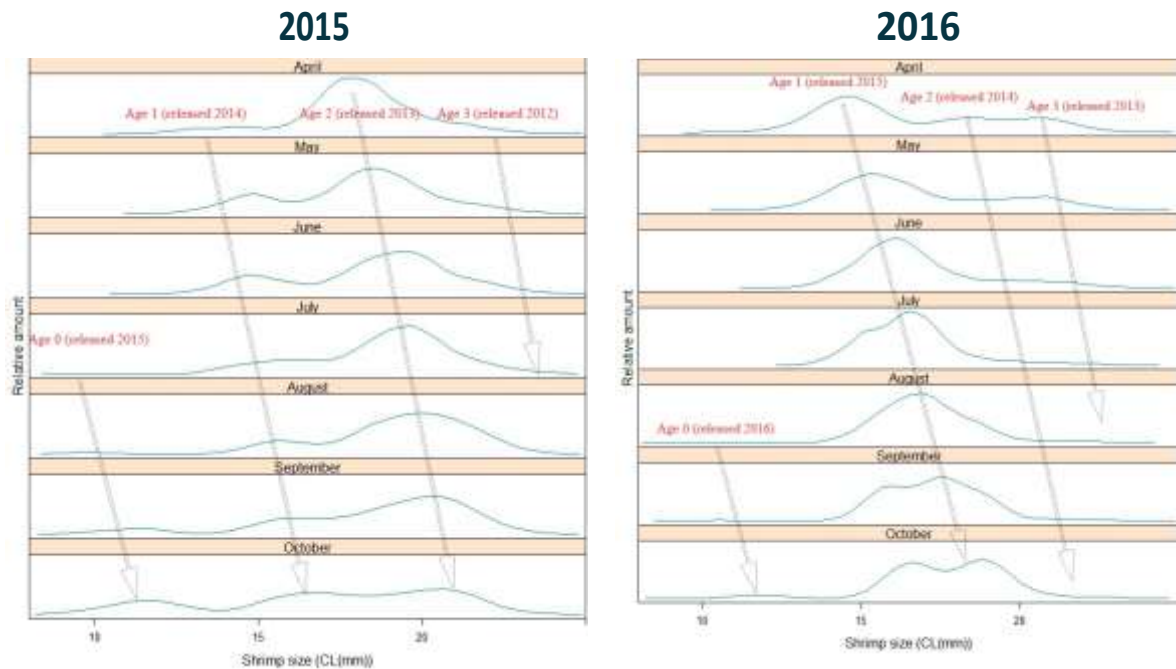


Figure 10. Oregon pink shrimp size-age distributions by month, 2015-2016. (Source: Groth et. Al. 2017)

Standardized catch per unit effort (lbs/SRE hour), an indicator of relative stock biomass, has exceeded 1000 lbs/SRE hour for Oregon vessels over the past decade and, from 2009 to 2015, averaged 1,377 lbs/SRE hour (Figure 11)(Groth, 2017b). Since then, CPUE has declined to numbers similar to those in the mid 2000s . Lowered CPUE in 2016 is likely due to the weak 2014 year class of shrimp (the 2 year olds in 2016) (Groth et. al. 2017). Catch rates for Washinton vessels have been comparable to Oregon for the shorter (2011-2016) data time series (Figure 11).

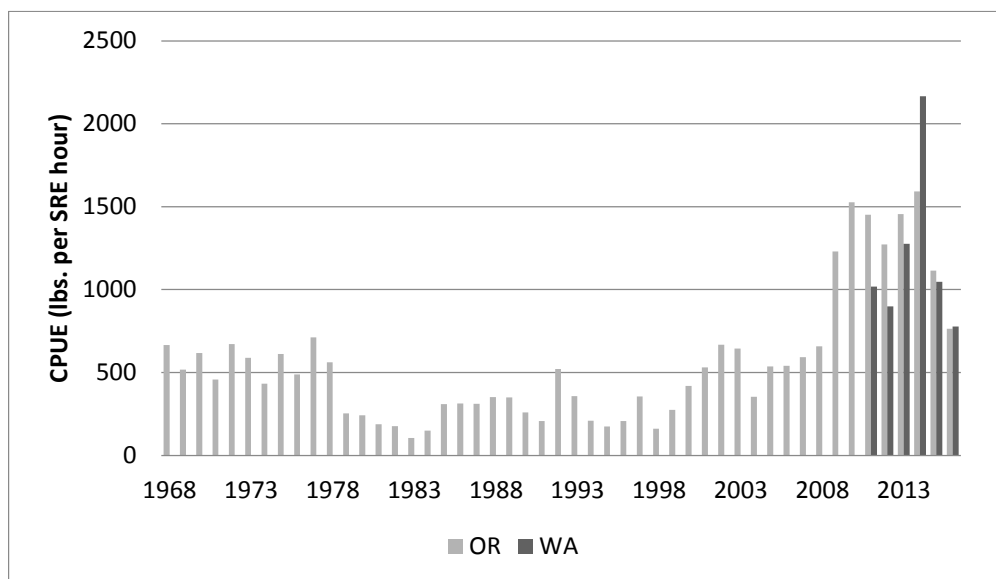


Figure 11. : Fishing catch per unit effort (CPUE in lbs/SRE hour) for pink shrimp landed in Oregon, 1968-2016, and in Washington, (2011-2016). (Source: Groth, 2017b; Wargo, 2017c)

The spatial distribution of fishery catches delivered to Oregon ports in 2016 shows that areas of increased catch were well distributed along the Oregon and Washington coasts (Figure 12). This is a positive sign, as the size of the shrimping area is known to vary with population size (Groth et. al. 2017).

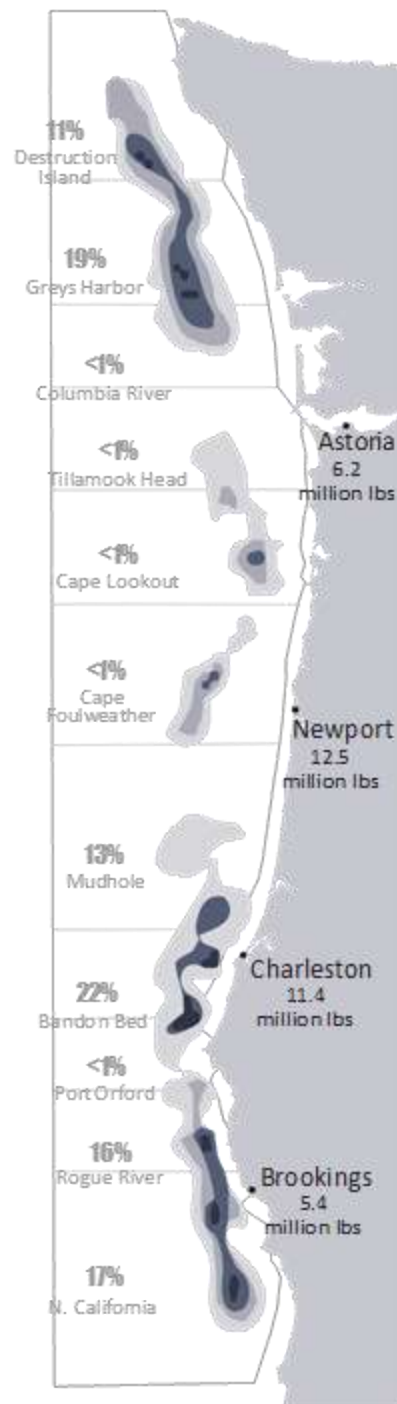


Figure 12. Spatial distribution of catch areas for pink shrimp landed in Oregon in 2016. Note: darker areas indicate increased catch levels. (Source: Groth et al., 2017)

Evaluation. The assessment approach for pink shrimp was designed recognizing that stock dynamics are largely driven by environmental factors. As such, the major uncertainties deal with predicting environmental effects on future stock conditions; the dynamic nature of ocean conditions and population responses to them are impediments for the development of reliable longer-term forecasting. Confidence limits for the SRE-Recruitment index address the uncertainty associated with the point estimates of annual values. Additionally, the

standardization of effort to single rig equivalents, and its use in the calculation of CPUE, accounts for some uncertainty in the fishery performance data as an indicator of biomass.

Annual assessments are reviewed internally at ODFW. Furthermore, research publications documenting the factors that control recruitment (e.g. predation, environment) are subjected to rigorous internal and external review. For example, the use of the SLH-Recruitment index as an indicator of pink shrimp stock status was reviewed via publication in a peer reviewed journal (Hannah 2011). The stock under consideration is not amenable to traditional, fishery assessment models. A comprehensive coast-wide stock assessment for pink shrimp was conducted and documented in the Fishery Management Plan for Pink Shrimp (Abramson et al., 1981). Coast-wide assessments were made using a Schaefer-type production model for Washington, Oregon, and California catch and effort for the period 1959-1980 (Abramson and Tomlinson, 1972). Analysis of the use of this model by Geibel and Heimann (1976) outlined the difficulties of setting meaningful quotas for a stock that appears to be more sensitive to environmental variation than effects of the fishery. General production, yield per recruit and catch-at-age models have been largely unsuccessful in assessing stock status and establishing meaningful reference limits for management of the pink shrimp fishery. However, environmentally based models, have been useful for predicting and explaining variation in recruitment and have failed to detect any consistent impact of the fishery on future stock abundance. The shift from traditional fishery models to environmentally based models in this instance is considered a significant advancement.

Given that the role of the environment as the major factor affecting stock dynamics has been demonstrated, and that the current stock size high, it is evident that the spawning stock is not significantly affected by the fishery and recruitment has not been impaired.

3.4 Principle Two: Ecosystem Background

3.4.1 The aquatic ecosystem, its status and any particularly sensitive areas, habitats or ecosystem features influencing or affected by the fishery.

Physical and biological characteristics of the California Current ecosystem (Figure 13), the area of operation of the Oregon and Washington pink shrimp trawl fishery, are summarized in detail in several comprehensive documents (PFMC (Pacific Fishery Management Council) and NMFS (National Marine Fisheries Service), 2010; PFMC, 2008). The description below begins with a summary from these references.



Figure 13. California Current (Source: NOAA, 2009).

The California Current ecosystem, like other eastern boundary current ecosystems, is a relatively open marine system characterized by tremendous fluctuations in physical conditions and productivity over multiple time scales (Mann and Lazier, 1996; Parrish, *et al.*, 1981). Food webs tend to be structured around coastal pelagic species (CPS) that exhibit boom-bust cycles over decadal time scales (Bakun, 1996; Schwartzlose, *et al.*, 1999). Baleen whales, fur seals, albacore tuna, salmon, and sooty shearwaters, dominate the top trophic levels of such ecosystems, whose dynamics may be partially or wholly driven by processes in entirely different ecosystems, even different hemispheres.

The California Current is basically the eastern limb of the Central Pacific Gyre. It begins where the west wind drift (or the North Pacific Current) reaches the North American Continent. This occurs near the northern end of Vancouver Island, between 45° and 50° N. latitude and 130° to 150° W longitude (Ware and McFarlane, 1989). The west wind drift splits into two broad coastal currents, caused by a divergence in the prevailing wind patterns, resulting in the California Current to the south and the Alaska Current to the north. This region is referred to as the California Current System because there are several dominant currents in the region, all of which vary in geographical location, intensity, and direction depending on the seasons (Hickey, 1979).

A year-round feature, the California Current consists of a massive southward flow of the cool waters of the west wind drift. The current is characterized as a shallow, wide, and slow-moving body of water, ranging from the shelf break to 1,000 km offshore, with the strongest flows at the sea surface, and in the summertime (Dodimead, *et al.*, 1963; Hickey, 1979; Lynn and Simpson, 1987). This surface current is matched in the summer by the California Undercurrent, which moves water northward from the south in a deep yet narrow band of subtropical water typically found just off of the shelf break at depths of 100 to 300 m. The undercurrent flows from Baja California to Vancouver Island, transporting warmer, saltier southern water north along the coast (Hickey, 1979). On average, the California Current flow volume reaches a maximum in spring and summer, when the flow moves inshore, closer to the shelf break. The California Undercurrent develops in late spring through early summer and persists into the fall.

Biogeographic patterns of the California Current ecosystem are distinct zoogeographic provinces extending North and South of Point Conception, California, known as the Oregonian and San Diego Provinces. The Oregonian Province, where the west coast pink shrimp fishery operates, extends from the Strait of Juan de Fuca in the north to Point Conception in the south (NMFS, 2004).

Patterns of adult groundfish distribution based on depth have been observed to occur between near-shore, continental shelf, and the continental slope, and have been used to form discrete management units. With respect to genetic evidence for biogeographic boundaries, Hedgecock (1994) found that fish and invertebrates with planktonic larvae generally maintain low spatial genetic variance over large (500 to 2,000 km) regions in the California Current. Analysis of a range of *Sebastes* species also suggests little genetic differentiation within the California Current region (Rocha-Olivares and Vetter, 1999), although some near-shore species exhibit greater spatial patterns of population substructure, particularly north and south of Cape Mendocino (Cope, 2004).

Pacific whiting, which have trophic interaction with pink shrimp (Hannah, 1995), are the only confirmed highly migratory groundfish species in the Pacific Coast Groundfish FMP, with a clear seasonal migration from southern spawning grounds off northern Mexico and Southern California to northern foraging habitat off of Oregon, Washington, and British Columbia (Bailey *et al.*, 1982). There is an ontogenetic component to this migration, as juveniles tend to be found off central and northern California, with larger, older fish dominating the northern range of this species. Similarly, the distribution of whiting tends to be more northerly in warm years (Dorn, 1995; Swartman and Hickey, 2003), reflecting inter-annual shifts in marine habitat conditions.

While the physical and bathymetric features associated with these general biogeographic boundaries (such as the “green muds” fished upon by the Oregon shrimp fishery) are fixed in space, the physical characteristics of water masses and associated plankton communities are clearly highly dynamic in space and time. Fulton and LeBrasseur (1985) described a transport-driven shifting subarctic domain in the northern reaches of the California Current System, the margin of which was characterized by abrupt declines in zooplankton biomass south of the subarctic boundary. Although the physical dynamics are thought to be more complex than their model, it is clear that climate-driven changes in transport and ocean conditions dramatically alter both the species composition and productivity of zooplankton throughout the California Current to a considerably greater extent than static boundaries based on geography (Mackas, et al., 2005; McGowan, et al., 1998; Peterson, et al., 2002; Peterson and Schwing, 2003).

For example, a subtropical species of copepod was more abundant through the 1980s and early 1990s, and was almost completely dominant during the 1997-98 El Niño, at which time standing biomass was near all time lows (Peterson et al., 2002). Since 1999, a northern (colder water) copepod species has again dominated numerically during spring and summer, and the standing biomass of zooplankton off of Oregon has been roughly double that observed prior to 1999 (Peterson and Schwing, 2003). This rapid transition from the 1997-98 El Niño event to the cool conditions of 1999 through to 2002 was also associated with tremendous recruitment in virtually all west coast groundfish, as evidenced by the age and size composition data available in stock assessment models in both the 2005 and 2007 stock assessment cycles. For most stocks in which recruitment events are reasonably well specified by the data, the 1999 recruitment was estimated to be as great, or greater than, any recruitment over the preceding 10 to 20 years. For example, the 1999 Pacific whiting year class was the largest since 1984, and doubled the stock biomass between 2000 and 2003. While there are signs of reasonably strong year classes in 2003 for some stocks, recent indices of recruitment have tended to indicate poor recruitment for most stocks since 2003, with particularly low levels of juvenile rockfish abundance observed in 2005 through 2007, a year in which low secondary productivity, anomalous upwelling conditions, and widespread die offs of some seabirds reflected generally unfavourable ocean conditions for many elements of the ecosystem (Sydeman et al., 2006). As the production of eggs and larvae for most west coast groundfish appears to be only modestly related to inter-annual changes in ocean conditions, the causes of these strong year classes are thought to be related to post-spawning (or post-parturition) survival of larval and juvenile life history stages, although the mechanism remains elusive (PFMC, 2010).

Field (2004) developed a characterization of the California Current ecosystem and proposed an initial approach to ecosystems management of resource harvest. The report concluded that the approach, however, would need to be improved upon with greater appreciation and understanding for the complexity of systems, the importance of life history considerations and greater recognition of the uncertainties that inevitably shroud all management decisions. Field, et al. (2006) presented results from dynamic simulations of the Northern California Current ecosystem, based on historical estimates of fishing mortality, relative fishing effort, and climate forcing. Climate was found to affect ecosystem productivity and dynamics both from the bottom-up (through short- and long-term variability in primary and secondary production), as well as from the top-down (through variability in the abundance and spatial distribution of key predators). In general, results suggest that there do not appear to be strong trophic interactions among many of the longer-lived, slower-growing rockfish, roundfish and flatfish in this ecosystem. Strong interactions, however, were observed in shrimp, salmon, and small flatfish populations, where high turnover and predation rates have been coupled with substantial changes in many predator populations over the last 40 years.

Studies of the recruitment dynamics of pink shrimp have established that recruitment success in the waters off the northern US west coast is primarily determined by variation in the ocean environment during the pelagic larval phase (Rothlisberg, 1975; Rothlisberg and Miller, 1983; Hannah, 1993, 1999). Specifically, an early and vigorous spring transition, marking the onset

of the upwelling season in the northern Californian/Oregon/Washington region as reflected in mean sea level height (SLH) in April, is associated with strong recruitment events (Hannah, 1993, 1999). Positive correlations between pink shrimp recruitment and coastal upwelling, as well as negative correlations with sea surface temperatures (SST), have also been shown (Rothlisberg, 1975; Hannah, 1993). The biological or physical mechanisms underlying these statistical relationships are not well understood. Pink shrimp larvae are released near the surface in March and April and occupy deeper portions of the water column later in their development, arriving at the sea floor by early fall (Rothlisberg, 1975). The spring transition causes marked changes in surface waters over the shelf, including a shift from winter conditions dominated by northward surface currents and warmer SST to southward flowing surface currents, increased nutrient levels and decreased SST (Huyer et al., 1979). Any, or all, of these effects of the spring transition could greatly influence larval survival or transport while larvae still inhabit near-surface waters and thereby exert a strong influence on recruitment to the fishery the following spring (Rothlisberg, 1975; Rothlisberg and Miller, 1983).

In a recent analysis by Hannah (2011), an atypical northward shift in the distribution of age-1 pink shrimp recruits off Oregon in 2000 and 2002–2004 was linked to anomalously strong coastal upwelling winds off southern Oregon (42°N latitude) in April–July of the year of larval release. This was the first clear evidence that strong upwelling winds can depress local recruitment of pink shrimp.

Regression analysis confirmed a long-term negative correlation between \log_e of ocean shrimp recruitment and April SLH at Crescent City, California, in the year of larval release, for both northern and southern Oregon waters. The regional pattern of pink shrimp catches and seasonal upwelling winds showed that, although the timing of the spring transition, as reflected in April SLH, drives pink shrimp recruitment success off Oregon generally, the strength and consistency of spring upwelling limits the distribution of large concentrations of ocean shrimp at the southern end of the northern California/Oregon/Washington area. A northward shift in 1999 and 2001–03 in the northern edge of this ‘zone of maximum upwelling’ is the likely cause of the weak southern Oregon recruitment and resulting atypical distribution of ocean shrimp observed off Oregon in 2000 and 2002–04, with a return to a more typical catch distribution as spring upwelling moderated in subsequent years. It is noted that a northward shift in the conditions that produce strong and steady spring upwelling winds is consistent with many predictions of global climate models under conditions of global warming.

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. Annually at its March meetings, the Council and its advisory bodies will (PFMC 2017h):

- 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 new initiatives are chosen for Council efforts, request background materials from the appropriate entities;
- in each odd-numbered year, starting with 2015, assess whether there are new ecosystem initiative proposals that could be added to the appendix; and
- in March 2018, assess whether to initiate a review and update of the FEP.

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 that is caught as bycatch in the pink shrimp fishery. The current and ongoing initiative is expected to review and potentially revise the suite of ecosystem indicators reported against in the California Current Ecosystem Status Report (PFMC 2017f).

The Oregon pink shrimp fishery uses semi-pelagic gear, a footrope system that incorporates a chain or cable groundline partially covered with 6.4-cm diameter rubber discs. The gear is configured to elevate the fishing line of the net about 35–70 cm above the bottom (Hannah and Jones, 2000). Areas that may be particularly sensitive, habitats, or ecosystem features that may be affected by the fishery, are primarily associated with the various substrates and topographic features of the shelf off the Oregon Coast. These are discussed in more detail in Section 3.4.4 below.

3.4.2 The Primary, secondary and endangered, threatened or protected (ETP) species including their status and relevant management history

Primary and Secondary Species

Primary species in Principle 2 are those parts of the catch that are not covered under Principle 1 because they are not included in the Unit of Certification and which have management tools and measures in place intended to achieve stock management objectives reflected in either limit or target reference points.. Secondary species in Principle 2 are species in the catch that are within scope of the MSC program but are not covered under P1 because they are not included in the Unit of Assessment, are not considered ‘primary’ as defined in SA 3.1.3; or SA3.1.4.2. and species that are out of scope of the program, but where the definition of ETP species is not applicable.

Retained and discarded catches in the fishery under assessment are estimated by federal, on-board fishery observers and are recorded dockside on fish receiving tickets (Table 2. Fish ticket data showing pounds landed by species in the Washington Pink Shrimp fishery between 2003 and 2016 Table 3).

On May 24, 2001, NOAA established the West Coast Groundfish Observer Program (WCGOP) in accordance with the Pacific Coast Groundfish Fishery Management Plan (50 CFR Part 660) (66 FR 20609). This regulation requires all vessels that catch and retain groundfish in the United States Exclusive Economic Zone (EEZ) from 3-200 miles offshore to carry an observer when notified to do so by NMFS or its designated agent. The WCGOP has observed vessels with Oregon state pink shrimp licenses and California state Northern Pink Shrimp Trawl Vessel licenses since 2004. The program provides improved estimates of total catch and discards by observing groundfish fisheries along the US west coast. The observed total catch weight (mt), discard weight (mt) and percent discarded from observed vessels in the Oregon pink shrimp fishery is available each year through 2015, so far, and for Washington, this data exists starting in 2010 (Somers et al, 2016).

Table 1 gives the observer data for all species comprising at least 0.1% of the observed catch averaged over the years 2010-2015 for both Washington and Oregon. Observer coverage for the fleet has been between 11 and 12% since 2011 (Somers et al, 2016).

Table 1. observer data for all species comprising at least 0.1% of the observed catch averaged over the years 2010-2015 for both Washington and Oregon.

Washington		
Species	Mean observed catch 2010-2015 (mt)	% of observed catch

Pink Shrimp	<i>Pandalus jordani</i>	912.4	93.9%
Shrimp Unid	<i>Caridea</i>	22.4	2.3%
Eulachon	<i>Thaleichthys pacificus</i>	13.3	1.4%
Pacific Hake	<i>Merluccius productus</i>	9.8	1.0%
Mixed Species	N/A	3.2	0.3%
Slender Sole	<i>Lyopsetta exilis</i>	3.1	0.3%
Non-Eulachon Smelt Unid	<i>Osmeridae</i>	0.9	0.1%
Oregon			
Species		Mean observed catch 2010-2015 (mt)	% of observed catch
Pink Shrimp	<i>Pandalus jordani</i>	2404.6	93.3%
Shrimp Unid	<i>Caridea</i>	77.9	3.0%
Eulachon	<i>Thaleichthys pacificus</i>	36.0	1.4%
Pacific Hake	<i>Merluccius productus</i>	25.1	1.0%
Slender Sole	<i>Lyopsetta exilis</i>	9.3	0.4%
Whitebait Smelt	<i>Allosmesus elongatus</i>	3.7	0.1%
Non-Eulachon Smelt Unid	<i>Osmeridae</i>	3.0	0.1%

Since 2010, observed coast-wide total catch (discarded + retained) in the pink shrimp fishery has averaged above 93% pink shrimp, with another 2-3% other shrimp.

Nearly all of the catch other than pink shrimp is discarded in this fishery. Trace amounts (<0.1% or less than one mt each) of non-target groundfish species were observed as caught and discarded between 2010 and 2015 (Somers et. al 2016). Fish ticket data from WA and OR shows also only trace amounts of non-target species retained and sold (see Table 2 and Table 3). Besides shrimp, the only species of caught in any quantity is eulachon smelt (an ETP species) and Pacific hake, which is MSC certified and not caught in high enough quantities to be considered a “main” P2 species. Therefore there are no main primary or secondary species in this fishery as defined by MSC.

Table 2. Fish ticket data showing pounds landed by species in the Washington Pink Shrimp fishery between 2003 and 2016

Species retained	Pounds landed and sold per year (Washington State)													
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ARROWTOOTH FLOUNDER			17											
LINGCOD		5		7										
PACIFIC COD	36													
PINK SHRIMP	7,893,802	5,362,525	6,265,005	6,150,037	3,345,240	6,290,320	6,974,313	9,336,580	9,105,318	8,841,198	13,466,114	30,106,428	40,533,976	13,775,910
ROCKFISH (YELLOWTAIL)(GREEN)	200	118	21	4										
SABLEFISH	156	2												
SLOPE ROCKFISH			24											
SOLE PETRALE			35				1					8		
SOLE REX							39		32					

Table 3. Fish ticket data showing pounds landed by species in the Oregon Pink Shrimp fishery between 2007 and 2016

Species	Pounds landed and sold per year (Oregon)									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Coho Salmon					6					
Lingcod	18									
Pacific Cod					62					
Pacific Whiting										2,736
Pink Shrimp	20,124,919	25,520,136	22,178,347	31,528,520	48,313,940	49,144,050	47,633,552	52,010,259	53,516,229	35,528,407
Rockfish, Darkblotched					1					
Rockfish, Shelf					2					
Rockfish, Slope					1					
Rockfish, Widow								3		
Rockfish, Yellowtail					10			2		
Sablefish	12		8		3					
Sanddab, Pacific									1	
Sole, Dover					9					
Sole, Petrale					1			1		
Squid, other		470								9

Since the early 1990's, some vessels began using bycatch reduction devices (BRDs). BRDs have been required since 2000 and have reduced fish bycatch by between 66% and 88% from historical (pre-BRD) levels. Prior to BRD requirements, bycatch was composed by weight mostly of adult and juvenile Pacific whiting, various smelts, yellowtail rockfish, sablefish, and lingcod, and ranged from 32% to 61% of the total catch by weight. By 2005, BRD use had reduced fish bycatch to approximately 7.5% of total catch, composed mostly of juvenile Pacific whiting (hake), slender sole, smelts, rex sole and juvenile rockfish (Hannah and Jones, 2007). Further reductions in juvenile rockfish bycatch has been achieved with the implantation of LED lights (Hannah et. al, 2015), discussed further below under ETP Species.

Endangered, Threatened or Protected (ETP) Species

Endangered, threatened or protected (ETP) species cover those organisms for which laws constrain their take (a term covering mortality and other non-lethal harmful effects). The principal laws are the Marine Mammal Protection Act (MMPA), the Endangered Species Act (ESA), the Migratory Bird Treaty Act (MBTA) of 1918, and Executive Order (EO). ETP species potentially affected by the pink shrimp fishery include salmon, green sturgeon, marine mammals, sea turtles, seabirds, and Pacific eulachon that occur in the area of operation of the fishery. The common and scientific names and protected status are as follows:

- Chinook Salmon (*Oncorhynchus tshawytscha*) Lower Columbia River Evolutionarily Significant Unit (ESU), Snake River fall-run ESU; Snake River spring/summer-run ESU; Upper Willamette River ESU (Threatened (T))
- Coho Salmon (*O. kisutch*) Oregon Coast ESU; Southern Oregon–Northern California Coast ESU (T);
- Chum Salmon (*O. keta*) Columbia R ESU (T)
- Steelhead (*O. mykiss*) middle Columbia River; Snake River Basin; upper Willamette River (T)
- Southern Resident killer whale (*Orcinus orca*) (Endangered (E))
- Humpback whale (*Megaptera novaeangliae*) (E)
- Blue whale (*Balaenoptera musculus*) (E)
- Fin whale (*Balaenoptera physalus*) (E)
- Sei whale (*Balaenoptera borealis*) (E)
- Sperm whale (*Physeter macrocephalus*) (E)
- Steller sea lion (*Eumetopias jubatus*) (T); critical habitat
- Southern distinct population segment, or DPS, of eulachon (*Columbia River smelt*) (*Thaleichthys pacificus*) (T)
- Southern distinct DPS, of north American green sturgeon (*Acipenser medirostris*) (T),

- Leatherback sea turtle (*Dermochelys coriacea*) (E)
- Green sea turtle (*Chelonia mydas*) (E)
- Olive ridley sea turtle (*Lepidochelys olivacea*) (E)
- Loggerhead sea turtle (*Caretta caretta*) (T)
- Albatross, short-tailed (*Phoebastria (=Diomedea) albatrus*) (E)
- Marbled murrelet, CA, OR, WA (*Brachyramphus marmoratus*) (T)
- Western snowy plover, Pacific coastal pop. (*Charadrius alexandrinus nivosus*) (T)

With the exception of Pacific eulachon there has been no interaction with ETP species recorded by observers of the shrimp trawl fishery (Al-Humaidhi 2011, NWFSC 2011, Somers et. al. 2016) and they will not be further discussed here.

The only ETP species observed in the fishery under assessment is the Southern Distinct Population Segment (DPS) of Pacific eulachon. This species is listed as threatened under the ESA. NMFS received an ESA petition from the Cowlitz Indian Tribe in November 2007 to list eulachon populations in Washington, Oregon and California. After reviewing the information presented in the petition and other information readily available in agency files, NMFS found that the petition presented substantial scientific or commercial information indicating that the petitioned action might be warranted. The agency initiated a status review of eulachon to determine if the species or distinct population segment(s) warranted ESA listing. NMFS proposed listing the southern DPS of eulachon on March 13, 2009. The effective date of the listing was May 17, 2010 (Federal Register, 2010). Critical habitat for eulachon was designated on December 19, 2011. The critical habitat does not include any marine waters where the candidate shrimp fishery operates (Federal Register, 2011).

Eulachon are endemic to the eastern Pacific Ocean, ranging from northern California to southwest Alaska and into the southeastern Bering Sea. Eulachon typically spend three to five years in saltwater before returning to freshwater to spawn from late winter through mid-spring. In the portion of the species' range that lies south of the U.S. – Canada border, most eulachon production originates in the Columbia River Basin. Other river basins in the U.S. where eulachon have been documented include the Mad River, Redwood Creek, and the Klamath River in California; the Umpqua River in Oregon; and infrequently in coastal rivers (primarily the Quinalt and Elwha rivers) in Washington.

After reviewing the best scientific and commercial (statistics WDFW and ODFW keep for the Columbia River commercial fisheries and DFOs statistics for the Fraser and other Canadian rivers) information available, NMFS determined that the species is composed of two or more DPS. Following an evaluation of the threats facing the species, and considering efforts being made to protect these fish, the agency determined that eulachon spawning in rivers south of the Skeena River (inclusive) in British Columbia, Canada, to the Mad River (inclusive) in California, are likely to become endangered within the foreseeable future. The agency has termed this unit of eulachon the southern DPS. Eulachon populations are at or near historically low numbers and have nearly disappeared from several locations. Threats include climate change effects on freshwater and marine habitats, bycatch in the pink shrimp fishery, water management and habitat changes in the Klamath and Columbia basins, and predation by marine mammals and birds, especially in the Fraser River and coastal rivers in British Columbia (NOAA, 2010).

The states of Washington and Oregon have closed commercial and recreational fisheries targeting eulachon in fresh water in recent years. Canada has done likewise, and has restricted the commercial shrimp trawl fishery through area closures, seasonal closures, and an eulachon action level with an at-sea observer program, implemented to monitor eulachon bycatch in West Coast Vancouver Island areas. Bycatch reduction devices (including rigid grates) are mandatory coastwide (DFO 2016). The 2016/17 initial eulachon action level for the WCVI was 4.0 tons, based on the 2015 eulachon biomass index, and there was no provision for in-season adjustment as there had been in previous years. The likely result of the action level being reached is a closure to the commercial shrimp trawl fishery off Vancouver Island (DFO 2016).

To date, there have been no restrictions imposed on commercial shrimp fisheries operating in the marine waters off the west coast of Washington, Oregon and California directed specifically at the restriction of take or interaction with eulachon other than requiring BRDs. However, there is recent and on-going research to understand the potential impacts of marine fisheries on the species, as well as evaluation of various mitigation measures. In addition, the federally managed groundfish fishery has a catch limit for eulachon that has thus far never been reached.

In 2010, the Oregon Department of Fish and Wildlife (ODFW) and WDFW were awarded a National Oceanic and Atmospheric Administration (NOAA) Fisheries Protected Species Conservation and Recovery (Section 6 of the ESA) grant to fund eulachon studies during 2010-2013. The goal of this project was to design and implement a monitoring program to track coast-wide status and trends in abundance and distribution to better manage anthropogenic impacts and other threats to recovery of the proposed threatened southern eulachon DPS. The objectives were: 1) to develop and implement an annual eulachon SSB estimate for the Columbia River that will allow managers to better track recovery and manage fishery impacts; 2) to better characterize current eulachon smelt distribution using egg and larvae surveys of known and potential spawning areas in the lower Columbia River, Columbia River tributaries, and coastal river systems of Washington and Oregon, to aid in determination of critical habitat for the DPS; 3) to assess and reduce the impacts of shrimp trawl operations on eulachon smelt by initiating an observer program to estimate the bycatch rates in Washington's ocean shrimp trawl fishery and by developing and testing modifications to ocean shrimp trawl; and 4) to assess the genetic makeup of spatial and temporal components of the Columbia River and Washington/Oregon coastal eulachon smelt runs (Mallette et al. 2014).

In September of 2014, ODFW and the Washington Department of Fish and Wildlife (WDFW) published a joint compendium entitled "Studies of Eulachon Smelt in Oregon and Washington," comprising three separate reports on aspects of eulachon biology and fishery impacts in the region (Mallette et al. 2014), designed to meet the project objectives mentioned above. These reports include attempts to understand eulachon spawning stock biomass in the Columbia river (James et al. 2014); freshwater distribution of eulachon in OR and WA estuaries and rivers (Storch et al. 2014); and the marine life stage of eulachon, including interactions with the shrimp trawl fishery (Wargo et al. 2014).

The James et al. report estimates a three-fold increase in eulachon spawning stock biomass in the Columbia river between 2011 and 2013, with the most recent (2012-2013) estimate at 4,400 metric tons, as compared with the 2011 estimate of 1,500 metric tons.

The Wargo et al. study used observer reports of eulachon bycatch in relation to a number of factors including time, depth and duration of shrimp fishing, as well as grid spacing on the Bycatch Reduction Devices (BRD) used in the fishery during the 2011 and 2012 fishing years. The authors reported that a smaller grid spacing on the BRD potentially reduced bycatch amounts of eulachon compared to larger grid spacing. However, these results have been somewhat superseded by the recent developments in using LED lights to deter eulachon, which appear to be more successful than the best performing BRD grids.

Based on experimental fishing with green LED lights beginning in the 2014 shrimp season, the paper "Tests of artificial light for bycatch reduction in an ocean shrimp (*Pandalus jordani*) trawl: Strong but opposite effects at footrope and near the bycatch reduction device" (Hannah et al. 2015) was published in Fisheries Research. By trawling with green LED lights affixed to the trawl lines, results reported in this paper include the reduction of eulachon bycatch in shrimp trawls by 91%, as well as a reduction of slender sole and other small flatfishes by 68%, darkblotched rockfish by 82% and other juvenile rockfishes by 56%.

Robert Hannah of ODFW also produced an Information Report (2016-02) entitled Modeling the effect of changing fishing effort and bycatch reduction technology on risk to eulachon (*Thaleichthys pacificus*) from bycatch mortality in the ocean shrimp (*Pandalus jordani*) trawl

fishery. Figure 14, excerpted from this report, shows model estimates of eulachon fishing mortality rate in the shrimp trawl fishery across a range of regional US fishing effort (standardized to single-rig equivalent hours; sreih), using the “conservative” parameter set assuming:

1. No use of bycatch reduction technology
2. Use of high efficiency 19.1mm BRDs only; and
3. Use of 19.1 mm BRDs with LED lights also affixed to all trawl fishing lines.

Also shown are a range of fishing mortality rates assumed to be sustainable for eulachon from 0.10 (solid horizontal line, Canadian F_{sust}) to 0.408 (dashed horizontal line $F=0.8 \times M$)

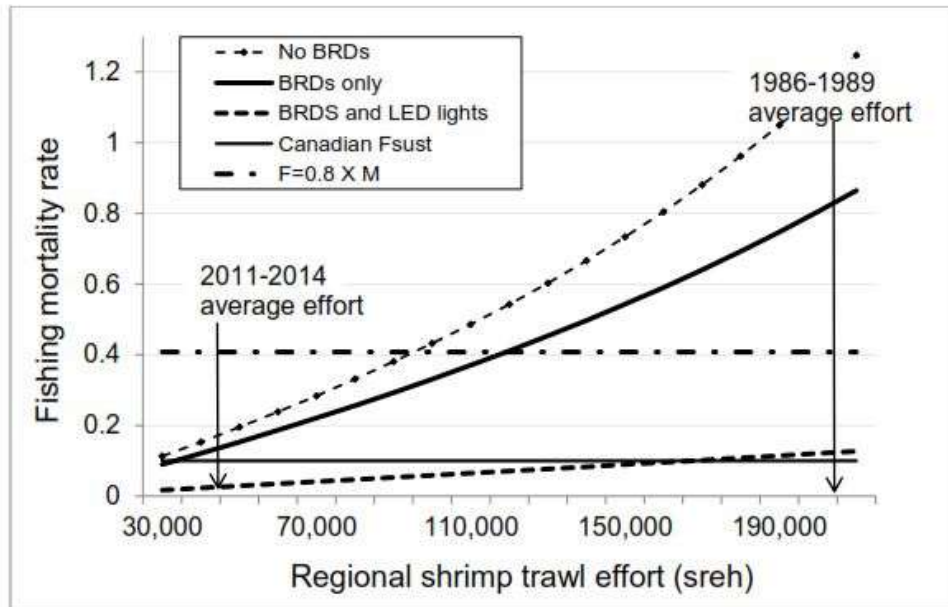


Figure 14. Model estimates of eulachon fishing mortality rate in the shrimp trawl fishery across a range of regional US fishing effort (standardized to single-rig equivalent hours; sreih), using the “conservative” parameter set (from Hannah 2016).

The following text has been excerpted from Hannah 2016:

The model estimates of eulachon fishing mortality from historic higher levels of shrimp trawl effort without bycatch reduction technology in use suggest that bycatch in the shrimp fishery may have contributed to the initial declines in eulachon abundance that led to its listing as “threatened”. However, model estimates of fishing mortality and sustainable fishing rates for eulachon both remain very uncertain. What seems clear though, is that the development of two complementary bycatch reduction technologies, high-efficiency codend BRDs and LED footrope lights (Hannah et al. 2015) can reduce risk to SDPS eulachon substantially without the need for management measures severely limiting trawl fishing effort. This assumes, however, that both bycatch reduction technologies can be implemented consistently and effectively across the entire fishery.

The results from this study suggest that requiring the use of LED lights on all ocean shrimp trawl footropes in use north of Cape Mendocino, California, along with modern, high-efficiency rigid-grate 19.1 mm BRDs, is the best way to maintain low risk for SDPS eulachon, across all anticipated changes in ocean shrimp trawling effort. Although the base model output suggests that at current levels of shrimp trawling effort, risk to eulachon is low [shown in Figure 3 of the report], effort in the shrimp fishery is likely to increase. The recent low effort levels result from a combination of factors that are likely to change in future years. The number of vessels participating in the ocean shrimp fishery was reduced by a federal groundfish vessel buyback program implemented in 2003 that also removed a number of shrimp trawl vessels from active fishing. However, in 2011 the groundfish trawl fishery was converted to a “catch shares” program, which has facilitated industry consolidation, leading to some vessels increasing their active participation in the shrimp fishery. Also, recent

catch-per-unit-effort in the fishery has been at an historical high due to several exceptionally large recruitment events (Hannah and Jones 2014). This has led to vessels very rapidly catching their limits and very short fishing trips. However, recruitment in ocean shrimp is environmentally driven (Hannah 2011) and is certain to decline at some point in the future. As recruitment declines towards average levels, more days of fishing will be needed to fill market orders and overall, fishing effort will likely increase.

