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Oregon and Washington Pink Shrimp (*Pandalus jordani*) Trawl Fishery

MSC Surveillance Report
(#4 for Oregon and #2 for Washington)
Prepared for the Oregon Trawl Commission and Pacific Seafood
Group

Certificate No: **MRAG-F-0034**

MRAG Americas, Inc.
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1. General Information

Fishery name	Oregon and Washington Pink Shrimp (<i>Pandalus jordani</i>) Trawl Fishery		
Unit(s) of assessment	Species: Pink Shrimp Area: West Coast USA (Oregon, Washington, California) Method of capture: Demersal otter trawl The units of certification are: Pink shrimp landed at ports within the state of Oregon. Pink shrimp landed at ports within the state of Washington		
Date certified	14 th February, 2013 for OR 8 th October, 2015 for WA	Date of expiry	13 th February, 2018 (both OR and WA)
Surveillance level and type	Surveillance level 5, On-site surveillance audit. See Appendix 5 for details.		
Date of surveillance audit	April 19 th and 20 th , 2017		
Surveillance stage (tick one)	1st Surveillance		
	2nd Surveillance	X (for WA)	
	3rd Surveillance		
	4th Surveillance	X (for OR)	
	Other (expedited etc.)		
Surveillance team	Lead assessor: Amanda Stern-Piriot; Assessor(s): Susan Hanna, Tom Jagielo		
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2. Background

This report contains the findings of **fourth** surveillance cycle in relation to the Oregon fishery, and **second** surveillance cycle for the Washington fishery. General updates on the fishery that apply to both states are given together, followed by specific sections for Oregon and Washington, in turn.

The clients' responses to the Conditions of Certification were set out in the Oregon and Washington Client Action Plans (CAP), which were appended to the OR and WA Public Certification Reports (PCR), respectively. In the case of WA, the Public Certification Report was in the form of a scope extension to the OR fishery, therefore only the parts of the fishery unique to WA were evaluated and presented in that report (including conditions and action plan). The detailed information about the fishery and the evaluations in common between the two states are given only in the Oregon PCR.

Progress associated with the actions set forth in the CAPs was examined as a part of this surveillance audit. For each Condition, the report sets out progress to date. This progress has been evaluated by MRAG Americas Audit Team (set out below as 'Progress on condition') against the commitments made in the CAPs. This assessment includes a re-evaluation of the scoring allocated to the relevant Performance Indicators (PIs) in the original MSC assessment under 'Status of condition' in each of Tables 3-8, below. Where the requirements of a Condition are met, the PI is re-scored at 80 or more and the Condition is "closed". For newly closed conditions, Appendix 1 contains a rescoring evaluation table. For this surveillance, PIs 2.3.3, 3.2.1, 3.2.4 and 3.2.5 were rescored and included in Appendix 1.

One condition, 3.2.1 for Washington, has not been closed and is now deemed behind target. See details in the results section.

Update on the fishery since the 2016 surveillance audit

Target stock update (excerpted or summarized from Groth et al. 2017, with some additions from Wargo and Ayres 2017)

Over 52m lbs of pink shrimp were landed on the West Coast in 2016, down from 102m lbs in 2015. Landings into Oregon ports were highest (35.5m lbs), followed by Washington (14.1m lbs) and California (3.0m lbs). The total value of the catch declined from over \$75m in 2015 to \$36m in 2016 (Groth 2017; Wargo 2017; Coates 2017). The decline in catch from 2015 to 2016 is largely attributed to the maturation and passing of the historically exceptional 2013 year class of pink shrimp through

the fishery.

Though down from 2015, landings in Oregon exceeded the 20 year average (29.4m lbs from 1996-2015). While the number of active vessels (75) and trips (1051) remained similar to recent years, the average price per lb (\$0.71) was the 3rd highest on record.

Much of the 2016 catch in Oregon (87%) was of one-year-old shrimp from the strong 2015 year class that was not detected until June 2015. Given their small size and large volume, fishermen actively avoided or mixed this year class with older/larger shrimp until they grew into legal size by late 2016. These shrimp grew quickly, resulting in good catches toward the end of the 2016 season.

In 2016, the Oregon fleet focused on different areas, depending on seasonal stock conditions. As the year began, fishing was best in the southern areas; 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.

In Oregon, annual efficiency, measured in catch per unit effort (CPUE) declined to levels similar to those seen in the mid-2000s. The reduced CPUE in 2016 indicates that abundance had declined, likely due to the weak 2014 year class of shrimp (the 2 year olds in 2016). Over the course of 2016, CPUE was steady in the south, while consistently improving in northern areas, as the dominant 1 year old year class grew to legal size.

While Washington's 2016 total landings of 14.1m lbs. were significantly lower than the 2014 and 2015 totals (of just over 30m lbs. and 40m lbs. respectively), this total remained above the historical seasonal average of 9.8m lbs (between 2009 and 2013). The number of active vessels decreased from 40 in 2015 to 28 in 2016. The total ex-vessel value of the fishery declined from over \$29m in 2015 to \$8.6m in 2016; the average price per lb was \$0.57. As in 2015, the majority of the landed catch came from the mid-coast of Washington in 2016. The 2016 season started slowly, with only 199,000 pounds landed in April, the slowest season start since 2008. However, as the season progressed the catch improved to more typical levels, peaking in the months of July and August.

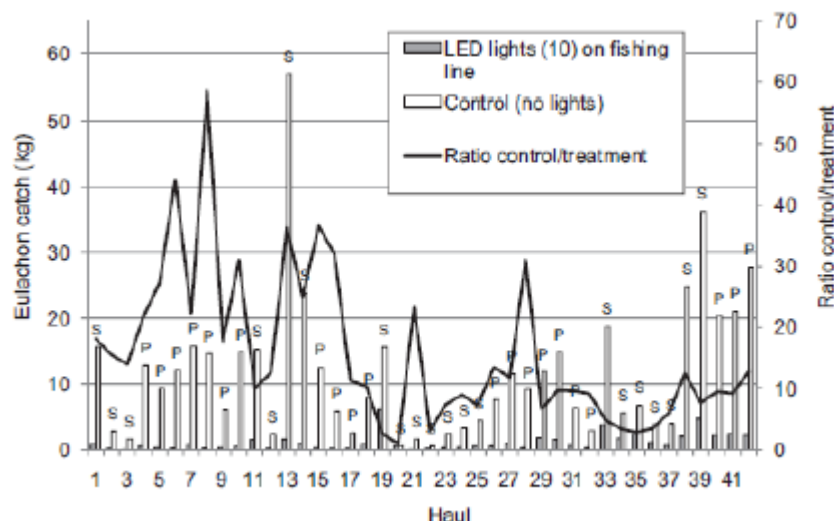
Fishery managers in Oregon and Washington expect the 2017 catch will be heavily influenced by the strong 2015 year class which will be present as age 2 shrimp in the fishery.