The model results also suggest that requiring LED footrope lights, along with BRDs, for ocean shrimp trawling, reduces the risk to eulachon in a number of ways. Obviously, the LED light technology should greatly reduce fishing mortality on average (Figures 3 and 4). Also though, because the LED footrope lights act to reduce elemental trawl efficiency for eulachon, requiring their use also reduces the risk to eulachon from uncertainty about BRD exclusion rates (p_{exclude}) and post-exclusion mortality rates (p_{latent}). If LED footrope lights are reducing trawl entrainment of eulachon by 91%, as estimated in fishing gear experiments (Hannah et al. 2015), or even at a somewhat reduced rate in the actual fishery, then the precise rates at which they are excluded by codend BRDs or survive post-exclusion, become much less critical. This analysis supports the general contention that, when possible, it's much better to keep bycatch species out of the trawl net entirely, than to exclude them after entrainment.

Insofar as the Washington pink shrimp fleet is implementing the same BRD and LED light technology as the Oregon fleet, the findings of this study apply to the fleet as a whole, therefore the results of this study pertaining to the likely impacts of the pink shrimp fishery on Pacific eulachon apply to both Oregon and Washington.

Operationally, WDFW reports the following with regard to use of LED lights in the WA pink shrimp fleet (Wargo and Ayres 2016):

Anecdotally most Washington shrimpers were reporting the use of LED lights in 2015. To better assess adoption, WDFW is conducting a survey of license holders. With 30% of active skippers responding, the results do point to nearly universal use of green LED lights, ranging from 8 to 18 per net. One Washington skipper is not yet using lights. Comments regarding the effectiveness of the lights at reducing bycatch ranged from good to very good – “They work!” The survey is also asking for information about ground gear design. The plan is to shift survey efforts to dockside interviews once the 2016 season opens to get a complete assessment of the fleet.

In Oregon, although no formal survey was conducted, based on an informal census, it appears as though all shrimpers that fished in 2015 used LED lights when trawling (Hannah and Jones 2016b).

NMFS released its five-year ESA review of Eulachon and a draft recovery plan for eulachon in 2016 (NMFS 2016a and 2016b). Neither document called for a change in the listing status of the southern DPS for eulachon; it remains ESA listed with the major threats identified as climate change and bycatch in the ocean shrimp trawl fisheries. The population trends and bycatch levels in the shrimp and groundfish fisheries have been summarized and quantified, including the reduction in bycatch resulting from first the introduction of the BRD grate and, more recently, the LED lights. NMFS acknowledges that the use of bycatch reduction devices, especially LED lights, represents a significant step in bycatch reduction and the threat bycatch poses to the persistence of eulachon. One of the actions listed in the draft recovery plan is to continue to work with the fishing industry to implement actions, e.g. fleet-wide implementation of light-emitting diode lights and rigid-grate bycatch reduction devices, to further reduce bycatch of eulachon in the offshore shrimp trawl fisheries. The figure below, taken from the eulachon recover plan, demonstrates the effectiveness of the LED lights during the 2015 trial phase. Both WDFW and ODFW are committed to making permanent rules requiring the use of these lights by the shrimp fleet and will have them in place following the completion of research enabling the necessary specificity of such rules after the 2017 season.

The major focus of the recovery plan for the next five-year period is to improve information about the status and trends of the eulachon population and the contribution of each of the major threats. Climate change is still identified as the major overriding risk to the population, and NMFS acknowledges that the threat associated with ocean shrimp trawling has been significantly reduced, and continues to be reduced, through advancements in bycatch mitigation. Other future recommended actions are directed at improving information on the impact of eulachon bycatch in the shrimp fishery include to (NMFS 2016a):

- Develop and implement a biologically-based analysis on the long-term effects of bycatch from the ocean shrimp fishery on eulachon recruitment.
- Develop and implement a research and monitoring plan to better understand the relationship between habitat types shared between eulachon and pink shrimp in the California Current.
- Develop and implement a monitoring plan to help quantify the benefits by-catch reduction methods.

3.4.3 Details of any critical environments or sources of concern and actions required to address them.

The pink shrimp trawl sector off the U.S. West Coast operates on mud-seafloor habitat in marine waters off Washington, Oregon, and Northern California (Shown in Figure 15 below).

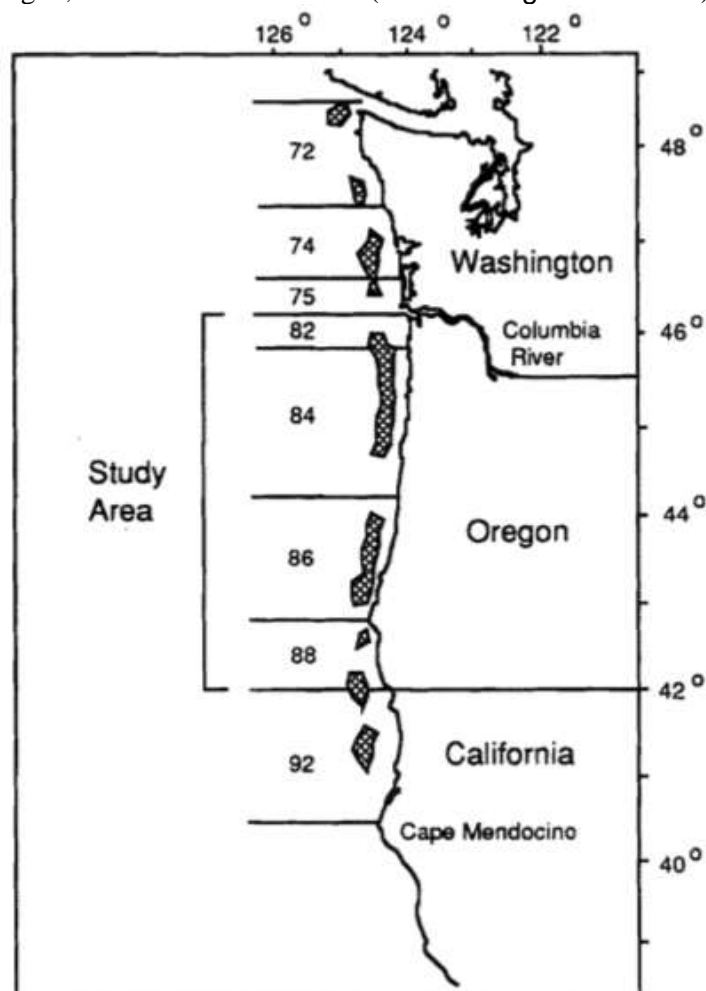


Figure 15. Pink Shrimp fishing grounds of the coast of WA, OR and CA.

Intensive fishing with bottom trawls can have significant effects on some types of seafloor habitats (Auster et al., 1996; Collie et al., 1997; National Research Council, 2002). The reduction in habitat complexity that can result from trawling is of particular concern because of the potential for reductions in fish production at impacted sites (Lindholm et al., 1999). In continental shelf waters off Oregon, Washington, and California, the effect of mobile fishing gears on seafloor habitats had received little study through 2005. The research that had been conducted focused on effects from otter trawls used to harvest groundfish (Engel and Kvitek, 1998; Hixon and Tissot, 2007). However, the principal trawl fishery currently operating on soft-bottom habitats on the outer continental shelf in these waters is the pink shrimp (*Pandalus jordani*) fishery. Habitat impacts from ocean shrimp trawls are likely to be different from those from groundfish trawls (Gibbs et al., 1980; Kaiser et al., 2002).

Pink shrimp trawls are considered to be semi-pelagic gear: they comprise a footrope system that incorporates a chain or cable groundline partially covered with 6.4-cm diameter rubber discs, but are configured to elevate the fishing line of the net about 35–70 cm above the bottom (Hannah and Jones, 2000, 2003).

Hannah et al. (2010) reported on surveys conducted with a remotely operated vehicle (ROV) at four mud-habitat sites with different histories of pink shrimp trawling. Results showed measurable effects of trawling on macroinvertebrate abundance and diversity. Densities of the sea whip (*Halipsteris* spp., $P < 0.01$), the flat mud star (*Luidia foliolata*, $P < 0.001$), unidentified Asteroidea ($P < 0.05$), and squat lobsters (unidentified *Galathea*, $P < 0.001$) were lower at heavily trawled (HT) sites, as was invertebrate diversity based on the Shannon-Wiener index. Sea cucumbers (unidentified *Holothuroidea*) and unidentified corals (*Hydrocoralia*) were observed at lightly trawled (LT) sites but not at HT sites. Hagfish (*Eptatretus* spp.) burrows were the dominant structural feature of the sediment surface at all sites and were more abundant at the HT sites ($P < 0.05$), a result potentially related to effects from fishery discards. Substantial heterogeneity was found between the northern and southern site pairs, indicating high site-to-site variability in macroinvertebrate densities in these deep (146–156 m) mud habitats. Two of the study sites were closed to trawling in June 2006.

To adequately understand and manage the ecosystem effects of shrimp trawl fisheries will require more information, well beyond basic information on removals and the physical effects of trawl footropes and doors. To prevent long-term detrimental effects from trawling, information on recovery times of macroinvertebrate populations specifically affected by shrimp trawls is critical. The data developed by Hannah et al., 2010 provides an opportunity for follow-up studies to better understand the recovery of macrobenthos and other changes in habitat after the cessation of trawl impacts at the Nehalem Bank closed area off northern Oregon. The research also provides a starting point for understanding the effects of the ocean shrimp trawl fishery on the ecosystem.

The various bodies with management responsibility for the west coast fisheries in general, and this fishery in particular (ODFW, WDFW), all show an appropriate recognition of the importance of habitat in the proper management of fisheries. Approaches to managing benthic impacts generally have the same basic objective, to reduce the overall level of impact leading to a higher probability of sustainability for whatever activities are being conducted. Activities leading to benthic impacts include but are not limited to fishing, and other activities may have a wider impact (e.g. pollution by flame retardants, radioactive releases and nutrients) or greater intensity of impact, such as aggregate or mineral extraction. Benthic habitats need a holistic approach to conservation management, protecting sufficient areas and selected highly vulnerable types from all activities, not just fishing. There are different approaches to reducing benthic habitat impacts with two standing out as being most common. These are (i) restrict the areas where (fishing) activity occurs, so leaving areas that are not impacted and (ii) lessening the intensity of the activity (fishing). Approaches to reducing intensity in relation to fishing include reduction in effort (number of vessels, number of days, etc.) and also in changing to less damaging gear types (lighter demersal trawl gear, smaller bobbins, semi-pelagic and pelagic trawls, etc.). Clearly, where fishing activity has been on-going for many years, and where there are no indications of system failures, it can be inferred that the level

of damage is below a critical threshold, but there may still be limited knowledge regarding the potential to recover (Tingley, 2011). It is important to note that the spatial distribution of a fishery is not uniform - this includes both the distribution of effort and catches (e.g. see Jennings et al. 1999). Thus, any impacts will also be differentially distributed in intensity. Local studies on the distribution of effort and impacts support this perspective as can be seen in the studies by Hannah (2003), Hixon & Tissot (2007) and Hannah et al. (2010). The spatial distribution of groundfish and shrimp effort on the Coquille Bank in the 1980s, for example, demonstrates the patchy distribution of effort, associated with different target species distributions, usually likened to some aspect of habitat differences.

Where impacts on benthic habitats occur, there are two types of assessment and management that are typically considered. These are (i) to define the vulnerability based on the ability to recover and (ii) to protect areas from some or all impacts. These are not mutually exclusive and are often used together. The first element is an assessment of the vulnerability and recovery potential of specific habitats usually based on both local and out-of-region studies. This approach has been developed for the US and shows a broadly similar picture to other such studies (PFMC 2005a, 2005b and 2005c). Essentially, habitats that experience considerable natural disturbance (e.g. sand and gravels) and thus have communities that are somewhat adapted to disturbance, typically exhibit less damage and faster recovery times than do habitats that experience little natural disturbance (e.g. hard substrates, but also deep-water muds). From this approach, benthic habitats can be classified into different categories of vulnerability to fishing (or other activities) and the most appropriate conservation and protection methods determined, taking into account a number of other factors.

The approach to define impact severity and recovery times of sensitive habitats is clearly laid out in a series of reports by the PFMC. These are appendices to the groundfish FMP and its amendments. These documents contain descriptions of the approach, the models used the input data, data gaps, etc. (PFMC 2005a). Importantly, the Council has considered the impacts of fishing on habitats with a specific west coast perspective (PFMC 2005b). The Oregon shrimp trawl fishery occurs on the sedimentary shelf over soft sand and mud substrate (Abramson, et al., 1981; Dahlstrom, 1970; NMFS, 2005a). Sensitivity of this habitat to trawls (including shrimp trawl) is rated at 1.2 on a scale of 0 to 3 (highest). Recovery time for trawls (including shrimp trawl) is generally estimated at 0.4 years (PFMC, 2005a). The fishery would not normally occur in Rockfish Conservation Areas (RCAs) because the substrate would tear the nets. The other factors that may be taken into account include the amount of the habitat type (i.e., overall area), the distribution of that area (degree of fragmentation), proximity to actual and potential sources of impact, and linkages to ETP species.

For either total or partial protection from some or all types of fishing and other activities there are designated areas, protected areas, that have been given a number of names but can all be classed as some form of marine protected area (MPA). MPAs can be small or large, closed to all activities or just some, open at certain times or always closed.

West coast MPAs fall into four different designations, each with rather different principal goals but all generating some significant level of benthic protection from fishing in general and demersal trawling in particular. The four designation types are:

- Sanctuaries: there is a network of marine sanctuaries operated under the National Marine Sanctuary Program (NMSP). Sanctuaries have very restricted permitted activities. The west coast has five sanctuaries (see URL: <http://sanctuaries.noaa.gov>)
- Marine protected areas (MPAs): there is a large network of MPAs, with many on the west coast (See URL: www.mpa.gov/)
- Essential Fish Habitat (EFH) protection areas: areas closed to bottom fishing to protect specific EFH (See URL: <http://www.pcouncil.org/groundfish/groundfish-essential-fish-habitat/>)

- Rockfish Conservation Areas (RCAs): areas closed to bottom fishing to protect overfished rockfish from trawling. These include areas are closed to protect (i) rockfish assemblages, (ii) cowcod, and (iii) yelloweye rockfish. RCAs are substantial areas and have typically been closed since the early 2000's (PFMC, 2010).

Figure 16 below shows the EFH areas and their designations on the US West Coast. The Trawl grounds closed in the state waters (out to 3 miles) of California and Washington are not shown on this maps.

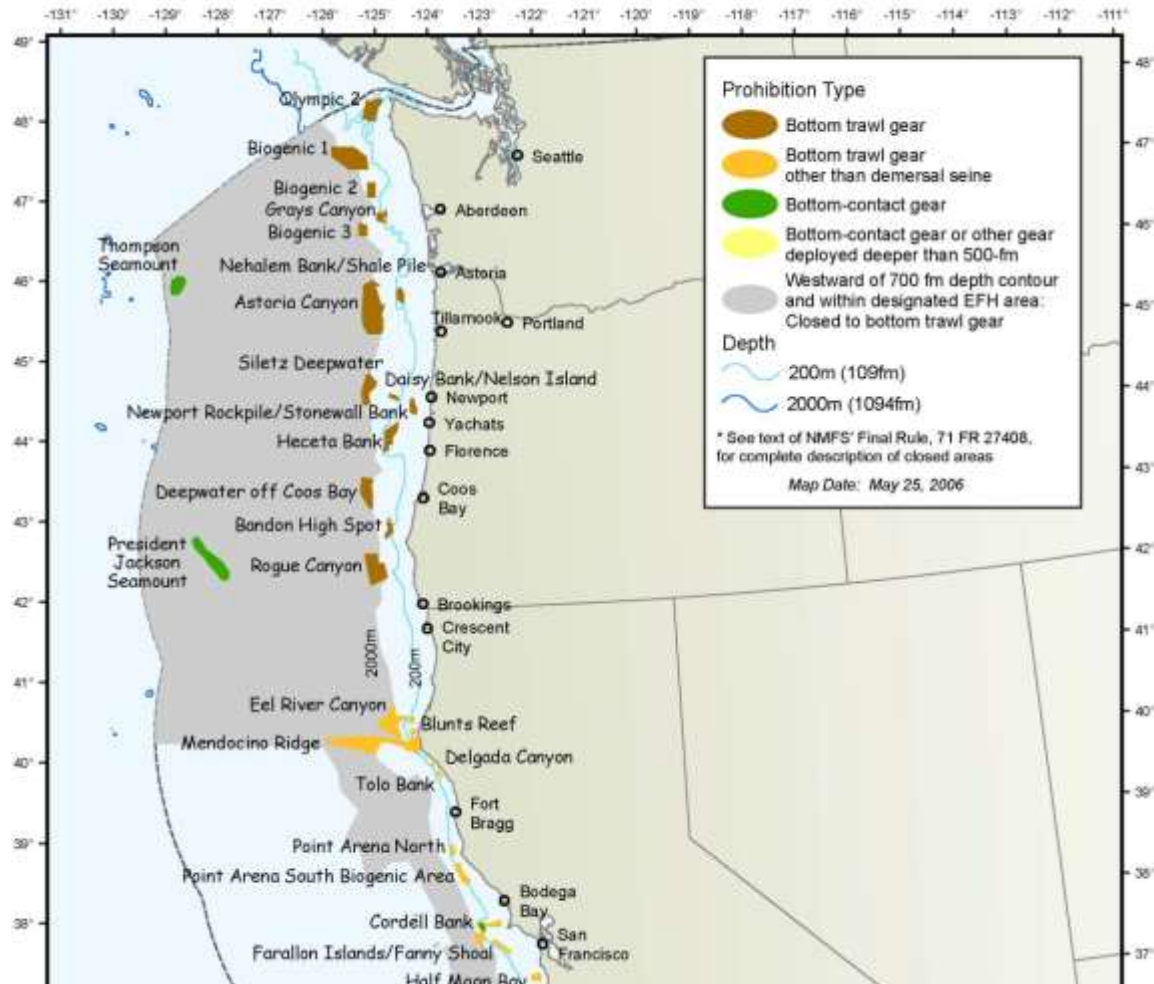


Figure 16. Essential Fish Habitat Areas off of the West Coast

There is a considerable proportion (~ half) of the marine benthic environment on the west coast of the US that is protected from demersal trawling by the range of mechanisms in place. Collectively these measures are protecting substantial proportions of the overall habitat. While the RCAs are targeted primarily at rockfish assemblages and focus on harder ground, they also encompass significant areas of softer, more trawlable ground.

EFH for groundfish is described as all waters from the high tide line (and parts of estuaries) to 3,500 meters (1,914 fathoms) in depth. Habitat areas of particular concern (HAPCs) are a subset of EFH used to focus management and restoration efforts. The current HAPC types are estuaries, canopy kelp, sea grass, and rocky reefs, none of which are areas where shrimp trawling occurs. In addition to identifying EFH and describing HAPCs, the Council also adopted 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 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 m (700 fm) and 3,500 m (1,914 fm), which is the outer extent of groundfish EFH. See Figure 16. The bottom contact closed areas are closed to all types of bottom contact gear intended to make contact with the bottom during fishing operations, which includes fixed-gear such as longline and pots. A more complete description of groundfish EFH is contained in the EFH EIS (NMFS, 2006), which is incorporated herein by reference.

The PFMC is currently in the process of reviewing and possibly revising EFH designated areas on the US West Coast (PFMC 2016), and is currently at the stage of analysing several Preliminary Preferred Alternatives (PPAs). However, none of the changes contained in the PPAs under evaluation will affect the pink shrimp trawl fisheries, as they are primarily concerned with protection of hard and habitat-forming substrate, none of which is currently considered pink shrimp trawl areas.

3.5 Principle Three: Management System Background (OREGON)

3.5.1 Area of Operation of the Fishery

The Oregon pink shrimp fishery operates within state and federal waters off the states of Washington, Oregon and California. State waters extend to 3 nautical miles (nm) offshore; federal waters extend from 3 to 200 nm offshore. The fishery occurs predominantly within federal waters of the US Exclusive Economic Zone (EEZ). Harvesters are allowed to fish anywhere within US federal waters beyond state limits but may land their catch only in the states for which they have landing permits (TAVEL Certification, 2007).

Pink shrimp are fished in areas of relatively flat, soft substrate at depths ranging from 75-145 fathoms (ODFW, 2017g). The fishery targets areas where stocks are concentrated, called beds. These beds increase and decrease in size as population abundance varies. For example in 2011 the majority of the catch was taken from the south coast and northern California areas, but the north coast also had high production levels (Hannah and Jones, 2012). By 2016 fishing was best in the southern areas in the early part of the year; mid coast abundances were low and northern area shrimp were too small. By mid-summer, northern area shrimp had grown to legal size and were fished intensely. By the end of the year, catch and effort increased again in the south (Groth et al. 2017).

3.5.2 User Groups and Rights

The pink shrimp fishery is exclusively commercial, prosecuted by Oregon fishers and a small number of Washington and California fishers permitted to land in Oregon ports. Washington, Oregon and California each have a limited entry permit system that limits the number of vessels participating.

Within Oregon, statute specifically exempts treaty rights of tribes from OFWC regulations (ORS 506.045, 1975b). Oregon treaty tribes are Columbia River tribes and do not participate in the shrimp fishery. At the federal level, NMFS and the PFMC are both bound by Federal Executive Order 13175 (2000), which requires meaningful consultation and collaboration with Indian tribal governments. The sovereign status and co-manager role of Indian tribes over shared federal and tribal fishery resources is recognized. At the regional level, this role is reflected in a designated tribal seat on the Pacific Fishery Management Council (PFMC, 2017a).

3.5.2 Legal Context

The management system operates within state laws and administrative rules. Oregon fishery management decisions are made by the Oregon Fish and Wildlife Commission (OFWC) and implemented through the Oregon Department of Fish and Wildlife (ODFW). The OFWC formulates fishery management policies and sets fishing seasons and other regulations. Some regulations, such as the maximum count per pound, are set in statute. Ultimate approval authority rests with governor.

The OFWC and ODFW operate within a framework of state laws, ORS chapters 496 through 513. Oregon state agencies are guided by a set of Oregon Administrative Rules (OARs) that set out general standards and procedures as well as fishery-specific rules. The OARs pertaining to ODFW are contained in chapter 635. The Oregon Trawl Commission is a state agency and operates under the umbrella mandate of the Oregon Department of Agriculture Commodity Commissions Program (specifically OAR chapter 656; OAR 2012f). In addition, all state entities adhere to the Public Meetings Law which requires that all meetings of governing bodies covered by the law are open to the public, that the public be given notice of the time and place of meetings, and that meetings be accessible to everyone (Open Oregon, 2012).

At the national level, management of state fisheries takes place within, and is coordinated with, a larger framework of federal laws, through the interface with the regional fishery management council system. 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). It 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.

In addition to the MSA, the PFMC adheres to a suite of “other applicable laws” (Buck, 1995; PFMC, 2011b):

- 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 (PFMC, 2011b).
- 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.

3.5.3 Administrative Context

Oregon Fish and Wildlife Commission

The Oregon Fish and Wildlife Commission (OFWC) formed in 1975 by the merger of the separate fish and wildlife commissions. The Commission has seven members appointed by the governor for staggered four year terms; one from each congressional district, one from east of the Cascades and one from the west of the Cascades. The Commission formulates policy for the management and conservation of fish and wildlife. It also sets regulations for recreational and commercial resource use, such as seasons and fishing methods (ORS 496, 1975a, ODFW, 2017c).

The OFWC website contains information on Commission membership, as well as meeting minutes, a schedule of upcoming meetings, and meeting procedures. It also provides a link to email questions and comments to the Commission. Commission meetings are held monthly and are open to the public.

Oregon Department of Fish and Wildlife

The Oregon Department of Fish and Wildlife (ODFW) operates under ORS chapters 496 through 513. It is charged with carrying out the policies set by the Commission and required by statute. ODFW consists of a director appointed by the OWFC and a state-wide staff distributed throughout Oregon. The mission of the ODFW is “to protect and enhance Oregon’s fish and wildlife and their habitats for use and enjoyment of present and future generations”

(ODFW, 2017h). The ODFW is divided into a Fish Division and a Wildlife Division. Oregon statute charges the ODFW with protecting and propagating fish in the state (ORS 506.036, 1965). This responsibility includes regulation of harvest, protection and enhancement of fish populations, and rearing and release of fish into public waters (ODFW, 2017h).

The ODFW is involved in multiple state, federal and regional policy processes related to the shrimp fishery. Oregon is a member of the Pacific Fishery Management Council (PFMC) (comprising Oregon, California, Washington and Idaho), North Pacific Fishery Management Council (NPFMC) (Alaska), and Pacific States Marine Fishery Commission (PSMFC) (Oregon, California, Washington, Idaho and Alaska). Within Oregon, the Ocean Policy Advisory Council (OPAC) is an advisory body to local governments, the Legislature and Governor on state ocean policy. The ODFW Marine Resources Program serves as a non-voting member of OPAC, whose present focus is on the protection of near-shore ocean resources and the spatial management of Oregon's Territorial Sea (OPAC, 2017).

ODFW Marine Resources Program

The Marine Resources Program (MRP) is a component of the ODFW Fish Division. The goal of the MRP is “to increase the quality and quantity of stock assessments and biological information collected through improved at-sea and dockside sampling programs and through carefully designed research projects.” The MRP is authorized by statute and administrative rule through administrative rule to administer the regulation, harvest and management of commercial and recreational fisheries (ODFW, 2017i). It has three areas of focus: 1. Policy, management and regulation; 2. Fisheries monitoring and data collection; 3. Research on species, habitats and fisheries. Specifically, it researches, assesses and manages the Oregon pink shrimp fishery. In addition to these direct responsibilities in state waters the MRP provides technical support and policy recommendations to regional and federal management entities that manage fisheries affecting Oregon stocks, fisheries and communities (ODFW, 2017i).

The MRP is based in Newport with field offices in Astoria, Charleston and Brookings. MRP staff is responsible for sampling, monitoring, research and management of commercial and recreational marine fisheries. These include ocean salmon, groundfish, halibut and shellfish. MRP staff has also been charged with managing the process of developing Oregon's system of marine reserves (ODFW, 2017f). The 2017 MRP budget is approximately \$9 million comprising federal, state general funds, license sales, and dedicated funds such as the commercial fish fund generated through ad valorem tax on landings (ODFW, 2017i).

Oregon Trawl Commission

The Oregon Trawl Commission (OTC) is a state agency operating under the Oregon Department of Agriculture Commodity Commissions Program. The OTC implements the practices and procedures established for commodity commissions by ORS chapter 656 of OAR. The commission was formed in 1963 by a vote of trawl producers (OAR 2017f, ODA 2017, OTC 2017b).

The mission of the Oregon Trawl Commission (OTC) is promotion, education, research and information. Specifically, the OTC seeks to enhance the image of the trawl industry, increase industry opportunities and contribute to the development of regulations and legislation (OTC, 2017a). The OTC provides web-based information on trawl gear and trawl fishing operations, attends seafood shows to promote trawl-caught products, features trawl-caught fish in cooking competitions and recipes, participates in management processes as advisors and informed stakeholders, and promotes research to resolve trawl-related issues.

The Commission has eight commissioners (eight fishermen, one processor, one distributor and one public member) appointed by the Director of the Oregon Department of Agriculture. Commissioners are chosen from among the owners and captains of trawl vessels, processors, and distributors; the mandated composition is five fishers, one processor, one distributor and one public member. The Commission is entirely funded through a mandatory ad valorem landings tax of .5% (OTC 2017b, ORS 508.505).

Oregon State Police

The Oregon State Police (OSP) Fish and Wildlife Division is charged with “ensuring compliance with the laws and regulations that protect and enhance the long term health and equitable utilization of Oregon’s fish and wildlife resources and the habitats upon which they depend” (OSP, 2012a).

The primary responsibility of the OSP Fish and Wildlife Division is enforcement of fish and wildlife laws. Additional responsibilities include public safety and enforcement of traffic, criminal, boating, livestock and environmental protection laws. The Fisheries Section works closely with the ODFW MRP to enforce Oregon’s commercial and sport fishing regulations through patrols of state waters and docks (OSP, 2017a). For example, in late 2015 ODFW conducted team training in various aspects of count sampling and determination in anticipation of potential count problems in 2016 (Groth et al., 2017).

The Oregon State Police formed a Marine Fisheries Team in 2015 to better coordinate fisheries and habitat enforcement along the Oregon coast. The Team, based in Newport and also working out of offices in Astoria, Tillamook, Florence and Coos Bay, consists of eight Fish and Wildlife troopers (OSP FWD, 2017a).

Pacific States Marine Fisheries Commission

The Pacific States Marine Fisheries Commission (PSMFC) is an interstate compact agency established by consent of Congress in 1947. Member states are California, Oregon, Washington, Idaho, and Alaska, each represented by three Commissioners. The purpose of the PSMFC is “to promote the better utilization of fisheries – marine, shell, and anadromous – of mutual concern, and to develop a joint program of protection and prevention of physical waste of such fisheries in all of those areas of the Pacific Ocean over which the compacting states jointly or separately now have or may hereafter acquire jurisdiction” (PSMFC 2017).

PSMFC has no regulatory or management authority. Instead, it serves as a neutral convener for discussion, interstate coordination, state-federal coordination, grants administration, funds disbursement, research and management coordination and database management. The PSMFC also participates as a non-voting member of the PFMC and the NPFMC (PSMFC, 2017).

Pacific Fishery Management Council

The ODFW coordinates state fishery management with the regional Pacific Fishery Management Council (PFMC). 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, 2004).

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 (MSA, 2007). 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).

The Council meets five times a year. All meetings are open to the public, except for discussions of personnel or other administrative matters. Meeting locations rotate among member state cities. Advisory bodies also meet at various times between Council meetings. 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 2017d).

3.5.4 Fishery Management Objectives

The Oregon Food Fish Management Policy (ORS 506.109, 1975) lists seven management objectives (identified as goals in the statute) for Oregon food fish that guide management decision-making by the OFWC. The objectives are preceded by a general policy statement that food fish are to be managed to provide the optimum economic, commercial recreational and aesthetic benefits for present and future generations of citizens.

The objectives may be paraphrased as:

- (1) To maintain all species of food fish at optimum levels;
- (2) To optimize the production, utilization and public enjoyment of food fish;
- (3) To permit an optimum and equitable utilization of available food fish;
- (4) To maintain public access to food fish resources;
- (5) To regulate food fish to provide optimum commercial and recreational benefits;
- (6) To preserve the economic contribution of the sports and commercial fishing industries consistent with sound food fish management practices;
- (7) To optimize the return of Oregon food fish for Oregon's recreational and commercial fisheries.

The Oregon fishery management system is also guided by Statewide Planning Goal 19 on Ocean Resources (State of Oregon, 1973), which is "to conserve marine resources and ecological functions for the purpose of providing long-term ecological, economic, and social value and benefits to future generations." This general goal is supplemented by implementation requirements pertaining to the use, management and protection of renewable marine resources. Complementing Goal 19 is the Governor's Executive order 08-07 which directs state agencies to protect coastal communities in considering the choices for marine reserves and wave energy sites, as well as subsequent state legislation establishing set of pilot marine reserves (State of Oregon 1973, 2008).

Oregon's Food Fish Management Policy (ORS 506.019, 1975) provides explicit overarching long-term objectives for Oregon's fisheries that guide OFWC decision-making.

The OARs provide the legally enforceable elements of fish management plans (OAR, 2017a).

In 2014 ODFW developed a draft FMP that has completed internal ODFW review and is now available for public comment (Oregon Department of Fish and Wildlife, 2015). The FMP comprises three major sections, each with several subsections:

1. Resource Analysis
 - Species
 - Description of the shrimp resource
 - Available data
 - Stock status
 - Known threats to the resource
 - Sustainable harvest levels
 - Prioritized list of research needs
2. Harvest Management Strategy.
 - Species
 - Management objectives
 - Current issues
 - Description of the fishery
 - Other social and/or cultural uses of the resource
 - Biological reference points and fishery controls
3. Glossary of terms and literature cited
 - Glossary of terms
 - Literature cited

The draft FMP contains both short-term and long-term fishery management objectives. The fishery is being managed according to the framework of the plan. ODFW staff will present the FMP to the Commission at its November 2017 meeting to request adoption (Groth, 2017; Groth et al. 2017).

3.5.5 Fishery Regulations

Fishery regulations designed to achieve the management objectives include a number of input controls described in detail in Section 3.2. These include mandatory commercial fishing vessel licenses, limited entry shrimp fishing permits, season limits, maximum count per pound, bycatch reduction devices and incidental catch limits. In addition, the fishery is subject to conservation area restrictions, landings fees, and onboard observer coverage.

3.5.6 Fishery Management Decision Processes

Established decision-making processes of the OFWC are outlined in law. These processes exist to enable the development of management measures that meet Food Fish Management Policy objectives (ORS 506.036, 1965; ORS 506.109, 1975; ODFW, 2017d).

In establishing and implementing law and policy, the Oregon Legislature and the OFWC use processes that are based on best available scientific information and exhibit a precautionary approach to pink shrimp management. For example, regulations establishing maximum count per pound and closed seasons were implemented to minimize effort on small shrimp and prevent fishing on spawning aggregations (OAR, 2017c; 2017d). Adoption of the BRD requirement was a precautionary approach to minimizing bycatch of rebuilding groundfish stocks. Further strengthening of the BRD specifications was a proactive and precautionary approach to minimizing all bycatch, including eulachon, recently listed as threatened under the ESA (OAR, 2017d; Hannah and Jones, 2012).

The management system provides opportunity, encouragement and facilitation of engagement by stakeholders through formal and informal processes.

Formal processes include the posting of announcements of OFWC meetings on the ODFW website well in advance of meetings, with full information about meeting agendas. The public

is encouraged to attend OFWC meetings or provide comment in advance of meetings through the Commissions website link (ODFW 2017d;). In addition, ODFW routinely posts notices of public meetings about upcoming regulations on their website and at port offices (ODFW, 2017e). The Oregon Public Meetings Law ensures public notice and access to meetings (Open Oregon, 2017). Annual planning meetings between enforcement and ODFW, as well as intra-season updates, establish enforcement priorities in anticipation of likely areas needing enforcement attention, and adapt to in-season enforcement issues as they emerge (OSP FWD, 2017; Thompson, 2017).

Less formal but equally established processes include a number of types of interaction and coordination among managers, enforcement personnel and stakeholders. Dockside interactions between the industry and ODFW biologists and the OSP take place on a regular basis through catch sampling and monitoring. MRP staff is generally available for informal meetings with stakeholders, as well as for more formal meetings arranged around a particular topic (Groth, 2017; Pettinger, 2017).

The ongoing process of active coordination and consultation with industry in identifying issues, monitoring compliance, and conducting cooperative research contributes to decision processes that are responsive, transparent and adaptive (ODFW 2017b; 2017e). The transparency, timeliness and adaptive manner of decision responses are demonstrated through the ODFW Annual Pink Shrimp Review. For example, in its 2017 annual edition the Review described 2016 experiments with eulachon bycatch reduction using LED lights and identified upcoming regulatory actions to be taken requiring LED lights on gear. That same edition included notification of the development of a shrimp management plan and encouraging public comments (ODFW, 2017a). Design, development and testing of refinements to the bycatch reduction device was done in collaboration with industry members, and the results quickly led to a decision about new regulations.

At the regional level, the PFMC process provides open and transparent distribution of information as well as opportunities for engagement of interested parties through committee membership and public testimony. ENGOs are routinely engaged in this process (PFMC, 2017c).

Executive Order 13132 (1999) 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. Any final published rule must be accompanied by a "federalism summary impact statement" (NMFS, 1997).

3.5.7 Stakeholder Consultations

The management system regularly seeks relevant information through extensive consultation with stakeholders. These consultations serve the purpose of proactively avoiding disputes. They provide open lines of communication among fishery participants on the likely impact of regulations and on upcoming fishery-related issues. Mechanisms for consultation include the Annual Pink Shrimp Review (ODFW, 2008-2017), OTC periodic newsletters and online news notices (OTC, 2011a; 2011b; 2017c), OSP monthly newsletter (OSP, 2017b), meetings at MRP offices, dockside interactions, and public testimony at OFWC meetings (ODFW, 2017d).

A recent example of the use of consultation in the pink shrimp management system is the use of the 2017 Annual Pink Shrimp Review to update the fleet on the latest research into the effectiveness of using LED lights to reduce bycatch of eulachon. Between 2013-2017 experiments with LED lights to reduce eulachon bycatch were conducted through an active agency-industry consultative process. Throughout that time period the Annual Pink Shrimp Review was used extensively as a tool for the communication of experimental results (Hannah and Jones, 2014a; 2014b; 2015, 2016b; Groth et al., 2017). Additionally, in 2017 the Review

was used to request stakeholder feedback on the newly developed shrimp fishery management plan (Groth et al., 2017).

At the regional level the PFMC process is based on consultations with member states through state agencies, PFMC appointees, advisory committee members, and meetings. The process of state participation in the formulation of federal management measures encourages complementary approaches between federal and state approaches (PFMC, 2007; 2010). Consultations among state agency staff, industry stakeholders and ENGOs occur informally through regular stakeholder meetings, interactions at PFMC settings, interactions with congressional staff, and various other meetings.

3.5.8 Stakeholder Education and Outreach

Education and outreach in the pink shrimp fishery comprises formal reporting and informal communication.

Formal reporting to all interested stakeholders is provided through various published sources. The ODFW Annual Pink Shrimp Review provides annual summaries of fishery performance, describes research results, and identifies upcoming issues affecting the fishery (cf. ODFW, 2008-2017). OFWC minutes describe Commission deliberations on various issues, the nature of scientific advice and public comment, and decision outcomes (cf. ODFW, 2017c, 2017d). Oregon State Police monthly Field Reviews inform fishery stakeholders of existing and emerging compliance and enforcement issues (cf. OSP, 2014- 2017). Oregon Trawl Commission quarterly newsletters provide fishery updates and identify economic and regulatory issues (cf. OTC, 2017c; 2017d). Pacific Fishery Management Council newsletters describe actions taken at Council meetings, committee openings and meeting schedules, and upcoming issues (cf. PFMC, 2017d). The Federal Register provides notice of all proposed federal actions (cf. Federal Register 2017).

The number of informal interactions among stakeholders and agency staff maintain open lines of communication that encourage active participation and promote widespread understanding of the roles and responsibilities of respective entities. The functions, roles and responsibilities are well understood for key areas of responsibility and action. Evidence of successful outreach education can be found in the extent of industry involvement in research (cf. Hannah and Jones, 2014a; 2014b; 2015, 2016b; Groth et al., 2017)., public testimony to the OFWC, engagement of the OTC in state and federal processes, and good compliance rates.

3.5.9 Monitoring, Control and Surveillance

A comprehensive system of monitoring, control and surveillance is in place, involving the Oregon Department of Fish and Wildlife, NMFS West Coast Groundfish Observer Program, Oregon State Police and US Coast Guard. Harvest control rules (seasons, maximum counts per pound and bycatch reduction devices) are clear and enforceable.

The Oregon Department of Fish and Wildlife provides port sampling of catch and actively monitors CPUE and size composition. Fishing location and effort are monitored through mandatory logbooks. The West Coast Groundfish Observer Program monitors the biological parameters of the total catch through at-sea monitoring of pink shrimp trips, the target is to obtain 20% coverage, however to date this has not yet been achieved (NWFSC, 2010). The Oregon State Police conduct random dockside catch samples to check for compliance with count-per-pound regulations and do pre-season checks of BRDs to ensure compliance with spacing requirements. Compliance with the count-per-pound regulation is reinforced by market preferences for larger shrimp (Hannah, 2012; Groth, 2017; Pettinger, 2012; 2017; Thompson, 2012; 2017). At-sea compliance with regulations (seasons, closed areas, licenses) is monitored by the US Coast Guard (PFMC, 2017b).