Eulachon update (ETP; excerpts from Groth et. al. (2017)) and Wargo and Ayres (2017) are in the shaded boxes))

Recovery Planning Efforts

NOAA's Eulachon Recovery Team has made a draft eulachon recovery plan available for public review and it will be finalized in November, 2016 (NMFS 2016b). In addition, the 5-year review of eulachon status has been published (NMFS 2016a) The documents are available on NOAA's Eulachon web page at "[http:// www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html](http://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html)".

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 bycatch reduction device (BRD) grate and, more recently, the LED lights. NMFS acknowledges that the use of BRDs, 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.

Columbia Returns/Ocean Abundance

Spawning stock biomass estimations of eulachon in the Columbia River have ranged from a low of 783,400 fish in 2005 to a high of 185,965,200 fish in 2013, with an estimated 54,556,500 fish in 2016.

Table from NMFS (2016b): Annual Columbia River eulachon run size 2000-2016; pounds converted to numbers of fish at 11.16 fish/pound (WDFW 2016). The estimates were calculated based on methods developed by (Parker 1985), Jackson and Cheng (2001), and Hay et al. (2002) to estimate spawning biomass of pelagic fishes. For 2000 through 2010 estimates were back-calculated using historical larval density data.

Maximum Estimates	Mean Estimates	Minimum Estimates	Year
8,971,500	5,421,500	3,205,200	2000
128,960,500	77,512,900	35,121,600	2001
76,645,800	59,114,500	42,541,900	2002
99,395,400	64,670,000	45,137,700	2003
—	—	—	2004
1,450,800	783,400	226,500	2005
3,527,700	1,233,200	387,300	2006
3,272,100	1,605,900	863,800	2007
6,510,700	2,418,400	713,100	2008
10,034,000	4,873,600	1,984,200	2009
4,281,000	1,759,900	612,700	2010
69,661,800	36,775,900	17,860,400	2011
61,437,400	35,722,100	20,008,600	2012
197,943,400	107,794,900	45,546,700	2013
323,778,300	185,965,200	84,243,100	2014
207,570,500	123,582,000	57,525,700	2015
111,991,000	54,556,500	21,654,800	2016

LED Use

From Groth et. al. (2017): During 2017, we will further examine use of LEDs in bycatch reduction. In collaboration with the Pacific States Marine Fisheries Commission (PSMFC), we plan to spend as much as 16 days at sea testing effects of different LED configurations along the fishing line of pink shrimp trawls. The LED configurations used during the 2014 research were green Lindgren Pittman Electralume® LED fishing lights, spaced approximately 4' apart along the center third of a trawl fishing line. The 2017 experiments will further test the use of LEDs and determine how catches of eulachon, darkblotched rockfish, other fishes, and ocean shrimp are affected by 1) altering the number of lights attached along the central portion of the trawl fishing line, and 2) attaching lights along the fishing line of the trawl wings as opposed to the central portion. The goal of this work is to understand the most efficient way to use LEDs for reducing bycatch.

From Wargo and Ayres (2017): A 2016 update of the 2015 survey of all vessels holding a Washington Trawl Licenses regarding the use LED as a method of reducing by-catch. Of the 28 License holders that reported landings in 2016, 24 or 86% responded to the survey and 100% of those respondents reported regularly using LED lights. Approximately 32% reported first use of LED beginning in 2014. This confirms the results found in our 2015 survey. A variety of spacing configurations were described, with the number of lights ranging from 6 to 12 per net. Respondents reported using only green lights.

As we discussed in our 2015 newsletter, the use of LED lights is likely to be required under still forthcoming National Marine Fisheries Service recovery plans for eulachon (i.e. the ESA listed southern distinct population segment). We anticipated that regulations would be in place prior to the 2017 season to require the use of lights and specify the configuration of lights in nets. However, after consultation with our counterparts at ODFW we have decided to join them in waiting to write these regulations. ODFW has plans to conduct some additional research during the summer of 2017 that will help inform the formulation of regulation language. The expectation is that new rules will be implemented in 2018.

Eulachon Management and Research in Washington State (from Wargo and Ayres, 2017)

The WDFW eulachon management and research program is based at the agency's Vancouver regional office. Program managers provided the following to highlight WDFW accomplishments in 2016 to better understand eulachon population abundance and dynamics:

- Conducted presence/absence surveys in various coastal river systems and tributaries of the Columbia River to better understand the distribution of the species
- Continued annual spawning stock biomass estimation for the mainstem Columbia River eulachon population (upstream from the estuary). The SSB estimate for the Grays River (a tributary that enters the estuary) was discontinued.
- Continued spawning stock biomass estimations for the Naselle River and Chehalis River for the purpose of understanding the role that neighboring estuaries may play in stabilizing the total population and influencing the run to the Columbia River
- Compared the patterns of SSB estimations for the Columbia River eulachon populations with those from other populations, such as the Fraser River
- Continued collaboration with the Cowlitz Indian Tribe to develop SSB estimations for the Cowlitz River, in order to better understand the distribution of spawning in the Columbia River mainstem and its tributaries
- Having determined from genetic analysis that some of the larvae visually identified as eulachon were not actually eulachon, WDFW has launched a more thorough examination of the whole larval outflow period, and will develop genetic markers for longfin smelt that can be used to determine if these non-eulachon are the result of spawning period and location overlaps between the two species. Completion of this genetic analysis is dependent on securing federal funding in 2018.
- WDFW is working with Oregon State University Department of Fisheries and Wildlife to test eDNA methods to assess relative abundance of Eulachon and Longfin smelt in the Chehalis River.
- WDFW fills the only non-NMFS position on the Eulachon Recovery Team.