Vessels fishing in the federal EEZ are subject to federal rules and sanctions (cf. NMFS 2017a, 2017b, 2017c). NOAA Office of Law Enforcement (OLE) monitors compliance with over 35 federal statutes, including declaration reports, vessel monitoring systems (VMS), and closed areas (NOAA OLE, 2017a; 2017b). Federal rules apply to federally managed species that interact with the Oregon management system. For the shrimp fishery, these rules pertain primarily to bycatch of federally managed species or species protected under the Endangered Species Act (ESA, 1973). Oregon enforcement is represented on the PFMC Enforcement Consultants committee, which includes representatives from state enforcement agencies in Washington, Oregon, and California, and the federal government (PFMC, 2017b). Coordination of state and federal laws is accomplished through this body.

At the state level, the management system uses the ODFW and OSP Coordinated Enforcement Process (CEP) to coordinate between agencies and to set priorities. Enforcement priorities are reviewed annually under the CEP for all commercial fisheries including the pink shrimp fishery (OSP FWD, 2017b).

The ODFW emphasizes an informational and consultative approach to new regulations by working with industry to develop workable approaches to compliance - for example, in the design development of the bycatch reduction device – and by advance notice to industry of upcoming regulation changes and enforcement issues through the Annual Pink Shrimp Review. The management philosophy of both ODFW and the OSP is to promote compliance through education and cooperation, and minimize the occurrence of noncompliance (Hannah, 2012; Groth, 2017; Thompson, 2012; 2017).

Sanctions for non-compliance exist, are defined in law and enforced through at-sea and dockside monitoring. Oregon State Police issue tickets for non-compliance. Fines typically range between \$500 and \$1000. All commercial fishery citations are reported as misdemeanors, but if there are multiple convictions, further violations may be upgraded to a felony (Thompson, 2012).

The Oregon State Police provides information on compliance and enforcement to the ODFW. Compliance rates are high; there have been few reported violations in the pink shrimp fishery since 2012 (Thompson, 2012; 2017; Hannah and Jones, 2012; Groth et al., 2017). In 2016 there was a single violation of the count-per-pound regulation ; between 2012 and 2015 there were none. No violations of the BRD regulation were reported in the period 2012-2016; Season openings are fully enforceable (ODFW, 2012; Thompson, 2012). In 2016, one fisher was cited by the OSP for wanton waste of commercial food fish after landing 30k lbs of spoiled shrimp (OSP, 2016). The harvester was subsequently tried, convicted and fined \$500 (Groth et al., 2017).

The high compliance rates in the pink shrimp fishery can be attributed to the emphasis on prevention, an educational approach to informing participants in the fishery about regulations, the collaborations with industry in developing effective gear design, control rules that are clear and enforceable and a coordinated monitoring and enforcement infrastructure (Groth, 2017).

3.5.10 Research to Support Management

ODFW MRP has conducted a longstanding and proactive shrimp research program that consists of the annual development of research projects in response to current and emerging conditions. Since 2013 the pink shrimp fishery has published its research plan for the upcoming year, as well as list of ODFW research reports, and peer-reviewed publications, in the Annual Pink Shrimp Review. (Hannah and Jones, 2013-2016; Groth et al., 2017).).

Research takes place in three areas: shrimp population dynamics, non-target catch and ecosystem effects. Although research priorities are addressed each year, activities that take place within each area depend on availability of staff, equipment and funding (Groth et al., 2017).

ODFW shrimp biologists have a strong publication record Hannah and Jones, 2000; Gallagher et al., 2004; Krutzikowsky et al., 2006; Hannah and Jones, 2007; Hannah et al., 2010; Hannah et al., 2011; Hannah, 2014; 2016; Hannah and Jones, 2014; 2015b).. The MRP is successful in producing reliable, timely and proactive research results that support management decisions. Research results are widely distributed in written form and are also widely disseminated informally through involvement of the industry in cooperative research and through frequent meetings and dockside interactions (Hannah, 2012).

3.5.11 Management Review

Some components of management performance are evaluated annually and reported in the Annual Pink Shrimp Review under the following section heads: season summary, indicators for the upcoming season, issues updates, research results, regulatory changes and enforcement issues (Hannah and Jones, 2013-2016; Groth et al., 2017). ODFW staff conducts ongoing review of control rules by monitoring CPUE, quantity, quality and size composition of catch, and bycatch. Performance of BRDs – in terms of effectiveness of bycatch reduction as well as impact on fishing operations – is evaluated through onboard observer reports and stakeholder feedback. Bycatch is monitored and evaluated through the onboard observer program. The Annual Pink Shrimp Review is the primary mechanism for reporting evaluation results.

The economic performance of the fishery is annually evaluated through discussions of shrimp processing and fishing effort in the Annual Pink Shrimp Review, and occasionally evaluated through analyses of economic impact of Oregon fisheries sponsored by the Oregon Coastal Zone Management Association (OCZMA, 2006).

Research results are subject to external review through the peer reviewed journal process, in which ODFW staff are actively engaged (cf. Hannah and Jones, 2000; Hannah and Jones, 2007; Hannah et al., 2010; Hannah et al., 2011; Hannah 2014, 2016; Hannah and Jones, 2014; 2015b).

An external review of the management policy was performed as a condition of the 2007 certification (TAVEL Certification, Inc, 2007; Golden 2008). This was followed in 2016-2017 by a second external review conducted by Golden Marine Consulting. The review focused on six management components: stock assessment; fishery monitoring; enforcement compliance; research; organizational integrity/viability; regulatory action. The review was conducted through a literature search and interviews with decision makers, researchers, and stakeholders. The report of the management evaluation was presented to the assessment team at the 2017 Surveillance audit (Golden Marine Consulting, 2017).

WASHINGTON

3.6 Principle Three: Management System Background (WASHINGTON)

3.6.1 Area of Operation of the Fishery

The US West Coast pink shrimp fishery operates within state and federal waters off the states of Washington, Oregon and California. State waters extend to 3 nautical miles (nm) offshore; federal waters extend from 3 to 200 nm offshore. The fishery occurs predominantly within federal waters of the US EEZ. Harvesters are allowed to fish anywhere within US federal waters beyond state limits but may land their catch only in the states for which they have landing permits (Wargo 2014).

Pink shrimp are fished in areas of relatively flat, soft substrate at depths ranging from 75-145 fathoms (ODFW 2012g). The fishery targets areas where stocks are concentrated, called beds. These beds increase and decrease in size as population abundance varies. Figure 1 illustrates the area of operation of the fishery and the extent of variation of the size of shrimp beds (Groth et al., 2017). In 2016, stock conditions in each area varied over the season. In the early season catches were concentrated in southern areas. By mid-season legal-size northern-area shrimp supported the fishery, and by late season the fishery was focusing on the Coos Bay area (Groth et al., 2017). The majority of the catch was taken from the northern California to Washington areas (Groth et al., 2017; Wargo, 2017).

3.6.2 User Groups and Rights

The pink shrimp fishery is currently non-tribal commercial, prosecuted by Washington, Oregon and California fishers. A small number of Washington and California fishers are also permitted to land in Oregon ports. All three states have a limited entry permit system that limits the number of vessels participating.

At the federal level, NMFS and the PFMC are both bound by Federal Executive Order 13175 (2000), which requires meaningful consultation and collaboration with Indian tribal governments. The sovereign status and co-manager role of Native American tribes over shared federal and tribal fishery resources is recognized. At the regional level, this role is reflected in a designated tribal seat on the Pacific Fishery Management Council (PFMC 2017a).

Three coastal Washington tribes have federally adjudicated usual and accustomed fishing grounds that include pink shrimp grounds. An intertribal dispute over the western boundaries of these grounds for two of the three coastal tribes has been heard in federal court and a decision has been rendered. This decision is referred to as: *United States v. Washington*, 2:09-sp-00001-RSM (Ayres, 2017). Formal state/tribal fishery management plans must be agreed to prior to any tribe fishing for pink shrimp. While WDFW has signed a fishery management plan with one of these tribes, no tribal fishing has occurred to date (Ayres, 2017; WFWC, 1996; WDFW and NWIFC, 2017).

3.6.3 Legal Context

Washington. In Washington, the management system operates within state laws: Title 77 Revised Code of Washington (RCW); and administrative rules: Title 220 Washington Administrative Code (WAC). Fishery management decisions are made by the Washington Fish and Wildlife Commission (WFWC) and implemented through the Washington Department of Fish and Wildlife (WDFW). The WFWC receives its authority from the passage of Referendum 45 by the 1995 Legislature and public at the 1995 general election (Ayres, 2017; RCW 2015a – 2015i; WDFW 2017c; 2017d; 2017g).

National. At the national level, management of state fisheries takes place within, and is coordinated with, a larger framework of federal laws, through the interface with the regional fishery management council system. 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). It 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.

In addition to the MSA, the PFMC adheres to a suite of “other applicable laws” (Buck, 1995; PFMC 2011b):

- 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 (PFMC 2011b).
- 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 U. S. Fish and Wildlife Service (USFWS) to develop memoranda of agreement to conserve migratory birds and to evaluate the effects of their actions on migratory birds in NEPA documents.

3.6.4 Administrative Context

Washington Fish and Wildlife Commission

The Washington Fish and Wildlife Commission (WFWC) consists of nine members serving six-year terms. Members are appointed by the governor and confirmed by the senate. The WFWC formulates fishery management policies and sets fishing seasons and other regulations. Ultimate approval authority for WFWC decisions rests with governor. Some regulations, such as the maximum count per pound, are set in statute. The Commission is the supervising authority for the Department. Through formal public meetings and informal hearings held around the state, the Commission provides an opportunity for citizens to actively participate in management of Washington's fish and wildlife (WDFW,2017c).

The WFWC website (URL:<http://wdfw.wa.gov/commission/>) contains information on Commission membership, as well as meeting minutes, a schedule of upcoming meetings, and meeting procedures. It also provides a link to email questions and comments to the Commission. Through formal public meetings and informal hearings held around the state, the Commission provides an opportunity for citizens to actively participate in management of Washington's fish and wildlife.

3.6.4.1.1

Washington Department of Fish and Wildlife

The Washington Department of Fish and Wildlife (WDFW) is charged with carrying out the policies set by the WFWC and as required by statute. WDFW consists of a director appointed by the WFWC and a state-wide staff of about 1,480 employees. The mission of the WDFW is “To preserve, protect and perpetuate fish, wildlife and ecosystems while providing sustainable fish and wildlife recreational and commercial opportunities”. In addition to its administrative headquarters in Olympia Washington, the Department is divided into six regions. Region 6, the Coastal Region, has field responsibility for coastal shellfish, including pink shrimp (WDFW, 2017a).

The WDFW is involved in multiple state, federal and regional policy processes related to the shrimp fishery. Washington is a member of the Pacific Fishery Management Council (PFMC) (comprising Oregon, California, Washington and Idaho), North Pacific Fishery Management Council (NPFMC) (Alaska), and Pacific States Marine Fishery Commission (PSMFC) (Oregon, California, Washington, Idaho and Alaska).

Washington Department of Fish and Wildlife Police

The WDFW Police Officers (FWOs) are general authority peace officers deployed to six regions throughout the state and a Marine Division (WDFW, 2017f; 2017b). During the 2005-2007 biennium, the Enforcement Program has employed 156 full-time employees (FTEs). Of these, 138 are commissioned FWOs and 16 are non-commissioned employees; two aircraft pilots, two vessel/vehicle shop staff and eight administrative support and professional staff. Currently, 89% of the Enforcement Program staff is field deployed. There are 2.5 FTEs that work in Westport and Ilwaco that opportunistically enforce pink shrimp regulations (Chadwick 2015).

Officers also hold federal U.S. Fish and Wildlife and National Marine Fisheries Service (NMFS) commissions, and have jurisdiction over federal violations, the most important of which are the Endangered Species Act and the Lacey Act. Officers work joint patrols and coordinate with these agencies and the U.S. Coast Guard (WDFW 2017f; Chadwick, 2017).

Pacific States Marine Fisheries Commission

The Pacific States Marine Fisheries Commission (PSMFC) is an interstate compact agency established by consent of Congress in 1947. Member states are California, Oregon, Washington, Idaho, and Alaska, each represented by three Commissioners. The purpose of the PSMFC is “to promote the better utilization of fisheries – marine, shellfish, and anadromous – of mutual concern, and to develop a joint program of protection and prevention of physical waste of such fisheries in all of those areas of the Pacific Ocean over which the compacting states jointly or separately now have or may hereafter acquire jurisdiction” (PSMFC, 2017).

PSMFC has no regulatory or management authority. Instead, it serves as a neutral convener for discussion, interstate coordination, state-federal coordination, grants administration, funds disbursement, research and management coordination and database management. The pink shrimp fish ticket data from Washington and California (as well as Oregon) is entered into the PSMFC’s Pacific Fisheries Information Network (PacFIN) system, and reports for fish product landings and value (including pink shrimp) are available. The PSMFC also participates as a non-voting member of the PFMC and the NPFMC (PSMFC, 2017).

Pacific Fishery Management Council

The WDFW coordinates state fishery management with the regional PFMC. 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, 2004).

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 (MSA, 2007). 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).

The Council meets five times a year. All meetings are open to the public, except for discussions of personnel or other administrative matters. Meeting locations rotate among member state cities. Advisory bodies also meet at various times between Council meetings. 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, 2017d).

3.6.5 Fishery Management Objectives

As stated earlier, in 1981 the three coastal states worked through the PFMC to develop a draft regional FMP for the ocean shrimp fishery off Washington, Oregon, and California (Abramson et al., 1981). That draft FMP stated specific management objects:

1. Prevent Long-Term Biological Damage to the Stock

2. Maximize the Long-Term Value of the Shrimp Catch
3. Minimize Costs of Fishing for and Processing Pink Shrimp
4. Minimize Costs of Managing the Pink Shrimp Fishery
5. Avoid Regulations that may cause Intra-Fishery Conflicts
6. Minimize Adverse Impacts of Regulation on the Social Structure of Coastal Communities
7. Avoid an Unfair Distribution of Income and Wealth from Pink Shrimp Fishing and Processing

Since that time, state agencies have continued to work together, primarily through communication and coordination of agency scientists and enforcement personnel, to address emerging fisheries resource and management issues.

As noted by WDFW in their 2016 Pink Shrimp review (Wargo and Ayres 2016), guiding principles for fishery management are founded in the agency mandate to “protect the resource and enhance commercial opportunity” (WDFW, 2017a). More specifically, the mandate for WDFW and the WFWC as it relates to pink shrimp is found at RCW 77.04.012: Wildlife, fish, and shellfish are the property of the state. The commission, director, and the department shall preserve, protect, perpetuate, and manage the wildlife and food fish, game fish, and shellfish in state waters and offshore waters. The department shall conserve the wildlife and food fish, game fish, and shellfish resources in a manner that does not impair the resource. In a manner consistent with this goal, the department shall seek to maintain the economic well-being and stability of the fishing industry in the state. The department shall promote orderly fisheries and shall enhance and improve recreational and commercial fishing in this state.

The Commission may authorize the taking of wildlife, food fish, game fish, and shellfish only at times or places, or in manners or quantities, as in the judgment of the commission does not impair the supply of these resources (WDFW, 2017c).

To achieve its mission, WDFW will continue to focus its activities on the following four goals laid out in the WDFW Strategic Plan (WDFW, 2017a):

Goal 1: Conserve and protect native fish and wildlife

Goal 2: Provide sustainable fishing, hunting, and other wildlife-related recreational and commercial experiences

Goal 3: Promote a healthy economy, protect community character, maintain an overall high quality of life, and deliver high-quality customer service

Goal 4: Build an effective and efficient organization by supporting our workforce, improving business processes, and investing in technology

The legislature finds (RCW 77.04.013) that all fish, shellfish, and wildlife species should be managed under a single comprehensive set of goals, policies, and objectives, and that the decision-making authority should rest with the Fish and Wildlife Commission.

A draft FMP reflecting the WDFW guiding principles for management is in development and has been released for public review and comment (Wargo, 2017). This draft FMP will be implemented formally in due course and contains explicit short and long-term objectives.

In 2005 the State of Washington developed a formal pink shrimp management plan (WDFW, 2005) with the Makah Tribe for that year’s shrimp season (although the Makah never fished). The goals were:

- Preserve, protect, and perpetuate the coastal pink shrimp resource to provide for their sustainable harvest.
- Maintain consistent, conservation-based regulations for state and tribal fisheries
- Maintain effective resource management while minimizing management costs
- Protect the reproductive capacity of the pink shrimp stocks
- Minimize harvest of small, unmarketable shrimp
- Minimize bycatch mortalities of other species
- Use simple, enforceable, management tools

It is reasonable to assume the same goals would apply in the future.

3.6.6 Fishery Regulations

Fishery regulations designed to achieve the management objectives include a number of input controls described in detail in Section 3.2. These include mandatory commercial fishing vessel licenses, limited entry shrimp fishing permits, season limits, maximum count per pound, bycatch reduction devices and incidental catch limits. In addition, the fishery is subject to conservation area restrictions, landings fees, and on-board observer coverage.

3.6.7 Fishery Management Decision Processes

WDFW follows the state laws that govern its rule making activity. Chapter 34.05 RCW requires that agencies conduct a process that ensures public involvement opportunities and considers the economic impact of its rules. The WDFW offers several formal and informal ways to provide input or comments on proposed rules (WDFW, 2017d).

Rules are codified under the WAC. The WDFW accepts public input throughout the rule-making process. For example, before WDFW begins the process of changing fishing rules, the agency often holds public workshops, forms advisory committees, and seeks public input to help formulate its rule proposals. Then WDFW offers a formal public comment period for each rule-proposal project once it files its Notice of Proposed Rule Making (Form CR-102), with the Office of the Code Reviser. WDFW posts CR-102s on its agency website within two days of filing, and the Office of the Code Reviser publishes CR-102s in the Washington State Register. CR-102s include information for submitting comments on proposed rules, and they provide the time, date and location of Commission meetings where the public can testify about proposed rule changes (WDFW, 2017d).

When a person comments on a rule during the formal public comment period or at a Commission meeting, the comments become part of the public record. The Commission takes these comments into consideration when deciding whether to adopt rules as proposed or to revise the rules if appropriate. Everyone who comments on a proposed rule will get a copy of the Department's official response to the comments.

In addition to the process outlined above, the public can petition the WFWC to change a rule or reconsider a specific rule adoption. If the public desires, one can go forward with a formal petition, by downloading the form at <http://www.ofm.wa.gov/reports/petition.pdf> (WDFW 2017d). The process of Washington State rulemaking is described at http://www.oria.wa.gov/site/alias__oria/448/default.aspx.

3.6.8 Stakeholder Consultations

3.5.8.1. Washington.

The WDFW offers several formal and informal ways to provide input or comments on proposed rules as noted above (WDFW 2017d). WDFW technical staff also informally contacts pink shrimp fishery stakeholders to inform or seek input on rule changes that may come under consideration (Wargo, 2014; 2017).

3.5.8.2. Regional Level

At the regional level, the PFMC process is based on consultations with member states through state agencies, PFMC appointees, advisory committee members, and meetings. The process of state participation in the formulation of federal management measures encourages complementary approaches between federal and state approaches (PFMC 2004; 2007). Consultations among state agency staff, industry stakeholders and ENGOs occur informally

through regular stakeholder meetings, interactions at PFMC settings, interactions with congressional staff, and various other meetings.

3.6.9 Monitoring, Control and Surveillance

An opportunistic system of monitoring, control and surveillance is in place, involving the WDFW police units, NMFS West Coast Groundfish Observer Program (WCGOP), and US Coast Guard. Harvest control rules (seasons, maximum counts per pound and bycatch reduction devices) are clear and enforceable.

WDFW does not provide port sampling of catch or actively monitor size composition. Shrimp harvest logbooks are required of all vessels (WDFW, 2017e; WAC, 2015c).

On March 13, 2009, the National Marine Fisheries Service proposed to list the eulachon Southern Distinct Population Segment (which consists of all eulachon spawning south of the Dixon Entrance and Nass River, BC) as threatened under the Endangered Species Act (74 FR 10857; 50 CFR Part 223: 10857-10876). WDFW felt there was a paucity of genetic data and limited understanding of how freshwater and oceanic environments affect eulachon population structure. They stated that, without direct observation, it was impossible to estimate the amount of bycatch in the Washington shrimp trawl fishery. Furthermore, it was recognized that fishery exploitation could not be calculated due to an unknown terminal run size. The ODFW and WDFW sought and were awarded funds in 2010 by the NOAA Fisheries Service to support a bi-state, multi-part project to address these limitations. The shrimp trawl observer project is one of four parts of the project and is intended to assess and reduce the impacts of shrimp trawl operations on eulachon smelt by initiating an observer program, with also required vessel fishing logbooks, to estimate the bycatch rates in Washington's ocean shrimp trawl fishery and by developing and testing modifications to ocean shrimp trawl gear or operations (Wargo and Ayres, 2016; Wargo et al., 2016).

The WCGOP monitors the biological parameters of the total catch through at-sea monitoring of pink shrimp trips, the target is to obtain 20% coverage, however to date this has not yet been achieved (NWFSC, 2010); coverage is 14 -15% (McVeigh, 2015).

The WDFW Police conduct opportunistic dockside catch samples to check for compliance with count-per-pound regulations (Chadwick, 2017b). Compliance with the count-per-pound regulation is reinforced by market preferences for larger shrimp (Hannah, 2012; Groth, 2017; Pettinger, 2012; 2017; Thompson 2012; 2017). At-sea compliance with regulations (seasons, closed areas, licenses) is monitored by the U.S. Coast Guard (PFMC, 2017b; 2017h).

Vessels fishing in the federal EEZ are subject to federal rules and sanctions (cf. NMFS, 2017a, 2017b, 2017c). NOAA Office of Law Enforcement (OLE) monitors compliance with over 35 federal statutes, including declaration reports, vessel monitoring systems (VMS), and closed areas (NOAA OLE, 2017). Federal rules apply to federally managed species that interact with the state management systems. For the shrimp fishery, these rules pertain primarily to bycatch of federally managed species or species protected under the Endangered Species Act (ESA, 1973). Representatives from state enforcement agencies in Washington, Oregon, and California, and the federal government (PFMC, 2017b) serve on the PFMC Enforcement Consultants committee. Coordination of state and federal laws is accomplished through this body.

Sanctions for non-compliance exist, are defined in law and enforced through at-sea and dockside monitoring. Compliance rates, however, are high; there have been almost no reported violations in the pink shrimp fishery over at least the past ten years. Sargent Dan Chadwick, WDFW Coastal Region, stated the pink shrimp trawl fishery in Washington has not had any enforcement issues since about 2006. That year a complaint was received about landings of small shrimp. An emphasis patrol was conducted, and the landings from six boats were examined, resulting in one citation for exceeding the quantity of undersized

shrimp (Chadwick 2015). In 2016 there were no incidences of illegal take or other forms of not in compliance with the exception of one Washington resident cited in Oregon for failure to provide a valid Oregon Shrimp Permit and a Non-Resident Boat Registration (Chadwick, 2017a).

The high compliance rates in the pink shrimp fishery can be attributed to the emphasis on prevention, an educational approach to informing participants in the fishery about regulations, the collaborations with industry in developing effective gear design, control rules that are clear and enforceable and a coordinated monitoring and enforcement infrastructure (Chadwick, 2015; 2017b).

3.6.10 Stakeholder Education and Outreach

Education and outreach in the pink shrimp fishery comprises formal reporting and informal communication.

Formal reporting to all interested stakeholders is provided through various means. WDFW staff have met twice per year, pre- and post-season in Westport with fishers, processors and other interested stakeholders to review status of observer program progress on the federal eulachon listing and recovery, and educate them on terms of the ESA or other relevant laws and regulations. Staff also interact via mail with fishers in Ilwaco and Westport. Staff distributes an industry newsletter each year to recap the past years performance convey other related fishery management news. The ODFW newsletter is included (Wargo and Ayres, 2015; 2016; 2017). The fishery is described on the WDFW website at URL: <http://wdfw.wa.gov/fishing/commercial/shrimp/>.

3.6.10.1 3.5.11. Review and audit of management

The performance of the fishery is periodically informally discussed by WDFW staff with their respective states' processors and fishers. Two-way communication between management and industry bring up issues that may need to be acted upon. In 2016 an external review of the Oregon and Washington management systems was conducted by Golden Marine Consulting. The report of the management evaluation was presented to the assessment team at the 2017 Surveillance audit (Golden Marine Consulting, 2017).

3.6.11 Research Plans

The Washington pink shrimp fishery has not historically had a separate formal research plan providing a strategic approach to research (Wargo and Ayres 2015;) but instead relied informally on ODFW's annual research plans, adaptive management of research, and publication and distribution of research results provided through its Annual Pink Shrimp Review, ODFW research reports, and manuscripts published in peer-reviewed literature (Hannah and Jones, 2000; Gallagher et al., 2004; Krutzikowsky et al., 2006; Hannah and Jones, 2007; Hannah et al., 2010; Hannah et al., 2011; Wargo, 2014) to support their respective management decisions.

However, since 2016 evidence of WDFW research collaboration with ODFW, NMFS and the Cowlitz Tribe as well as within-agency research has been described in the annual Pink Shrimp Review. This research includes projects on eulachon distribution in the Columbia River, estimates of annual spawning stock biomass for the Columbia, Grays, Nashelle, Chehalis and Cowlitz Rivers, eulachon larval collection protocols, eulachon larval genetics, genetic marking of longfin smelt, adult eulachon sampling, and eulachon fecundity.

The 2017 Washington Pink Shrimp Newsletter summarizes research conducted by the WDFW in 2016 as well as research to be conducted in 2017. Research conducted in 2016 on bycatch in the pink shrimp fishery is detailed in Wargo et al. (2016)

4 Evaluation Procedure

4.1 Harmonised Fishery Assessment

This fishery is not subject to harmonization as there are no other certified shrimp fisheries in the area. Harmonization may need to occur in the future if other shrimp fisheries (such as those in British Columbia) enter the MSC assessment process. This potential need will be monitored at annual surveillance)

4.2 Previous assessments

The Oregon pink shrimp trawl fishery was initially certified under the MSC program in December of 2007. At that time the assessment was conducted using the MSC Principles and Criteria for Sustainable Fishing, Issue 2 (November 2 2002) and the Fisheries Certification Methodology (FCM) (v.5), using a team developed assessment tree, as required at that time. The fishery was certified with four conditions, all of which were subsequently closed and the performance indicators have been re-scored to 80.

The Oregon fishery was recertified in 2012 and the Washington unit was added via scope extension to the OR certificate in 2015. The conditions placed on the OR and WA fisheries from this more recent certification process are given in Table 4 below. All conditions for OR were closed as of the 4th surveillance audit, and one remains open for WA.

Table 4. Summary of Previous Assessment Conditions

Details of the rationale used to judge progress and close conditions for both states can be found in the most recent surveillance report (MRAG Americas 2017).

Condition	PI(s)	Year closed	Justification
1-OR	1.1.2	2016	All milestones in the client action plan were met and the fishery consequently has been meeting the SG80 for this PI.
2-OR	2.3.1	2016	All milestones in the client action plan were met and the fishery consequently has been meeting the SG80 for this PI.
3-OR	2.3.3	2017	All milestones in the client action plan were met and the fishery consequently has been meeting or exceeding the SG80 for this PI, with the score at 4 th surveillance being 85.
4-OR	3.2.1	2017	All milestones in the client action plan were met and the fishery consequently has been meeting the SG80 for this PI.
5-OR	3.2.4	2014	All milestones in the client action plan were met and the fishery consequently has been meeting or exceeding the SG80 for this PI, with the score after the 1 st surveillance being 90.
6-OR	3.2.5	2017	All milestones in the client action plan were met and the fishery consequently has been meeting the SG80 for this PI.
1-WA	1.1.2	2016	All milestones in the client action plan were met and the fishery consequently has been meeting the SG80 for this PI.
2-WA	2.3.1	2016	All milestones in the client action plan were met and the fishery consequently has been meeting the SG80 for this PI.
3-WA	2.3.3	2017	All milestones in the client action plan were met and the fishery consequently has been meeting or exceeding the SG80 for this PI, with the score at 2 nd surveillance being 85.
4-WA	3.2.1	OPEN	
5-WA	3.2.4	2016	All milestones in the client action plan were met and the fishery consequently has been meeting the SG80 for this PI.
6-WA	3.2.5	2017	All milestones in the client action plan were met and the fishery consequently has been meeting the SG80 for this PI.

4.3 Assessment Methodologies

The Oregon and Washington pink shrimp trawl fishery was reassessed against using the MSC Fishery Certification Requirements and associated Guidance to the MSC Fishery Certification Requirements, version 2.0.

The Oregon and Washington pink shrimp trawl fishery recertification assessment was conducted using the default assessment tree contained in v2.0 of the MSC FCR, without modification.

4.4 Evaluation Processes and Techniques

4.4.1 Site Visits

The reassessment audit process as defined in the MSC Fishery Certification Requirements version 2.0 was followed in this assessment. The site visit for the reassessment was combined with the site visit for the 4th surveillance audit for these fisheries.

Information supplied by the clients and management agencies was reviewed by the assessment team ahead of the onsite meeting, and discussions with the clients and management agencies centred 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 stakeholders from the full assessment were informed of the visit and the opportunity to provide information to the auditors in advance of, or during, the site visit. We received no requests from outside stakeholders to take part in meetings or provide information remotely.

The audit visit was held at the Hatfield Marine Science Center in Newport Oregon on April 19th and 20th, 2017, in conjunction with the site visit for the 4th annual surveillance audit of these fisheries. See Table 5 and Table 6 for details of participants and the agenda.

Table 5. Site visit participants and their affiliations.

Name	Affiliation
Amanda Stern-Pirlot	MRAG Americas, Assessment team
Susan Hanna	Oregon State University, Assessment team
Tom Jagielo	TJC, Assessment team
Brad Pettinger	Oregon Trawl Commission, Client
Charlie Kirschbaum	Pacific Seafood Group, Client
James Golden	Golden Marine Consulting
Scott Groth	Oregon Department of Fish and Wildlife (ODFW)
Matt Blume	ODFW
Kelly Lawrence	ODFW
Lorna Wargo	Washington Department of Fish and Wildlife (WDFW)-20 th only
Dan Ayres	WDFW-20 th only
Julia Coates	California Department of Fish and Wildlife
Pippa Kohn	Marine Stewardship Council
Robert Anderson	NOAA Protected Resources Division (phone, 19 th only)

Table 6. Summary of the agenda for the site visit meeting, held on April 19th and 20th in Newport, OR.

Time	Item	Lead	Supporting documents
8:30	Opening meeting, introduction to surveillance process reassessment and expectations for the meeting and process as a whole	ASP	Previous OR and WA surveillance report, OR assessment report, and WA scope extension report.
8:45	Presentation of external management system review with focus on Oregon	James Golden	James Golden report
10:00	Break		
10:15	Principle 1 topics for Oregon	Scott Groth Tom Jagielo	Oregon Shrimp newsletter
12:30	Lunch		
13:30	P2 Topics: Eulachon	Robert Anderson ASP	Eulachon 2016 5-year review and draft recovery plan.

14:00	P2 Topics: other bycatch issues	Scott Groth ASP	Shrimp landings report Groundfish stock assessments
14:30	Break		
14:45	P2 Topics: habitat and ecosystem	Scott Groth ASP	EFH report
15:00	P3 Topics	Scott Groth Susan Hanna	Jim Golden report Enforcement report (OSP summary) Documents in Susan Hanna memo
16:30	Additional questions or requests for information from assessment team	TJ, SH, ASP	
17:00	End of day one		
	April 20, 2017		
Time	Item	Lead	Supporting documents
8:30	Opening day 2 with focus on Washington, recap of day 1 on topics of relevance for WDFW folks	ASP	Previous OR and WA surveillance report, and WA scope extension report, notes from day one.
8:45	Presentation of external management system review with focus on Washington	James Golden	James Golden report
9:15	P1 topics for Washington	Lorna Wargo Dan Ayres Tom Jagielo	OR Shrimp newsletter and WA shrimp newsletter
10:00	Break		
10:15	Principle 2 topics for Washington	Lorna Wargo Dan Ayres ASP	WA shrimp landings report Groundfish stock assessments EFH report
10:45	Principle 3 topics for Washington	Lorna Wargo Dan Ayres Susan Hanna	Jim Golden report Enforcement report Other documents as specified in Susan's memo
12:30	Lunch		
13:30	Wrap up—Q and A with Julia and Pippa and any other stakeholders in attendance.	Julia Cotes Pippa Kohn	
14:30	Closing meeting	ASP Clients	
14:45	Break		
15:00	Assessment team meeting	TJ, SH, ASP	
16:00	End of site visit		

Standards and Guidelines used:

MSC Certification Requirements version 2.0

Guidance to the MSC Certification Requirements version 2.0

MSC Full Assessment Reporting Template version 2.0.

4.4.2 Consultations

See Table 6, above, with respect to details of the individuals interviewed during the site visit, and summary of topics discussed.

4.4.3 Evaluation Techniques

MRAG published an announcement of the reassessment on our website and sent a direct email to all stakeholders on our stakeholder list. MSC posted the announcement on its Oregon and Washington Pink Shrimp track-a-fishery page, as well as sent it by email in their Fishery Announcements newsletter to all registered recipients. At this time, MRAG Americas also announced the assessment site visit dates and location, as well as the assessment team. This was done according to the process requirements as laid out in MSC's Fisheries Certification Requirements v2.0. The site visit for this assessment was held at the same time as the site visit for the 4th surveillance audit for these fisheries, and the announcements for both went to stakeholders together. Together, these media presented the announcement to a wide audience representing industry, agencies, and other stakeholders.

The assessment team and the clients set up meetings with Oregon and Washington fishery management and science personnel, and industry and harvest-sector representatives relevant to the fishery assessment.

In the CR v2.0 default assessment tree used for this assessment, the MSC has 28 'performance indicators', six in Principle 1, 15 in Principle 2, and seven in Principle 3. The performance indicators are grouped in each principle by 'component.' Principle 1 has two components, Principle 2 has five, and Principle 3 has two. Each performance indicator consists of one or more 'scoring issues;' a scoring issue is a specific topic for evaluation. 'Scoring Guideposts' define the requirements for meeting each scoring issue at the 60 (conditional pass), 80 (full pass), and 100 (state of the art) levels.

Note that some scoring issue may not have a scoring guidepost at each of the 60, 80, and 100 levels; in the case of the example above, scoring issue (b) does not have a scoring issue at the SG60 level. The scoring issues and scoring guideposts are cumulative; this means that a performance indicator is scored first at the SG60 levels. If not all of the SG scoring issues meet the 60 requirements, the fishery fails and no further scoring occurs. If all of the SG60 scoring issues are met, the fishery meets the 60 level, and the scoring moves to SG80 scoring issues. If no scoring issues meet the requirements at the SG80 level, the fishery receives a score of 60. As the fishery meets increasing numbers of SG80 scoring issues, the score increases above 60 in proportion to the number of scoring issues met; performance indicator scoring occurs at 5-point intervals. If the fishery meets half the scoring issues at the 80 level, the performance indicator would score 70; if it meets a quarter, then it would score 65; and it would score 75 by meeting three-quarters of the scoring issues. If the fishery meets all of the SG80 scoring issues, the scoring moves to the SG100 level. Scoring at the SG100 level follows the same pattern as for SG80.

Principle scores result from averaging the scores within each component, and then from averaging the component scores within each Principle. If a Principle averages less than 80, the fishery fails.

Scoring for this fishery followed a consensus process in which the assessment team discussed the information available for evaluating performance indicators to develop a broad opinion of performance of the fishery against each performance indicator. Review of sections 3.2-3.5 by all team members assured that the assessment team was aware of the issues for each performance indicator. Subsequently, the assessment team member responsible for each principle, filled in the scoring table and provided a provisional score. The assessment team members reviewed the rationales and scores, and recommended modifications as necessary, including possible changes in scores.

Performance Indicator scores were entered into MSC's Fishery Assessment Scoring Worksheet (see **Error! Reference source not found.** below) to arrive at Principle-level scores.

Table 7. Scoring elements

Component	Scoring elements	Main/Not main	Data-deficient or not
P1	US West Coast pink shrimp	Target	Not
P2 Primary	Pacific hake	Minor	Not
ETP	Eulachon	N/A	Not
Habitat	Muddy substrate, shrimp beds	Main	Not
Ecosystem	California Current LME	Only	Not

5 Traceability

5.1 Eligibility Date

The target eligibility date for product from the fishery under assessment is concurrent with the expiry of the existing certificate. As this is a recertification assessment, any product landed prior to the expiry of the existing certificate is considered certified.

The actual eligibility date will be concurrent with the expiry of the existing certificate.

5.2 Traceability within the Fishery

1. The report shall include a description of factors that may lead to risks of non-certified fish being mixed with certified fish prior to entering Chain of Custody, using Table 4 below. For each risk factor, there shall be a description of whether the risk factor is relevant for the fishery, and if so, a description of the relevant mitigation measures or traceability systems in place.

2. The report shall include:

- a. A description of the tracking, tracing and segregation systems within the fishery and how these systems will allow any products sold as MSC certified to be traced back to the UoC.
- b. An evaluation of the robustness of the management systems related to traceability.

(Reference: FCR 7.12.1.1, 7.12.1.3, 7.12.1.4)

The West Coast pink shrimp trawl fishery is managed through a limited entry and licence based management system in all states. Harvesters operating in the fishery are required to renew permits annually, and report on catch if they choose to actively participate in the fishery, therefore, allowing the respective state management agencies to track the number of permit holders in total as well as the number active permit holders in the fishery.

Through requirements associated with dockside monitoring, landings reporting, and VMS, those involved in the management and enforcement of regulations have the ability to identify the quantity of product caught, as well as the area from which it was harvested.

As the unit of certification covers the entire area of operation of the fishery, and does not exclude any areas in which fishing is permitted, along with the fact that the fishery operates on a single stock, the possibility of those vessels included in the unit of certification fishing outside the UoC is minimal. There are several vessels permitted to harvest pink shrimp which hold landing permits for California, that harvest the same areas and stock, but would not be included in the UoC if they do not also possess a valid Washington or Oregon landing permit.

Likewise, the risk of substitution of certified product with non-certified product prior to landing is negligible, as there is only one stock of pink shrimp in the area of operation of the fishery, which has been assessed in Principle 1. Therefore, although harvesters may operate in state waters of all three west coast states as well as in the EEZ, any pink shrimp landed would be from the P1 assessed stock. As well, any harvester permitted to legally land in Oregon and/or Washington is in the UoC, therefore any legally landed product is covered in the assessment.

There is no at sea processing of shrimp harvested in the WOC pink shrimp trawl fishery under assessment, except for one vessel freezing pink shrimp at sea with a WA permit and these are frozen in blocks for packaging. The remaining harvested product is landed for shore side processing as fresh (iced) whole shell-on product.

Over the course of the assessment it was evident that there were no concerns associated with trans-shipping in the fishery under consideration.

Table 4 Traceability Factors within the Fishery:

Traceability Factor	Description of risk factor if present. Where applicable, a description of relevant mitigation measures or traceability systems (this can include the role of existing regulatory or fishery management controls)
Potential for non-certified gear/s to be used within the fishery	No risk present. All pink shrimp is harvested using certified gears
Potential for vessels from the UoC to fish outside the UoC or in different geographical areas (on the same trips or different trips)	No risk present. All vessels fish only within the geographic area of the UoA/UoC
Potential for vessels outside of the UoC or client group fishing the same stock	As there is some restriction of the UoC in Washington to be a subset of the UoA, there is some risk associated with certified activity within the UoA being outside the UoC. This is managed through the chain of custody of the client group.
Risks of mixing between certified and non-certified catch during storage, transport, or handling activities (including transport at sea and on land, points of landing, and sales at auction)	No risk present.
Risks of mixing between certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of Custody)	No risk present
Risks of mixing between certified and non-certified catch during transshipment	No risk present.
Any other risks of substitution between fish from the UoC (certified catch) and fish from outside this unit (non-certified catch) before subsequent Chain of Custody is required	No risk present.

5.3 Eligibility to Enter Further Chains of Custody

The fishery assessment covers all pink shrimp, *P. jordani*, landed from vessels operating in the Units of Certification until the point of landing, therefore the scope of certification ends at the point of landing. Beyond landing, any company that is part of the client group (currently Pacific Seafood Group, Ocean Gold, and Jesse's Illwaco Fish Co.) taking ownership of the product and wishing to identify it as MSC certified will need a CoC certificate. Members of the client group are listed on a schedule to the fishery certificate, which can be amended as necessary to accommodate companies joining or leaving the group.

Traceability of product from the fishery is covered by the fishery certificate up until the first point of landing in Washington ports by legally permitted Washington shrimp fishing vessels. In order for subsequent links in the distribution chain to be able to use the MSC logo, companies and/or individuals must be part of the client group and enter into separate chain of

custody certification, and be able to track product to Washington permitted vessels landing in Washington ports. As the entire shrimp fishery is certified up to the point of landing, risk of non-certified fish or products entering the supply chain is minimal to zero. The risk of non-eligible companies (i.e. buyers outside of the client group) taking ownership of product and identifying it as certified is minimized because primary receivers of the certified product must have chain of custody, and chain of custody audits address the risk of non-client group members selling Washington pink shrimp as certified.

Product from the fishery under assessment is landed in one of several ports including: Astoria/Warrenton, Garibaldi, Newport, Coos Bay, Brookings, Westport, and Ilwaco. On occasion, but seldom, product may be landed in Winchester Bay.

5.4 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to Enter Further Chains of Custody

There is no inseparable or practically inseparable stock involved in this assessment.

6 Evaluation Results

6.1 Principle Level Scores

The overall performance of the OR and WA pink shrimp (*Pandalus jordanii*) trawl fishery against each Principle is identified in the table below. Based on these results the fishery under assessment meets the MSC requirement that each MSC Principle has an aggregated, weighted score higher than the required score of 80 (Table 8). Additionally, as indicated in the summary of scores table below (Table 9), no individual PI scored less than 60. As such, it has been recommended that the pink shrimp trawl fishery should be recertified under the MSC Sustainable Fishery program.

Table 8. Final Principle Scores

Final Principle Scores	
Principle	Score
Principle 1 – Target Species	88.3
Principle 2 – Ecosystem	94.3
Principle 3 – Management System	OR: 95.8 WA: 94.0

6.2 Summary of PI Level Scores

Table 9. Summary of PI scores

Principle	Component	Wt	Performance Indicator (PI)		Wt	Score	
One	Outcome	0.333	1.1.1	Stock status	1.0	90	
	Management	0.667	1.2.1	Harvest strategy	0.25	95	
			1.2.2	Harvest control rules & tools	0.25	80	
			1.2.3	Information & monitoring	0.25	80	
			1.2.4	Assessment of stock status	0.25	95	
Two	Primary species	0.2	2.1.1	Outcome	0.333	100	
			2.1.2	Management strategy	0.333	100	
			2.1.3	Information/Monitoring	0.333	100	
	Secondary species	0.2	2.2.1	Outcome	0.333	100	
			2.2.2	Management strategy	0.333	100	
			2.2.3	Information/Monitoring	0.333	100	
	ETP species	0.2	2.3.1	Outcome	0.333	80	
			2.3.2	Management strategy	0.333	100	
			2.3.3	Information strategy	0.333	80	
	Habitats	0.2	2.4.1	Outcome	0.333	80	
			2.4.2	Management strategy	0.333	95	
			2.4.3	Information	0.333	80	
	Ecosystem	0.2	2.5.1	Outcome	0.333	100	
			2.5.2	Management	0.333	95	
			2.5.3	Information	0.333	100	
						OR	WA
Three	Governance and policy	0.5	3.1.1	Legal &/or customary framework	0.333	100	100
			3.1.2	Consultation, roles & responsibilities	0.333	100	100
			3.1.3	Long term objectives	0.333	90	90
	Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.25	80	80
			3.2.2	Decision making processes	0.25	100	95
			3.2.3	Compliance & enforcement	0.25	100	100
			3.2.4	Monitoring & management performance evaluation	0.25	100	90

6.3 Summary of Conditions

There are no new conditons of certification and all previous conditions have been closed. Following the fourth surveillance audit, one condition on PI 3.2.1 remained open and behind target for Washington, but this has now been closed with the publication of the draft shrimp FMP and a schedule for formal implementation.

6.4 Recommendations

Although the draft WA FMP is sufficient to close the condition on 3.2.1, the team wishes to recommend that WDFW formulates the FMP so that the short- and long-term objectives are categorized as such, and they should use the format of the ODFW shrimp FMP as a guide.

6.5 Determination, Formal Conclusion and Agreement

Based upon results of the fishery assessment, the weighted average score for all Criteria under each Principle is above 80 for each of the 3 Principles; no individual scoring issue was awarded a score of less than 60 on any PI or Criterion, the assessment team recommends that the Oregon pink shrimp trawl fishery and Washington pink shrimp trawl fishery, as defined by the units of certification are recertified against the MSC Standard.

(REQUIRED FOR PCR)

- | |
|--|
| <ol style="list-style-type: none">1. The report shall include a formal statement as to the certification action taken by the CAB's official decision-makers in response to the Determination recommendation. |
|--|

~~Based upon results of the fishery assessment, the weighted average score for all Criteria under each Principle is above 80 for each of the 3 Principles; no individual scoring issue was awarded a score of less than 60 on any PI or Criterion, it is therefore determined that that the Oregon pink shrimp trawl fishery, as defined by the unit of certification is recertified against the MSC Standard.~~

6.6 Changes in the fishery prior to and since Pre-Assessment

Not applicable—this is a reassessment and all changes to the fishery since the previous assessment are documented in subsequent surveillance reports.

7 References

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Appendices

Appendix 1 Scoring and Rationales

Appendix 1.1 Performance Indicator Scores and Rationale

Evaluation Table for PI 1.1.1 – Stock status

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Stock status relative to recruitment impairment			
	Guide post	It is likely that the stock is above the point where recruitment would be impaired (PRI).	It is highly likely that the stock is above the PRI.	There is a high degree of certainty that the stock is above the PRI.
	Met?	Y	Y	Y
	Justification	<p>It is well documented that pink shrimp recruitment in the UOA is driven by environmental factors, as opposed to spawning stock size (Hannah 1993, 1999, 2010, 2011; Hannah and Jones 2014a, 2016c). Furthermore, early research determined that fishery independent measures of stock size (e.g. research survey estimates) were poor pre-season predictors of biomass (Abramson et al. 1981). Given these constraints, ODFW makes use of proxy indicators to evaluate pink shrimp stock status with respect to PRI.</p> <p>MSC CR Ver 2.0 provides for the assessment fisheries where proxies are used as indicators of stock status (SA2.2.3), and in particular, for situations where natural environmental variability is known to strongly influence fishery productivity (SA2.2.7). Thus, the assessment team undertook to evaluate SI a (and SI b, below) by: 1) determining if the proxy indicators used by ODFW are reasonable in the context of the pink shrimp fishery, and if so, 2) evaluating the current status of the stock with respect to these proxy indicators.</p> <p>Evaluation of proxy indicators. ODFW employs an innovative approach that closely monitors the fishery on an annual basis (described in Section 3.3.1b above). Assessment of the stock incorporates: 1) an environmental index to forecast recruitment, 2) an input based control rule with proxy target and limit reference points, 3) an evaluation of the size-age composition of the fishery landings to assess the strength of yearclasses expected to support the fishery in the coming year, 4) ongoing monitoring of the historical trend in fishery CPUE, and 5) examination of the geo-spatial distribution of pink shrimp catches to look for any shrinkage of the fishing area, a potential sign of reduced abundance.</p> <p>Derivation of the proxies used by ODFW to gauge current stock status with respect to target and limit reference points is described by Hannah and Jones (2014a, 2014b), and further evaluated by Hannah and Jones (2016c). Specifically: 1) Sea Level Height (SLH) in the larval year is used as a proxy for environmental conditions (favorable, or deleterious to pink shrimp), 2) current year fishery CPUE (the average June catch per vessel) is used as a proxy for in-season standing stock biomass, and 3) standardized historical fishery CPUE (lbs/SRE-hour) serves as a time series of relative stock abundance. The limit reference point, established in 2014 for the pink shrimp fishery, is summarized in the following two paragraphs (adapted from Hannah and Jones 2014b).</p> <p>A mean April-January SLH greater than 7.5 ft at Crescent City, CA during the larval year, in combination with a June catch per trip in the age 1 harvest year of less than 10,000 lbs provides very strong evidence that there is risk of November spawning</p>		

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
		<p>stock biomass falling below the lowest level previously observed if fishing were to continue through October. The choice of 10,000 lb for June catch per trip is based on the 1983 and 1998 values of less than 7,500 lb per trip, adjusted upward by 2,500 lb/trip to account for improvements over time in fishing vessel efficiency. If and when these two conditions coincide, the shrimp trawl fishery will be closed as soon as possible for the remainder of the season and not re-open until April 15th of the following year to provide the maximum protection possible for that year's spawning stock biomass and egg-bearing females.</p> <p>Given this stock's proven ability to rebuild very quickly from the lowest levels observed to date, B_{loss} (lowest observed spawning stock) is an appropriate LRP. If conditions can be identified in-season that accurately predict that the stock may be approaching B_{loss} with continued fishing, the fishery can be closed to prevent the "testing" of even lower spawning stock biomass levels which could result in impairment of reproductive capacity or delayed stock rebound. This strategy is very similar to that used for 3 short-lived penaeid shrimp stocks in the Gulf of Mexico, where environmental conditions also principally determine stock size (Gulf of Mexico Fishery Management Council 2015), and is consistent with MSC guidance on short-lived stocks (http://msc-info.accreditation-services.com/questions/trp-in-annual-or-nearly-annual-fisheries).</p> <p>The team concludes that: 1) the proxies used by ODFW are reasonable for the context in which they are used, and 2) the proxy PRI limit reference point is set above the level where there is an appreciable risk of recruitment failure.</p> <p>Stock status with respect to the proxy indicators. The most recent assessment describes a healthy stock with positive outlook for the short term (Groth et al. 2017). Inputs to the Harvest Control Rule indicate that the pink shrimp stock status has been above the proxy PRI limit levels (see Section 3.3.1b above); June catch per trip has been well above the limit value of 10,000 lbs/trip for over a decade, and SLH has been consistently below the limit index value (7.5 ft.) (Groth 2017b).</p> <p>Standardized catch per unit effort has exceeded 1000 lbs/SRE hour over the past decade and, from 2009 to 2015, averaged 1,377 lbs/SRE hour (Groth 2017b). Since then, CPUE has declined to numbers similar to those in the mid 2000s. Lowered CPUE in 2016 (760 lbs/SRE hour) is likely due to the weak 2014 year class of shrimp (the 2 year olds in 2016) (Groth et al. 2017). By comparison, the average CPUE from 1980 - 2010, a period of relative stability in the fishery, was about 400 lbs/SRE hour (Groth 2017b).</p> <p>Recent size and age composition of the fishery landings indicate a stable stock. High larval survival in 2013 was evident, and this cohort made up much of the 2014 and 2015 catch. In 2016, age 1 shrimp were a large part of the catch. These data, together with recent values of SLH-Recruitment index, indicate moderate to strong year-classes to support the fishery in the near future (Groth et al. 2017).</p> <p>The spatial distribution of fishery catches delivered to Oregon ports in 2016 showed that areas of increased catch were well distributed along the Oregon and Washington coasts. This would appear to indicate a healthy stock, as the size of the shrimping area is known to vary with population size (Groth et al. 2017).</p> <p>Given positive indications from the three proxy indicators of stock status, along with moderate to strong yearclass conditions and an apparently healthy geo-spatial distribution, the team concludes that there is a high degree of certainty that the stock is above the PRI.</p>		
		Stock status in relation to achievement of MSY		

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
b	Guide post		The stock is at or fluctuating around a level consistent with MSY.	There is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		Y	N
	Justification	As noted above under SI a, proxy indicators and reference points are used to score PI 1.1.1 for pink shrimp, as per SA2.2.3. As such, the assessment team made a qualitative evaluation of the status of the stock, based primarily on empirical observation of sustainability (SA2.2.3.1). The team found evidence to support that the stock is above PRI (see SI a, above); however, it is intractable to relate the status of the pink shrimp stock to any proxy for MSY for this environmentally driven and short-lived species (Hannah and Jones 2014b). Inputs to the Harvest Control Rule indicate that the stock status of pink shrimp has been well above the proxy TRP levels (see Section 3.3.1b above); June catch per trip has been above the target value of 12,500 lbs/trip for well over a decade, and SLH has been consistently below the limit index value (7.5 ft.) (Groth 2017b). As noted above, standardized CPUE, as well as the size/age composition and geo-spatial distribution of the catches also provide empirical support for sustainability of the fishery, supporting a score at the SG80 level. The assessment team considers this to be a well-managed stock; however, evaluating stock status using proxy indicators, in particular when natural environmental factors are highly influential, is an inherently uncertain process. Factors contributing to this uncertainty for pink shrimp are discussed below under PI 1.2.4. Hannah and Jones (2014b) note that the pink shrimp TRP, based primarily on in-season catch rates, was established with the intent of providing a “back-stop” for the possibility of unexpected environmental changes that could result in persistent low levels of recruitment. As a target, this is not consistent with a “high degree of certainty” of stock status, and thus the team concludes the SG100 level is not met.		
References		Abramson et al. 1981; Groth 2017b; Groth et al.2017; Gulf of Mexico Fishery Management Council 2015; Hannah 1993, 1999, 2010, 2011; Hannah and Jones 2014a, 2014b, 2016c.		
Stock Status relative to Reference Points				
	Type of reference point	Value of reference point	Current stock status relative to reference point	
Reference point used in scoring stock relative to PRI (SIa)	Proxy indicators	June average catch per trip of <10,000 lbs. in the age 1 harvest year	43,243 lbs/trip (2016)	
		SLH at Cresent City, CA in larval year >7.5 ft	7.3423 ft. (2017)	
Reference point used in scoring stock relative to MSY (SIb)	Proxy indicator	June average catch per trip of <12,500 lbs. in the age 1 harvest year	43,243 lbs/trip (2016)	
OVERALL PERFORMANCE INDICATOR SCORE:				90
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 1.1.2 – Stock rebuilding

PI 1.1.2		Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	Rebuilding timeframes			
	Guide post	A rebuilding timeframe is specified for the stock that is the shorter of 20 years or 2 times its generation time . For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.		The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the stock.
	Met?	(Y/N) NA		(Y/N) NA
	Justification	The most recent assessment (see Groth et al. 2017) describes a healthy stock with positive outlook in the short term. As such, given the stock is not considered depleted, this indicator is not applicable, and not scored (SA2.3.1).		
b	Rebuilding evaluation			
	Guide post	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe.	There is evidence that the rebuilding strategies are rebuilding stocks, or it is likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.	There is strong evidence that the rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.
	Met?	(Y/N) NA	(Y/N) NA	(Y/N) NA
	Justification	The stock is not considered depleted, this indicator is not applicable, and not scored (SA2.3.1).		
References		Groth et al. 2017.		
OVERALL PERFORMANCE INDICATOR SCORE:				
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guide post	The harvest strategy is expected to achieve stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in PI 1.1.1 SG80.
	Met?	Y	Y	Y
	Justification	<p>The harvest strategy for pink shrimp relevant to these objectives was designed to avoid recruitment overfishing by protecting spawning females (closed season) and protecting recruiting shrimp by reducing fishing mortality of age-1 shrimp (count per pound, mesh size), thereby increasing the size of spawning stock at the end of each season and ensuring shrimp are taken at a marketable size (Abramson et al., 1981). Maximizing economic yield has been investigated (Gallager et al. 2003) and is addressed to some extent through the count per pound regulation (see 1.2.2 SG a, below).</p> <p>Stock management objectives are reflected in the newly-developed target and limit reference points (discussed under PI 1.1.1) in that these reference points seek to further ensure recruitment overfishing is not taking place by shortening the fishing season if there are environmental conditions indicating likely poor recruitment (Hannah and Jones 2014b, 2016b).</p> <p>The management system appears to be managing the shrimp fishery responsibly and adaptively. Evidence supports that environmental variability apparently has a greater effect on stock abundance than fishing mortality. Nevertheless, the long-standing harvest strategies provide additional protection to the recruitment (count per pound) and spawning biomass (closed season) and, to some extent, help maximize economic yield. In addition, season-shortening measures in Oregon and Washington will be taken should the newly-developed target and limit reference levels be approached that are explicitly designed to achieve stock management objectives. While the new target and limit reference points have not yet been codified formally (the FMP is currently in draft form), managers have effectively adopted them in recent years as is evidenced by annual reviews of the fishery (Groth et al. 2017)</p> <p>Annual and in-season monitoring of fishing patterns and biological data, as well as forecasting of the next season's recruitment, provide guidance for the harvest strategy (e.g. Hannah and Jones 2014b, 2016b), ensuring that it is responsive to the state of the stock, and that appropriate management action (shortening the fishing season), should the newly implemented target and limit reference points be approached.</p> <p>There is good cooperation between the WOC enforcement personnel and their respective state fish and wildlife departments in identifying and resolving issues (e.g. count per pound, BRD requirements) as they arise.</p> <p>Altogether, the evidence presented demonstrates that the fishery meets the SG100.</p>		
b	Harvest strategy evaluation			
	Guide post	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
				that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Y	Y	N
	Justification	<p>Although there is no annual quota, the harvest strategy has helped to ensure a sustained and healthy fishery since its inception. Long-term fishery impacts are not detectable (Hannah and Jones 1991, 2014a, 2014b) and recruitment is heavily influenced by environmental factors during the larval stages (Hannah 1993, 1999, 2010, 2011; Hannah and Jones 2014a, 2014b). Regulations are effective in providing additional protection for the spawning stock and recruitment, and additional season-shortening measures in Washington and Oregon, should target or limit thresholds be approached, provide extra precaution (Hannah and Jones 2014b, 2016b).</p> <p>Over the history of the fishery, two successive year class failures have not been observed, providing evidence that the strategy is achieving its objectives. Target and limit reference points are newly adopted and recruitment and stock size have been high, thus the effectiveness of management action should these trigger levels be reached have not been fully tested. However, modelling work used to determine appropriate threshold levels provides evidence that this aspect of the harvest strategy will achieve its objectives (Hannah and Jones 2014b, 2016c).</p> <p>Compliance with rules is monitored principally shore-side by the respective state enforcement authorities, agency staff, and fish processing plants. The federally sponsored at-sea observer program (WCGOP) was implemented in 2001 for the limited entry groundfish trawl fishery. Observers were first deployed in the pink shrimp fishery in 2002. During the period 2004 to 2010 (excluding 2006), a total of 398 shrimp trips were observed. The average coverage rate (observed proportion of total pink shrimp landings) over this period was 6%. NMFS currently requires 15% observer coverage of vessels, and recent actual coverage has been close to this level (ca 14%) fleetwide (McVeigh 2015). Monitoring through these programs is considered sufficient to ensure that the components of the harvest strategy are implemented successfully.</p> <p>Monitoring is in place and the 56-year history of the landings demonstrates that, while there are fluctuations, the CPUE is well above average (Groth 2017b), providing evidence that objectives are being achieved.</p> <p>The evidence presented demonstrates that the fishery meets the SG80; the fishery does not meet the SG100 because uncertainty remains regarding how robust and precautionary the strategy will be in the event of long term climate change, and other unforeseen environmentally related fluctuations in ocean productivity.</p>		
	Harvest strategy monitoring			
Guide post	Monitoring is in place that is expected to determine whether the harvest strategy is working.			
Met?	Y			
Justification	Harvest control rules (see PI 1.2.2) are described, communicated and enforced. During the fishing season, Oregon, Washington and California monitor fishery performance, collecting information on the distribution of fishing effort, size, and sex. Logbook records are required for this fishery. Additionally, the WCGOP provides at-sea monitoring and estimation of catch and bycatch with a coverage level in the pink shrimp fishery of ca 14%. The evidence demonstrates that the fishery meets the SG60.			
Harvest strategy review				
Guide post				The harvest strategy is periodically reviewed and improved as necessary.

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Met?			Y
	Justification	Periodic reviews of the pink shrimp harvest strategy consist of consultation and coordination with enforcement, logbook analysis, harvesters and state agencies. Recently, in response to Condition 1 in the Oregon pink shrimp fishery, the harvest strategy was reviewed in order to propose target and limit reference points appropriate for the fishery. This review (Hannah and Jones 2014a, 2014b, 2016c) consisted of looking at indices of recruitment and spawning stock and their relationship to selected environmental variables and CPUE in the fishery. The results of this review were updated indices and further support of the fact that population size and recruitment of pink shrimp are largely environmentally driven. Although these reviews have thus far been undertaken by ODFW scientists and managers, they have evaluated the performance of the entire fishery's harvest strategy, thus also benefiting participants in California and Washington. This meets the SD100.		
e	Shark finning			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	NA	NA	NA
	Justification	NA		
f	Review of alternative measures			
	Guide post	There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.
	Met?	(Not relevant)	(Not relevant)	(Not relevant)
	Justification	The assessment team was provided with evidence to indicate that unwanted catch of the target stock (e.g. small, below market size shrimp) has not been problematic in the fishery (Abramson et al., 1981) (see Sla). The fishery has been operated for many years and monitoring has not revealed a high-grading problem. Thus, this SI was not scored.		
References		Abramson, et al. 1981; Gallagher et al. 2003; Groth 2017b; Hannah 1993, 1999, 2010, 2011; Hannah and Jones 1991, 2014a, 2014b, 2016b); McVeigh 2015; TAVEL 2007, 2009.		
OVERALL PERFORMANCE INDICATOR SCORE:				
				95
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	Guide post	Generally understood HCRs are in place or available that are expected to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.	Well defined HCRs are in place that ensure that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs.	The HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time.
	Met?	Y	Y	
	Justification	<p>The fishery is managed by season to protect spawning females, and count-per-pound to protect recruiting shrimp by reducing fishing mortality of age-1 shrimp, thereby increasing the size of spawning stock at the end of each season and ensuring shrimp are taken at a marketable size (Abramson et al. 1981). In addition, measures to shorten the shrimp season in Oregon and Washington, should target and limit thresholds be approached, are appropriate to ensure that the exploitation rate is appropriately reduced when conditions indicate poor recruitment is likely. As stock dynamics are largely controlled by environmental factors, these rules are precautionary measures.</p> <p>Washington has the most flexible rulemaking of the three west coast coastal states. In contrast to other states, Washington fisheries are closed by default and open by rule. “Emergency rule” describes routine rulemaking for routine management decisions, such as season opening. The emergency rule process can also accommodate the need to take management action as target or limit reference points established by ODFW or other sources are approached (WDFW 2015h; Wargo and Ayres 2015).</p> <p>Signals that would trigger measures to respond to a significant risk to recruitment are given in Hannah and Jones (2014b, 2016b). These are: 1) Mean April-January Sea Level Height (SLH) greater than 7.5ft at Crescent City, CA during the larval year, and 2) an average June catch-per-trip in the age 1 harvest hear of less than 10,000lbs. The combination of these two situations could indicate a scenario where spawning stock biomass is likely to fall below the current LRP of lowest observed spawning stock biomass (B_{loss}). Should this occur, management in WA and OR would respond by closing the current shrimp fishing season as soon as possible, and delaying the following season re-opening until April 15th of the following year.</p> <p>Although the assessment team is not confident in the ability for California to take management action in response to target and limit levels being approached, California landings in this fishery have hovered around only 10% of the total WOC landings in the past five years (WDFW 2015; CDFW 2015; ODFW 2015). Processing capacity is limited to one facility in Crescent City (Kirschbaum 2015), and licenses in the northern region are limited to 30. In addition, a closure of the fishery in WA or OR prohibits not only landing in WA and OR, but all fishing for pink shrimp off WA and OR (Hannah and Jones 2014b), including to vessels licensed in other states. If WA closes the fishery, it can prohibit WA licensed vessels from fishing for pink shrimp in waters off WA (Wargo 2015). Because of these factors, even if CA can’t close the fishery in response to trigger reference points, the closure of the fishery in the other two states is sufficient to ensure that the exploitation rate will be sufficiently reduced as limit reference points are approached. This meets the SG80 level.</p>		
		HCRs robustness to uncertainty		

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
b	Guide post		The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a wide range of uncertainties including the ecological role of the stock, and there is evidence that the HCRs are robust to the main uncertainties.
	Met?		Y	N
	Justifi cation	The main uncertainties relate to the protection of berried females and recruitment, as no fishery effects on recruitment have been demonstrated. Rather, studies have demonstrated environmentally-driven recruitment which obscures any deleterious fishery effects. The HCRs are explicitly crafted to respond to environmental conditions averse to the shrimp resource (see SIa) and thus are robust to the main uncertainties, meeting the SG80. Although the selection of control rules explicitly account for main uncertainties, given the newness of the HCRs, there is no evidence to suggest that they were designed to encompass a wide range of uncertainty, and therefore do not meet the SG100.		
c	HCRs evaluation			
	Guide post	There is some evidence that tools used or available to implement HCRs are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the HCRs.
	Met?	Y	Y	N
	Justifi cation	The continued healthy state of the stock throughout the 55-year history of the fishery and the apparent lack of any significant negative fishery effects provide evidence that existing management tools are appropriate as precautionary measures. In addition, Washington and Oregon are able to act in-season as newly developed Target and Limit reference points are approached by shortening the fishing season. Although California management is currently not sufficiently flexible to accommodate this in-season action, the current seasonal closure clearly protects berried females and the count per pound is effective in reducing fishing pressure on age-1 shrimp (as evidenced by significant carry over as age-2 in 2010 and 2011), and, as discussed under SIa, California landings are sufficiently small to ensure that management action by WA and OR would be sufficient to achieve the exploitation levels required under harvest control rules. The evidence presented demonstrates that the fishery meets the SG80; the fishery does not meet the SG100 because uncertainty remains regarding how effective the HCRs will be in the event of long term climate change, and other unforeseen environmentally related fluctuations in ocean productivity.		
References		Abramson et al.1981; CDFW 2015; Hannah and Jones 2014b; Kirschbaum 2015; ODFW 2015; Wargo 2015; Wargo and Ayres 2015; WDFW 2015; WDFW 2015h. http://wdfw.wa.gov/fishing/commercial/shrimp/landings.html http://www.dfg.ca.gov/marine/research.asp#management http://www.dfw.state.or.us/MRP/shellfish/commercial/shrimp/landings.asp		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 1.2.3 – Information and monitoring

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Range of information			
	Guide post	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Y	Y	N
	Justification	<p>There is a significant amount of information collected and monitoring conducted in the WOC pink shrimp fishery, primarily by Oregon scientists, but also through regular logbook reporting and monitoring in all three states. As such it has been determined that sufficient information (as defined in SA2.6.1) on these components exists. Refer to Section 3.3.1b above) for details.</p> <p>SA2.6.1.1 identifies several information categories that are to be considered when assessing this performance indicator, including: stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other data.</p> <p>Distribution of pink shrimp extends from the Aleutian Islands in Alaska to southern California (Dahlstrom 1970). They are generally found in mud-sand habitat at depths ranging from about 40 to 450 m and in commercial concentrations, in depths of about 100 to 200 m, supporting fisheries from Vancouver, British Columbia, Canada south to Point Arguello, California (Collier and Hannah 2001). Oregon, being the center of distribution, has historically had the highest landings, averaging 65% of U.S landings in recent years (2011-2016) (see Section 3.2.1 Figure 2).</p> <p><i>Pandalus jordani</i> are protandrous hermaphrodites, beginning life as males and, later, changing sex to become females. The time spent at each life stage (larvae, juvenile males, mature males and females) varies by location and population density (Charnov and Hannah 2002). Juvenile male shrimp occur in increasingly deeper water as they develop and begin to appear in commercial catches by late summer (Collier and Hannah 2001). Natural mortality is high, variable by year class and has been related to predator abundance (Hannah 1995).</p> <p>Growth rates and age/size of sex change for ocean shrimp are variable by area, sex and year class (Dahlstrom 1970). There tends to be rapid growth during spring and summer and slower growth over the winter. The growth rate decreases as the shrimp age and, during the ovigerous period from fall to spring, females do not grow at all.</p> <p>Migratory behavior of pink shrimp is primarily passive, associated with ocean currents, summer winds and upwelling (Hannah 1993). Nightly vertical migrations take place as shrimp move off the bottom into the water column to feed (Pearcy 1970). These vertical migrations may also assist with movement and dispersal of shrimp by alongshore currents.</p> <p>Oceanographic factors explain most of the variation in recruitment and, subsequently, the abundance of adults. Recruitment has been negatively correlated with April sea level height and it has been inferred that, when winter-like current conditions extend into the spring beyond the average timing of transition, newly</p>		

PI 1.2.3	Relevant information is collected to support the harvest strategy
	<p>released shrimp larvae are advected to the north away from favorable habitat. Furthermore, strong periods of upwelling may result in shrimp larvae being advected offshore and also away from favorable habitat (Hannah 1993, 1995, 1999, 2010, 2011).</p> <p>The Washington and California sampling programs collect landing data for the ocean shrimp fishery. Shrimp landings and incidentally caught groundfish are recorded through the use of fish tickets.</p> <p>Washington and California monitor the fishery by collecting and analyzing logbook data, while in Oregon, biological samples from landed catch are also taken and analyzed. Logbook data are considered accurate and biological sampling is conducted in all major landing ports in Oregon (Hannah, pers. comm.). Washington, California, and Oregon collect logbook data and compile and report catch, fishing effort and CPUE by Pacific States Marine Fisheries Commission statistical area.</p> <p>ODFW collects biological data, catch and CPUE data from the fleet catching shrimp off Washington, Oregon, and California and delivering to Oregon ports. The resource sampled is representative of most of the stock area fished.</p> <p>Shrimp trips have been observed in Washington, California, and Oregon by the West Coast Groundfish Observer Program (WCGOP) since 2002. This is a statistically based sampling program and estimates of shrimp and groundfish catch and discard were quantified from the observed trips.</p> <p>Fleet composition is known and monitored through fish ticket data and landings are designated by licence at the point of sale. As noted previously, the pink shrimp fishery operates under a limited entry, with not all eligible harvesters participating each year, however, annual landing permits are also required, providing information on the number of vessels participating in the fishery each year.</p> <p>ODFW annually assesses the stock to characterize abundance, distribution, and size/sex composition (e.g. Groth et al. 2017). ODFW assessments of stock condition consist of between and within-season monitoring of CPUE, geographic distribution of catch, and year-class strength. A recruitment forecast for the upcoming season from the environmental model is also provided annually (e.g. Groth et al. 2017). Periodically, a stock reconstruction is conducted using VPA, and the recruitment model is re-evaluated and updated (e.g. Hannah and Jones 2014a, 2016c). This work carried out by ODFW benefits the entire WOC fleet regardless of landing port.</p> <p>Fishing effort is expressed in terms of single-rig equivalents (SRE), providing a standardized CPUE index. Catch, effort, and age and sex composition of the catch by statistical area have been compiled from available data since 1985. Off the Oregon coast, standardized CPUE is regarded as a useful as an index of stock size over time, and analysis of the historical size/age composition has provided valuable information on yearclass strength (Groth et al. 2017).</p> <p>Annual fishery-independent shrimp trawl surveys were conducted off the Oregon coast during the mid to late 1970's; however, the results were not thought to represent a reliable indicator of stock abundance (Abramson et al. 1981). Fishery effects, if any, are masked by environmental influences on survival of recruits. Consequently, focus shifted towards environmental models which, at present, are retrospective with short-term forecasting (e.g. Hannah and Jones 2014a, 2016c) and also provide valuable insight regarding the major factors influencing ocean shrimp production.</p> <p>Numerous studies have described environmental effects of oceanographic changes (Rothlisberg and Miller, 1983; Rothschild and Fogarty 1989; Hannah 1993, 1995, 1999, 2010, 2011) and predator impacts (Gotshall 1969a, 1969b; Alton and Nelson 1970; Francis 1983; Rexstad and Pitkitch 1986; Hannah 1995) on pink shrimp populations. Oceanographic factors appear to explain most of the variation seen in recruitment and abundance of adults. Pink shrimp are also prey for several</p>

PI 1.2.3		Relevant information is collected to support the harvest strategy		
		<p>groundfish species (Gotshall 1969a, 1969b), particularly age 2 Pacific whiting <i>Merluccius productus</i> (Hannah 1995).</p> <p>Considerable progress has been made in the development of shrimp population dynamics models which incorporate environmental and fisheries information (Hannah 1993, 1995, 1999, 2010, 2011; Hannah and Jones 1991, 2014a, 2016c). Model results have successfully explained much of the variability in shrimp abundance, and the evidence points towards the ocean environment as being the primary driver. Modelling efforts to date are exemplary and, in addition to providing a recruitment forecast for the fishery, afford valuable insight with respect to the major factors controlling population dynamics of ocean shrimp.</p> <p>The information described above represents a comprehensive range which is considered supportive of the harvest strategy and inclusive of analysis of environmental influence on the stock and meets the SG80 level. The assessment team notes however, that there are no fishery – independent sources to provide information on stock characteristics. As such, while the fishery itself provides sufficient information relevant to the requirements of the SG100, the absence of fishery independent information results in this scoring issue not being fully and unambiguously met.</p>		
b	Monitoring			
	Guide post	Stock abundance and UoA removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule , and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Y	Y	N
	Justification	<p>In-season tracking and annual summaries of data meet the data requirements for the assessments to ensure that stock size/composition, catch and effort are appropriately monitored (e.g. Hannah and Jones 2014b, 2016c; Groth et al. 2017).</p> <p>Fishing location, catch and activity are reported in logbooks. Landing information is obtained from fish tickets.</p> <p>CPUE is an index of stock biomass and dockside sampling, logbooks and fish tickets monitor the fishing season, fishery removals, and count per pound (WOC enforcement and plant monitoring). Environmental indices likely to impact recruitment, such as sea surface height are also monitored. Annual and in-season assessments support the management tools and ensure that stock abundance and catch are regularly monitored. The information from logbooks, fish tickets and sampling programs provides input for the assessment (catch, effort, CPUE, size/age composition) and is considered accurate and spatially representative. The West Coast Groundfish Observer Program (WCGOP) is a statistically based sampling program and estimates of shrimp and groundfish catch and discard are quantified from the observed trips.</p> <p>Coastal state fish and wildlife agencies monitor the harvest control rules with high frequency and a high degree of certainty. To the benefit of the entire WOC fishery, ODFW has identified the areas of uncertainty and understands the uncertainties related to, for example, the accuracy of the count/lb, the extent of unobserved and unrecorded discard and the representativeness of the observer coverage. This is sufficient to reach the SG80. There appears to be a good, albeit, qualitative understanding of the robustness of assessment and management to this uncertainty, so does not provide all information necessary to meet SG100.</p>		

PI 1.2.3		Relevant information is collected to support the harvest strategy		
c	Comprehensiveness of information			
	Guide post		There is good information on all other fishery removals from the stock.	
	Met?		Y	
	Justification	Landings data from Canada, when combined with Washington, California, and Oregon data, provide good information on all directed fishery removals, reaching the SG80 level. No other fishery retains this species as by-catch. Discarding of shrimp within the shrimp fishery has been quantified (0.5% in 2011 - Jones, pers. comm.) and is considered negligible. There are no commercial or recreational pot fisheries targeting pink shrimp.		
References		Abramson et al. 1981; Alton and Nelson 1970; Charnov and Hannah 2002; Collier and Hannah 2001; Dahlstrom 1970; Francis 1983; Gotshall 1969a,1969b; Groth et al. 2017; Hannah 1993, 1995, 1999, 2010, 2011; Hannah and Jones 1991, 2014a, 2014b, 2016c; Percy 1970; Rexstad and Pitkitch 1986; Rothlisberg and Miller 1983; Rothschild and Fogatry 1989.		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Appropriateness of assessment to stock under consideration			
	Guide post		The assessment is appropriate for the stock and for the harvest control rule.	The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.
	Met?		Y	Y
	Justifi- cation	The assessment for pink shrimp was designed recognizing that stock dynamics are driven primarily by environmental factors (see Section 3.3.1b, above). Reviews of stock trends in distribution, biomass and size/sex composition facilitate an evaluation of current stock conditions in a historical context and in relation to harvest control rules (see PI 1.2.2 above). An environmental model (Hannah and Jones 2014a, 2016c) predicts recruitment for the short term and demonstrates the critical role of the environment in stock dynamics.		
		The stock does not lend itself to traditional, fishery assessment models that can be used to produce abundance based target and limit reference points. Rather, the assessment relies on empirical data to assess current stock status and an environmentally-driven recruitment model to forecast recruitment for the next fishing season. Therefore, the assessment is appropriate for the stock because it explicitly captures the biology of the species (recruitment dynamics) and nature of the fishery (largely dependent on recruitment). As control measures (i.e. closed season, count per pound and shortening the season as target or limit reference indicators are reached) are designed to help avoid recruitment overfishing, the assessment is equally appropriate for the harvest control rule.		
b	Justifi- cation	The shift from traditional fishery models to environmentally based models is considered a significant advancement. Examples of models that successfully incorporate environmental variables and produce reliable forecasts are rare in fisheries science. The modelling efforts by ODFW for pink shrimp are impressive, especially given that lengthy time series of stock production and environmental data are required for their construction. The ODFW research on pink shrimp, with respect to environmental forcing, rates highly when compared to similar efforts for other pandalid stocks throughout the northern hemisphere. The researchers at ODFW are proactive in understanding what drives production for pink shrimp, providing relevant information supported by careful analysis, and this benefits the WOC fishery as a whole. This reaches the SG100 level.		
	Assessment approach			
	Guide post	The assessment estimates stock status relative to generic reference points appropriate to the species category.	The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.	
	Met?	Y	Y	

PI 1.2.4		There is an adequate assessment of the stock status		
		<p>Assessments presently take the form of in-season and annual analysis of catch, effort, CPUE from the WOC fleet, and biological sampling from the Oregon fleet (e.g. Groth et al. 2017). Catch, effort, CPUE, age, size and sex composition, year-class strength, and geographic distribution of catch are compared and evaluated against historical data and indicators of Biological Concern listed in the draft shrimp Fishery Management Plan (FMP) (Abramson et al. 1981; Hannah and Jones 2016b), and target and limit CPUE and sea level height reference thresholds. Sampling is representative of a large portion of the stock area as boats landing in Oregon also fish off Washington and California. The environmental models are updated yearly and provide a forecast of recruitment for the upcoming fishing season.</p> <p>Periodically, ODFW shrimp biologists analyze historical data from the shrimp fishery, update long-term recruitment and spawning stock indices, and re-examine existing environmental models to determine if there is any evidence that fishing has negatively impacted recruitment (Hannah and Jones 2014a, 2016c). Together, these components of the stock assessment process meet the SG80.</p>		
c	Uncertainty in the assessment			
	Guide post	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	Y	Y	N
	Justification	The major uncertainties of assessments deal with predicting environmental effects on future stock conditions. Fishery effects are masked by environmental influences on survival of recruits. Retrospective studies are periodically conducted for environmentally based models to help explain trends in population abundance (Hannah 1993, 1999, 2010, 2011; Hannah and Jones 2014a, 2016c). This meets the SG80. The stock is not evaluated relative to reference points in a probabilistic way, precluding a score at the SG100 level.		
d	Evaluation of assessment			
	Guide post			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			Y
	Justification	<p>Condition (3.6.1) of the original Oregon pink shrimp assessment (TAVEL 2007), required the client to subject the fishery monitoring program to an independent outside review to identify gaps. Stock assessment was an element of that review and the first surveillance audit (TAVEL 2009) reported: "The reviewer evaluated sampling and monitoring programs along with in-season stock assessments. The reviewer also interviewed the Senior Shrimp Biologist regarding ODFW's plans to update annual environmental models. ODFW and staff have collected catch, effort, and biological data and are in the process of evaluating it for their annual review. Sampling continues to be robust in comparison to previously established statistical standards. No alarming trends were seen in the data collected during the 2008 season when evaluated against the draft FMP's list of Biological Concerns." The assessment of stock status is not model based and, therefore, is not greatly influenced by errors in assumptions.</p> <p>A comprehensive coastwide stock assessment for ocean shrimp was conducted and documented in the Fishery Management Plan for Pink Shrimp (Abramson et al. 1981). Coastwide assessments were made using a Schaefer-type production model for Washington, Oregon, and California catch and effort for the period 1959-1980 (Abramson and Tomlinson 1972). Analysis of the use of this model by Geibel and Heimann (1976) outlined the difficulties of setting meaningful quotas for a stock that</p>		