Monitoring, Control and Surveillance Update

No major changes regarding the West Coast Observer Program activities in the shrimp fishery occurred in the 2016 season, and none is planned for the 2017 shrimp season. Selected Oregon, Washington and California shrimp vessels will continue to be required to accommodate federal observers at an effective coverage rate of 11-12% (Golden Marine Consulting 2017, citing data from the West Coast Observer Program). Observers will be documenting the use of LED lights, as well as documenting bycatch and compliance with new sorting requirements, in addition to their other duties (Groth et al. 2017).

Oregon:

In contrast to 2015, catches in 2016 were dominated by age-1 shrimp until late in the season. The large percentage of small shrimp required active fleet avoidance or mixing with larger shrimp to avoid count-per-pound violations. Fast in-season growth resulted in large landed catches by the end of the season (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 2015). In anticipation of potential count problems in the 2016 season as indicated by the high percentage of age 0 shrimp in late 2015, ODFW conducted team training in various aspects of

count sampling and determination (Groth et al. 2017).

The OSP Fish and Wildlife Division reported the following enforcement statistics for 2017 (Thompson 2017a):

- Enforcement Hours: **145**
- Number of Contacts: **79**
- Not in Compliance Contacts: **5**
- Incidents Involving Illegal Take: **1**

The five “not in compliance contacts” consisted of:

- 1 count per pound violation
- 1 wanton waste of commercial foodfish violation
- 3 non-Oregon boats fishing inside Oregon waters

The count per pound violation resulted in a fine of \$435 and forfeiture of the catch. The waste of commercial food fish catch hasn't yet been adjudicated (Thompson 2017b).

Washington:

As in Oregon, 2016 catches were dominated by age-1 shrimp until late in the season. The large percentage of small shrimp required active fleet avoidance or mixing with larger shrimp to avoid count-per-pound violations. Fast in-season growth resulted in large landed catches during July through September (Wargo and Ayres 2017)

The WDFW Enforcement Detachment 3 reported the following enforcement statistics for 2016 (Chadwick 2017):

- Enforcement Hours: **26**
- Number of Contacts: **17**
- Not in Compliance Contacts: **0**
- Incidents Involving Illegal Take: **0**

One Washington resident was cited in Oregon for failure to provide a valid Oregon Shrimp Permit and a Non-Resident Boat Registration.

There have been no other notable changes to the Oregon and Washington fisheries since the previous surveillance audit. However with regard to management of the fishery, ODFW shrimp biologists Bob Hannah and Steve Jones both retired in 2016 after lengthy and distinguished careers. Their excellent research and rapport with the shrimp fishing industry as well as collaboration with WDFW have been major factors in the success of the pink shrimp fishery over the past 30 years. ODFW staff Scott Groth, Matthew Blume and Jill Smith have been assigned to manage the pink shrimp program and have continued publication of the annual pink shrimp review (Groth et al. 2017).

Table 1. TAC and Catch Data

Note TACs are not provided because this fishery is not managed through a TAC.

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

Table 2a. Summary of Assessment Conditions for Oregon

Condition number	Performance indicator (PI)	Status	PI original score	PI revised score
1	1.1.2	Closed	65	80
2	2.3.1	Closed	70	80
3	2.3.3	Closed	75	85
4	3.2.1	Closed	60	80
5	3.2.4	Closed at 1 st surveillance	70	90
6	3.2.5	Closed	70	80

Table 3b. Summary of Assessment Conditions for Washington

Condition number	Performance indicator (PI)	Status	PI original score	PI revised score
1	1.1.2	Closed	75	80
2	2.3.1	Closed	70	80
3	2.3.3	Closed	75	85
4	3.2.1	Behind target	60	Not revised
5	3.2.4	Closed at 1 st surveillance	70	90
6	3.2.5	Closed	70	80

3. Assessment Process

The surveillance audit process as defined in the MSC Fishery Certification Requirements version 2.0 was followed in this audit.

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 reassessment of these fisheries.

The following participants were in attendance:

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)

The table below summarizes the agenda for the 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 (for process requirements)
 MSC Certification Requirements version 1.3 (for performance requirements, including assessment tree)
 Guidance to the MSC Certification Requirements version 2.0 (for process requirements)
 Guidance to the MSC Certification Requirements version 1.3 (for performance requirements, including assessment tree)
 MSC Surveillance Reporting Template version 1.0.

4. Results

The following tables contain information on the agreed client action plans, milestones set, and progress against each of the fishery's conditions. NOTE: At the second surveillance audit, the client action plan for some conditions was modified slightly to ensure consistency with MSC requirements. Modifications can be found with "track changes" in the 2015 OR surveillance report, but are no longer tracked in this report.

Table 4. Condition 1—Oregon and Washington

Performance Indicator(s) & Score(s)	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
	1.1.2	Limit and target reference points are appropriate for the stock.	65

Condition	By the 4 th surveillance audit, the client must provide evidence that a limit reference point for pink shrimp is set above the level at which there is an appreciable risk of impairing reproductive capacity. In addition, by the 4 th surveillance audit the client must provide evidence to show that the target reference point for pink shrimp is such that the stock is maintained at a level consistent with BMSY or some measure or surrogate with similar intent or outcome.
Milestones	<p>Oregon: The following annual milestones are in place for condition 1:</p> <ul style="list-style-type: none"> Year 1: The client must provide an update on progress of planning Year 2: The client must provide a document detailing population dynamics of pink shrimp as related to the setting of target and limit-based management Year 3: The client shall present a proposed target/limit reference management system for review by the assessment team <p>Based on the nature of the work and the requirements of meeting the 80SG it is not anticipated that the score for this PI will change until the 4th surveillance audit.</p> <p>Washington: The following annual milestones are in place for condition</p> <ul style="list-style-type: none"> Year 1: (aligned with year 3 for Oregon) The client with WDFW shall present a proposed target reference management system for review by the assessment team demonstrating that the target reference point meets the MSC intent of a level "consistent with Bmsy or surrogate with similar outcome" Year 2 (aligned with year 4 for Oregon) The client shall demonstrate that WDFW has adopted a target and limit reference point and is willing and able to take management action should target or limit thresholds be reached.
Client action plan	<p>Oregon: The client will work with and encourage ODFW to develop a document that describes the population dynamics of pink shrimp as they relate to target and limit-based management. By the 1st annual audit, the Client will provide an update on the progress of the document described above. By the 2nd annual audit the client will provide said document. By the 3rd annual audit, a proposal for a target/limit reference management system for the Oregon pink shrimp fishery will be submitted for review. The client, by the 4th audit, will demonstrate how Limit and Target reference points in place for the fishery are set above the level at which there is an appreciable risk of impairing reproductive capacity, and are such that the stock is maintained at a level consistent with Bmsy or some measure or surrogate with similar intent or outcome, respectively.</p> <p>Washington: The client will work with and encourage WDFW to work closely with ODFW such that a target reference point is developed for ocean pink shrimp which ensures the stock is maintained at a level consistent with Bmsy or some measure or surrogate with similar intent or outcome.</p> <p>If a target/limit reference concept is considered inappropriate, the client, by the 2nd annual audit (aligned with the 4th annual audit for Oregon), will document the rationale demonstrating how existing or revised harvest control rules meet the intent of the MSC standards and certification requirements</p>
Progress on Condition [Year	Information report 2014-08 on The Population Dynamics of Oregon Ocean Shrimp (<i>Pandalus jordani</i>) and Recommendations for Management Using