PI 1.2.4		There is an adequate assessment of the stock status	
		<p>appears to be more sensitive to environmental variation than effects of the fishery. General production, yield per recruit and catch-at-age models have been largely unsuccessful in assessing stock status and establishing reference points for management of the pink shrimp fishery. Environmentally based models, on the other hand, have been useful for explaining variation in recruitment but failed to detect any consistent impact of the fishery on future stock abundance (e.g. no consistent stock-recruitment relationship).</p> <p>These early efforts preceeded the current stock assesement approach, and provide evidence of a robust exploration of alternative hypotheses and models, supporting a scoring at the SG100 level.</p>	
e	Peer review of assessment		
	Guide post		The assessment of stock status is subject to peer review.
	Met?		The assessment has been internally and externally peer reviewed.
	Justifi cation	Y	Y
		<p>Annual assessments for the WOC pink shrimp fishery conducted by ODFW are reviewed by the ODFW Program supervisor, the Program Manager of the Marine Program and the harvest manager of Fish Division. In addition, when periodic evaluations of the evidence for any influence of spawning stock on recruitment are conducted and submitted for publication, they are reviewed by two people internally, then by NMFS staff, and then by 2-4 external journal peer-reviewers.</p> <p>In addition to internal peer review, periodic independent outside peer review of the monitoring program has been conducted, as required under Condition (3.6.1) of the original assessment (TAVEL 2007). These reviews have resulted in periodic external peer review of the stock assessment approach (Golden 2008; Golden Marine Consulting (2017) , reaching the SG100.</p>	
References		<p>Abramson et al. 1981; Abramson and Tomlinson 1972; Geibel and Heimann 1976; Golden 2008; Golden Marine Consulting 2017; Groth et al. 2017; Hannah 1993, 1999, 2010, 2011; Hannah and Jones 2014a, 2016b, 2016c; 1976; TAVEL 2007, 2009.</p>	
OVERALL PERFORMANCE INDICATOR SCORE:			95
CONDITION NUMBER (if relevant):			

Evaluation Table for PI 2.1.1 – Primary species outcome

PI 2.1.1		The UoA aims to maintain primary species above the PRI and does not hinder recovery of primary species if they are below the PRI.		
Scoring Issue		SG 60	SG 80	SG 100
a	Main primary species stock status			
	Guide post	Main primary species are likely to be above the PRI	Main primary species are highly likely to be above the PRI	There is a high degree of certainty that main primary species are above the PRI and are

PI 2.1.1		The UoA aims to maintain primary species above the PRI and does not hinder recovery of primary species if they are below the PRI.		
		OR If the species is below the PRI, the UoA has measures in place that are expected to ensure that the UoA does not hinder recovery and rebuilding.	OR If the species is below the PRI, there is either evidence of recovery or a demonstrably effective strategy in place between all MSC UoAs which categorise this species as main , to ensure that they collectively do not hinder recovery and rebuilding.	fluctuating around a level consistent with MSY.
	Met?	Y	Y	Y
	Justification	Nearly all of the catch other than pink shrimp is discarded in this fishery. Only trace amounts (<<0.01%) were observed as retained or sold between 2010 and 2015 and trace amounts (<0.1% or less than one mt each) of non-target groundfish species were observed as caught and discarded between 2010 and 2015 (Somers et. al 2016). Besides shrimp, the only species of caught in any quantity is eulachon smelt (an ETP species) and Pacific hake, which is MSC certified and not caught in high enough quantities to be considered a “main” P2 species. Therefore there are no main primary or secondary species in this fishery as defined by MSC hence the SG100 is met for this scoring issue.		
b		Minor primary species stock status		
	Guide post			Minor primary species are highly likely to be above the PRI OR If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species
	Met?			Y
	Justification	The only minor primary species encountered in significant enough quantities to be considered under this PI is Pacific hake. This species is MSC certified and has regular stock assessments showing it is highly likely to be above the PRI (Berger et al 2017).		
References		Berger, A.M., Grandin, C.J., I.G. Taylor, A.M. Edwards, and S. Cox. 2017. Status of the Pacific Hake (whiting) stock in U.S. and Canadian waters in 2017. 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. 202 p.		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.1.2 – Primary species management strategy

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to above the point where recruitment would be impaired.	There is a partial strategy in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the point where recruitment would be impaired.	There is a strategy in place for the UoA for managing main and minor primary species.
	Met?	Y	Y	Y
	Justifi cation	As mentioned above under 2.1.1. there are no main primary species in this fishery, hence the SG80 is met. The only minor primary species under consideration is Pacific hake, which is MSC certified and managed under it's own fishery management plan to maintain a healthy stock size, and the target fisheries for hake far exceed catches in the shrimp fishery, hence the SG100 is also met. See ORS 635-005-0195 Incidental Catch Limit: It is unlawful to have on board a commercial fishing boat taking shrimp for commercial purposes an aggregate incidental catch of more than 250 Dover, English, or petrale sole less than 11 inches in length. It is unlawful for a commercial fishing boat taking shrimp for commercial purposes to land an incidental catch of ocean food fish in excess of 1,500 pounds per day accumulated over the trip. Pacific hake, and arrowtooth flounder are excluded from the incidental landing restriction. Federally established RCAs and bycatch reduction devices including net grids and LED lights also limit catch of rockfish species.		
b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	Y
	Justifi cation	Oregon and Washington shrimp trawl vessels use of bycatch reduction devices (BRDs) has reduced fish bycatch by between 66% and 88% from historical (pre-BRD) levels. By 2005, BRD use had reduced fish bycatch to approximately 7.5% of total catch, composed mostly of juvenile Pacific whiting, slender sole, smelts, rex sole and juvenile rockfish (Hannah and Jones 2007), and recent use of LED lights to deter eulachon have also resulted in further reductions in incidental catches of other species, particularly juvenile rockfish (Hannah et al 2015). Therefore testing supports high confidence that this strategy is working based on information directly about the fishery and species involved and the SG100 is met.		
c	Management strategy implementation			
	Guide post		There is some evidence that the measures/partial strategy is being implemented successfully .	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
				overall objective as set out in scoring issue (a).
	Met?		Y	Y
	Justifi cation	The extremely low numbers of primary species in the catch and landings compositon constitutes clear evidence that the strategy is being implemented successfully and is achieving its overall objective. In addition, based on the success of BRDs and LED lights in relation to bycatch minimization, coupled with ODFW staff and OSP observations that confirm fleet compliance at 100% (Hannah, 2012; Thompson, 2012), there is evidence that the strategy is achieving its overall objective and the SG100 is met.		
d	Shark finning			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant
	Justifi cation	This fishery does not have any sharks as primary species.		
e	Review of alternative measures			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	Y	Y	Y
	Justifi cation	The extremely low numbers of primary species in the catch based on observer and fish ticket data comprises evidence that UoA related mortality of unwanted catches is already extremely low. However, there has been regular and ongoing review of bycatch excluding measures such as the BRD grates and LED lights and where improvements can be made, these have been adopted (e.g. Hannah et al 2015). This consitutes at least the biennial review required of SG100.		
References		NWFSC 2011; ORS 635-005, Hannah and Jones 2007; Hannah, 2012; Thompson, 2012, Hannah et al 2015).		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.1.3 – Primary species information

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impact on main primary species			
	Guide post	Qualitative information is adequate to estimate the impact of the UoA on the main primary species with respect to status. OR If RBF is used to score PI 2.1.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is adequate to assess the impact of the UoA on the main primary species with respect to status. OR If RBF is used to score PI 2.1.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for main primary species.	Quantitative information is available and is adequate to assess with a high degree of certainty the impact of the UoA on main primary species with respect to status.
	Met?	Y	Y	Y
	Justification	Both qualitative and quantitative information continues to be collected in order to estimate the amount of primary species taken by the fishery to support assessment of the effectiveness of the strategy to manage them. However, as there are no main primary species in this fishery, the SG100 is met for this scoring issue by default.		
b	Information adequacy for assessment of impact on minor primary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			Y
	Justification	The single minor primary species in the pink shrimp fishery is Pacific hake, which is caught in very small quantities relative to those in the targeted hake fishery. Observer and fish ticket (both quantitative) data is available on the amount of hake taken in the pink shrimp fishery and this is incorporated into hake stock assessments and therefore quota and TAC setting (Berger et al 2017). This constitutes quantitative information adequate to estimate the impact of the UoA on Pacific hake with respect to stock status and the SG100 is met.		
c	Information adequacy for management strategy			
	Guide post	Information is adequate to support measures to manage main primary species.	Information is adequate to support a partial strategy to manage main Primary species.	Information is adequate to support a strategy to manage all primary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y	Y
	Justification	The WCGOP observer coverage is 11-12% in the pink shrimp fishery. The data are used in conjunction with additional commercial pink shrimp fishery landings information (fish receiving tickets, Groth 2017, Avers 2017) to expand bycatch		

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species
		estimates to the fleet-wide level in order to inform the management process of coastwide total mortality to all primary species in this fishery. (Somers et al 2016). ODFW and WDFW regulations limit retention quantities of several species and port samplers obtain logbook and biological information on samples of landed catch. Such monitoring and analysis support a comprehensive strategy to manage primary species, and periodic evaluation assures a high degree of certainty the strategy is achieving its objective, hence the SG100 is met.
References		Somers et al. 2016, Groth 2017, Ayers 2017, Berger et. al. 2017.
OVERALL PERFORMANCE INDICATOR SCORE:		100
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit.		
Scoring Issue		SG 60	SG 80	SG 100
a	Main secondary species stock status			
	Guide post	Main Secondary species are likely to be within biologically based limits. OR If below biologically based limits, there are measures in place expected to ensure that the UoA does not hinder recovery and rebuilding.	Main secondary species are highly likely to be above biologically based limits OR If below biologically based limits, there is either evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are considerable, there is either evidence of recovery or a, demonstrably effective strategy in place between those MSC UoAs that also have considerable catches of the species, to ensure that they collectively do not hinder recovery and rebuilding.	There is a high degree of certainty that main secondary species are within biologically based limits.
	Met?	Y	Y	Y
	Justification	Observed coastwide catch (discarded + retained) in the 2010-2015 pink shrimp fisheries averaged above 93% pink shrimp and around 2-3% other shrimp. Trace amounts (<0.1% or less than one mt each) of non-target groundfish species were observed as caught and discarded between 2010 and 2015 (Somers et. al 2016). Some of these might be classified as secondary species but none come anywhere near being caught in sufficient quantities to consider them as main species. Besides shrimp, the only species of caught in any quantity is eulachon smelt (an ETP species) and Pacific hake, which is MSC certified and not caught in high enough quantities to be considered a “main” P2 species (it is a minor primary species). Therefore there are no main secondary species in this fishery as defined by MSC and the SG100 is met for this scoring issue.		
b	Minor secondary species stock status			
	Guide post			Minor secondary species are highly likely to be above biologically based limits. OR If below biologically based limits', there is evidence

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit.		
				that the UoA does not hinder the recovery and rebuilding of secondary species
	Met?			Y
	Justification	Only trace amounts of species that would be considered as minor secondary species are caught in this fishery (<<0.01%), therefore we consider these below a reasonable diminimus value that precludes the need to specifically consider them here. Hence there are no minor secondary species and the SG100 is met.		
References		NWFSC 2010; Stewart and Hamel 2010; Stewart and Forrest, 2011; PFMC 2011b.		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.2.2 – Secondary species management strategy

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be within biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a partial strategy in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be within biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a strategy in place for the UoA for managing main and minor secondary species.
	Met?	Y	Y	Y
	Justification	ODFW and WDFW have established sophisticated gear regulations for the shrimp trawl fishery that minimize bycatch (Hannah and Jones 2007; ODFW 2008, ODFW 2009, Hannah et al 2015). Of the non-ETP species, retention of Pacific halibut, Dungeness crab, and rebuilding rockfish stocks are prohibited in the pink shrimp fishery. Federally established Rockfish Conservation Areas (RCAs), designed to limit catch of rockfish species, also reduce all bycatch and federal EFH conservation zones also protect sensitive habitats. There is enforcement of ORS 635-005-0190 Fishing Gear, and federal monitoring by the WCGOP. Results of these activities are evaluated annually by fishery managers to manage and minimise bycatch. Because the bycatch is so low, catches of all other species are exceptionally rare and negligible in respect to significantly impacting each respective stocks, hence the SG100 is met.		
b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	Y	Y	Y
	Justification	The gear measures implemented by ODFW and WDFW are based on documented observations of extensive field-testing (Hannah and Jones 2007; ODFW 2008, ODFW 2009, Hannah et al 2015). Based on gear test results (Hannah and Jones 2007; ODFW 2008, ODFW 2009, Hannah et al 2015) the use of BRD grids and LED lights in the shrimp trawl nets has greatly minimized bycatch, virtually eliminating all secondary species from the catch. This constitutes 'testing' that meets the SG100.		
c	Management strategy implementation			
	Guide post		There is some evidence that the measures/partial strategy is being	There is clear evidence that the partial strategy/strategy is being

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
			implemented successfully.	implemented successfully and is achieving its objective as set out in scoring issue (a).
	Met?		Y	Y
	Justification	<p>Regulations have been promulgated to require BRD use in shrimp trawl nets and although LED light use is still voluntary, there is widespread adoption in the OR and WA fleets. See ORS 635-005-0190 Fishing Gear, which states requirements. Results from the WCGOP, which documents bycatch, shows a decreasing trend in the percentage of bycatch since implementation of BRDs (<1% from 2010-2015 vs. 11% average from 2003 through to 2009). Oregon State Police and WDFW enforcement officers report very few, if any, violations related to catch/retention of bycatch species.</p> <p>The fishers support the use of BRDs and have commented on their usefulness for reducing time and resources spent on sorting.</p> <p>Results from the WCGOP, which documents bycatch, shows a decreasing trend in the percentage of bycatch since implementation of BRDs (3% in 2010 vs 11% average since 2003). For those species that are prohibited to retain, the observer data indicate that they are being returned to the water. Because the bycatch is so low, it is negligible in respect to significantly impacting any stock hence the SG100 is met.</p>		
d	Shark finning			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not Relevant	Not Relevant	Not Relevant
	Justification	There are no sharks caught in this fishery.		
e	Review of alternative measures to minimise mortality of unwanted catch			
	Justification	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all secondary species, and they are implemented, as appropriate.
	Met?	Y	Y	Y
	Guide post	The extremely low numbers of secondary species in the catch based on observer and fish ticket data comprises evidence that UoA related mortality of unwanted catches is already extremely low. However, there has been regular and ongoing review of bycatch excluding measures such as the BRD grates and LED lights and where improvements can be made, these have been adopted (e.g. Hannah et al 2015). This constitutes at least the biennial review required of SG100.		
References		Hannah and Jones 2007; ODFW 2008, ODFW 2009; Romano 2012		
OVERALL PERFORMANCE INDICATOR SCORE:				
				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.2.3 – Secondary species information

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts on main secondary species			
	Guide post	Qualitative information is adequate to estimate the impact of the UoA on the main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and adequate to assess the impact of the UoA on main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and adequate to assess with a high degree of certainty the impact of the UoA on main secondary species with respect to status.
	Met?	Y	Y	Y
	Justification	Both qualitative and quantitative information continues to be collected in order to estimate the amount of primary species taken by the fishery to support assessment of the effectiveness of the strategy to manage them. However, as there are no main secondary species in this fishery, the SG100 is met for this scoring issue by default.		
b	Information adequacy for assessment of impacts on minor secondary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.
	Met?			Y
	Justification	Observer and fish ticket (both quantitative) data are available on the amount of minor secondary species taken in this fishery, and the amounts are so insignificant as to not warrant consideration as minor secondary species. However, this data collection does constitute quantitative information adequate to estimate the impact of the UoA on minor secondary species with respect to stock status and the SG100 is met.		
c	Information adequacy for management strategy			
	Guide post	Information is adequate to support measures to manage main secondary species.	Information is adequate to support a partial strategy to manage main secondary species.	Information is adequate to support a strategy to manage all secondary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective .
	Met?	Y	Y	Y
	Justification	The WCGOP observer coverage is 11-12% in the pink shrimp fishery. The data are used in conjunction with additional commercial pink shrimp fishery landings information (fish receiving tickets, Groth 2017, Ayers 2017) to expand bycatch estimates to the fleet-wide level in order to inform the management process of coastwide total mortality to all primary and secondary species in this fishery (Somers et al 2016). ODFW and WDFW regulations limit retention quantities of		

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species.	
		several species and port samplers obtain logbook and biological information on samples of landed catch. Such monitoring and analysis support a comprehensive strategy to manage secondary species, and periodic evaluation assures a high degree of certainty the strategy is achieving its objective, hence the SG100 is met.	
References		Bellman, 2012; Hannah and Jones, 2007; Hannah, et al., 2011; NWFSC 2010; Groth 2017, Ayres 2017)	
OVERALL PERFORMANCE INDICATOR SCORE:			100
CONDITION NUMBER (if relevant):			

Evaluation Table for PI 2.3.1 – ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species		
		The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guide post	Where national and/or international requirements set limits for ETP species, the effects of the UoA on the population/stock are known and likely to be within these limits.	Where national and/or international requirements set limits for ETP species, the combined effects of the MSC UoAs on the population/stock are known and highly likely to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a high degree of certainty that the combined effects of the MSC UoAs are within these limits.
	Met?	Not relevant	Not relevant	Not relevant
	Justification			
b	Direct effects			
	Guide post	Known direct effects of the UoA are likely to not hinder recovery of ETP species.	Known direct effects of the UoA are highly likely to not hinder recovery of ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP species.
	Met?	Y	Y	N
	Justification	<p>Bycatch of nearly all ETP species is negligible, for example no salmonids, birds, sea turtles, or marine mammals have been observed in the fishery.</p> <p>One coho salmon was confiscated from a landed shrimp vessel in 2011, but it was unclear if it was actually taken by the shrimp trawl gear. However, given the low quantity landed, and the fact that salmon do not appear in the observer data, there is negligible impact.</p> <p>The Southern Distinct Population Segment (DPS) of Pacific eulachon is listed as threatened under the ESA. There are currently no ESA take prohibitions for the Southern DPS eulachon (Federal Register 2011), so there are no requirements for protection and rebuilding, therefore the team shall not score the first element in SG 2.3.1.</p> <p>The only ETP species that is potentially impacted by the fishery is eulachon. The Biological Review Team (BRT) concluded that the Southern Eulachon DPS is at “moderate risk” of extinction throughout all of its range. From 1999 - 2008, the Columbia River commercial eulachon fishery alone averaged 3.4 million spawner fish (range 2,460 to 13,325,820) (BRT 2008). Bycatch in the Oregon pink shrimp fishery averaged 397,000 fish (made up of several year classes), since 2004 (range 146,560 to 845,081 fish) (Al-Humaidhi et al., 2011). Table 2 above indicates the quantity of eulachon catch observed in the OR and WA pink shrimp fisheries between until 2015. While the bycatch in the pink shrimp trawl fishery is not likely to be a primary cause of the decline in Fraser River and Columbia River eulachon stocks, one cannot rule out the possibility that it could be a factor limiting their recovery (Federal Register, 2010).</p> <p>While the estimates of total bycatch in Canada are only approximate, in general, the magnitude of bycatch when compared to the probable quantities of eulachon spawning runs in the main eulachon rivers (like the Frasier and Columbia) is not large (Hay and McCarter, 2000).</p>		

PI 2.3.1	<p>The UoA meets national and international requirements for the protection of ETP species</p> <p>The UoA does not hinder recovery of ETP species</p>
	<p>The fishery likely takes just a small percentage of the eulachon in marine waters that would live to spawners, because eulachon in marine waters are likely subject to high natural mortality, based on the following related studies. Beamish and MacFarlane (1999) described a recent northward movement of Pacific whiting, as they have expanded to water of southeastern Alaska. As Pacific whiting move into previously unoccupied habitat, their substantial predatory biomass might have resulted in local depletions of eulachon. As eulachon gather at the mouths of rivers prior to spawning runs, several marine mammal species and birds are attracted to feed on them (Hay and McCarter, 2000). Samples from Canadian shrimp research surveys conducted in May, showed 2 distinct size modes corresponding to ages 1 and 2 years, with some smaller 0+ and larger, 3 year old fish. The view is that most fish spawn at age 3 with some at age 4 (Hay and McCarter, 2000). Eulachon spawn in late winter (January-February in the Columbia River) to spring (April-May off Canada). In the Columbia River adult spawners are reported to be 3-5 years old (based on reading rings on scales and otoliths), with the majority at 3 years, although some are purported to be up to 9 years old (WDFW and ODFW 2001). Because it is likely a large percentage of age 1 and 2 year eulachon are lost to natural mortality, the numbers of these year classes taken incidentally in the shrimp fishery may not be significant relative to spawning runs during most years.</p> <p>Based on experimental fishing with green LED lights beginning in the 2014 shrimp season (see section 3.4.2 for more details), The paper “Tests of artificial light for bycatch reduction in an ocean shrimp (<i>Pandalus jordan</i>) trawl: Strong but opposite effects at footrope and ear the bycatch reduction device” (Hannah et. al. 2015) was published in Fisheries Research. By trawling with green LED lights affixed to the trawl lines, results reported in this paper include the reduction of eulachon bycatch in shrimp trawls by 91%, as well as a reduction of slender sole and other small flatfishes by 68%, darkblotched rockfish by 82% and other juvenile rockfishes by 56%. A full description of information contained in Information Report (2016-02) on modeling the effect of changing fishing effort and bycatch reduction technology on the risk to eulachon is contained in section 3.4.2., above.</p> <p>Insofar as the Washington pink shrimp fleet is implementing the same BRD and LED light technology as the Oregon fleet, the findings of this study apply to the Unit of Assessment as a whole, therefore the results of this study pertaining to the likely impacts of the pink shrimp fishery on Pacific eulachon apply to both Oregon and Washington.</p> <p>Operationally, WDFW reports the following with regard to use of LED lights in the WA pink shrimp fleet (Wargo and Ayres 2016):</p> <p>Anecdotally most Washington shrimpers were reporting the use of LED lights in 2015. To better assess adoption, WDFW is conducting a survey of license holders. With 30% of active skippers responding, the results do point to nearly universal use of green LED lights, ranging from 8 to 18 per net. One Washington skipper is not yet using lights. Comments regarding the effectiveness of the lights at reducing bycatch ranged from good to very good – “They work!” The survey is also asking for information about ground gear design. The plan is to shift survey efforts to dockside interviews once the 2016 season opens to get a complete assessment of the fleet.</p> <p>In Oregon, although no formal survey was conducted, based on an informal census, it appears as though all shrimpers that fished in 2015 used LED lights when trawling (Hannah and Jones 2016b).</p> <p>As reported by Wargo and Ayres (2016) and Hannah and Jones (2016b) the use of LED lights is likely to be required under forthcoming National Marine Fisheries Service recovery plans for eulachon. In anticipation of this, the ODFW is proposing the following regulation for adoption before or during the 2017 fishery season. “It is</p>

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species	
		The UoA does not hinder recovery of ETP species	
		<p>unlawful to fish with trawl gear for pink shrimp for commercial purposes without approved and operational footrope lighting devices in use, arranged according to rule. Lighting devices must be securely attached to the fishing line of the trawl, defined as a line spanning, and attached to, the forward leading edge of the trawl netting. Lighting devices are required along the center third of the fishing line of each trawl net and are to be spaced at a maximum of four feet apart. Approved lighting devices include: (a) Lindgren-Pittman Electralume Light Emitting Diode (LED) lights. (b) Other footrope lighting devices that are deemed by the Department to have comparable or greater total illumination may be approved for use, on a case-by-case basis, through issuance of an Experimental Gear Permit (EGP)."</p> <p>In Washington the proposed rule is a starting point for discussion. This draft language will be modified as needed to fit current WDFW regulation format and style. For example, to encourage and allow improvements, the ODFW rule includes provisions for an experimental gear permit. This portion of the rule isn't necessary for the Washington fishery. Upon request, each Washington shrimp trawl permit can be conditioned to authorize skippers to test and report results of alternative lights or light arrangements (Wargo and Ayres 2016).</p> <p>With regard to studying the overlap of the shrimp fishery footprint with the eulachon population, the condition was considered closed following the 3rd/1st surveillance audit for the OR and WA fisheries, respectively (MRAG Americas 2016) With regard to the BRD work, the results of the Hannah 2016 modelling study provide sufficient evidence determine that, with current bycatch reduction practices (soon to be required by regulation in both WA and OR), the fishery is highly unlikely to create unacceptable impacts to the ETP species Pacific eulachon.</p> <p>In summary, eulachon by-catch in offshore shrimp fisheries was not ranked as the top threat in all sub-areas of the DPS (NMFS, 2016). The fishers and ODFW are reducing the bycatch of eulachon by use of BRDs and LED lights and continuing gear studies to minimize fishery effects. Because there are currently no ESA take prohibitions for the SDPS eulachon (Federal Register 2011), and the pink shrimp fishery does not affect spawning/rearing habitat or food sources, the known effects of fishery currently appear to be unlikely to create unacceptable impacts to this species, hence the SG80 is met. However, some uncertainty in the impacts of the bycatch precludes scoring at SG100.</p>	
c	Indirect effects		
	Guide post	Indirect effects have been considered and are thought to be highly likely to not create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?	Y	N
	Justification	The Oregon and Washington pink shrimp fishery does not affect spawning/rearing habitat or food sources, the fishery currently appears to be unlikely to create unacceptable impacts to this species from indirect effects, meeting the SG80.However, a high degree of certainty does not exist to reach SG100.	
References		Biological Review Team (2008); Gustafson, et al. (2010); Federal Register (2011); Hannah et. al. (2015); Hannah (2016); Wargo and Ayres (2016); Hannah and Jones (2016b), MRAG Americas (2016).	
OVERALL PERFORMANCE INDICATOR SCORE:			80
CONDITION NUMBER (if relevant):			

Evaluation Table for PI 2.3.2 – ETP species management strategy

PI 2.3.2		The UoA has in place precautionary management strategies designed to: <ul style="list-style-type: none">• meet national and international requirements;• ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guide post	There are measures in place that minimise the UoA-related mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a comprehensive strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.
	Met?	NA	NA	NA
	Justification	NA		
b	Management strategy in place (alternative)			
	Guide post	There are measures in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a strategy in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a comprehensive strategy in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species
	Met?	Y	Y	Y
	Justification	ODFW and WDFW, in cooperation with shrimp fishers, have implemented a comprehensive strategy to limit bycatch of eulachon. Implementation of the use BRDs with 19 mm bar spacing, and results from reconfiguration of trawl footropes and use of LED lights has reduced bycatch of eulachon (Hannah et al., 2011, Hannah 2012, Hannah et al 2015). ODFW and WDFW are continuing research and responding to results and changing conditions, and both states are in the process of rulemaking to specify and mandate the use of LED lights in the fishery (there is already widespread voluntary adoption). Existing shrimp seasons and EFH and RCAs also contribute to limiting the time for interaction with eulachon, to such a level that the fishery does not hinder the recovery. Therefore, the fishery meets the SG100.		
c	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is an objective basis for confidence that the measures/strategy will work, based on information directly about the fishery and/or the species involved.	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work.
	Met?	Y	Y	Y

PI 2.3.2		<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none">• meet national and international requirements;• ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.</p>		
	Justifi- cation	<p>The results presented by Hannah et al. (2011), Hannah and Jones (2007), and Hannah et al (2015) on the effectiveness of BRD use and LED light use in the fishery to minimize eulachon mortality provide an objective basis for confidence that the strategy in place is working (see details in 2.3.1 SIb).</p> <p>Quantitative analysis of information directly from the fishery (contained in Hannah et al 2015 in particular and through ongoing testing) supports high confidence that this strategy is working to reduce eulachon bycatch in the pink shrimp fishery. Hence the SG100 is met.</p>		
d	Management strategy implementation			
	Guide post		There is some evidence that the measures/strategy is being implemented successfully.	There is clear evidence that the strategy/comprehensive strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a) or (b).
	Met?		Y	Y
	Justifi- cation	Results of monitoring of the fishery show a decline (12%) in the estimated bycatch of eulachon during 2010 compared to 2009 (Al-Humaidhi et al. 2011) and an even more marked decline following the implementation of LED lights (Hannah et al 2015). ODFW amd WDFW meetings with fishers, monitors and enforcement as well as skipper surveys demonstrate a high level of compliance, support, and involvement of the fleet with respect to these measures, comprising clear evidence that the stategy is being implemented successfully and achieving its objective to minimize eulachon bycatch, hence the SG100 is met.		
e	Review of alternative measures to minimize mortality of ETP species			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality ETP species, and they are implemented, as appropriate.
	Met?	Y	Y	Y
	Justifi- cation	As described under previous PIs and scoring issues, the area of research into measures to minimize catch of eulachon in the shrimp fishery is very active. Over the past decade there have been numerous studies and tests of alternative measures and these are expected to continue as long as eulachon is ESA listed and the pink shrimp fishery is considered pose a risk to the recovery of the species based on quantities of eulachon bycatch. Hence, there has been at least biennial review of the potential effectiveness and practicality of alternative measures to minimize UoA related mortality of eulachon, implemented as appropriate and the SG100 is met.		
References		Al-Humaidhi et al. 2011; Hannah et al., 2011; Hannah 2012; Hannah, R.W. and Jones, S.A. (In preparation); and Hannah and Jones, 2007.		
OVERALL PERFORMANCE INDICATOR SCORE:				
100				

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.</p>
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 2.3.3 – ETP species information

PI 2.3.3		Relevant information is collected to support the management of UoA impacts on ETP species, including: <ul style="list-style-type: none">• Information for the development of the management strategy;• Information to assess the effectiveness of the management strategy; and• Information to determine the outcome status of ETP species.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts			
	Guide post	Qualitative information is adequate to estimate the UoA related mortality on ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species.	Some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.	Quantitative information is available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	Y	Y	N
	Justification	There are several sources of quantitative information available which contribute to the ability to estimate eulachon mortality the impact of the US west coast pink shrimp fishery on the southern DPU of eulachon including: at-sea observer coverage, mandatory logbook reporting, observation by ODFW and WDFW of the performance of BRDs and LED lights, footrope configuration, and landings documentation. The WCGOP provides improved estimates of total catch and discard by observing groundfish fisheries along the US west coast. The observed total catch weight (mt), discard weight (mt) and percent discarded eulachon is available from observed vessels in the pink shrimp fishery each year through 2015 (beginning in 2010 for Washington vessels; Somers et al, 2016). In terms of information to determine whether the UoA may be a threat to the protection and recovery of eulachon, studies included in Mallette et al (2014), including James et al (2014) and Storch et al. (2014) comprise quantitative information regarding aspects of eulachon biology and fishery impacts in the region. In addition, the NMFS Eulachon 5-year review and draft recovery plans contain information sufficient to meet the SG80 for this scoring issue for eulachon. For all other ETP species in the area, extremely limited or absent interaction with the pink shrimp fishery means that quantitative information (in the form of lack of observed interactions) is available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of non-eulachon ETP species.		
	b	Information adequacy for management strategy		
Guide post		Information is adequate to support measures to manage the impacts on ETP species.	Information is adequate to measure trends and support a strategy to	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and

PI 2.3.3		<p>Relevant information is collected to support the management of UoA impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 		
			manage impacts on ETP species.	injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.
	Met?	Y	Y	N
	Justification	<p>Because of documented no or very low bycatch of all ETP species except for eulachon, information is sufficient to evaluate whether the fishery is a threat to their protection and recovery.</p> <p>Regarding eulachon, observer coverage in the pink shrimp trawl fishery had remained relatively consistent at 7% coast-wide through 2009, and increased to 12% in 2010, and has remained fluctuating around 11-12% coast wide since then (Sommers et al. 2016). The vessel/trip selection process is designed to produce a logistically feasible sampling plan with a distribution of observations throughout the entire geographic range of the fishery over time (Al-Humaidhi et al., 2011).</p> <p>The current status of eulachon, risks to the population, and sources of mortality (including the impact of bycatch in the shrimp fishery) are comprehensively analyzed in the Eulachon 5-year review and recovery plan (NMFS 2016a and 2016b). In addition, Hannah (2016) modeled the effects of changing fishing effort and bycatch reduction technology on risks to eulachon by the shrimp fishery.</p> <p>This constitutes sufficient information to determine whether the pink shrimp fishery may be a threat to the protection and recovery of eulachon hence the SG80 level is met. The information is sufficient to support a comprehensive strategy, but not to evaluate it with a high degree of certainty, thereby not meeting SG100.</p>		
References		Al-Humaidhi et al., 201; Hannah and Jones, in preparation; Biological Review Team 2008; and Federal Register 2011. Sommers et al 2016; NMFS 2016a and 2016b; Hannah 2016.		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.4.1 – Habitats outcome

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates.		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly encountered habitat status			
	Guide post	The UoA is unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is evidence that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	Y	Y	N
	Justification	<p>The assessment team considers that there is no more than a 40% probability that fishery is within the range where there is risk of serious or irreversible harm to reduce habitat structure and function based on the following: Existing shrimp seasonal closures, EFH and RCAs contribute to limiting the area or interaction with sensitive substrates; and use of gear configurations which allow trawl footropes to glide over the substrate. In addition, ODFW is continuing its research on effects of shrimp trawl on substrate and responding to results and changing conditions.</p> <p>The West Coast shrimp trawl fishery occurs on the sedimentary shelf over soft sand and mud substrate off the coast of Washington, Oregon, and California. Sensitivity of this habitat to trawls (including shrimp trawl) is rated at 1.2 on a scale of 0 to 3 (highest). Similarly, descriptions of sensitivity levels and recovery time (years) for gear impact assessments have been described. Recovery time for trawls (including shrimp trawl) is generally estimated at 0.4 years (PFMC, 2005b).</p> <p>Interviews with Oregon shrimp trawlers suggest that little damage to the substrate occurs, because they fish flat, mud/sand areas, and gear is configured such that the trawl footropes glide over the substrate. Underwater video taken by ODFW shows that only the shoe of the trawl doors is in contact, making a furrow up to 3" deep. Furrows quickly fill in due to energy generated from currents, rendering the impact undetectable (Hannah et al., 2010).</p> <p>This was supported from controlled experiments conducted by ODFW (Hannah, et al., 2010), which showed shrimp trawl impacts to substrate and benthos are not serious or irreversible. This leads to the conclusion that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm, thereby meeting the SG80.</p> <p>Essential Fish Habitat (EFH) has been described for species covered under the PFMC Groundfish Plan (PFMC, 2005). Habitat use data is analyzed both by species and habitat to provide input into various components of characterization of fishing impacts. There is no evidence of serious or irreversible harm. The fishery does not affect critical habitats for eulachon, salmonids, or killer whales, which are not present offshore (Federal Register 2005; Federal Register 2010, Federal Register 2011).</p> <p>While there is some evidence the fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm, more evidence needed to conclude the fishery is highly unlikely to reduce habitat structure.</p>		
VME habitat status				

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates.		
b	Guide post	The UoA is unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is evidence that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.
	Met?	Not relevant	Not relevant	Not relevant
	Justification	This fishery does not take place in potential VME areas. Competent authorities have not established VMEs, and areas within the broader fishing zone off the US west coast that could be classified as VME are closed to bottom contacting gear and are also not suitable shrimp habitat.		
c	Minor habitat status			
	Guide post			There is evidence that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.
	Met?			N
	Justification	This fishery takes place over muddy substrates on the shrimp banks identified in section 3.4.3 of the report. There is no indication of the existence of ‘minor habitats’ within the shrimp fishing area, but due to a lack of finer scale resolution on habitat types, it cannot be said that there is evidence that the UoA is highly unlikely to reduce the structure and function of the minor habitats. Thus this SI is not met at the 100 level.		
References		Federal Register 2005; Federal Register 2010, Federal Register 2011; Hannah, et al. 2010; PFMC, 2005; PFMC, 2005b		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.4.2 – Habitats management strategy

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	Y	Y	Y
	Justification	<p>By regulation the shrimp trawl season runs from April 1 through October 31. The PFMC has proposed and NMFS has implemented area closures for protection of Essential Fish Habitat (EFH Conservation Areas), rockfish habitat areas (RCAs) (NOAA, 2011b), and Marine Protected Areas (MPAs) (PFMC, 2012a). ODFW and WDFW have gear regulations that focus on minimizing impact to habitats.</p> <p>Closed seasons and areas, along with gear regulations, are considered measures that contribute to the protection of habitats within the area of operation of the fishery. In addition, the permitted gear type used in the fishery under assessment provides as a measure for protection of hard surface sensitive benthic habitats (i.e. corals) as nets tear easily; these areas are generally avoided by those participating in the fishery.</p> <p>Closed areas, identified by the PFMC, are intended to minimize to the extent adverse effects of fishing on groundfish EFH. EFH Conservation Areas are closed to specific types of fishing (NOAA, 2011b). Rockfish Conservation Areas (RCAs) are large-scale closed areas that extend along the entire length of the U.S. West Coast. The RCA boundaries are lines that connect a series of latitude/longitude coordinates intended to approximate particular depth contours. Locations of the boundaries are set in order to minimize opportunities for vessels to incidentally take overfished rockfish by eliminating fishing in areas where, and times when, overfished species are likely to co-occur with healthy stocks of groundfish (NOAA, 2011b). Based on evaluation of the effectiveness of these measures, EFH areas and RCA boundaries may be modified.</p> <p>NMFS has implemented the regulatory provisions of Amendment 19 to the Pacific Coast Groundfish Fishery Management Plan. These are intended to minimize, to the extent practicable, adverse effects to EFH from fishing. The measures include fishing gear restrictions and prohibitions, areas that are closed to bottom trawling, and areas that are closed to all fishing that contacts the bottom (Federal Register, 2006a). See Figure 9 for an illustration of EFH areas defined in Oregon State waters.</p> <p>The WCGOP reports observations of any bottom debris that may occur in trawl hauls. Information can alert managers of any emerging issues.</p> <p>Federal agents and state police enforce regulations for area closures.</p> <p>ODFW continues gear research to minimize effects of trawl groundlines on benthic organisms (Hannah, 2012).</p> <p>The fact that measures have been designed to directly manage habitat impacts, there is monitoring in place understand if they are working, and that there is the ability to increase or decrease protected areas through various options (see 80c), it is considered that the components of a strategy are in place, reaching the SG100.</p>		

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.		
b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some objective basis for confidence that the measures/partial strategy will work, based on information directly about the UoA and/or habitats involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or habitats involved.
	Met?	Y	Y	N
	Justifi cation	<p>Shrimp grounds habitat recovery time for trawls is generally estimated at 0.4 years (PFMC, 2005b). Based on the maximum season permitted for the OR and WA pink shrimp fishery, trawled habitat has 5 months to fully recover between seasons. Likewise there are several closed areas within the area of operation of the fishery which have been implemented to minimize to the extent possible effect of fishing on EFH. Closed areas provide protection from trawl impacts not only to sensitive species, but also to sensitive habitats. In addition, areas of coral are avoided, not only due to low shrimp abundance, but also high risk of gear damage or loss.</p> <p>There is information directly about the fishery and/or habitats involved (PFMC, 2005; PFMC, 2005b; PFMC, 2005d; PFMC, 2005e). The PFMC process includes review of regulatory strategies by stakeholders, technical teams and scientific and statistical committees, which provide some objective basis for confidence that the partial strategy is working, thus meeting the SG80.</p> <p>Testing of all aspects of this strategy has not been conducted, to date.</p>		
c	Management strategy implementation			
	Guide post		There is some quantitative evidence that the measures/partial strategy is being implemented successfully.	There is clear quantitative evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		Y	Y
	Justifi cation	<p>Neither Oregon State Police nor WDFW enforcement officers have reported any incidents of shrimp trawlers fishing out of season or within closed areas, which is substantiated by VMS data. During the public comment period for the PFMC Groundfish Plan Amendment 19 (establishment of EFH and associated regulations), the ODFW proposed a change to the proposed Nehalem Bank/Shale Pile area in order to avoid impracticable impacts to the shrimp trawl industry. The change would replace the point at 45° 52.77' N. lat., 124° 28.75' W. long. with a point at 45° 55.63' N. lat., 124° 30.516' W. long. NMFS determined that the suggested change was consistent with Amendment 19 in that it provides for substantial protection of rocky reef habitat within the constraints of practicability. Therefore, NMFS made the suggested change in the rule (Federal Register, 2006a).</p> <p>ODFW continues gear research to understand gear impacts and to determine if there are additional measures that can be taken to minimize effects of trawl groundlines on benthic organisms (Hannah, 2012).</p> <p>Ongoing federal and ODFW research on EFH continues. NMFS performs periodic research to evaluate whether these measures are achieving their purpose or if adjustments are needed to EFH Conservation areas (PMFC 2012 and 2012a).</p>		
d	Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs			