2]

Target and Limit Reference Points or Suitable Proxies was published as part of the ODFW "Information Reports" series in June 2014 (Hannah and Jones 2014).

The production and publication of this report satisfies the milestone required by the time of this (the 2nd) annual audit for this fishery.

In this document, target and limit reference point proxies based on Sea Level Height (an environmental variable strongly linked to pink shrimp recruitment success), and CPUE expressed as catch per trip, and consequent management actions to be taken (seasonal closures) should these levels be reached, designed to be in line with MSC requirements under PI 1.1.2 are proposed. The following is a relevant excerpt from Hannah and Jones 2014:

Suitable limit and target reference points for ocean shrimp

Based on the above results, the following approach for implementing target- and limit-based management is proposed for consideration, recognizing that a variety of options exist both for potential in-season indicators of stock status as well as in-season management actions:

As a limit

We propose that 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 10,000lbs provides very strong evidence that there is risk of November spawning 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. We propose that if and when these two conditions coincide, the shrimp trawl fishery 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.

As a target

Suggesting an approach for target-like management is more difficult for ocean shrimp. However, such an approach should recognize that environment-recruitment models frequently break down over time (Myers 1998), and also that there are indications that global climate change could significantly alter recruitment patterns of ocean shrimp over time (Hannah 2011). Thus, a potentially appropriate action level for ocean shrimp should be based primarily upon in-season catch rates, providing a "back-stop" for the possibility of unexpected environmental changes that could result in persistent low levels of recruitment. We propose that an average June catch per trip value of less than 12,500lbs, regardless of the ocean conditions during the larval year, indicates the need for additional precautionary management of spawning stock biomass. We propose that should June catch per trip drop below this level, the ocean shrimp season should close October 15th and not reopen until April 15th of the following year, to provide increased protection for egg-bearing females.

Rationale:

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 Bloss (lowest observed spawning stock) 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

	<p>environmental conditions also principally determine stock size (Gulf of Mexico Fishery Management Council 2005).</p> <p>The very rapid stock rebuilding potential of ocean shrimp, along with environmentally-driven recruitment and scant evidence for a stock-recruit relationship makes it difficult to specify an appropriate target reference point that is in any way related to maximum sustainable yield (MSY). A reasonable alternative is to develop an 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. Such an approach would be similar in intent to a target reference point and the requirement to "maintain the stock at a level consistent with B_{MSY} or some measure or surrogate <i>with similar intent or outcome</i>".</p> <p>Milestone three requires that by the 3rd annual audit, a proposal for a target/limit reference management system for the Oregon pink shrimp fishery be "submitted for review," and if deemed inappropriate there is a 4th milestone due by the 4th audit requiring a rationale for how existing or revised harvest control rules meet the intent of the MSC standards and certification requirements.</p> <p>The abovementioned information paper (Hannah and Jones 2014) is considered to be official ODFW agency policy as of its publication date. ODFW upper management decided that there was no rulemaking needed to implement this. The policy is designed to be implemented via temporary rule when the published target or limit point is reached and then followed up with permanent rulemaking within 60 days, which would be needed to implement the delayed opening date the following year. Procedures for Oregon permanent and temporary rule making, are described on the Oregon Department of Fish and Wildlife webpage (http://www.dfw.state.or.us/OARs/) through this link: http://arcweb.sos.state.or.us/doc/rules/RuleFile_Overviews.pdf. The Oregon Fish and Wildlife Commission was made aware of the policy development via the shrimp newsletter, which they receive every year.</p> <p>Whether the agency goes to the commission to put changes like this into rule depends on the level of controversy and the need for additional public input. If this had been controversial with the fleet, it would have required the attention of the ODFW Commission. However, as the target and limit reference point proposal was well-supported by the industry, it was simply adopted as policy. An example of a controversial policy that has been put into a rule via this process is the automatic closure of the summer crab fishery under certain circumstances. Leaving the Target and Limit Management Plan out of rule allows for more flexibility to modify the policy if new information on the vulnerability of shrimp to overharvest comes to light (Bob Hannah, pers. comm).</p> <p>In light of these developments, the assessment team is confident that the Target and Limit Management Plan is operational. However, while the team considers the LRP set and management response are well justified and in line with MSC requirements under PI 1.1.2 SG 80 SI b., we are not confident that the TRP is consistent with MSC requirements under PI 1.12, SG80 SI c. Therefore, additional justification for how the TRP is consistent with this MSC requirement is needed before this condition can be considered closed. As such the condition will remain open, but the Performance Indicator rescored at 75. A full justification for the new score against PI 1.1.2 is given in Appendix 1.</p>
<p>Progress on Condition [Year 3 for OR, Year 1 for WA]</p>	<p>Since the 2nd surveillance audit for Oregon and scope extension site visit for Washington, further clarification has since been provided by the MSC (Hoggarth pers. comm.) for setting TRPs in circumstances where stock productivity is unrelated to stock size above the LRP, stating the following (emphasis added to the relevant sections):</p>

The section quoted is from v2.0 GSA 2.2.3. The following subsection 2.2.3.1 includes the following text:

Where proxies are used that are not expressed as percentages of B_0 , teams should generally ensure that:

- *Any reference point used as a proxy for scoring the PRI is set above the point where there is an appreciable risk of recruitment failure; and*
- *Any reference point used as a proxy for the MSY level maintains the stock well above the PRI and at levels of production and stock sizes consistent with B_{MSY} or a similar highly productive level.*

Where proxy reference points are defined in this way, teams should take account of the difference between the reference point and the required (PRI or MSY) levels in their scoring.