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.		
	Guide post	There is qualitative evidence that the UoA complies with its management requirements to protect VMEs.	There is some quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is clear quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	Y	Y	Y
	Justification	Competent authorities have not established VME, but areas with potential as VME are protected. As stated under PI 2.4.1, this fishery is prohibited from fishing within established EFH areas that could be regarded as VMEs. There is clear quantitative evidence through OSP and WDFW enforcement reports that season and area restrictions on the fishery are complied with. These closed-area protection measures are afforded to these potential VME areas by all US west coast fisheries, including the pink shrimp fishery. Hence the SG100 level is reached.		
References		Federal Register, 2006a; NOAA, 2011b; PFMC, 2005; PFMC, 2005b; PFMC, 2005d; PFMC, 2005e; PFMC 2012; PFMC, 2012a		
OVERALL PERFORMANCE INDICATOR SCORE:				95
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.4.3 – Habitats information

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	<p>The types and distribution of the main habitats are broadly understood.</p> <p>OR</p> <p>If CSA is used to score PI 2.4.1 for the UoA:</p> <p>Qualitative information is adequate to estimate the types and distribution of the main habitats.</p>	<p>The nature, distribution and vulnerability of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA.</p> <p>OR</p> <p>If CSA is used to score PI 2.4.1 for the UoA:</p> <p>Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.</p>	<p>The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.</p>
	Met?	Y	Y	N
	Justification	<p>As noted in Hannah (1997 and 2010), the geographic stock area of shrimp varies from one year to the next, is generally known, and is monitored annually. Likewise, sediment and substrate type in these areas are also known and have been documented (Abramson, et al., 1981; Dahlstrom, 1970; NMFS, 2005a).</p> <p>The nature, distribution of all main habitat types in the fishery are known (Hannah, 1999). The Oregon shrimp trawl fishery occurs on the sedimentary shelf over soft sand and green mud substrate (NMFS, 2005a, Hannah 2010). Essential Fish Habitat (EFH) has been described for species covered under the PFMC Groundfish Plan (PFMC, 2005) and is reviewed every five years.</p> <p>Vulnerability in this context is to be interpreted as the combination of 1) the likelihood that the gear would encounter the habitat, and 2) the likelihood that the habitat would be altered if an encounter between the gear and habitat did occur. In addition to an understanding of the gear type used, as well as anecdotal information on the degree of impact of gear on bottom habitats, research was conducted by ODFW to quantify the degree of impact. Hannah et al., 2010 describe that the interaction with the sea floor is for the most part limited to the doors of the trawl, given the semi-pelagic nature of the gear. Hannah et al., 2010 also provided estimates of the area that may be trawled in any given year, and compared the degree of impact of this fishery with other trawl fisheries.</p> <p>Habitat use data is analyzed both by species and habitat to provide input into various components of characterization of fishing impacts. Descriptions of sensitivity levels and recovery time (years) for gear impact assessments have been described (PFMC, 2005b). Sensitivity of this habitat to trawls (including shrimp trawl) is rated at 1.2 on a scale of 0 to 3 (highest) Recovery time for trawls (including shrimp trawl) is generally estimated at 0.4 years (PFMC, 2005b).</p> <p>The NMFS and PFMC developed an environmental impact statement regarding Essential Fish Habitat (EFH) designation and minimization of adverse impacts to EFH (NMFS, 2005a). Habitat types off the coast of Oregon have been mapped</p>		

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.		
		(Bellman and Heppel, 2004). Data analysis has been completed to address habitat types has included spatial and temporal analysis of the distribution of habitat types, distribution of fish species, habitat use by fish, sensitivities of habitat to perturbations, and the dynamics of fishing effort (MRAG Americas, 2004; PFMC, 2005d).Hence The nature, distribution and vulnerability of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA and the SG80 is reached. However, as noted in PI 2.4.1, it can't be said that the distribution of ALL habitats are known throughout the range of the fishery, therefore the SG100 is not reached.		
b	Information adequacy for assessment of impacts			
	Guide post	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	The physical impacts of the gear on all habitats have been quantified fully.
	Met?	Y	Y	N
	Justifi cation	ODFW and WDFW maintain a fishermen's logbook system that documents location of the fishing effort (e.g. ODFW 2015). The NMFS Vessel Monitoring System (VMS) also tracks distribution of effort. That program is an enforcement tool used to monitor compliance with areas closed to fishing such as RCAs and other sensitive habitat areas. This information, as well as information collected on effort through the WCGOP can be used to understand the potential impacts in the areas of operation of the fishery, given the habitat distributions are known. The nature of the impacts of the fishery on habitat types has been described in Hannah et al., 2010. Because the spatial distribution of fishing effort is known from analysis of the logbook and VMS data, the extent, timing, and location of interaction can be deduced. Shrimp trawl grounds are mapped for years of high and low abundance (Hannah 2010). Data analysis that has been completed to address habitat types has included spatial and temporal analysis of the distribution of habitat types, distribution of fish species, habitat use by fish, sensitivities of habitat to perturbations, and the dynamics of fishing effort (PFMC, 2005d). Therefore, the SG80 is met. However, as before, there is not sufficient information to determine that the physical impacts of the gear on ALL habitat types have been fully quantified, therefore the SG100 is not met.		
c	Monitoring			
	Guide post		Adequate information continues to be collected	Changes in habitat distributions over time are measured.

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.		
			to detect any increase in risk to the main habitats.	
	Met?		Y	N
	Justification	The Pacific Fishery Management Council has established a two-phase process (see Council Operating Procedure 22) to consider proposals to modify groundfish essential fish habitat (EFH) (PFMC 2012). ODFW and WDFW continue to collect fishery logbook, fish ticket, and biological data, as well as interactive communication with fishers. In addition, the WCGOP continues annually at a coverage rate of 11-12%. This supplies information to detect changes in risk, meeting the SG80. Determination of habitat changes over time does not occur, thereby not reaching SG100.		
References		Abramson et al., 1981; Bellman and Heppel, 2004; Dahlstrom, 1970; Hannah, 1997; Hannah, 1999; Hannah, 2010; Hannah, 2012; Hannah et al., 2010; MRAG Americas, 2004; NMFS, 2005a; ODFW, 2008; ODFW, 2009; ODFW, 2010; PFMC 2012; PFMC, 2005b; PFMC, 2005d; Somers et al 2016b.		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.		
Scoring Issue		SG 60	SG 80	SG 100
a	Ecosystem status			
	Guide post	The UoA is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Y	Y	Y
	Justification	<p>According to the MSC, serious or irreversible harm in the ecosystem context should be interpreted in relation to the capacity of the ecosystem to deliver ecosystem services. Examples include trophic cascades, severely truncated size composition of the ecological community, gross changes in species diversity of the ecological community, or changes in genetic diversity of species caused by selective fishing.</p> <p>The fishery is highly unlikely to disrupt the key issues underlying ecosystem structure and function to a point where there would be a serious or irreversible harm, as shown in studies of the California Current Ecosystem (CCE) Integrated Ecosystem Assessment (IEA) (NOAA Fisheries 2014c) and Kaplan et al. (2012). The direct fishery impacts on shrimp predators in the ecosystem are very low due to the negligible bycatch. Ocean shrimp occupy a lower trophic level than the diverse ichthyofauna, which prey on shrimp. It is important to note that the current shrimp fleet operates in a small percentage of the total shrimp habitat (by both depth and area) at any one time along the coast. For example, there are high percentages (5 – 45%) of pink shrimp in the diets of rougheye rockfish, rosethorn rockfish, and Pacific ocean perch, but these species occur much deeper in rocky areas that do not overlap the shrimp fishing grounds (Buckley et al., 1999; Dufault, 2009). Pacific sanddab, Pacific whiting, arrowtooth flounder, sablefish, and other finfish species occupying the same areas as the shrimp fishery are known to be predators of pink shrimp, however the average proportion of pink shrimp is <10% generally of their overall diet, but may be higher depending on season, area, and life history stage (Dufault, 2009). Small, plankton-feeding pelagic fish can exert a major control on energy flows in productive ecosystems, and this has been termed “wasp-waist” control as those forage fish resources can affect trophic levels both downwards and upwards (i.e. a bottom-up control of top predators by small pelagic fishes, and top-down control of plankton) (Cury, et al., 2000). Examples are Pacific herring, anchovies, and sardines in the California Current upwelling system. Because the fishery does not capture such fishes, and pink shrimp are not in this category of forage species, their level of removal by the fishery is highly unlikely to seriously, let alone irreversibly, disrupt the key elements underlying ecosystem structure and function. Therefore, the risk of trophic cascade, caused by the depletion of predators, especially keystone predators, is not a concern in the fishery.</p> <p>Based on existing studies, there are no gross changes in the species biodiversity of the ecological community caused by the fishery. Fishery effects on habitat structure are limited and reversible (Hannah et al., 2010).</p> <p>There is evidence that the fishery under assessment is highly unlikely to disrupt key ecosystem structure and function.</p> <p>Fishery effects on habitat are limited and reversible (Hannah et al., 2010). Descriptions of sensitivity levels and recovery time (years) for gear impact assessments have been described (PFMC, 2005b). Sensitivity of this habitat to trawls (including shrimp trawl) is rated at 1.2 on a scale of 0 to 3 (highest) Recovery</p>		

PI 2.5.1		The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.	
		<p>time for trawls (including shrimp trawl) is generally estimated at 0.4 years (PFMC, 2005b).</p> <p>Relative to the scale and intensity of the fishery on the crucial ecosystem elements described above, their resilience and productivity are maintained. Because of the very low bycatch relative to current abundances of individual species, genetic diversity of non-shrimp species is highly unlikely to be significantly disrupted.</p> <p>The evidence provided above demonstrates that the fishery does not cause serious or irreversible harm to the ecosystem structure and function, thereby meeting the SG100.</p>	
References		Buckley et al., 1999; Cury, et al., 2000; Dufault, 2009; Hannah et al., 2010; PFMC, 2005; PFMC, 2005b; Rexstad and Pikitch, 1986, NOAA fisheries 2014c; Kaplan et. al. 2012	
OVERALL PERFORMANCE INDICATOR SCORE:			100
CONDITION NUMBER (if relevant):			

Evaluation Table for PI 2.5.2 – Ecosystem management strategy

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary which take into account the potential impacts of the fishery on key elements of the ecosystem.	There is a partial strategy in place, if necessary, which takes into account available information and is expected to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a strategy that consists of a plan , in place which contains measures to address all main impacts of the UoA on the ecosystem, and at least some of these measures are in place.
	Met?	Y	Y	Y
	Justification	<p>The PFMC developed a draft pink shrimp plan, which the 3 coastal states use as a guide for individual state management strategies, and both ODFW and WDFW have drafted FMPs for shrimp management in their states. Although the state FMPs have not been formally adopted yet, they are already being followed by the fishery. ODFW and WDFW implement state and federal management strategies by regulation in managing the trawl fishery for pink shrimp.</p> <p>ODFW and WDFW have implemented fishing gear measures such as BRDs and LED light arrays to reduce bycatch of other species in the food chain (Pacific whiting, rockfishes, and eulachon), and net footropes that glide over the substrate to minimize benthic structure impacts. Federal regulations exist, which established EFH prohibited areas and Rockfish Conservation Areas (RCAs), and Marine Protected Areas (MPAs) where shrimp trawling is prohibited (NOAA, 2011b, PFMC. 2012a), which reduces impacts to habitat structure, minimizes take of sensitive species in the ecosystem, and maintain biological productivity for prey organisms. By law, ODFW and WDFW operate a logbook system, which provides location of fishing; and monitors landings; and the WCGOP records bycatch in the fishery.</p> <p>Fishing seasons and shrimp size restrictions allow predators to feed on shrimp in time and space without competition from the fishery. The WCGOP records bycatch in the fishery. The partial strategy also calls for enforcement of regulations related to protecting the ecosystem.</p> <p>Information on fishing location and bycatch is available from the logbook system, landing records, and observations generated from the WCGOP. The information is used by state and federal managers to restrain impacts of the fishery on the ecosystem. The strategy takes into account results of ODFW studies on effects of fishing on benthic habitats (Jones et al, 2010).</p> <p>The west coast shrimp trawl fishery occurs on the sedimentary shelf over soft sand and mud substrate. Sensitivity of this habitat to trawls (including shrimp trawl) is rated at 1.2 on a scale of 0 to 3 (highest). Recovery time for trawls (including shrimp trawl) is generally estimated at 0.4 years (PFMC, 2005b). The fishery would not normally occur in RCAs because the substrate would tear the nets. While the information generated from measures summarized above may exist primarily to manage the impact on target species or other components, it is recognized they also have the capacity to achieve ecosystem outcomes related to habitat structure through restraint on impacts.</p> <p>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</p>		

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.		
		<p>California Current Ecosystem (CCE).” This document contains a wealth of information on characteristics of the CCE where the pink shrimp fishery occurs and the types of impacts fisheries and other anthropogenic activities have on ecosystem dynamics and marine habitat. 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.” Some measures in place (e.g. development and enforcement of RCAs, EFH Conservation Areas, and shrimp trawl seasons and ecosystem impact reduction devices) support the policies of the FEP, and work continues to improve protection as necessary.</p> <p>This can be considered as a formal plan containing measures to identify and address all main impacts of the fishery on the ecosystem. Therefore the SG100 is met for this PI.</p>		
b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or ecosystem involved
	Met?	Y	Y	Y
	Justifi cation	<p>Sensitive ecosystem elements are protected when fishing is restricted in those areas. Fishers are prohibited from and willingly avoid sensitive areas of corals and rocky bottoms. Required BRDs and widespread use of LED lights (soon to be required) reduce bycatch to less than 3% (lowest of any net fishery in the region).</p> <p>The shrimp trawl fishery has relatively low impact on the type of grounds fished. Enforcement of closures of the RCAs and EFH areas to shrimp fisheries preclude impact to these sensitive areas.</p> <p>OR and WA laws prohibit landing of small shrimp and prohibited species, and impose incidental landing limits on selected groundfish species. Sensitive ecosystem elements are protected when fishing is restricted in those areas. Fishers are prohibited from sensitive areas of corals and rocky bottoms. The measures are considered likely to work because they are enforced, and results of enforcement show very high compliance. Thus it can be concluded that testing supports high confidence that the partial strategy is working based on information directly about the UoA and ecosystem involved and the SG100 is met.</p>		
c	Management strategy implementation			
	Guide post		There is some evidence that the measures/partial strategy is being implemented successfully .	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a) .
	Met?		Y	Y
	Justifi cation	<p>Oregon State Police and WDFW enforcement records show very few violations associated with the fishery. The majority of fishers willingly work with state biologists and managers to develop and maintain a clean fishery. This constitutes clear evidence that the partial strategy is being implemented successfully and is achieving its objective, thus the SG100 is met.</p>		

PI 2.5.2	There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.	
References	NOAA, 2011b; PFMC, 2012a; Jones et al., 2010, Somers et al 2016, PFMC 2013.	
OVERALL PERFORMANCE INDICATOR SCORE:		100
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	Information is adequate to identify the key elements of the ecosystem.	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Y	Y	
	Justification	Information is adequate to broadly understand the key issues as provided in studies of the Ecosystem (CCE—the ‘element’ per MSC parlance) Integrated Ecosystem Assessment (IEA) (NOAA Fisheries 2014b) and Kaplan <i>et al.</i> (2012). Formulations and parameterization have been developed for the biology and physics of the Central California Atlantis Model (CCAM) (Horn et al., 2010). This is a robust simulation of the California Current ecosystem that will allow exploration of potential effects of natural and human-induced perturbations over a range of spatial and temporal scales. Main food webs have been characterized (Buckley et al. 1999; Dufault, et al. 2009). Physical and biological characteristics of the California Current ecosystem, where the pink shrimp trawl fishery, operates are summarized in great detail in several comprehensive documents (PFMC and NMFS, 2010; PFMC 2008). Fields (2004) and Fields et al, (2006) have provided broad understanding of key issues of the California Current ecosystem. Additional information is available in Buckley et al., (1999) and Dufault, (2009). Biodiversity of benthic organisms play a critical role in determining groundfish habitat use and preference. Structure forming invertebrates, for example, such as sponges, anemones and cold water corals, can be an important and component of fish habitat. The EFH model uses information on habitat preferences of species and life stages in the Groundfish FMP for three habitat characteristics; benthic habitat (including biogenic habitat), depth and latitude, to support the development of alternatives for identifying EFH. GIS data has been compiled for several essential biological habitat components, including benthic invertebrates. Data on the presence of sponges, anemones, and cold water corals (including gorgonians, black corals, and sea pens) are available from the NOAA Fisheries bottom trawl surveys on the West Coast shelf and slope (Keller et al 2017). Hence, the SG80 is met for this scoring issue.		
b	Investigation of UoA impacts			
	Guide post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and some have been investigated in detail.	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and have been investigated in detail.
	Met?	Y	Y	Y
	Justification	Hannah et al. 2010 studied biophysical impacts. Surveys with a remotely operated vehicle (ROV) at four mud-habitat sites off Oregon with different histories of shrimp trawling showed measurable effects of trawling on macroinvertebrate abundance and diversity. Densities of the sea whip (<i>Halipteris</i> spp.), the flat mud star (<i>Luidia foliolata</i>), unidentified Asteroidea, and squat lobsters (unidentified Galathoidea) were lower at heavily trawled (HT) sites, as was invertebrate diversity. Sea cucumbers (unidentified Holothuroidea) and unidentified corals (Hydrocoralia) were observed at lightly trawled (LT) sites but not at HT sites. Hagfish (<i>Eptatretus</i> spp.) burrows were the dominant structural feature of the sediment surface at all sites and were more abundant at the HT sites, a result potentially related to effects from fishery discards.		

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem.	
		<p>Habitats that experience considerable natural disturbance (e.g. sand and gravels) and sustain communities that are somewhat adapted to disturbance, typically exhibit less damage and faster recovery times than do habitats that experience little natural disturbance (e.g. hard substrates) (PFMC 2005a, 2005b and 2005c). Where fishing activity has been on-going for many years (such as with the shrimp trawl fishery), and where there are no indications of system failures, it is possible to deduce that the level of damage is below a critical threshold, but there may still be limited knowledge regarding the potential to recover. Local studies on the distribution of effort and impacts support this perspective as can be seen in the studies by Hannah (2003), Hixon & Tissot (2007) and Hannah et al. (2010).</p> <p>The main interactions between the fishery and these ecosystem elements (e.g. biological: fish, benthos, and plankton; and physical: bottom substrate, currents, oxygen concentration, temperature, salinity, etc.) can be inferred from existing information (PFMC 2005a; 2005b; and 2005c), and have been investigated (Hannah et al. 2010; Hannah, 2003; Hixon & Tissot, 2007; MRAG Americas, 2004).</p> <p>Several large scale ecosystem studies for the California to Washington coast have been conducted, either model-based or using modeling as a key tool. NOAA has initiated an on-going study, the California Current Integrated Ecosystem Assessment (CCIEA) (Burner, 2010), which is producing outputs that better define the understanding of the California Current system and inputs to the approach that the PFMC is developing to manage the fisheries in a more holistic way (Brand et al., 2008; NOAA, 2011c; NOAA 2011d). A key aspect of these studies is large scale modeling using the Atlantis model, which permits many different aspects of the ecosystem to be explored, including various socio-economic aspects that have been omitted from studies elsewhere (Horne et al. 2010). Therefore, it is clear that main impacts of the UoA on ecosystem elements can be inferred based on existing information and have been investigated in detail. Hence the SG100 is met.</p>	
c	Understanding of component functions		
	Guide post	The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are known .	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are understood .
	Met?	Y	Y
	Justification	<p>There is generally good, but not comprehensive information about the key trophic relationships of this ecosystem. There have been a number of studies examining trophic relationships within this ecosystem, with one focused specifically on depleted fish species and interactions with predators (Brand et al., 2008; Harvey et al., 2008; Horne et al., 2010).</p> <p>Much is known about the ETP species in the ecosystem, but the most relevant information to the shrimp fishery is about eulachon, which is an important marine forage fish and component of riverine ecology (BRT 2008).</p> <p>Habitats have been described by Hannah (2003), Hixon & Tissot (2007) and Hannah et al. (2010). The broader physical aspects of ecosystem function are supported by a number of initiatives. An example is the multi-disciplinary Pacific Coast Ocean Observing System (PACOOS), which is “Providing ocean information for the sustained use of the California Current Large Marine Ecosystem under a changing climate”. This initiative publishes online quarterly reports detailing aspects of biotic and physical (oxygen concentration, temperature, salinity, etc.) as well as climate scale issues (ENSO, upwelling indices) http://www.pacoos.org/.</p>	

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem.	
		<p>Other physical studies of the ecosystem and it's functional state have been conducted and are highly pertinent, including, for example, a study of ocean acidification in the California Current system (Hauri, et al., 2009). Biological habitat components of the ecosystem are modeled in Essential Fish Habitat EIS (MRAG Americas, 2004). Studies if these types are enabling initial understanding of the vulnerability and robustness of organisms, communities and eventually ecosystems to specific and large scale perturbation to better understood.</p> <p>Retained and bycatch catches are estimated by federal, on-board fishery observers, and information is considered by stock assessment used to manage the target, bycatch and most ETP species. The effects of the fishery on eulachon have been identified and there is an increasing understanding of the impact of the pink shrimp fishery on eulachon. Therefore, the SG100 is met, because impacts of the UoA have been identified, and the main functions of these components of the ecosystem are understood.</p>	
d	Information relevance		
	Guide post	Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?	Y	Y
	Justifi cation	Adequate information is available (see above citations, as well as Hannah 2010, and Hannah et al. 2015) on the impacts of the UoA on the components and elements of the ecosystem to allow the main consequences for the ecosystem to be inferred. More generally, trawl fishery effects on biological components of the ecosystem are modeled in the Essential Fish Habitat EIS. Hence the SG100 is met.	
e	Monitoring		
	Guide post	Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?	Y	Y
	Justifi cation	<p>OR and WA monitoring of the fishery, bycatch reduction studies, and investigation of trawl effects on substrate and continuing and provide sufficient data to detect changes in risk levels.</p> <p>Development of strategies for management of ecosystem impacts is ongoing. It is clear that the real and potential impacts of the fishery on the ecosystem are taken seriously, that appropriate research is being developed and funded, and that the research outputs are taken into account in the consideration of management actions (Burner 2012, Fields, 2004; Fields et al, 2006; Horn, et al. 2010; and Levin and Wells, 2011). While knowledge of the ecosystem is far from complete, all required elements are in place to permit an adequate assessment of the overall impact of the fishery on key aspects of ecosystem function, especially when this is done considering approaches used elsewhere, where the background knowledge may be more advanced.</p> <p>Information from and that being developed by application of the groundfish EFH model to fishing effects on benthic components of the ecosystem, reviewed every five years, provides information that can also be used to make inferences of the main consequences on the ecosystem from the shrimp trawl fishery. An example is</p>	

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem.	
		the measurement of the large reduction in trawl fishing effort on rocky grounds when roller gear was prohibited on such grounds.	
References		Brand et al., 2008; Buckley et al., 1999; Burner, 2010, 2012; Dufault, 2009; Fields, 2004; Fields et al, 2006; Hannah, 2003; Hannah et al., 2010; Harvey et al., 2008; Hauri et al., 2009; Hixon & Tissot, 2007; Horn, et al. 2010; Levin and Wells, 2011; MRAG Americas 2004; NOAA 2011c; NOAA 2011 d; PFMC 2005a; 2005b; and 2005c; PFMC and NMFS 2010; PFMC 2008. Keller, et al 2017.	
OVERALL PERFORMANCE INDICATOR SCORE:			100
CONDITION NUMBER (if relevant):			

Principle 3 Evaluation Tables – Oregon

Evaluation Table for PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: <ul style="list-style-type: none"> Is capable of delivering sustainability in the UoA(s); and Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and Incorporates an appropriate dispute resolution framework. 		
Scoring Issue		SG 60	SG 80	SG 100
a	Compatibility of laws or standards with effective management			
	Guide post	There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and binding procedures governing cooperation with other parties which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	<p>At the state level, the management system operates within state laws and administrative rules. Oregon fishery management decisions are made by the Oregon Fish and Wildlife Commission (OFWC) and implemented through the Oregon Department of Fish and Wildlife (ODFW). The OFWC formulates fishery management policies and sets fishing seasons and other regulations to determine who may fish for pink shrimp, when they may fish and how they may fish. Some regulations, such as the maximum count per pound, are set in statute. Ultimate approval authority rests with governor. The OFWC and ODFW operate within a framework of state laws, ORS chapters 496 through 513. All Oregon state agencies are guided by a system of Oregon Administrative Rules (OARs) that set out general standards and procedures as well as fishery-specific rules. The OARs pertaining to ODFW are contained in chapter 635. The Oregon Trawl Commission (OTC) is a state agency and operates under the umbrella mandate of the Oregon Department of Agriculture Commodity Commissions Program (specifically OAR chapter 656; OAR 2012f). In addition, all state entities adhere to the Public Meetings Law which requires that all meetings of governing bodies covered by the law are open to the public, that the public be given notice of the time and place of meetings, and that meetings be accessible to everyone (Open Oregon, 2017). Regulations are enforced by the ODFW and the Oregon State Police (OSP).</p> <p>At the national level, management of state fisheries takes place within and is coordinated with a larger framework of federal laws, through the interface with the regional fishery management council system. Federal fishery management is carried out under the authority of the federal Magnuson Stevens Fishery Conservation and Management Act (MSA), first passed in 1976 and most recently reauthorized in 2006 (MSA, 2007). It 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. In addition to the MSA, the PFMC adheres to a suite of “other applicable laws:” the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act (MBTA); the Administrative Procedure Act (APA), Paperwork Reduction Act (PRA); Regulatory Flexibility Act (RFA); Coastal Zone</p>		

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: <ul style="list-style-type: none">Is capable of delivering sustainability in the UoA(s); andObserves the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; andIncorporates an appropriate dispute resolution framework.		
		Management Act (CZMA): and other relevant U.S. laws, Executive Orders and regulations (MSA, 2007). The SG100 is met.		
b	Resolution of disputes			
	Guide post	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective .
	Met?	Y	Y	Y
	Justification	As described above under 3.1.1. SG 60a, the fishery is managed primarily under state statutes and administrative rules, in a fashion that respects domestic law. Federal rules apply to federally managed species that interact with the Oregon management system. For the pink shrimp fishery, these rules pertain primarily to bycatch of federally managed species or species protected under the ESA (ESA, 1973). Oregon enforcement is represented on the PFMC Enforcement Consultants committee, which includes representatives from state enforcement agencies in Washington, Oregon, and California, and the federal government (PFMC, 2017b). Coordination of state and federal laws is accomplished through this body. At the state level, the management system uses the ODFW and OSP Coordinated Enforcement Process (CEP) to coordinate between agencies and to set priorities. Enforcement priorities are reviewed annually under the CEP for all commercial fisheries, including the pink shrimp fishery (OSP, 2012b). Mechanisms for dispute resolution are transparent, and are both informal and formal: Informal mechanisms for both avoiding and resolving disputes are contained in the ongoing processes of communication and consultation between ODFW MRP staff and industry. Formal mechanisms for resolving disputes include: <ul style="list-style-type: none">Petition processes of the OFWC that allow issues to be brought for Commission decision (ODFW, 2017d).The Oregon Fishery Permit Review Board, which evaluates ODFW denials of limited entry permits and considers permit transfers (ORS 508.867, 1981).The tri-state coordination process administered by the Pacific States Marine Fisheries Commission (PSMFC) can be activated as needed to resolve shrimp fishery management issues or disputes among Washington, Oregon and California (Abramson et al., 1981; Hannah, 2012).The coordination mechanism of the PFMC to resolve any disputes between state and federal fisheries (PFMC, 2007; 2017d.).		

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: <ul style="list-style-type: none">• Is capable of delivering sustainability in the UoA(s); and• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and• Incorporates an appropriate dispute resolution framework.		
		The conditions for SG100 are met.		
c	Respect for rights			
	Guide post	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	Within Oregon, statute specifically exempts treaty rights of tribes from OFWC regulations (ORS 506.045, 1975). Oregon treaty tribes are Columbia River tribes and are not affected by the pink shrimp fishery. At the federal level, NMFS and management through the PFMC are both bound by Federal Executive Order 13175 (2000), which requires meaningful consultation and collaboration with Indian tribal governments. The sovereign status and co-manager role of Indian tribes over shared federal and tribal fishery resources is recognized. At the regional level, this role is reflected in a designated tribal seat on the Pacific Fishery Management Council (PFMC, 2017a). In sum, the management system operates under effective state and national legal systems, contains binding procedures governing cooperation with other parties and delivers management outcomes consistent with MSC Principles 1 and 2. It has transparent mechanisms that have been shown to be effective in resolving legal disputes. It formally commits to legal rights in a manner consistent with principles 1 and 2. A score of 100 is awarded.		
References		Abramson et al., 1981; E.O. 13175, 2000; ESA, 1973; Groth et al., 2017; Hannah, 2012; Hannah and Jones, 2014a; 2014b; 2015, 2016b, MSA, 2007; NMFS, 1997; OAR, 2012f; ODFW 2009, 2010, 2011, 2012, 2012d; ODFW, 1989, 2010a, 2010b, 2017d; Open Oregon, 2017; Oregon State Police Fish and Wildlife Division, 2012a, 2012b; OAR 2012f; ORS 496 – 513; ORS 506.036, 1965; ORS 506.045, 1975; ORS 506.129, 1975; ORS 508.867, 1981; OTC, 2011a, 2011b; PFMC, 2007, 2012a, 2012b, 2017d		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties.		
		The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guide post	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood .	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
	Met?	Y	Y	Y
	Justification	OFWC, ODFW, OTC, PFMC, and the state and federal enforcement entities of the Oregon State Police, US Coast Guard, and NMFS Enforcement are all explicitly identified, and roles defined, in statutes, administrative rules, and operating procedures. Open lines of communication between agencies and stakeholders promote widespread understanding of the roles and responsibilities of respective entities. Lines of authority and responsibility among the state and federal entities are clear, as are procedures for coordination among them (cf. OSP, 2012b). The functions, roles and responsibilities are well understood for all areas of responsibility and action. Evidence of understanding on the part of the fishing industry and other stakeholders is provided by various testimony to the OFWC, engagement of the OTC in state and federal processes, and, in the case of the shrimp fishery, good compliance rates of BRD adoption. This meets the SG100.		
b	Consultation processes			
	Guide post	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used .
	Met?	Y	Y	Y
	Justification	The management system regularly seeks and accepts relevant information through active consultation by PFMC and Oregon with the fleet and other stakeholders on the likely impact of regulations and on upcoming fishery-related issues. The system uses local knowledge through such mechanisms as regular feedback from the industry regarding conditions on the fishing grounds and cooperative research (Hannah, 2012; Hannah and Jones, 2013-2-16; Groth et al., 2017). Specifically, consultations include dockside interactions between the industry, ODFW biologists and OSP, stakeholder meetings at ODFW MRP offices, general availability of ODFW staff to public calls, publication of the ODFW annual newsletter (Hannah, 2012), OTC quarterly newsletter (OTC 2011a, 2011b), and OSP monthly		

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties.	
		The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties	
		<p>newsletter (OSP 2009, 2012), and public testimony at OFWC meetings (ODFW, 2017d).</p> <p>The frequency of these consultations varies by the particular process. OSP newsletters are monthly. OTC newsletters are quarterly. MRP shrimp reviews are annual with inter-annual supplements to address emerging issues. The OFWC meets monthly. Stakeholder meetings are issue-driven and informal stakeholder-MRP staff interactions are ongoing on a “drop-in” basis at the MRP offices.</p> <p>The management system demonstrates consideration of the information and provides explanations as to how it is or is not used through newsletters and through records of OFWC decisions (Hannah and Jones, 2013-2016; Groth et al., 2017). This meets the SG100.</p>	
c	Participation		
	Guide post		<p>The consultation process provides opportunity for all interested and affected parties to be involved.</p> <p>The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.</p>
	Met?		<p>Y</p> <p>Y</p>
	Justification	<p>The management system’s consultation processes provides opportunity, encouragement and facilitation of engagement of any interested party through a variety of mechanisms. These include dockside interactions between the industry, ODFW biologists and the OSP, stakeholder meetings at ODFW MRP offices, general availability of ODFW staff to public calls, publication of the ODFW annual newsletter (Hannah, 2012), OTC quarterly newsletter (OTC 2011a, 2011b), and OSP monthly newsletter (OSP 2010, 2016), and public testimony at OFWC meetings (ODFW, 2017d).</p> <p>Oregon’s Public Meetings Law ensures public notice and access to meetings (Open Oregon, 2017). ODFW routinely posts notices of public meetings about upcoming regulations on their website and at port offices (ODFW 2017e). Likewise, announcements of Oregon Fish and Wildlife Commission meetings are posted on the ODFW website well in advance, with full information about meeting agendas (ODFW, 2017c, 2017d).</p> <p>At the regional level, the PFMC process provides open and transparent distribution of information as well as opportunities for engagement of interested parties through committee membership and public testimony. ENGOs are routinely engaged in this process (PFMC, 2017c).</p> <p>Executive Order 13132 (1999) 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. Any final published rule must be accompanied by a “federalism summary impact statement” (NMFS, 1997; PFMC, 2011b).</p> <p>The Council process involves different types of consultations with member states through state agencies, Council appointees, advisory committee membership, and meetings. The process of state participation in the formulation of federal</p>	

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties
		<p>management measures encourages complementary approaches between federal and state approaches (PFMC, 2004; 2007). Consultations among state agency staff, industry stakeholders and ENGOs occurs informally through regular stakeholder meetings, interactions at the Pacific Fishery Management Council settings, interactions with congressional staff, and various other fora.</p> <p>In sum, the functions, roles and responsibilities are well understood for all areas of responsibility and action. The Oregon management system includes consultation processes that regularly seek and accept relevant information and the system provides explanations for how information is used.</p> <p>A score of 100 is awarded.</p>
References		Abramson et al. ,1981; E.O. 13172, 1999; E.O. 13175, 2000; Groth et al., 2017; Hannah, 2012; Hannah and Jones, 2013-2016; MSA, 2007; NMFS, 1997; ODFW, 2012b,, 2017d, 2017e; ORS 496, 1975; ORS 506.036, 1965; ORS 506.129, 1975 ; ORS 506.045, 1975; Open Oregon, 2012; OSP 2009, 2012b 2010, 2016; Oregon Trawl Commission, 2011a, 2011b; Pettinger, 2012-; PFMC, 2004, 2007, 2011b, 2017c.
OVERALL PERFORMANCE INDICATOR SCORE:		100
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC fisheries standard and the precautionary approach, are implicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach, are explicit within and required by management policy.
	Met?	Y	Y	Partial
	Justification	<p>The Oregon Food Fish Management Policy (ORS 506.109, 1975) lists seven management objectives (identified as goals in the statute) for Oregon food fish that guide management decision-making by the OFWC. The objectives are preceded by a general policy statement that food fish are to be managed to provide the optimum economic, commercial recreational and aesthetic benefits for present and future generations of citizens. The optimization over biological, economic and social objectives requires OFWC and ODFW to take a precautionary approach under conditions of uncertainty or in the absence of adequate scientific information. Examples of precautionary actions that OFWC and ODFW have taken include the implementation of maximum count per pounds to protect small shrimp, timing of seasons to protect spawning, and implementation of BRD's.</p> <p>The objectives may be paraphrased as:</p> <ol style="list-style-type: none"> (1) To maintain all species of food fish at optimum levels (2) To optimize the production, utilization and public enjoyment of food fish. (3) To permit an optimum and equitable utilization of available food fish. (4) To maintain public access to food fish resources (5) To regulate food fish to provide optimum commercial and recreational benefits. (6) To preserve the economic contribution of the sports and commercial fishing industries consistent with sound food fish management practices. (7) To optimize the return of Oregon food fish for Oregon's recreational and commercial fisheries. <p>In addition, the Oregon fishery management system is guided by Statewide Planning Goal 19 on Ocean Resources (State of Oregon, 1973), which is "To conserve marine resources and ecological functions for the purpose of providing long-term ecological, economic, and social value and benefits to future generations." This general goal is supplemented by implementation requirements pertaining to the use, management and protection of renewable marine resources. Complementing Goal 19 is the Governor's Executive order 08-07 which directs state agencies to protect coastal communities in locating marine reserves and wave energy sites, as well as subsequent state legislation establishing set of pilot marine reserves (State of Oregon 1973, 2008).</p> <p>The objectives of Oregon's Food Fish Management Policy (ORS 506.019, 1975) are explicit overarching long-term objectives for Oregon's fisheries that guide OFWC decision-making. However, to take the form of requirements, these policy objectives would need to be expressed in the form of fishery management plans (FMPs) that included accountability measures related to those objectives.</p>		

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.
		<p>The OARs provide the legally enforceable elements of fish management plans. Although state FMPs do exist for a number of Oregon fisheries, pink shrimp is not yet managed through a FMP (OAR, 2017a). As such, it is not possible for the fishery to meet the second component of the scoring issue which states that clear long term objectives are ‘required’ by the management policy.</p> <p>In 2014 ODFW developed a draft FMP that has completed internal ODFW review and is now out for public comment (Hannah and Jones 2016a). The FMP comprises three major sections, each with several subsections:.The draft FMP contains both short-term and long-term fishery management objectives. The fishery is being managed according to the framework of the plan. The submission of the FMP for approval by the OFWC was delayed until a full round of LED gear experiments was completed in 2017. ODFW staff will present the FMP to the Commission at its November 2017 meeting to request adoption (Groth, 2017; Groth et al. 2017).</p> <p>The criterion of clear long-term objectives for management will be met once the FMP is adopted.</p> <p>Although the ODFW coordinates management with the PFMC, as a state-managed fishery it does not explicitly referece MSA objectives or National Standards. The fishery has been managed according to the objectives contained in the Food Fish Management Policy. Once the FMP is adopted by the OFWC in November it will be managed according to the objectives stated in the FMP. This is already taking place in practice.</p> <p>As per Section CR 27.10.63, partial scoring of this PI is permitted as there is only a single scoring issue at each SG level. Therefore, since that the first part of the scoring issue is met, in that clear longer term objectives that guide decision-making, consistent with MSC P&C and the precautionary approach, as discussed in SG80a, a partial score of 90 is awarded.</p>
References		OAR, 2017a; ORS 506.109, 1975; ORS 506.036, 1965; OSP 2010. 2016; ODFW, 2006, 2017d; State of Oregon 1973, 2008
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 3.2.1 Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Objectives , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery-specific management system.	Short and long-term objectives , which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system.	Well defined and measurable short and long-term objectives , which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system.
	Met?	Y	Y	N
	Justification	<p>Objectives for all Oregon food fish fisheries are stated in the Oregon Food Fish Management Policy (ORS 506.109, 1975). During the site review ODFW MRP staff also articulated implicit objectives under which the pink shrimp fishery is managed: to prevent recruitment overfishing and maximize economic yield.</p> <p>In addition, the draft shrimp FMP (Abramson et al., 1981) has provided implicit management objectives to the Oregon shrimp fishery, as do the National Standard Guidelines under which federal FMPs are structured (Hannah, 2012; NMFS 2005). Actions taken proactively to by the MRP in coordination with the fleet to develop BRDs and experiment with LEDs also reflect implicit objectives on bycatch and ETP species.</p> <p>Prior to 2014 the pink shrimp fishery had been managed under the umbrella objectives for all Oregon food fish (ORS 506.109, 1975). In 2014 ODFW developed a draft FMP containing fishery-specific management objectives. The FMP has completed internal ODFW review and is out for public comment (Hannah and Jones 2016a). The FMP comprises three major sections, each with several subsections:</p> <p>1. Resource Analysis (with sections on species, descriptions of the shrimp resource, available data, stock status, known threats to the resource, sustainable harvest levels, prioritized list of research needs); 2. Harvest Management Strategy (with sections on species, management objectives, current issues, description of the fishery, other social and/or cultural uses of the resource, biological reference points and fishery controls); 3. Glossary of Terms and Literature Cited.</p> <p>The draft FMP contains both short-term and long-term fishery management objectives. The fishery is being managed according to the framework of the plan, so objectives are now explicit within the system. ODFW staff will present the FMP to the Commission at its November 2017 meeting to request adoption (Groth, 2017; Groth et al. 2017).</p> <p>In sum, short and long-term objectives consistent with principles 1 and 2 are explicit within the management system, and so the criterion for SG80 is met. However, until the FMP is formally adopted and required, a score of 100 is not justified.</p> <p>A score of 80 is awarded.</p>		
References		Abramson et al., 198; Groth, 2017; Groth et al., 2017; Hannah and Jones, 2016c; Hannah, 2012; NMFS, 2005; ORS 506.109, 1975.		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.2 – Decision-making processes