*We refer in various places in the GFCR to such 'MSY or a similar highly productive level'. **Although we allow the use of proxy reference points and expect that teams should take account of the difference between the reference point and the required (PRI or MSY) levels in their scoring (SA 2.2.3.1), our use of the underlined text above recognises that MSY may not always be reliably estimable, and it may be sufficient in these cases to ensure that the stock is fluctuating around a 'highly productive' level that is clearly above any likely PRI.** One approach here is the use of B_{MSY} trigger as a lower threshold (not a target, and not MSY) in EU fisheries. **Another approach may be to simply say that productivity is unrelated to stock size above the limit reference point, and therefore any productivity higher than the limit point is acceptable.** Other approaches such as setting $F=M$, or working to achieve an annual escapement of around 40% are all pragmatic proxies for MSY.*

Based on this clarification from MSC, the assessment team considers the implemented TRP as consistent with MSC requirements in that there is clearly a difference in productivity, or expected productivity between the LRP and TRP, and since productivity is unrelated to stock size above the limit reference point in this case, any productivity higher than the LRP is acceptable as a TRP. Thus the TRP is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.

Washington, as reported in the Scope Extension Report (MRAG 2015), 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).

Signals that would trigger measures to respond to a significant risk to recruitment are given in Hannah and Jones 2014a. 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 year 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 (Bloss). 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.

Status of condition	This condition is now closed for both states following 2016 surveillance, and PI 1.1.2 rescored at 80. The full evaluation table is provided in Appendix 1.
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Table 5. Condition 2-Oregon and Washington

	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
Performance Indicator(s) & Score(s)	2.3.1	The fishery meets national and international requirements for protection of ETP species. The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.	70
Condition	<p>Oregon: By the 4th surveillance audit, the client must provide evidence to show that the direct effects of the Oregon pink shrimp fishery are highly unlikely (as defined by the MSC) to create unacceptable impacts to ETP species, in particular eulachon.</p> <p>Washington: By the 4th surveillance audit of the combined WO fisheries, the client must provide evidence to show that the direct effects of the WO pink shrimp fishery are highly unlikely (as defined by the MSC) to create unacceptable impacts to ETP species, in particular Pacific eulachon.</p>		
Milestones	<p>Oregon: The client has demonstrated support of management agencies each year to assess the degree of the fishery's effect on Pacific eulachon.</p> <p>The following milestones have been defined, and will be monitored during each surveillance audit:</p> <ul style="list-style-type: none"> Year 1: The client must identify the information required and the scope of the work to be carried out Year 2: The client must provide evidence to indicate their commitment to the study on the effectiveness of the BRD and/or to examine the spatial footprint of the fishery in relation to the distribution of eulachon Year 3: The client must provide evidence of the work completed, and provide an update on the progress of the study <p>Washington:</p> <p>The client has demonstrated support of management agencies each year to assess the degree of the fishery's effect on Pacific eulachon.</p> <p>The following milestones have been defined, and will be monitored during each surveillance audit:</p> <ul style="list-style-type: none"> Year 1 (aligned with year 3 for Oregon): The client must provide evidence of the work completed, and provide an update on the progress of the Hannah Study. Year 2 (aligned with year 4 for Oregon): The client will present evidence that the fishery is highly unlikely (as defined by MSC) to create unacceptable 		

	impacts to ETP species, in particular Pacific eulachon.
Client action plan	<p>Oregon: The client will continue to support ODFW in developing techniques to assessing gear interaction and pursuing innovations to reduce potential mortality of eulachon, where practicable. By the 1st annual audit, the Client will identify the information needed and the scope of work to be done in the study. By the 2nd annual audit the Client will commit to a study on the effectiveness of the BRD in excluding large mature eulachon and/or to also examine the spatial footprint of the shrimp fleet in relation to the depth distribution of eulachon. By the 3rd annual audit, the Client will give an update on progress of the study(s). By the 4th annual audit, the Client will present evidence that the fishery is highly unlikely (as defined by the MSC) to create unacceptable impacts to ETP species, in particular eulachon.</p> <p>Washington: The client will work with WDFW in developing techniques to assess gear interaction and pursuing innovations to reduce potential mortality of eulachon, where practicable. By the 1st annual audit (corresponding with the 3rd OR annual audit) the Client will give an update on progress of bycatch reduction work completed to date. By the 2nd annual audit (corresponding with the 4th OR annual audit), the Client will present evidence that the fishery is highly unlikely (as defined by MSC) to create unacceptable impacts to ETP species, in particular Pacific eulachon.</p>
Progress on Condition [Year 2]	<p>NOAA's biological review team for eulachon regards the shrimp fishery as at least a moderate threat to the SDPS of eulachon. The most up-to-date information on proposals and actions taken by NOAA on eulachon, in addition to studies on eulachon in OR and WA waters, can be found at the following website: http://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html</p> <p>ODFW published an Information Report (2014-06), titled "Evaluating the population-level impact of the ocean shrimp (<i>Pandalus jordani</i>) trawl fishery on the southern distinct population segment of eulachon (<i>Thaleichthys pacificus</i>)". This report contained results from some ODFW in-house modeling that compared the extent of the areas trawled by Oregon shrimpers to the total area potentially inhabited by SDPS eulachon, in an effort to estimate the level of impact the Oregon pink shrimp fishery really may have on the SDPS as a whole. The ODFW conclusions, given numerous assumptions, is that the west coast shrimp trawl fishery (CA, OR, WA), especially at recent effort levels, would not have been enough to cause the sharp decline of the SDP (Hannah 2014). The report has been forwarded to NOAA's Office of Protected Resources for their consideration</p> <p>The abovementioned study satisfies the milestone to examine the spatial footprint of the shrimp fleet in relation to the distribution of eulachon, and also the milestones set out for the 3rd and 4th annual audits in relation to shrimp trawl footprint overlap with the eulachon population distribution.</p> <p>Regarding the effectiveness of the BRD, there have been significant developments in using LED lights attached to the fishing line on shrimp trawl nets to reduce eulachon and other bycatch. ODFW and shrimp industry tests using a series of ten green LED lights on the fishing line of a shrimp trawl to reduce eulachon bycatch proved to be extremely successful in 2014. Working on the chartered vessel Miss Yvonne in late July, ODFW shrimp project and Pacific States Marine Fisheries Commission (PSMFC) staff identified a simple method for dramatically reducing eulachon smelt bycatch in the pink shrimp fishery; a method that has since been widely embraced by the fleet. The work was funded through a NOAA Bycatch Reduction Engineering Program (BREP) grant administered through PSMFC. The "2014 In-Season Pink</p>

	<p>Shrimp Update” is posted on the ODFW web site at http://www.dfw.state.or.us/MRP/publications/. (Hannah and Jones 2015b).</p> <p>Some of the final results are as follows (including Figure 1, from Hannah and Jones, 2015b)</p> <ol style="list-style-type: none">1. Eulachon were reduced by 90.5% (by weight), with levels ranging from about 60% to 99%.2. Shrimp loss was 0.7% and was statistically non-significant, but variable.3. Combined juvenile rockfish were reduced by 78.0% (by weight).4. Combined flatfish (slender sole, rex, arrowtooth etc.) were reduced by 68.8% (by weight).
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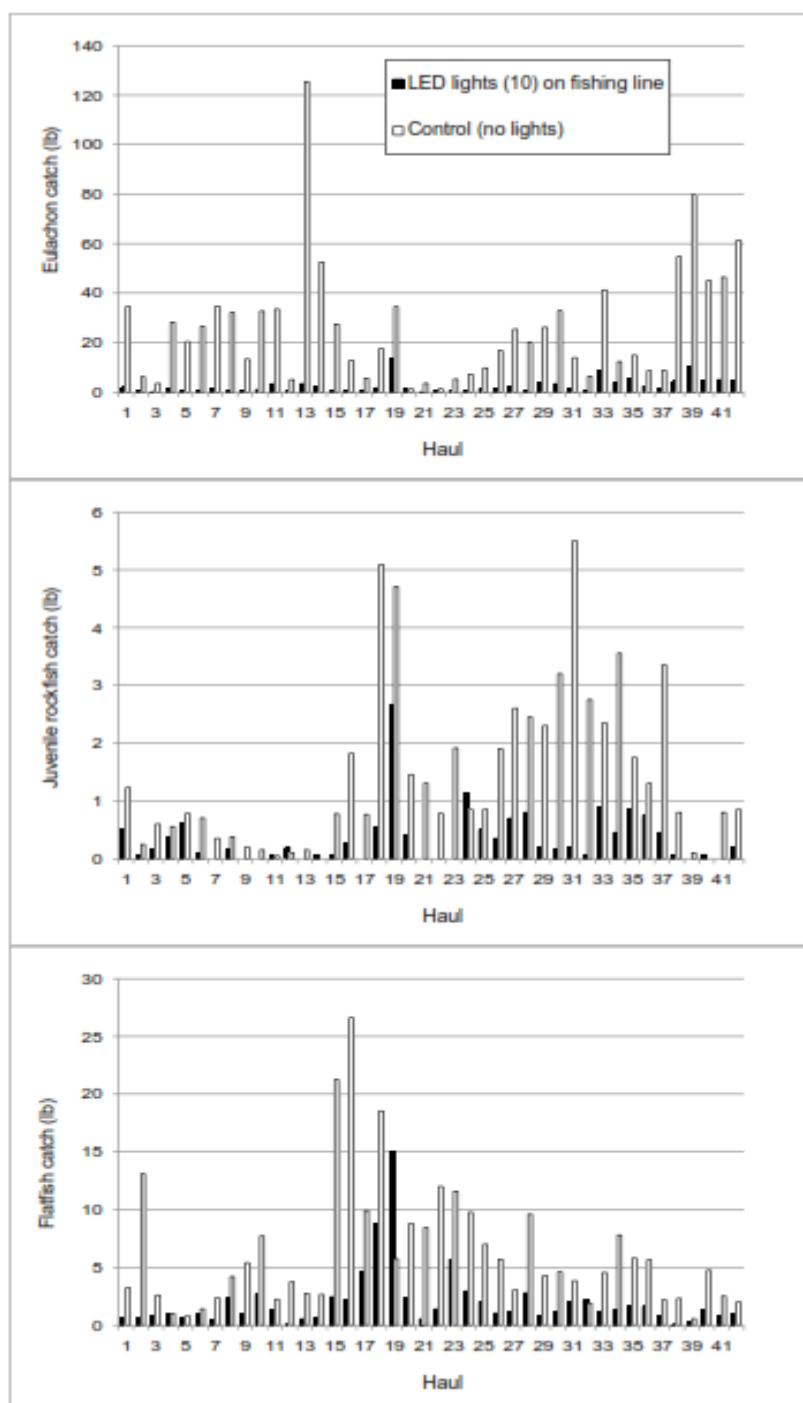


Figure 1 (after Hannah and Jones 2015b). The reduction by weight of eulachon, juvenile rockfish and flatfish achieved in each tow of during the illuminated fishing line LED study.

ODFW has prepared a final report detailing all aspects of the eight -day study, titled “Tests of artificial light for bycatch reduction in an ocean shrimp (*Pandalus jordani*) trawl: strong but opposite effects at the footrope and near the bycatch reduction device.” This has been submitted for publication in the journal Fisheries Research and hopefully will be published sometime during 2015.

This study with its preliminary results is sufficient to satisfy the milestones required at the 2nd and 3rd annual audits for this condition. The assessment team looks forward to

	seeing the final published paper and continuing results of using LED lights during the 2015 fishing season.
Progress on condition [Year 3 for OR, Year 1 for WA]	<p>Based on experimental fishing with green LED lights beginning in the 2014 shrimp season (see above for more details), The paper “Tests of artificial light for bycatch reduction in an ocean shrimp (<i>Pandalus jordani</i>) 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%.</p> <p>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 (<i>Thaleichthys pacificus</i>) from bycatch mortality in the ocean shrimp (<i>Pandalus jordani</i>) trawl fishery. The following figure, 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; srehs), using the “conservative” parameter set assuming:</p> <ol style="list-style-type: none"> 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. <p>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 $F=0.8 \times M$)</p> <p>The following text has been excerpted from Hannah 2016:</p> <p>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. 2011, 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</p>

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).