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Y	Y	
	Justification	Established decision-making processes are followed by the OFWC as outlined in law (ORS 506.036, 1965). These processes result in management measures and strategies that meet the objectives specified by the Food Fish Management Policy (ORS 506.109, 1975). These processes are stable.		
b	Responsiveness of decision-making processes			
	Guide post	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important 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.	Decision-making processes 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.
	Met?	Y	Y	Y
	Justification	<p>Decision-making processes have covered a wide range of issues and demonstrate responsiveness to all shrimp fishery issues identified through research, monitoring, evaluation and stakeholder consultation. A good example of decision response to all of these elements is the design, development and testing of the BRD in collaboration with industry members and in response to an identified need to reduce bycatch of finfish species. The transparency, timeliness and adaptive manner of decision response is demonstrated through the ODFW Annual Pink Shrimp Review, which in both its annual edition and a supplemental edition identified upcoming potential issues with eulachon in anticipation of its listing under ESA, and the need to take proactive action (Hannah and Jones, 2013-2016; Groth et al., 2017)).</p> <p>Annual planning meetings between enforcement and ODFW, as well as intra-season updates, establish enforcement priorities in anticipation of likely areas needing enforcement attention, and adapt to in-season enforcement issues as they emerge (OSP 2009; 2010; 2012b).</p> <p>The ongoing process of active coordination and consultation with industry in identifying issues, monitoring compliance, and conducting cooperative research also contributes to decision processes that are responsive, transparent and adaptive (ODFW, 2017e; Groth et al., 2017). Coordination and consultation between the state and federal processes, conducted through the PFMC process, promotes the consideration of the implication of pink shrimp fishery management decisions on other fisheries and ecosystem issues, for example the rebuilding of rockfish stocks and the protection of ESA listed species.</p>		
		Use of precautionary approach		

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
c	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Y	
	Justification	Decision processes employed by the Oregon Legislature (in establishing law and policy) and the OFWC (in implementing policy) exhibit a precautionary approach to pink shrimp management and a basis in best available scientific information. The regulations establishing maximum count per pound and closed seasons were implemented to minimize effort on small shrimp and prevent fishing on spawning aggregations (OAR, 2017c; 2017d). Adoption of the BRD requirement was a precautionary approach to minimize bycatch of rebuilding groundfish stocks. Further strengthening of the BRD specifications was a proactive and precautionary approach to minimizing all bycatch, including eulachon, recently listed as threatened under the ESA (OAR, 2017d; Hannah and Jones, 2012). The assessment made evident that groups and organizations involved in the fishery are conducting ongoing research with respect to both the target species and P2 species and impacts; experiments with LED lights on gear to reduce bycatch of eulachon are a good example. It is clear that management decision processes in the Oregon pink shrimp fishery consider all available information, including new and emerging research results, resulting in a score of SG80.		
d	Accountability and transparency of management system and decision-making process			
	Guide post	Some information on the fishery's performance and management action is generally available on request to stakeholders.	Information on the fishery's performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	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.
	Met?	Y	Y	Y
	Justification	Formal reporting to all interested stakeholders is provided through a number of avenues. The ODFW Annual Pink Shrimp Review provides annual summaries of fishery performance, describes research results, and identifies upcoming issues affecting the fishery (Hannah and Jones, 2013-2016; Groth et al., 2017). OFWC minutes describe Commission deliberations on various issues, the nature of scientific advice and public comment, and decision outcomes (ODFW, 2017c, 2017d). Oregon State Police monthly Field Reviews inform fishery stakeholders of existing and emerging compliance and enforcement issues (cf. OSP, 2016, 2017.) Oregon Trawl Commission quarterly newsletters provide fisheries updates and identify economic and regulatory issues (cf. OTC, 2011a, 2011b, 2017c). The PFMC newsletters describe actions taken at Council meetings, committee openings and meeting schedules, and upcoming issues (PFMC, 2017d). The		

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
		Federal Register provides notice of all proposed federal actions (cf. Federal Register 2017). The conditions for SG100 are met.		
e	Approach to disputes			
	Guide post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	Y	Y	Y
	Justification	There are no existing or previous court challenges to the fishery nor is there evidence of regulatory noncompliance that could threaten the sustainability of the fishery. According to information provided by ODFW staff, the Oregon fishery management system is not operating under binding legal decisions arising from legal challenges (Groth, 2017). No legal challenges have been made to Oregon pink shrimp fishery regulations. Similarly, the PFMC has no existing or previous court challenges related to the fishery nor is there evidence of regulatory noncompliance in other fisheries that could threaten the sustainability of the fishery. In sum, the Oregon pink shrimp fishery is managed under established and transparent decision processes. These processes respond to all issues in a timely manner, are based on best available information and use a precautionary approach. Decision-making processes are responsive to all issues identified through research, monitoring, evaluation and consultation. Comprehensive information on management actions and fishery performance is provided to stakeholders, and through its extensive consultation the system acts proactively to avoid legal disputes. The criteria for all elements of SG100 are met and a score of 100 is awarded.		
References		Groth, 2017; Groth et al., 2017; Hannah and Jones, 2013-2016; OAR, 2017a, 2017c, 2017d; ODFW, 2017c, 2017d, 2017e; ORS 506.036, 1965; ORS 506.109, 1975; ORS 506.129, 1975;; OSP, 2016, 2017; OTC, 2011a, 2011b, 2017c; PFMC 2017d; Federal Register, 2017		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guide post	Monitoring, control and surveillance mechanisms exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Y	Y	Y
	Justification	<p>Harvest control rules (seasons, maximum counts per pound and bycatch reduction devices) are clear and enforceable. A comprehensive system of monitoring, control and surveillance is in place, involving the Oregon Department of Fish and Wildlife, NMFS West Coast Groundfish Observer Program, Oregon State Police and US Coast Guard. The Oregon Department of Fish and Wildlife conducts port sampling of catch and actively monitors CPUE, and size composition of the catch. The Groundfish Observer Program has a coverage target of 20% of pink shrimp trips and monitors the biological parameters of the total catch (NWFSC, 2010; Golden Marine Consulting, 2017). The Oregon State Police conducts random dockside catch samples to check for compliance with count per pound regulations and does pre-season checks of bycatch reduction devices to ensure compliance with spacing requirements. Compliance with the count-per-pound regulation is reinforced by market preferences for larger shrimp. At-sea compliance with regulations (seasons, closed areas, licenses) is conducted by the US Coast Guard by vessel patrol. While fishing in the federal EEZ (3-200 miles offshore) vessels are also subject to federal rules and sanctions enforced by the US Coast Guard and the NMFS Office of Law Enforcement, such as the requirement (since 2008) that pink shrimp vessels be equipped with VMS (cf. ODFW, 2008; NMFS 2014a, 2014b, 2017a, 2017b).</p> <p>At the state level, the management system uses the ODFW and OSP Coordinated Enforcement Process (CEP) to coordinate between agencies and to set priorities. Enforcement priorities are reviewed annually under the CEP for all commercial fisheries including the pink shrimp fishery (OSP FWD, 2017b).</p> <p>In 2015 the Oregon State Police formed a Marine Fisheries Team to better coordinate fisheries and habitat enforcement along the Oregon coast. The Team, based in Newport and also working out of offices in Astoria, Tillamook, Florence and Coos Bay, consists of eight Fish and Wildlife troopers (OSP FWD, 2017a). The Team works closely with the ODFW MRP to enforce Oregon's commercial and sport fishing regulations through patrols of state waters and docks (OSP, 2017a). For example, in late 2015 ODFW conducted team training in various aspects of count sampling and determination in anticipation of potential count problems in 2016 (Groth et al., 2017).</p> <p>In addition, ODFW emphasizes an informational consultative approach to new regulations by working with industry to develop workable approaches to compliance, for example in the design development of the bycatch reduction device, and by advance notice to industry of upcoming regulation changes and enforcement issues through the Annual Pink Shrimp Review. The management philosophy of both ODFW and the OSP is to promote compliance through education and cooperation and minimize the occurrence of non-compliance.</p>		

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
		The comprehensive system has demonstrated a consistent ability to enforce management regulations. No count-per-pound issues occurred during the 2016 season (Thompson, 2017). The conditions for SG100 are met.		
b	Sanctions			
	Guide post	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	Y	Y	Y
	Justification	Sanctions for non-compliance exist, defined in law and enforced through at-sea and dockside monitoring. Oregon State Police issue tickets for non-compliance. Fines typically range between \$500 and \$1000. All commercial fishery citations are reported as misdemeanors, but if there are multiple convictions, further violations may be upgraded to a felony (Thompson, 2012). Effectiveness of sanctions is evidenced by the high rate of compliance. The Oregon State Police provides information on compliance and enforcement to the ODFW. Effectiveness of sanctions is evidenced by the high rate of compliance. For example, there have been few reported violations in the pink shrimp fishery since 2012 (Thompson, 2012; 2017; Hannah and Jones, 2012; Groth et al., 2017). In 2016 there was a single violation of the count-per-pound regulation; between 2012 and 2015 there were none. No violations of the BRD regulation were reported in the period 2012-2016; Season openings are fully enforceable (ODFW, 2012; Thompson, 2012). In 2016, one fisher was cited by the OSP for wanton waste of commercial food fish after landing 30k lbs. of spoiled shrimp (OSP, 2016). The harvester was subsequently tried, convicted and fined \$500 (Groth et al., 2017). The conditions for SG100 are met.		
c	Compliance			
	Guide post	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Y	Y	Y
	Justification	The Oregon State Police provides information on compliance and enforcement to the ODFW. There have been few reported violations in the pink shrimp fishery since 2012 (Thompson, 2012; 2017; Hannah and Jones, 2012; Groth et al., 2017). In 2016 there was a single violation of the count-per-pound regulation ; between 2012 and 2015 there were none. No violations of the BRD regulation were reported in the period 2012-2016; Season openings are fully enforceable (ODFW, 2012; Thompson, 2012). In 2016, one fisher was cited by the OSP for wanton waste of commercial food fish after landing 30k lbs of spoiled shrimp (OSP, 2016). The harvester was subsequently tried, convicted and fined \$500 (Groth et al., 2017). The high compliance rates can be attributed to the emphasis on prevention, an educational approach to informing about regulations, the collaborations with industry in developing gear design that achieves regulatory goals, control rules that		

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.	
		<p>are clear and enforceable and a coordinated monitoring and enforcement infrastructure (Hannah, 2012; Groth, 2017).</p> <p>There are several examples of tests within the shrimp fishery showing the effectiveness of this approach, including:</p> <p>The use of the annual (ODFW) and quarterly (OTC) newsletters to inform industry about upcoming changes in regulations and to avoid disputes. As an example, the subject of first ODFW newsletter was to inform industry about completed research on count per pound and to provide advance notice on the types of regulation to expect (ODFW, 1989). While the count per pound regulations was initially controversial, the Commission adopted the regulation with industry backing.</p> <p>Communication between port biologists, ODFW, and the OTC about the use of BRDs was actively directed at informing industry of the utility of reducing bycatch and the avoidance of conflict over the adoption of BRDs (ODFW 2010a, 2010b; OTC 2011a, 2011b). By the time a BRD regulation came before the OFWC no industry members testified against it.</p> <p>A recent example of the use of consultation in the pink shrimp management system is the use of the 2017 Annual Pink Shrimp Review to update the fleet on the latest research into the effectiveness of using LED lights to reduce bycatch of eulachon, Between 2013-2017 experiments with LED lights to reduce eulachon bycatch were conducted through an active agency-industry consultative process. Throughout that time period the Annual Pink Shrimp Review was used extensively as a tool for the communication of experimental results (Hannah and Jones, 2014a; 2014b; 2015, 2016b; Groth et al., 2017) and for preparing the industry for the eventual adoption of LED regulations.</p> <p>Additionally, in 2017 the Review was used to request stakeholder feedback on the newly developed shrimp fishery management plan (Groth et al., 2017) in advance of the FMP's being presented to the OFWC for adoption later in 2017.</p> <p>In sum, there is a high degree of confidence that fishers comply with the management system and provide information of importance to management. The conditions for SG100 are met.</p>	
d	Systematic non-compliance		
	Guide post		There is no evidence of systematic non-compliance.
	Met?		Y
	Justification	<p>As described in 100b, compliance is good and there is no evidence of systematic non-compliance.</p> <p>In sum, there is a high degree of confidence that fishers comply with the management system, and the collaborative nature of the interaction among industry, ODFW and OSP encourages the industry to provide information of importance to the effective management of the fishery. There is evidence of good compliance in the shrimp fishery and no evidence of systematic non-compliance; therefore existing sanctions are demonstrably effective.</p> <p>A score of 100 is awarded.</p>	
References		Golden Marine Consulting, 2017; Groth, 2017; Groth et al., 2017, Hannah, 2012; Hannah and Jones, 2012; NMFS 2014a, 2014b, 2017a, 2017b; NWFSC, 2010; OSP, 2009; OSP, 2010, 2016, 2017a, 2017b; ODFW, 2008, 2009, 2010, 2012; Thompson, 2012, 2017	
OVERALL PERFORMANCE INDICATOR SCORE:			100

PI 3.2.3	Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system.		
Scoring Issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate some parts of the fishery-specific management system.	There are mechanisms in place to evaluate key parts of the fishery-specific management system	There are mechanisms in place to evaluate all parts of the fishery-specific management system.
	Met?	Y	Y	Y
	Justification	Some components of management performance are evaluated annually and reported in the Annual Pink Shrimp Review under the following section heads: season summary, indicators for the upcoming season, issues updates, research results, regulatory changes and enforcement issues (Hannah and Jones, 2013-2016; Groth et al., 2017)). The fishery has in place to mechanisms to evaluate all meaningful aspects of the management system. Population indicators are monitored through at-sea sampling. Fishing location and effort are monitored through mandatory logbooks. Amount and size composition of landed catch is comprehensively monitored through dockside sampling and fish tickets. Bycatch is monitored and evaluated through the onboard observer program. Performance of BRDs – in terms of effectiveness of bycatch reduction as well as impact on fishing operations – is monitored through onboard observer reports and stakeholder feedback. The economic performance of the fishery is annually evaluated through discussions of shrimp process and effort in the Annual Pink Shrimp Review, and occasionally evaluated through analyses of economic impact of Oregon fisheries sponsored by the Oregon Coastal Zone Management Association (OCZMA, 2006). The primary mechanism for reporting evaluation results is the ODFW Annual Pink Shrimp Review (cf Hannah and Jones, 2013-2016; Groth et al., 2017).		
b	Internal and/or external review			
	Guide post	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
	Met?	Y	Y	Y
	Justification	The ODFW conducts annual post-season reviews of the Oregon pink shrimp trawl fishery, the results of which are presented in the Annual pink shrimp review. During the same time, ODFW will meet with OSP to discuss compliance and enforcement within the fleet and address any issues or concerns that were identified. In addition, throughout the season ODFW is involved in the continual monitoring of control rules, catch quantity, quality and size composition of catch, and bycatch. The pink shrimp fishery is subject to regular internal review, as described in SG80a above. ODFW staff conducts ongoing review of control rules by monitoring of CPUE, quantity, quality and size composition of catch, and bycatch. Research results are subject to external review through the peer reviewed journal process, in which ODFW staff are actively engaged (cf. Hannah and Jones, 2000;		

PI 3.2.4		<p>There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives.</p> <p>There is effective and timely review of the fishery-specific management system.</p>
		<p>Hannah and Jones, 2007; Hannah et al., 2010; Hannah et al., 2011; Hannah 2014, 2016; Hannah and Jones, 2014; 2015b).</p> <p>An external review of the management policy was performed as a condition of the 2007 certification (TAVEL Certification, Inc, 2007; Golden 2008). This was followed in 2016-2017 by a second external review conducted by Golden Marine Consulting. The review focused on six management components: stock assessment; fishery monitoring; enforcement compliance; research; organizational integrity/viability; regulatory action. The review was conducted through a literature search and interviews with decision makers, researchers, and stakeholders. The report of the management evaluation was presented to the assessment team at the 2017 Surveillance audit (Golden Marine Consulting, 2017).</p> <p>ODFW Marine Region management has committed to continuing these external reviews on a five-year schedule. Consequently the fishery is now subject to both regular internal and external reviews. Through the combination of internal and external reviews, mechanisms are in place to evaluate all parts of the management system.</p> <p>The criteria for SG100 have been met, in parts a and b and therefore a score of 100 is awarded.</p>
References		Golden, 2008; Golden Marine Consulting, 2017; Groth et al., 2017; Hannah, 2012; Hannah and Jones, 2000; Hannah and Jones, 2007; Hannah et al., 2010; Hannah et al., 2011; ODFW 2008, 2009, 2010, 2011, 2012; Oregon Coastal Zone Management Association, 2006; TAVEL Certification Inc., 2007.
OVERALL PERFORMANCE INDICATOR SCORE:		100
CONDITION NUMBER (if relevant):		

Principle 3 Evaluation Tables – Washington

Evaluation Table for PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: <ul style="list-style-type: none">• Is capable of delivering sustainability in the UoA(s); and• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and• Incorporates an appropriate dispute resolution framework.		
Scoring Issue		SG 60	SG 80	SG 100
a	Compatibility of laws or standards with effective management			
	Guide post	There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and binding procedures governing cooperation with other parties which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	<p>At the state level, the management system operates within state laws and the administrative code. Washington fishery management decisions are made by the Washington Fish and Wildlife Commission (WFWC) and implemented through the Washington Department of Fish and Wildlife (WDFW). The WFWC formulates fishery management policies and sets fishing seasons and other regulations to determine who may fish, when they may fish and how they may fish. Some regulations are set in statute. Ultimate approval authority rests with governor. The WFWC and WDFW operate within a framework of state laws under the Revised Code of Washington (RCW) Title 77. All Washington state executive branch agencies are guided by the Washington Administrative Code (WAC) that codifies regulations. set out general standards and procedures as well as fishery-specific rules. The WACs pertaining to WDFW are contained in Title 220; rules and regulations pertaining specifically to commercial shrimp fishing are WAC 220-52-075 (logbooks) and 220-52-050 (trawl fishery regulations).</p> <p>In addition, all state entities adhere to the “sunshine laws” (RCW 42); the Open Public Meetings Act and the Public Records Act which require that all meetings of governing bodies and state agencies are open and accessible to the public, and that most public records be made available to members of the public (RCW 42.30.010 e; RCW 42.56).</p> <p>The Administrative Procedure Act (RCW 34.05) requires that agencies conduct a process that ensures public involvement opportunities and considers the economic impact of its rules. These are binding requirements.</p> <p>Regulations are enforced by the WDFW Police (WDFW 2017b, 2017f).</p> <p>WDFW engages in government-to-government relationships with Native American Treaty Tribes. WDFW negotiates with Northwest treaty tribes to develop annual fishery co-management agreements. Principles guiding negotiating agreements are articulated in a WFWC Policy Document (WFWC, 1996). These agreements governing cooperation are binding.</p> <p>At the national level, management of state fisheries takes place within and is coordinated by a larger framework of federal laws, through the interface with the regional fishery management council system. Federal fishery management is carried out under the authority of the federal 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</p>		

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: <ul style="list-style-type: none">• Is capable of delivering sustainability in the UoA(s); and• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and• Incorporates an appropriate dispute resolution framework.		
		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. In addition to the MSA, the PFMC adheres to a suite of “other applicable laws:” the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act (MBTA); the Administrative Procedure Act (APA), Paperwork Reduction Act (PRA): Regulatory Flexibility Act (RFA): Coastal Zone Management Act (CZMA): and other relevant U.S. laws, Executive Orders and regulations (MSA, 2007). This national legal system outlines procedures governing cooperation among entities authorized to implement these acts. The procedures are well described in consultation rules, and are binding.		
b		Resolution of disputes		
Guide post	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective .	
Met?	Y	Y	Y	
Justification	As described above under 3.1.1. a, the fishery is managed primarily under state statutes and administrative codes, in a fashion that respects domestic law. Federal rules apply to federally managed species that interact with the Washington management system. For the pink shrimp fishery, these rules pertain primarily to bycatch of federally managed species or species protected under the ESA (ESA, 1973). The Washington Open Public Meetings Act (RCW 42-30-010) and Public Records Act (RCW 42.56) ensure transparency and public access. Additionally, the WFWC has issued policy guidelines for negotiating shellfish management agreements with treaty tribes (WFWC, 1996). State and federal agents monitor fisheries and enforce compliance with the laws and regulations related to pink shrimp, incidentally caught groundfish, eulachon or other protected species, (WDFW 2017f). Washington enforcement is represented on the PFMC Enforcement Consultants committee, which includes representatives from state enforcement agencies in Washington, Oregon, and California, and the federal government (PFMC, 2017b). Coordination of state and federal laws is accomplished through this body. WDFW police are advised by a seventeen-member Enforcement Advisory Committee, which makes recommendations on issues such as staffing, deployment, workload, outreach and education (WDFW, 2017b). At the state level, the management system uses the WDFW Law Enforcement Program Marine Division to enforce laws and regulations (WDFW, 2017g). Fish and Wildlife Officers (FWOs) are general authority peace officers with responsibilities that include fish protection and commercial fish and shellfish harvest. In addition to state laws, they enforce federal laws and Oregon state statutes through memoranda of agreement (WDFW, 2017f).			

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: <ul style="list-style-type: none">• Is capable of delivering sustainability in the UoA(s); and• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and• Incorporates an appropriate dispute resolution framework.		
		<p>At the national level, management of state fisheries takes place within and is coordinated with a larger framework of federal laws, through the interface with the regional fishery management council system. Federal fishery management is carried out under the authority of the federal Magnuson Stevens Fishery Conservation and Management Act (MSA), first passed in 1976 and most recently reauthorized in 2006 (MSA, 2007). It 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. In addition to the MSA, the PFMC adheres to a suite of “other applicable laws:” the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act (MBTA); the Administrative Procedure Act (APA), Paperwork Reduction Act (PRA): Regulatory Flexibility Act (RFA): Coastal Zone Management Act (CZMA): and other relevant U.S. laws, Executive Orders and regulations (MSA, 2007).</p> <p>Mechanisms for dispute resolution are transparent, and are both informal and formal:</p> <p>Informal mechanisms for both avoiding and resolving disputes are contained in the ongoing processes of communication and consultation between WDFW Shellfish Program staff and industry. There are several examples of tests within the shrimp fishery showing the effectiveness of this approach, including:</p> <ul style="list-style-type: none">• The use of the annual WDFW newsletter as well as the ODFW annual shrimp review to inform industry about upcoming changes in stock status, gear research and regulations and to avoid disputes. As an example, the 2014 WDFW newsletter to license holders contained information of no new changes in regulations and a reminder of the regulations to maintain logbooks and about spacing requirements on rigid grate excluders. (Ayres, 2014).• Meetings between WDFW biologists, industry and the public are held as needed, for example in the early 2000’s with implementation of excluders to reduce rockfish bycatch, and more recently with eulachon issues and observer project. The entire fleet included (Ayres and Wargo, 2015, 2016, 2017). <p>Formal mechanisms for resolving disputes include:</p> <ul style="list-style-type: none">• Petition processes of the WFWC that allow issues to be brought for Commission decision (WFWC, 2017d).• The tri-state coordination process administered by the Pacific States Marine Fisheries Commission (PSMFC) can be activated as needed to resolve shrimp fishery management issues or disputes among Washington, Oregon and California (Abramson et al., 1981; Hannah, 2012).• The coordination mechanism of the PFMC to resolve any disputes between state and federal fisheries (PFMC, 2004; 2007). <p>The conditions for SG10 are met.</p>		
c	Respect for rights			
	Guide post	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with	The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: <ul style="list-style-type: none">Is capable of delivering sustainability in the UoA(s); andObserves the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; andIncorporates an appropriate dispute resolution framework.		
		the objectives of MSC Principles 1 and 2.	objectives of MSC Principles 1 and 2.	the objectives of MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	<p>Since 1996 the WFWC has had a formal policy for negotiating shellfish management agreements with treaty tribes (WFWC, 1996). An example is the 2014 agreement on fishing arrangements for treaty and non-treaty salmon fisheries. These arrangements are negotiated annually by WDFW and treaty tribes based on best pre-season information available, and may be modified by agreement of the parties on the basis of later information (WDFW and NWIFC, 2017).</p> <p>The Northwest Indian Fisheries Commission (NWIFC) is a support service organization for 20 treaty Indian tribes in western Washington. Headquartered in Olympia, the NWIFC employs approximately 65 people with satellite offices in Burlington and Forks (NWIC, 2017).</p> <p>The NWIFC was created following the U.S. v. Washington ruling (Boldt Decision) (U.S. v. Washington 1074) that re-affirmed the tribes’ treaty-reserved fishing rights and established them as natural resources co-managers with the State of Washington. The role of the NWIFC is to assist member tribes in their role as natural resources co-managers. The commission is composed of representatives from each member tribe who elect a chair, vice chair and treasurer. Commissioners provide direction to the NWIFC executive director, who in turn implements that direction (NWIC, 2017).</p> <p>In May 1999, the U.S. Supreme Court upheld a lower court ruling that reaffirmed the tribes’ treaty reserved right to harvest shellfish, establishing the tribes as co-managers of shellfish resources in western Washington (Woods, 2005). The scope of participation by treaty Indian tribes in the management of natural resources in western Washington has grown steadily since the U.S. vs. Washington ruling (NWIC, 2017).</p> <p>At the federal level, NMFS and management through the PFMC are both bound by Federal Executive Order 13175 (2000), which requires meaningful consultation and collaboration with Indian tribal governments. The sovereign status and co-manager role of Indian tribes over shared federal and tribal fishery resources is recognized. At the regional level, this role is reflected in a designated tribal seat on the Pacific Fishery Management Council (PFMC, 2017a).</p> <p>In sum, the management system operates under effective state and national legal systems, contains binding procedures governing cooperation with other parties and delivers management outcomes consistent with MSC Principles 1 and 2. It has transparent mechanisms that have been shown to be effective in resolving legal disputes. It formally commits to legal rights of indigenous people in a manner consistent with principles 1 and 2.</p> <p>A score of 100 is awarded.</p>		
References		Abramson et al., 1981; Ayres, 2014; Ayres and Wargo, 2015, 2016, 2017; E.O. 13175, 2000; ESA, 1973; Hannah, 2012; MSA, 2007; NMFS, 1997; NWIFC, 2017; PFMC 2004, 2007, 2017b; , RCW 42.30.010; RCW 42.56; RCW 34.05; WAC 220-52-075; WAC 220-52-050; WDFW and NWIFC, 2017; WDFW 2017b, 2017f, 2017g.; WFWC, 1996, 2017d; Woods, 2005.		
OVERALL PERFORMANCE INDICATOR SCORE:				100

PI 3.1.1	<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> • Is capable of delivering sustainability in the UoA(s); and • Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and • Incorporates an appropriate dispute resolution framework.
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties.		
		The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guide post	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood .	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
	Met?	Y	Y	Y
	Justification	WFWC, WDFW, PFMC, and the state and federal enforcement entities of the WDFW Police, US Coast Guard, and NMFS Enforcement are all explicitly identified, and roles defined, in statutes, administrative code, and operating procedures. Open lines of communication between agencies and stakeholders promote widespread understanding of the roles and responsibilities of respective entities. Lines of authority and responsibility among the state and federal entities are clear, as are procedures for coordination among them (Wargo and Ayres, 2015, 2016, 2017; Chadwick, 2015). The functions, roles and responsibilities are well understood for all areas of responsibility and action. Evidence of understanding on the part of the fishing industry and other stakeholders is provided by testimony to the WFWC, and, in the case of the shrimp fishery, good compliance rates of BRD adoption (Chadwick, 2015). This results in a score of SG100.		
b	Consultation processes			
	Guide post	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used .
	Met?	Y	Y	Y
	Justification	The management system regularly seeks and accepts relevant information through active consultation with the fleet and other stakeholders on the likely impact of regulations and on upcoming fishery-related issues. The system uses local knowledge through such mechanisms as regular feedback from the industry regarding such issues as conditions on the fishing grounds and gear innovation experiments (Wargo and Ayres, 2015, 2016, 2017). Specifically, consultations include dockside interactions between WDFW police, fleet and plants; informal stakeholder meetings at WDFW Shellfish Program offices, general availability of WDFW staff to public calls, publication of the WDFW annual		

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties.	
		The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties	
		<p>newsletter, and public testimony at WFWC meetings (Ayres, 2014; Ayres and Wargo, 2015, 2016, 2017; Chadwick, 2015).</p> <p>The management system demonstrates consideration of the information and provides explanations as to how it is or is not used through newsletters and through records of WFWC decisions (Ayres, 2014; WDFW, 2017d).</p> <p>The frequency of these consultations varies by the particular process. Dockside interactions occur once or twice weekly. WDFW letters to license holders are annual. The WFWC meets monthly. Stakeholder meetings are issue-driven and informal stakeholder-WDFW staff interactions are ongoing on a “drop-in” basis at the Shellfish Program offices (Chadwick, 2015; Wargo and Ayres, 2015, 2016, 2017).</p> <p>A score of SG100 is given.</p>	
c	Participation		
	Guide post		<p>The consultation process provides opportunity for all interested and affected parties to be involved.</p> <p>The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.</p>
	Met?		<p>Y</p> <p>Y</p>
	Justification	<p>The management system’s consultation processes provides opportunity, encouragement and facilitation of engagement of any interested party through a variety of mechanisms. These include dockside interactions between the industry and the WDFW police, open availability to stakeholders of WDFW Shellfish Program staff, publication of an annual WDFW newsletter, circulation of the ODFW annual shrimp review summarizing stock status and distribution, CPUE, landings, research results and emerging issues that also relate to the Washington fishery (cf. Hannah and Jones 2014,2015, 2016; Groth et al., 2017), and public testimony at WFWC meetings (WDFW, 2017e).</p> <p>Washington’s Open Public Meetings Act ensures public notice and access to meetings (RCW 42.30). WDFW routinely posts notices of public meetings about upcoming regulations on their website and at port offices. Likewise, announcements of Washington Fish and Wildlife Commission meetings are posted on the WDFW website well in advance, with full information about meeting agendas (WDFW 2017d). WDFW’s online Rules Information Center provides information on processes for permanent and emergency rulemaking, with information on how stakeholders can be involved (WDFW, 2017g). The Washington Public Records Act (RCW 42.56.010) ensures transparency of agency information.</p> <p>At the regional level, the PFMC process provides open and transparent distribution of information as well as opportunities for engagement of interested parties through committee membership and public testimony. ENGOs are routinely engaged in this process (PFMC, 2017c).</p> <p>Executive Order 13132 (1999) 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. Any final published rule must be accompanied by a “federalism summary impact statement” (NMFS, 1997; PFMC, 2011d).</p> <p>The Council process involves different types of consultations with member states through state agencies, Council appointees, advisory committee membership, and meetings. The process of state participation in the formulation of federal</p>	

PI 3.1.2		<p>The management system has effective consultation processes that are open to interested and affected parties.</p> <p>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</p>
		<p>management measures encourages complementary approaches between federal and state approaches (PFMC, 2004; 2007). Consultations among state agency staff, industry stakeholders and ENGOs occurs informally through regular stakeholder meetings, interactions at the Pacific Fishery Management Council settings, interactions with congressional staff, and various other fora.</p> <p>In sum, the functions, roles and responsibilities are well understood for all areas of responsibility and action. The Washington management system includes consultation processes that regularly seek and accept relevant information and the system provides explanations for how information is used.</p> <p>A score of 100 is awarded.</p>
References		Abramson et al. ,1981; Chadwick, 2015; E.O. 13172, 1999; E.O. 13175, 2000; Hannah, 2012; Hannah and Jones, 2014, 2015, 2016; MSA, 2007; NMFS, 1997; PFMC, 2004, 2007, 2011d, 2017c; RCW 42.30; RCW 42.56.010; Wargo and Ayres, 2015; WDFW, 2017b, 2017d, 2017e; WDFW, 2017g; .
OVERALL PERFORMANCE INDICATOR SCORE:		100
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC fisheries standard and the precautionary approach, are implicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach, are explicit within and required by management policy.
	Met?	Y	Y	Partial
	Justification	<p>Long-term objectives to guide fishery management are explicit within the Washington Department of Fish and Wildlife 2013-2015 Strategic Plan (WDFW 2013). The plan is guided by five principles:</p> <ul style="list-style-type: none"> • Support healthy ecosystems • Maximize the impact of limited resources • Consider public values • Anticipate uncertainty; respond to change • Improve internal processes <p>Four general goals stem from these principles: The Each goal is accompanied by objectives and strategies designed to meet those objectives:</p> <p>Goal 1: Conserve and protect native fish and wildlife.</p> <ul style="list-style-type: none"> • The ecological integrity of critical habitat and ecological systems is protected and restored • Washington's fish and wildlife diversity is protected at levels consistent with ecosystem management principles, established in the Conservation Initiative (WDFW, 2015a). • Threatened and endangered fish and wildlife populations are recovered to healthy, self-sustaining levels. <p>Goal 2: Provide sustainable fishing, hunting, and other wildlife-related recreational and commercial experiences.</p> <ul style="list-style-type: none"> • Fishing, hunting, wildlife viewing, and other outdoor activities are enhanced and expanded. • Hatcheries and public access sites are safe, clean, and effectively support people's use and enjoyment of natural resources • Tribal treaty coordination and implementation is achieved with adequate resources. <p>Goal 3: Promote a healthy economy, protect community character, maintain an overall high quality of life, and deliver high-quality customer service.</p> <ul style="list-style-type: none"> • Conservation of fish and wildlife is widely supported by communities across Washington • The economic benefits of fishing, hunting, and other wildlife-related jobs are supported by and linked to the Department's activities. • The Department's decisions support communities through valuing, understanding, and evaluating input from stakeholders • The Department responds to citizens and customer needs in a timely and effective way. <p>Goal 4: Build an effective and efficient organization by supporting our workforce, improving business processes, and investing in technology.</p>		

PI 3.1.3	The management policy has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.
	<ul style="list-style-type: none"> • The Department has a diverse, robust workforce with the knowledge, skills and abilities to meet future business needs. • Employees are energized, engaged in agency priorities, and empowered to continuously improve their productivity. • Achieve operational excellence through effective business processes, workload management, and investments in technology. • Work environments are safe, highly functional, and cost-effective. <p>In addition, WDFW is guided by six conservation principles articulated in the Conservation Initiative (WDFW, 2017a). These can be paraphrased as to:</p> <ul style="list-style-type: none"> • Practice conservation by managing, protecting and restoring ecosystems for the long term benefit of people and for fish, wildlife and habitat; • More effectively manage fish, wildlife and their habitats by supporting healthy ecosystems; • Work across disciplines to solve problems; • Integrate ecological, social and institutional perspectives into our decision making; • Embrace new knowledge and apply best science to address changing conditions through adaptive management; • Collaborate with conservation and community partners to help achieve shared goals. <p>Pink shrimp management objectives area also implicit in the management goals for Dungeness crab (Wargo and Ayres, 2015; WFWC, 1999). These are paraphrased as to:</p> <ul style="list-style-type: none"> • Protect the reproductive capacity of the stock; • Involve industry representatives in the management of the fishery; • Protect public health; • Maximize the economic benefit from the resource; • Adopt regulations to achieve safe and orderly fisheries; • Provide a sustainable fishery of high quality product consistent with the “even flow” legislative mandate; • Provide support to industry buyback initiatives; <p>Protect habitat.</p> <p>The objectives of the Washington Department of Fish and Wildlife Strategic Plan are explicit overarching long-term objectives for Washington’s fisheries that guide WFWC decision-making (WDFW, 2013). However, to take the form of requirements, these policy objectives would need to be expressed in the form of fishery management plans (FMPs) that included accountability measures related to those objectives.</p> <p>The WAC codifies regulations, setting out general standards and procedures as well as fishery-specific rules and providing the legally enforceable elements of fish management plans (cf. WAC 220-50-010). Although state FMPs do exist for some Washington fisheries (e.g. forage fish; Puget Sound rockfish), pink shrimp is not managed through an FMP (Wargo and Ayres, 2015).</p> <p>In 2005 the State of Washington developed a formal pink shrimp management plan (WDFW 2005) with the Makah Tribe for that year’s shrimp season (although the Makah never fished). The goals were:</p> <ul style="list-style-type: none"> • Preserve, protect, and perpetuate the coastal pink shrimp resource to provide for their sustainable harvest. • Maintain consistent, conservation-based regulations for state and tribal fisheries • Maintain effective resource management while minimizing management costs • Protect the reproductive capacity of the pink shrimp stocks

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.
		<ul style="list-style-type: none">• Minimize harvest of small, unmarketable shrimp• Minimize bycatch mortalities of other species• Use simple, enforceable, management tools <p>It is reasonable to assume the same goals would apply in the future.</p> <p>A draft FMP reflecting the WDFW guiding principles for management is in development and undergoing internal WDFW review before release for public review and comment (Wargo, 2017).</p> <p>As such, it is not possible for the fishery to meet the second component of the scoring issue, which states that clear long-term objectives are ‘required’ by the management policy.</p> <p>As per Section CR 27.10.63, partial scoring of this PI is permitted as there is only a single scoring issue at each SG level. Therefore, since that the first part of the scoring issue is met, in that clear longer term objectives that guide decision-making, consistent with MSC P&C and the precautionary approach, as discussed in SG80a, a partial score of 90 is awarded.</p>
References		WAC 220-50-010; WFWC, 1999; WDFW, 2005, 2013, 2017a; Wargo, 2017; Wargo and Ayres, 2015;
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 3.2.1 Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Objectives , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery-specific management system.	Short and long-term objectives , which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system.	Well defined and measurable short and long-term objectives , which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system.
	Met?	Y	Y	N
	Justification	<p>The WDFW Strategic Plan contains four goals and sixteen objectives for fish, wildlife and ecosystems (see detail under Section 3.6.5) (WDFW, 2013). These goals and objectives have shaped the content of the draft shrimp FMP, which is now available to the public with a schedule for formal implementation (Wargo and Ayres 2017b).</p> <p>The FMP contains short- and long-term objectives consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, as it covers management objectives for the shrimp resource, including harvest strategy and reference points, current management tools, and management of incidental landings, bycatch management and ETP interactions, as well as management of habitat impacts.</p> <p>Although these objectives are explicit, and comprise both long- and short-term components, they are not organized as such (i.e. not arranged into short- and long-term aspects). The assessment team has raised a recommendation to WDFW related to this.</p> <p>This draft FMP is sufficient to achieve the 80 scoring guidepost for this PI, however in order to reach the 100, the FMP would have to include objectives stated in more measurable terms, and subsequently be adopted and fully implemented.</p> <p>Thus a score of 80 is awarded.</p>		
References		Wargo and Ayres, 2017b; WDFW, 2013		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.2 – Decision-making processes

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Y	Y	
	Justification	Established decision-making processes are followed by the WFWC and within the WDFW as outlined in law (RCW Title 77.). These processes result in management measures and strategies that meet the objectives specified in the WDFW Strategic Plan (WDFW, 2013). These processes are stable. The conditions for SG80 are met.		
b	Responsiveness of decision-making processes			
	Guide post	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important 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.	Decision-making processes 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.
	Met?	Y	Y	Y
	Justification	Decision-making processes have covered a wide range of issues and demonstrated responsiveness to all shrimp fishery issues identified through research, monitoring, evaluation and stakeholder consultation . Coordination and consultation between the state and federal processes, conducted through the PFMC process, promotes the consideration of the effects of pink shrimp fishery management decisions on other fisheries and ecosystem issues, for example the rebuilding of rockfish stocks and the protection of ESA listed species. . A good example of decision response to all of these elements is the adoption of the finfish excluder grate to reduce rockfish bycatch and later, with smaller grate spacing, to protect ESA-listed eulachon. These successive BRD decisions were made in collaboration with industry members and in response to an identified need to reduce bycatch of finfish species. The transparency, timeliness and adaptive manner of decision response is ensured by the Open Public Meetings Act (RCW 42.30.010 and Public Records Act (RCW 42.56.010), and demonstrated through agency rulemaking authority, stakeholder testimony at monthly WFWC meetings, informal stakeholder-agency contacts, and the provision of information to industry through the annual newsletter (cf. Ayres, 2014; Wargo and Ayres, 2015, 2016, 2017) and the circulation of the Oregon pink shrimp review, which in both its annual edition and a supplemental edition identified upcoming potential issues with eulachon in anticipation of its listing under ESA, and the need to take proactive action (cf. Hannah and Jones, 2014, 2015, 2016; Groth et al., 2017). Frequent communication and coordination between enforcement and WDFW staff, as well as intra-season updates, establish enforcement priorities in anticipation of		

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
		<p>likely areas needing enforcement attention, and adapt to in-season enforcement issues as they emerge (Chadwick, 2015, 2017).</p> <p>The ongoing process of active coordination and consultation with industry in identifying issues and monitoring compliance also contributes to decision processes that are responsive, transparent and adaptive (Wargo and Ayres, 2015; Wargo, 2017). Coordination and consultation between the state and federal processes, conducted through the PFMC process, promotes the consideration of the effects of pink shrimp fishery management decisions on other fisheries and ecosystem issues, for example the rebuilding of rockfish stocks and the protection of ESA listed species.</p> <p>The conditions of SG100 are met.</p>		
c	Use of precautionary approach			
	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Y	
	Justification	<p>Decision processes employed by the Washington State Legislature (in establishing law and policy) and the WFWC (in implementing policy) exhibit a precautionary approach to pink shrimp management and a basis in best available scientific information. A precautionary approach based on ecosystem management is explicit in the WDFW Strategic Plan (WDFW, 2013). The regulations establishing maximum count per pound and closed seasons were implemented to minimize effort on small shrimp and prevent fishing on spawning aggregations (WAC 220-52-050). Adoption of the BRD requirement was a precautionary approach to minimize bycatch of rebuilding groundfish stocks. Further strengthening of the BRD specifications was a proactive and precautionary approach to minimizing all bycatch, including eulachon, recently listed as threatened under the ESA (WAC 220-52-050). The fleet’s experimentation with LED lights on gear is part of the overall effort to minimize non-shrimp bycatch (Wargo and Ayres, 2015; 2016, 2017; Wargo et al., 2016).</p> <p>Washington has the most flexible rulemaking of the three west coast coastal states. In contrast to other states, Washington fisheries are closed by default and open by rule. “Emergency rule” describes routine rulemaking for routine management decisions, such as season opening. The emergency rule process could also accommodate the establishment of target and limit reference points using indicators established by ODFW or other sources (WDFW, 2017g; Wargo and Ayres 2015, 2017a).</p> <p>Discussions during the site review made evident that WDFW staff as well as members of the Washington shrimp fleet are in close communication with ODFW staff and members of the Oregon fleet who are conducting research with respect to both the target species and P2 species and impacts. It is clear that management decision processes in the Washington pink shrimp fishery use the precautionary approach and consider all available information, including new and emerging research results, resulting in a score of SG100.</p>		
d	Accountability and transparency of management system and decision-making process			
	Guide post	Some information on the fishery’s performance and management action is generally available on request to stakeholders.	Information on the fishery’s performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations	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

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
			emerging from research, monitoring, evaluation and review activity.	findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	Y	Y	N
	Justification	<p>Formal reporting to all interested stakeholders is provided through a number of avenues. WDFW sends an annual newsletter to the fleet providing updates on regulations and summaries of fishery performance, including quantity and value of landings, number of licenses and number of vessels fishing (cf. Ayres, 2014; Wargo and Ayres, 2015, 2016, 2017). WDFW also circulates the ODFW Annual Shrimp Review to holders of shrimp trawl license holders. This more extensive newsletter contains information directly relevant to the Washington fleet, both those who land in Washington and Oregon ports and those who land in Washington ports exclusively. It provides annual summaries of fishery performance, describes research results, and identifies upcoming issues affecting the fishery (cf. Hannah and Jones, 2014, 2015, 2016; Groth et al., 2017). WFWC meeting agendas and minutes describe Commission deliberations on various issues, the nature of scientific advice and public comment, and decision outcomes (WDFW, 2017d).</p> <p>WDFW Police develop weekly reports of dockside enforcement of vessels and processing plants in Westport and Ilwaco that inform fishery stakeholders of existing and emerging compliance and enforcement issues (Chadwick, 2015; 2017).</p> <p>The PFMC newsletters describe actions taken at Council meetings, committee openings and meeting schedules, and upcoming issues (PFMC, 2017d). The Federal Register provides notice of all proposed federal actions (cf. Federal Register, 2017). However, the absence of dockside biological sampling and the fact that logbook data remain unanalyzed mean that comprehensive information on fishery performance is not provided, so the SG100 conditions are not met. Conditions for SG80 are met.</p>		
e	Approach to disputes			
	Guide post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	Y	Y	N
	Justification	<p>In April 2015 the WDFW pink shrimp regulations received their first legal challenge, which was immediately complied with by WDFW.</p> <p>The management system uses coordination, consultation and information transfer between WDFW and stakeholders to proactively avoid disputes. In addition to the general public process requirements to facilitate public participation, the annual newsletter provides specific information to shrimp permit holders about potential or upcoming changes in regulations.</p> <p>Another proactive avoidance of legal disputes is provided by the dockside enforcement presence of the WDFW Police to explain new regulations and conduct pre-season checks of gear (Chadwick, 2015, 2017).</p>		

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.
		<p>In April 2015 the WDFW pink shrimp regulations received their first legal challenge, which met with an immediate response by WDFW.</p> <ul style="list-style-type: none">On March 31, 2015 WDFW issued an emergency regulation that made it unlawful to violate the following provisions:<ul style="list-style-type: none">Fail to deliver ocean pink shrimp landings to a processing facility located on shore;Process ocean pink shrimp at-sea;Freeze ocean pink shrimp at-sea; orTransfer pink shrimp catch from one fishing vessel to another.On April 2, 2015 WDFW was served with a Temporary Restraining Order contesting this regulation.After consultation with the State Attorney General’s Office, WDFW rescinded the emergency regulation on April 9, 2015 (Ayres and Wargo 2015). <p>The PFMC has no existing or previous court challenges related to the fishery nor is there evidence of regulatory noncompliance in other fisheries that could threaten the sustainability of the fishery.</p> <p>The ongoing process of active coordination and consultation with industry in identifying issues and monitoring compliance also contributes to decision processes that are responsive, transparent and adaptive. As the stakeholder consultation process and the timely reaction of the WDFW to the regulatory challenge of 2015 indicate, the management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.</p> <p>The SG100 conditions of part d are only partially met. Therefore, a score of 80 is awarded .</p>
References		Ayres, 2014; Chadwick, 2015, 2017; Federal Register, 2012; Groth et al., 2017; Hannah and Jones, 2014, 2015, 2016; PFMC, 2017d; RCW Title 77; RCW 42.30.010; RCW 42.56.010; WAC 220-52-050; Wargo and Ayres, 2015, 2016, 2017; WDFW, 2013, 2017d.
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guide post	Monitoring, control and surveillance mechanisms exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Y	Y	Y
	Justification	<p>The harvest strategy, comprising seasons, maximum counts per pound and bycatch reduction devices, is clear and enforceable. A comprehensive system of monitoring, control and surveillance for compliance and enforcement is in place, involving the WDFW, NMFS West Coast Groundfish Observer Program, WDFW Police and US Coast Guard. The Groundfish Observer Program has a coverage target of approximately 15% of pink shrimp trips and monitors the biological parameters of the total catch (McVeigh, 2015). The WDFW Police conduct random dockside checks of compliance with regulations on count-per-pound and bycatch reduction device spacing. Compliance with the count-per-pound regulation is reinforced by market preferences for larger shrimp (Ayres, 2017; Chadwick, 2017b; Wargo, 2017). At-sea compliance with regulations (seasons, closed areas, licenses) is conducted by the US Coast Guard by vessel patrol. While fishing in the federal EEZ (3-200 miles offshore) vessels are also subject to federal rules and sanctions enforced by the US Coast Guard and the NMFS Office of Law Enforcement, such as the requirement (since 2008) that pink shrimp vessels be equipped with VMS (NMFS 2017a, 2017b).</p> <p>Port sampling of shrimp catch is limited to count-per-pound. Shellfish Program staff do random count checks twice per week, and WDFW Police do count checks on a random basis. WDFW does not conduct biological sampling of catch or actively monitor size composition. Shrimp harvest logbooks are required of all vessels (WDFW, 2017e; WAC 2015c; Wargo, 2017).</p> <p>WDFW emphasizes an informational consultative approach to new regulations by working with industry to develop workable approaches to compliance, for example in the design development of the bycatch reduction device, and by advance notice to industry of upcoming regulation changes and enforcement issues through the annual letter to license holders. The management philosophy of both WDFW and the WDFW Police is to promote compliance through education and cooperation and minimize the occurrence of non-compliance (Chadwick, 2017; Wargo, 2017).</p> <p>Compliance rates are high; there have been almost no reported violations in the pink shrimp fishery over at least the past ten years. The pink shrimp fishery has not had any enforcement issues since about 2006; that year a complaint was received about landings of small shrimp. An emphasis patrol was conducted, and the landings from six boats were examined, resulting in one citation for exceeding the quantity of undersized shrimp (Chadwick 2015). In 2016 there were no incidences of illegal take or other forms of not in compliance with the exception of one Washington resident cited in Oregon for failure to provide a valid Oregon Shrimp Permit and a Non-Resident Boat Registration (Chadwick, 2017a).</p>		

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
		The high compliance rates in the pink shrimp fishery can be attributed to the emphasis on prevention, an educational approach to informing participants in the fishery about regulations, the collaborations with industry in developing effective gear design, control rules that are clear and enforceable and a coordinated monitoring and enforcement infrastructure (Chadwick, 2015; 2017b). This meets the SG100.		
b	Sanctions			
	Guide post	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	Y	Y	Y
	Justification	Sanctions for non-compliance exist, defined in law and enforced through at-sea and dockside monitoring. WDFW Police issue tickets for non-compliance. Violations of commercial fishing areas or times in the second degree is a gross misdemeanor (punishable by up to one year imprisonment, a fine up to \$5,000 or both); violations of areas or times in the first degree is a Class C felony (punishable by up to five years' imprisonment, a fine of up to \$10,000, or both)(RCW 77.15.550; WRC 9A.20.021). WDFW Police provides information on compliance and enforcement to the WDFW and WFWC. Effectiveness of sanctions is evidenced by the high rate of compliance. For example, there have been no violations of the count-per-pound or BRD regulations over the past 10 years. Good relationships with processors and the fleet have created a climate promoting informing enforcement of potential compliance issues. Season openings, BRD specifications, and count-per-pound are all fully enforceable regulations (Chadwick, 2015, 2017b). This meets the SG100.		
c	Compliance			
	Guide post	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Y	Y	Y
	Justification	There have been no violations of the count-per-pound or BRD regulations over the past 10 years. The last citation was in 2006; in that year a complaint was received about landings of small shrimp. An enforcement patrol was conducted, and the landings from six boats were examined, resulting in one citation for exceeding the quantity of undersized shrimp (Chadwick 2015). Good relationships with processors and the fleet have created a climate promoting informing enforcement of potential compliance issues. Season openings are fully enforceable (Chadwick, 2015). The high compliance rates can be attributed to the small size of the fleet, emphasis on prevention, good provision of information about regulations, the collaboration with ODFW and the Oregon industry, control rules that are clear and enforceable and a coordinated monitoring and enforcement infrastructure (Chadwick, 2015, 2017b; Wargo and Ayres, 2015, Wargo, 2017). Therefore there is a high degree of confidence that fishers comply with the management system, and the collaborative nature of the interaction among industry, WDFW and WDFW Police encourages the industry to provide information of importance to the effective management of the fishery, this meeting the SG100.		

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
d	Systematic non-compliance			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	There is evidence of good compliance in the shrimp fishery and no evidence of systematic non-compliance. In sum, there is a high degree of confidence that fishers comply with the management system, and the collaborative nature of the interaction among industry, WDFW and WDFW Police encourages the industry to provide information of importance to the effective management of the fishery. There is evidence of good compliance and no evidence of systematic non-compliance; therefore existing sanctions are demonstrably effective. A score of 100 is awarded.		
References		Ayres, 2017; Chadwick, 2015, 2017a, 2017b; McVeigh, 2015; NMFS 2017a, 2017b, 2011c; RCW 77.15.550; Wargo, 2017; Wargo and Ayres, 2015, WRC 9A.20.021		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives.		
		There is effective and timely review of the fishery-specific management system.		
Scoring Issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate some parts of the fishery-specific management system.	There are mechanisms in place to evaluate key parts of the fishery-specific management system	There are mechanisms in place to evaluate all parts of the fishery-specific management system.
	Met?	Y	Y	N
	Justification	<p>The WDFW conducts annual informal post-season reviews of the Washington pink shrimp trawl fishery, the results of which are presented in the annual newsletter to license holders. The ODFW Annual Pink Shrimp Review also contains post-season summaries and is circulated WA license holders. WDFW staff also discusses compliance and enforcement issues with WDFW Police (Chadwick, 2015, 2017b; Ayres, 2014; Wargo, 2017; Wargo and Ayres, 2015, 2016, 2017).</p> <p>In addition, throughout the season WDFW Police and the WC GOP is involved in the continual monitoring of control rules, catch quantity, quality and size composition of catch, and bycatch.</p> <p>The fishery has in place to mechanisms to evaluate key aspects of the management system. Population indicators and bycatch are monitored through at-sea sampling through the WC GOP. Fishing location and effort are monitored through mandatory logbooks. Amount of landed catch is comprehensively monitored through dockside sampling and fish tickets. Performance of BRDs – in terms of effectiveness of bycatch reduction as well as impact on fishing operations – is monitored through onboard observer reports and stakeholder feedback. The economic performance of the fishery is annually evaluated in terms of ex-vessel price, landed quantities and value.</p> <p>The primary mechanism for reporting evaluation results is the annual newsletter to license holders (Ayres, 2014; Wargo and Ayres, 2015, 2016, 2017;) and the ODFW Annual Pink Shrimp Review (Hannah and Jones, 2014, 2015, 2016; Groth et al., 2017).</p> <p>However, in the absence of regular dockside biological monitoring by WDFW there are not yet mechanisms in place to evaluate all parts of the fishery-specific management system, thereby not meeting SG100.</p>		
	b	Internal and/or external review		
Guide post		The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
Met?		Y	Y	N
Justification		<p>The pink shrimp fishery is subject to regular informal internal review. Annually the WDFW conducts informal post-season reviews of the Washington pink shrimp trawl fishery, the results of which are presented in the annual newsletter to license holders. The ODFW Annual Pink Shrimp Review also contains post-season summaries and is circulated WA license holders. WDFW staff also discusses compliance and enforcement issues with WDFW Police (Chadwick, 2015, 2017b; Wargo and Ayres, 2015, Ayres, 2017; Wargo, 2017).</p> <p>As a condition of certification, the WDFW and ODFW co-sponsored an external review of the management system by Golden Marine Consulting. The review focused on six management components: stock assessment; fishery monitoring;</p>		

PI 3.2.4		<p>There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives.</p> <p>There is effective and timely review of the fishery-specific management system.</p>
		<p>enforcement compliance; research; organizational integrity/viability; regulatory action. The review was conducted through a literature search and interviews with decision makers, researchers, and stakeholders. The report of the management evaluation was presented to the assessment team at the 2017 Surveillance audit (Golden Marine Consulting, 2017).</p> <p>In sum, mechanisms exist to evaluate key parts but not all parts of the fishery-specific management system. The fishery has both regular internal review and occasional external review. Fishery managers have committed to a schedule of conducting an external review every five years, and the passage of time will demonstrate whether the external review is repeated and is established as a regular feature of the management system.</p> <p>The conditions for SG80 are met for parts a and b and a score of 80 is awarded.</p>
References		Ayres, 2014, 2017; Chadwick, 2015, 2017b; Golden Marine Consulting, 2017; Groth et al., 2017; Hannah and Jones, 2014, 2015, 2016; Wargo, 2017; Wargo and Ayres, 2015, 2016, 2017;
OVERALL PERFORMANCE INDICATOR SCORE:		80
CONDITION NUMBER (if relevant):		

Appendix 1.3 Conditions

N/A. There are no open conditions for this fishery.

Appendix 2 Peer Review Reports

Peer Reviewer A

Summary of Peer Reviewer Opinion

<i>Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?</i>	Yes	CAB Response
<p><u>Justification:</u></p> <p>I believe that the assessment team has reached the correct conclusion that this fishery should be certified. This is a reassessment of a previously-certified fishery following which a number of conditions were raised and subsequently met, and so it is appropriate that the fishery scores relatively highly on all three Principles and that there are no new conditions raised. There are several points in the assessment report which require attention, but none of these have implications for the overall conclusion that the fishery should be re-certified.</p> <p>For P1 the key issue is that the assessment of the status of the pink shrimp stock does not follow conventional approaches because there is no clear spawning stock biomass-recruitment relationship and instead recruitment is influenced strongly by environmental conditions associated with upwelling conditions and currents. In consequence traditional measures of stock status that compare the current spawning population biomass to estimates of the stock in an unfished condition, or measures of B_{msy}, are not appropriate for the pink shrimp fishery. The assessment approach is therefore to use an environmentally-driven recruitment model to forecast recruitment for the next fishing season, and the harvest strategy is one of “constant escapement” where the control rule ensures that the fishery’s impact on egg-bearing females is reduced whenever there is in-season evidence that spawning biomass may be very low. The control rule uses proxy reference points based on both environmental and stock abundance indicators. The assessment team has very carefully considered how this approach conforms with the MSC Certification Requirements v2.0, and I believe correctly confirmed that the approach used to assess stock status and how the management strategies respond to changes in stock status meets the MSC’s Standard and thus the fishery should be recertified.</p> <p>For P2, a strength of the fishery is the long-standing observer programme with around 12% coverage, which demonstrates that this is a good, clean fishery. Another strength is that environment-fisheries interactions are well-studied and understood.</p> <p>For P3, there is very strong governance, including consultation with stakeholders, and very high levels of compliance, all of which is reflected in the high score achieved for Principle 3 PIs.</p>		<p>Thank you for this confirmation. Specific responses to points raised are given below under the respective PIs.</p>

<i>Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCR 7.11.1 and sub-clauses]</i>	N/A	CAB Response
<u>Justification:</u> There were no new conditions raised during the re-assessment of this fishery.		N/A

If included:

<i>Do you think the client action plan is sufficient to close the conditions raised? [Reference FCR 7.11.2-7.11.3 and sub-clauses]</i>	N/A	CAB Response
<u>Justification:</u> There were no new conditions raised during the re-assessment of this fishery, and therefore no requirement for a client action plan.		N/A

Performance Indicator Review

Please complete the appropriate table(s) in relation to the CAB's Peer Review Draft Report:

- For reports using one of the default assessment trees (general, salmon or enhanced bivalves), please enter the details on the assessment outcome using Table 10.
- For reports using the Risk-Based Framework please enter the details on the assessment outcome at **Error! Reference source not found..**
- For reports assessing enhanced fisheries please enter the further details required at **Error! Reference source not found..**

Table 10 For reports using one of the default assessment trees:

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
<i>Example: 1.1.2</i>	<i>No</i>	<i>No</i>	<i>NA</i>	<i>The certifier gave a score of 80 for this PI. The 80 scoring guidepost asks that there is evidence that rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within the timeline specified. However, no timeline has been specified based on previous performance, or simulation models.</i>	
1.1.1	Yes	Yes	N/A	The assessment team provides a detailed rationale of how the proxy indicators and reference points are used to score this PI, and provides justification for their use as reasonable proxies of stock status with respect to PRI and Bmsy. I agree that the proxy TRP based on in-season catch rates is not set at a level consistent with a high degree of certainty of the stock being at Bmsy, and whilst in-season catch rates for 2016 were well above this proxy TRP, a precautionary score of 80 rather than 100 for SIb is appropriate.	Thank you. No change required.
1.1.2	N/A	N/A	N/A		

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.1	No	Yes	N/A	<p>There needs to be some clarity about the status of the reference points and harvest control rules. The text of the report notes on many occasions that these reference points and HCRs are new and form part of the <u>draft</u> FMP. Has the FMP now be formally adopted?</p> <p>Slf on the review of alternative measures to minimise mortality of unwanted catch of the target stock has not been scored. If there is no catch of small unwanted shrimps, then this justification for not scoring Slf should be given. The rationale for Sla states that a key element of the harvest strategy is “protecting recruiting shrimp by reducing fishing mortality of age-1 shrimp (count per pound, mesh size)”. There are minimum mesh size regulations in place (in California only) suggesting that measures to minimise mortality of small shrimps have been reviewed. In addition a regulation on count per pound might be an incentive for ‘high-grading’ to occur, and evidence should be presented that such high-grading does not occur.</p>	<p>The assessment team notes that, while the FMP has not yet been formally adopted, evidence shows the fishery has effectively been managed to the new reference points and HCRs in recent years.. Additional text has been added to 1.2.1 Sla for clarification on this point.</p> <p>Given the long history of the fishery, and based on recent interviews with managers, the assessment team deemed scoring of Slf to be not applicable. Justification text has been added to 1.2.1 Slf for clarification on this point.</p>

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.2	Yes	No	N/A	<p>The scoring rationale should include why the SG100 is not met for SIa.</p> <p>There is a minor problem in that California has no explicit harvest control rules, but as the Oregon and Washington fisheries account for 90% of the fishing effort, it is reasonable to conclude that the overall exploitation rate will be reduced as reference points are approached.</p> <p>I do not disagree with the scoring for SIb, but the wording of the rationale appears to have been copied straight from the original certification report, as it reflects the wording of the scoring guideposts in MSC CR v1.3. Some minor re-phrasing is required.</p>	<p>Text was added to the justification explaining the rationale for why SG 100 is not met for 1.2.2 SIa..</p> <p>Text was added to the justification for the scoring of 1.2.2 SIb, for clarification.</p>
1.2.3	Yes	Yes (but see comment)	N/A	<p>The score for SIa seems harsh. The rationale for not meeting the SG100 is that no fishery-independent information is available, yet it is recognised that fishery-independent surveys were not informative of stock abundance.</p>	<p>The team notes that, should reliable fishery independent indices of abundance be developed, it would strengthen the current inferences derived from the fishery dependant data.</p> <p>No change to the scoring or rationale has been made</p>

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.4	Yes	No	N/A	For SIb, the proxy TRP is not much higher than the LRP, and for the scoring of PI 1.1.1, the assessment team noted that the proxy TRP <i>'was established with the intent of providing a "back-stop" for the possibility of unexpected environmental changes that could result in persistent low levels of recruitment'</i> . The rationale for SIb should note therefore that this proxy TRP is not a conventional target reference point to which management of the fishery aims.	The team notes that, while managers have referred to the TRP as a "back-stop" for the possibility of unexpected environmental changes, the terminology is consistent with the intent of providing for a reference point above LRP. The rationale for SIb was modified to clarify that the proxy TRP is not a conventional target reference point.
2.1.1	Yes	Yes, but see comment	N/A	The assessment team has scored SIa at 100 because there are no main primary species. Recent advice from MSC is that under such circumstances, this SI should not be scored. The CAB should check the most up-to-date advice from MSC on this issue.	The assessment team scored this PI at 100 on the basis that the only minor species encountered in significant enough quantities to be considered under the PI is Pacific Hake, which is MSC certified and has regular stock assessments showing it is highly likely to be above the PRI (see justification under scoring issue b). The remaining species observed in the catch composition occur only in very trace quantities (<<0.01%) therefore we regarded these as below a reasonable diminimus amount for consideration. No change to the scoring or rationale has been made.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.1.2	Yes	Yes	N/A		
2.1.3	Yes	Yes	N/A	See comment on PI 2.1.1	A similar explanation is given here as for 2.1.1. See the rationale under scoring issue b for explanation of scoring of Pacific Hake as the sole minor species warranting consideration here.
2.2.1	Yes	Yes	N/A	See comment on PI 2.1.1	As explained in the rationale under scoring issue b pertaining to minor species, only trace amounts of species that would be considered as minor secondary species are caught in this fishery (<<0.01%), therefore we consider these below a reasonable diminimus value that precludes the need to specifically consider them here. Hence there are no minor secondary species and the SG100 is met. No change to the justification or scoring has been made.
2.2.2	Yes	Yes	N/A		

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.2.3	Yes	Yes	N/A	See comment on PI 2.1.1	As explained in the rationale for scoring issue b: Observer and fish ticket (both quantitative) data are available on the amount of minor secondary species taken in this fishery, and the amounts are so insignificant as to not warrant consideration as minor secondary species. However, this data collection does constitute quantitative information adequate to estimate the impact of the UoA on minor secondary species with respect to stock status and the SG100 is met. No change to the rationale or scoring has been made.
2.3.1	Yes	Yes	N/A		
2.3.2	Yes	Yes	N/A		
2.3.3	Yes	Yes	N/A	N.B. In the rationale for SIa, the word 'not' appears to be missing from the last sentence. (Otherwise the SG100 would be met.)	The last sentence pertains to all non eulachon ETP species with which the fishery has the potential to interact, so it is correct as stated, but fails to meet the SG100 on the basis of the assessment with regard to eulachon.
2.4.1	Yes	Yes	N/A		

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.2	Yes	Yes	N/A		
2.4.3	Yes	Yes	N/A		
2.5.1	Yes	Yes	N/A		
2.5.2	Yes	Yes	N/A		
2.5.3	Yes	Yes	N/A		
Oregon					
3.1.1	Yes	Yes	N/A		
3.1.2	Yes	Yes	N/A		
3.1.3	Yes	Yes	N/A	I agree that a partial score of 90 is appropriate for this PI because clear long-term objectives are not currently 'required' by the management policy.	Noted with thanks.
3.2.1	Yes	Yes	N/A	Note: the scoring table shows that the SG80 was not met for Sla, which clearly is incorrect.	Thank you, the error has been corrected.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.2.2	Yes	Yes	N/A		
3.2.3	Yes	Yes	N/A		
3.2.4	Yes	No	N/A	A rationale should be given as to why the SG100 is not met for SIa. The score of 80 for SIb seems harsh on the basis that there have been two previous external reviews of the management system and fishery managers have now committed to a schedule of conducting the external review every five years.	A fair point. Text had been added and the score has been adjusted upward to 100.
Washington					
3.1.1	Yes	Yes	N/A		
3.1.2	Yes	Yes	N/A		
3.1.3	Yes	Yes	N/A	I agree that a partial score of 90 is appropriate for this PI because clear long-term objectives are not currently 'required' by the management policy.	Noted with thanks.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.2.1	No	Yes	N/A	It should be noted in the rationale that the FMP is still only in draft stage and is not yet fully agreed and implemented.	Agree. Text to this effect has been added.
3.2.2	Yes	Yes	N/A		
3.2.3	Yes	Yes	N/A		
3.2.4	Yes	No	N/A	The score of 80 for SIb seems harsh on the basis that there have been two previous external reviews of the management system and fishery managers have now committed to a schedule of conducting the external review every five years.	For the Washington component of the fishery there has only been one external review, therefore we determined that this is not sufficient to qualify as 'regular reviews' as is required under SG100. No change to the scoring or rationale has been made.

Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary) can be added below and on additional pages

This is a comprehensive and well written report with extensive references to published papers and other reports. In particular there is a detailed description of the California Current ecosystem and recruitment dynamics of fish and invertebrate species found in that ecosystem, and of the only ETP species caught in the fishery.

There are a large number of acronyms in the report and the incorporation of a glossary would be beneficial. **CAB RESPONSE: Noted—we have included a glossary.**

There are two clarifications required in relation to the UoCs. Firstly in the executive summary, under 'Stock' it needs to be clarified that the assessment considers the Oregon and Washington permitted harvest on that stock. Secondly, in section 3.1.1, under the Washington UoC, it should be clarified whether there are any other eligible fishers.

CAB RESPONSE: Under 'Fleet' the two separate UoCs are identified separately, first Oregon, then Washington, and 'and Washington' has been added under the 'Stock' heading. The other eligible fishers information has been added in section 3.1.1. Hopefully this is now clear.

Harmonisation. The report states that this fishery is not subject to harmonisation. I think that a little more detail should be added in this section. Are there any other certified fisheries in the region? There is currently no requirement to harmonise between fisheries assessed under MSC CRv2.0 and with those certified under CRv1.3, but in time all fisheries will now need to be recertified under CRv2.0, so there should at least be a comment as to when harmonisation might need to occur in future.

CAB RESPONSE: Noted—we have added the suggested language.

Peer Reviewer B

Summary of Peer Reviewer Opinion

<i>Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?</i>	Yes	CAB Response
<i>Justification: Based on available information the assessment team arrived at a complete evidence based conclusion which is appropriate and adequate, and all principle scores were above 80. .</i>		N/A

<i>Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCR 7.11.1 and sub-clauses]</i>	NA	CAB Response
<i>Justification:</i> Conditions are not raised for this fishery. Besides, all conditions of certification from the previous assessment have been closed		N/A

If included:

<i>Do you think the client action plan is sufficient to close the conditions raised? [Reference FCR 7.11.2-7.11.3 and sub-clauses]</i>	NA	CAB Response
<u>Justification:</u> Conditions are not raised for this fishery.		N/A

Performance Indicator Review

Please complete the appropriate table(s) in relation to the CAB's Peer Review Draft Report:

- For reports using one of the default assessment trees (general, salmon or enhanced bivalves), please enter the details on the assessment outcome using Table 10.
- For reports using the Risk-Based Framework please enter the details on the assessment outcome at **Error! Reference source not found..**
- For reports assessing enhanced fisheries please enter the further details required at **Error! Reference source not found..**

Table 11 For reports using one of the default assessment trees:

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
<i>Example: 1.1.2</i>	<i>No</i>	<i>No</i>	<i>NA</i>	<i>The certifier gave a score of 80 for this PI. The 80 scoring guidepost asks that there is evidence that rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within the timeline specified. However, no timeline has been specified based on previous performance, or simulation models.</i>	
1.1.1	Yes	Yes	NA	Explanation under SI a and b are complete. High degree of certainty that the stock is above the impaired (PRI), and consistent with MSY that meets SG100.	N/A
1.1.2	NA	NA	NA	Not applicable as the stock is not considered depleted.	N/A

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.1	Yes	Yes	NA	<p>Explanations under SI a, and d are complete and SG100 met. Explanations under SI b is appropriate. Responsible management in place and avoid recruitment overfishing by protecting spawning female using closed season. Explanations under SI c is relevant that meets SG60. SI e and f are not applicable.</p> <p>Long history of landing, adequate monitoring and CPUE is well above average.</p>	N/A
1.2.2	Yes	Yes	NA	<p>Explanation under SI a, b and c are complete. Well defined HCRs are in place and exploitation rate is reduced. Besides, rules reflected in the target and available evidence indicates that the tools in use are appropriate and effective. The long history of the fishery and lack of significant negative effects provide evidence that existing management measures are appropriate and operative. Besides, no fishing effects on production of berried female and recruitment.</p>	N/A

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.3	Yes	Yes	NA	Explanations under SI a, b and c are complete. Sufficient relevant information related to stock productivity, fleet composition is available to support the harvest strategy. Stock abundance regularly monitored at a level of accuracy and coverage consistent with the harvest control rule.	N/A
1.2.4	Yes	Yes	NA	Explanations under SI a, b, c, d and e are complete. Environmentally based models produce reliable forecasts for pink shrimp regarding time series of stock production and understanding what drives production for pink shrimp.	N/A
2.1.1	Yes	Yes	NA	Explanation under SI a and b are complete. There are high degree of certainty that main primary species are above the PRI, and no primary or secondary species in this fishery as defined by MSC that meets SG100 requirement.	N/A, although we wish to note that there was one primary minor species identified and scored (Pacific Hake)

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.1.2	Yes	Yes	NA	Explanation under SI a, b, c and e are complete. There is a strategy in place for managing main and minor primary species and evidence that strategy is implemented successfully that meets SG100. SI d is not relevant. There are minor primary species in this fishery and have management plan to harvest target fisheries.	N/A
2.1.3	Yes	Yes	NA	Explanation under SI a, b and c are complete. Quantitative information is adequate to assess with a high degree of certainty and support strategy to manage all primary species that meets SG100. Besides, there are no dominant primary species in this fishery	N/A
2.2.1	Yes	Yes	NA	Explanation under SI a and b are complete. There are no main secondary species in this fishery as defined by MSC. Besides, there are high degree of certainty that only trace amount of minor secondary species caught (<<0.01%) that meets SG100.	N/A

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.2.2	Yes	Yes	NA	A secondary species management strategy is in place that meets SG100 requirements and shrimp trawl nets has greatly minimized by-catch.	N/A
2.2.3	Yes	Yes	NA	Explanations under SI a, b and c are complete. Besides, there are no main secondary species in this fishery and the amount of minor secondary species taken in this fishery are insignificant.	N/A
2.3.1	NA	NA	NA	ETP species is negligible, besides, in Oregon all shrimpers used LED lights when trawling that reduce bycatch from good to very good, and reduction of eulachon bycatch by 91%.	N/A
2.3.2	Yes	Yes	NA	Explanations under SI b, c, d and e are complete. SG100 is met for the Oregon and Washington Pink Shrimp fishery. Both states have implemented a comprehensive strategy to limit bycatch of eulachon. Quantitative analysis of information directly from the fishery supports high confidence that this strategy is working to reduce eulachon bycatch.	N/A

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.3.3	Yes	Yes	NA	Several sources of quantitative information available to estimate Eluachon mortality the impact pink shrimp fishery and other ETP species are extremely limited or absent with the pink shrimp fishery.	N/A
2.4.1	Yes	Yes	NA	ODFW is continuing its research on effects of shrimp trawl on substrate and responding to results and changing conditions. Besides, experiments conducted by ODFW showed shrimp trawl impacts to substrate and benthos are not serious and there is no evidence of serious or irreversible harm.	N/A
2.4.2	Yes	Yes	NA	Explanations under SI a, b, c and d are complete. However, Management strategy implementation under SI c, the SG met scored 80, but not clearly mentioned in justification.	N/A
2.4.3	Yes	Yes	NA	Habitat use data is analyzed both by species and habitat and reveals that recovery time for shrimp trawl is estimated at 0.4 years (PFMC 2005b).	N/A

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.5.1	Yes	Yes	NA	Complete explanations are provided under SI a. There is evidence that the fishery under assessment is highly unlikely to disrupt key ecosystem structure and function. There are no gross changes in the species biodiversity of the ecological community caused by the fishery	N/A
2.5.2	Yes	Yes	NA	Explanations under SI a, b and c are complete. The PFMC developed a draft pink shrimp plan and 3 coastal states use as a guide. Besides, ODFW and WDFW have implemented fishing gear measures e.g., BRDs and LED light arrays to reduce bycatch.	N/A
2.5.3	Yes	Yes	NA	Explanations under SI a, b, c and d are complete and adequate information provided to broadly understand the key elements of the ecosystem.	N/A

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.1.1	Yes	Yes	NA	Comprehansive explanations are provided under SI a, b and c. There is a binding procedures governing cooperation with other, management system inorporates to a transparent mechanism and formally commit to the legal rights that meets SG100.	N/A
3.1.2	Yes	Yes	NA	Explanations under SI a, b and c are complete.Organizations involved in the management process are explicitly defined and well understood for all areas of responsibility.	N/A
3.1.3	Yes	Yes	NA	The functions, roles and responsibilities are well understood for key areas of responsibility and interaction. The management system seeks and accepts relevant information through active consultation among key stakeholders.	N/A

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.2.1	Yes	Yes	NA	Fishery specific objectives are stated in the Oregon Food Fish Managt Policy (ORS 506.109, 1975). Explanations under SI a is complete. There are short and long-term objectives consistent with P1 and P2 are explicit within the fishery specific management system that meets SG80.	N/A
3.2.2	Yes	Yes	NA	Clarifications under SI a, b, c, d and e are complete. Established decision-making processes respond to issues identified in research, monitoring, evaluation and stakeholder consultation.	N/A
3.2.3	Yes	Yes	NA	Explanation under SI a, b, c and d are complete and meets SG100 requirements. Comprehensive monitoring, control and surveillance mechanisms are in place and there is a high degree of confidence that fisheries comply with the management system of the fishery.	N/A
3.2.4	Yes	Yes	NA	Mechanisms in place to evaluate management system. Under SI a, the SG score awarded 80, and need to clearly declared in justification.	N/A

Appendix 3 Stakeholder submissions

1. The report shall include:
 - a. All written submissions made by stakeholders during consultation opportunities listed in FCR 7.15.4.1.
 - b. All written and a detailed summary of verbal submissions received during site visits regarding issues of concern material to the outcome of the assessment (*Reference FCR 7.15.4.2*)
 - c. Explicit responses from the team to stakeholder submissions included in line with above requirements (*Reference: FCR 7.15.4.3*)

(REQUIRED FOR FR AND PCR)

2. The report shall include all written submissions made by stakeholders about the public comment draft report in full, together with the explicit responses of the team to points raised in comments on the public comment draft report that identify:
 - a. Specifically what (if any) changes to scoring, rationales, or conditions have been made.
 - b. A substantiated justification for not making changes where stakeholders suggest changes but the team makes no change.
- (Reference: FCR 7.15.5-7.15.6)*

Appendix 4 Surveillance Frequency

1. The report shall include a rationale for any reduction from the default surveillance level following FCR 7.23.4 in Table 4.1.
2. The report shall include a rationale for any deviations from carrying out the surveillance audit before or after the anniversary date of certification in Table 4.2
3. The report shall include a completed fishery surveillance program in Table 4.3.

Table 4.1 : Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
e.g.3	e.g. On-site audit	e.g. 1 auditor on-site with remote support from 1 auditor	e.g. From client action plan it can be deduced that information needed to verify progress towards conditions 1.2.1, 2.2.3 and 3.2.3 can be provided remotely in year 3. Considering that milestones indicate that most conditions will be closed out in year 3, the CAB proposes to have an on-site audit with 1 auditor on-site with remote support – this is to ensure that all information is collected and because the information can be provided remotely.

Table 4.2: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
e.g. 1	e.g. May 2014	e.g. July 2014	e.g. Scientific advice to be released in June 2014, proposal to postpone audit to include findings of scientific advice

Table 4.3: Fishery Surveillance Program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
e.g. Level 5	e.g. On-site surveillance audit	e.g. On-site surveillance audit	e.g. On-site surveillance audit	e.g. On-site surveillance audit & re-certification site visit

Appendix 5 Objections Process

**(REQUIRED FOR THE PCR IN ASSESSMENTS WHERE AN OBJECTION WAS RAISED
AND ACCEPTED BY AN INDEPENDENT ADJUDICATOR)**

The report shall include all written decisions arising from an objection.

(Reference: FCR 7.19.1)