As reported by Wargo and Ayres (2016) and Hannah and Jones (2016b) The use of

	<p>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 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 Electrolume 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 Oregon 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>
Status of condition	<p>This condition is now closed for both states following the 2016 surveillance. With regard to studying the overlap of the shrimp fishery footprint with the eulachon population, the condition was considered closed following the previous surveillance audit. With regard to the BRD work, the results of the Hannah 2016 modelling study provide sufficient evidence to close this portion of the condition as well, as it can now be considered highly likely that with current bycatch reduction practices, the fishery is highly unlikely to create unacceptable impacts to the ETP species Pacific eulachon. The assessment team will continue to monitor progress within the fishery on this topic. The assessment team is pleased to see progress such that this condition could be closed ahead of target. Revised scoring for indicator 2.3.1 is provided in the Appendix below.</p>

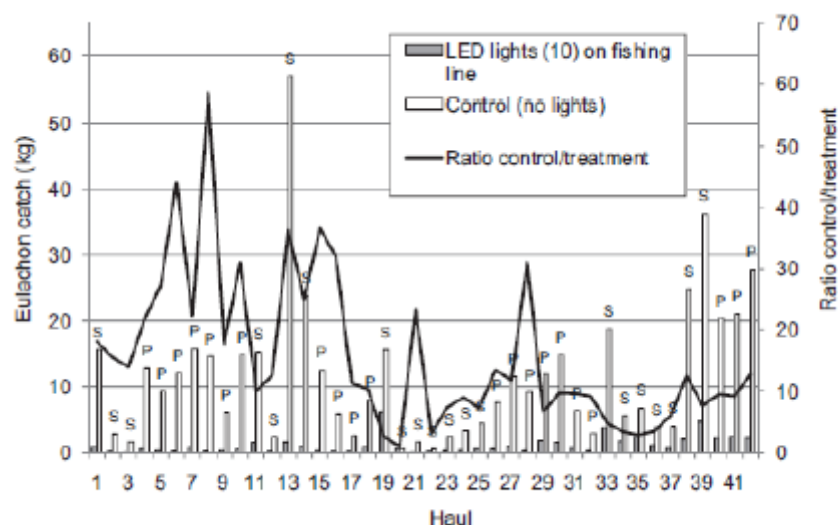
Table 6. Condition 3-Oregon and Washington

	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
Performance Indicator(s) & Score(s)	2.3.3	Relevant information is collected to support the management of fishery impacts on ETP species, including: 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.	75
Condition	<p>Oregon: By the 4th surveillance audit the client must provide sufficient information that allows for the determination on whether the Oregon pink shrimp fishery may be a threat to the protection and recovery of ETP species, in this case specifically eulachon.</p> <p>Washington:</p>		

	<p>By the 4th surveillance audit of the combined WO fisheries (2nd for WA and 4th for OR), the client must provide sufficient information that allows for the determination on whether the WO pink shrimp fishery may be a threat to the protection and recovery of ETP species, in this case specifically eulachon.</p>
Milestones	<p>Oregon: The following milestones have been defined in relation to this PI, and progress at meeting each milestone will be monitored at each surveillance audit:</p> <ul style="list-style-type: none"> • Year 1: The client must provide evidence that consultation has taken place to address the issue of eulachon catch, as well as report on the level of engagement of agencies involved. • Year 2: The client must provide an update on the progress related to understanding eulachon population abundance and dynamics. • Year 3: The client must provide an update on the information being generated to understand eulachon population abundance and dynamics, and the level of bycatch that does not pose a risk of serious or irreversible harm to eulachon and does not hinder its recovery. • Year 4: The client must provide information to allow for a determination on if the Oregon Pink Shrimp Fishery is a threat to the protection and recovery of ETP species in particular eulachon. <p>Washington: The following milestones have been defined in relation to this PI, and progress at meeting each milestone will be monitored at each surveillance audit:</p> <ul style="list-style-type: none"> • Year 1: 1 (aligned with year 3 for Oregon) The client must provide an update on the information being generated to understand eulachon population abundance and dynamics, and the level of bycatch that does not pose a risk of serious or irreversible harm to eulachon and does not hinder its recovery. • Year 2: (aligned with year 4 for Oregon): The client must provide information to allow for a determination if the WO Pink Shrimp Fishery is a threat to the protection and recovery of ETP species in particular eulachon.
Client action plan	<p>Oregon: The Client will engage the appropriate state and federal agencies to encourage actions that result in an estimation of the population of eulachon, and what is an acceptable level of bycatch by the OPS fishery. This is already occurring with the state in discussions with ODFW to standardize gear, as the shrimp fishery has the potential to be an indicator of abundance. By the 1st annual audit, the Client will report on the level of engagement undertaken with the relevant agencies on the eulachon issue. By the 2nd annual audit, the Client will give an update on progress made in understanding eulachon populations and abundance with the relevant agencies. By the 3rd annual audit, the Client will give an update on the progress made in understanding eulachon populations and the level of bycatch that does not pose a risk of serious or irreversible harm to eulachon and does not hinder its recovery. By the 4th annual audit the Client will present documentation of its interactions with the agencies and a summary of the subsequent developments which have increased the understanding of the eulachon population and effect on recovery posed by the fishery. This information will be sufficient to determine whether the fishery may be a threat to the protection and recovery of ETP species</p> <p>Washington: The Client will engage the appropriate state and federal agencies to encourage actions that result in an estimation of the population of eulachon, and what is an acceptable level of bycatch by the WOPS fishery. This is already occurring with the state(s) in discussions with WDFW and ODFW to standardize gear, as the shrimp fishery has the potential to be an indicator of abundance.</p>

	<p>By the 1st annual audit, the Client will give an update on the progress made in understanding eulachon populations and the level of bycatch that does not pose a risk of serious or irreversible harm to eulachon and does not hinder its recovery.</p> <p>By the 2nd annual audit the Client will present documentation of its interactions with the agencies and a summary of the subsequent developments which have increased the understanding of the eulachon population and effect on recovery posed by the fishery to the point where the assessment team can determine if the fishery is a threat to the protection and recovery of eulachon.</p>
Progress on Condition [Year 2]	<p>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 ed. 2014).</p> <p>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 ed. 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).</p> <p>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.</p> <p>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.</p> <p>The production of these reports representing progress toward understanding the eulachon population and interactions with the shrimp fishery, in addition to</p>

	<p>the Hannah 2014 report summarized under Condition 2, satisfies the 2nd milestone for this condition. As yet there are no estimates of what is considered a level of eulachon bycatch in the pink shrimp fishery that would not pose a threat to the eulachon population or hinder its recovery. The assessment team will evaluate eulachon population and bycatch trends and adoption and performance of LED lights to re-evaluate this Performance Indicator at the next annual surveillance audit in 2016.</p>
<p>Progress on Condition [Year 3 for OR, Year 1 for WA]</p>	<p>As reported under Condition 2, the Hannah et al. (2015) publication in Fisheries Research, as well as the Hannah (2016) modeling study represent the latest information on the current understanding of eulachon population abundance and dynamics, and the level of bycatch that does not pose a risk of serious or irreversible harm to eulachon and does not hinder its recovery. The National Marine Fisheries Service (NMFS) is expected to release a Recovery Plan for the Southern Distinct Population Segment of eulachon this year. Based on the information provided in Hannah (2016), the fact that the majority of vessels in the OR and WA fleets are using LED lights, and there is a proposed rule in process for both OR and WA to require the use of LED lights, this fishery can be considered to be on target. With the release of the NMFS Recovery Plan and associated information, it is expected that this condition can be closed following the next annual surveillance audit.</p>
<p>Progress on Condition [Year 4 for OR, Year 2 for WA]</p>	<p>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.</p>



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.

The assessment team recommends the clients and state agencies to continue working with NMFS to realize these recommendations. The assessment team recognizes that the shrimp fishery and state agencies have taken and continue to take all practicable measures necessary to reduce their impact on eulachon. With the publication of the 5-year review and draft recovery plan, the assessment team has determined that, while there is still work to be done, the understanding of the eulachon population and effect on recovery posed by the fishery has improved to the point where the assessment team can conclude that relevant information is collected to support the management of fishery impacts on ETP species, including: 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 the ETP species eulachon. Therefore the condition is now closed

Status of condition

This condition closed following this surveillance audit (4 for OR, 2 for WA). Updated scoring for this PI can be found in Annex 1.

Table 7. Condition 4--Oregon

Performance Indicator(s) &	Insert relevant PI number(s)	Insert relevant scoring issue/scoring guidepost text	Score
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Score(s)	3.2.1	The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2	60
Condition	By the 4 th surveillance audit the client must demonstrate that short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, have been explicitly defined within the fishery's management system		
Milestones	<p>The milestones associated with attaining this condition are:</p> <ul style="list-style-type: none"> • Year 1: The client must provide an update on the approach to be taken to develop short and long term objectives within the fisheries management system. • Year 2: The client must provide a draft outline of the short and long term objectives that will be incorporated within the fisheries management system. • Year 3: The client must provide evidence of public consultation on short and long term objectives within the fishery management system. • Year 4: The client is to demonstrate that short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, have been explicitly defined within the fishery's management system. An Oregon Pink Shrimp Fishery FMP is formally adopted and implemented. 		
Client action plan	<p>The client will work with ODFW to develop a FMP by year three of the certification. The FMP will contain explicit and measurable annual and long-term objectives which are explicitly defined within the fishery's management system. By the 1st annual audit, the Client will give an update on progress made. By the 2nd annual audit, the Client will give an update on progress made. By the 3rd annual audit, a fishery management plan for the shrimp fishery will be presented. By the 4th annual audit the fishery management plan containing explicit short- and long-term objectives which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, will be adopted by the Oregon Fish and Wildlife Commission and implemented by ODFW.</p>		
Progress on Condition [Year 2]	<p>An FMP was drafted in summer 2014 and underwent internal ODFW review. The FMP is presently undergoing revision in response to review comments, including the incorporation of socio-economic elements. The plan will include target and limit management measures is likely to include requirements for the use of LED lights on gear.</p> <p>The process of adopting the FMP could vary according to the level of controversy associated with its contents. In its present version the plan represents a more formal specification of existing management practice for this fishery and is therefore not particularly controversial. Experience with various types of LED lights during the 2015 fishing season is likely to generate information sufficient to develop rules for their use. However, further fishery restrictions related to the listing of eulachon could increase the level of controversy about the plan and require the approval of the Oregon Fish and Wildlife Commission. If the plan goes before the Commission for approval it will extend the implementation time by several months.</p> <p>Further development of the plan will wait until NOAA decisions about eulachon are made. In the interim the FMP draft will be provided to Golden Marine Consulting for its use in planning the management review. ODFW expects to be able to submit the FMP in time for the 2016 surveillance audit.</p>		

Progress on Condition [Year 3]	<p>A draft FMP has completed internal ODFW review and is now available for public comment (Hannah and Jones 2016a). The FMP comprises three major sections, each with several subsections:</p> <ol style="list-style-type: none"> 1. Resource Analysis <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Glossary of terms • Literature cited <p>As noted, the FMP contains both short-term and long-term objectives. Public consultation on these and other elements of the FMP is taking the form of a notice in the Annual Pink Shrimp Review (Hannah and Jones 2016b, pp. 7-8) of the draft FMP's availability and a request for public comments. The public comment period extends until 31 May, a period of 3.5 months.</p>
Progress on Condition [Year 4]	<p>The FMP remained open for public comment throughout 2016 as additional LED experiments were conducted, so that both regulatory changes could be taken before the Oregon Fish and Wildlife Commission as a single regulatory package. The FMP comment period has been further extended through August 2017 as a final round of LED experiments are conducted during the 2017 season. ODFW staff will present the FMP to the Commission at its November 2017 meeting to request adoption.</p>
Status of condition	<p>The draft FMP includes clearly specified short-term and long-term objectives for the management of the fishery. Although the FMP was not formally adopted and implemented by the end of the 2016 season, the fishery is being managed according to the framework of the plan and is on a clear path for FMP adoption in November 2017. The delay of FMP adoption and implementation until a final season of LED experiments has a clear and supportable rationale. Thus the condition is considered closed and the PI is rescored at 100.</p>

Table 8. Condition 4-Washington

Performance Indicator(s) & Score(s)	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
	3.2.1	The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2	60
Condition	By the 4th surveillance audit of the combined WO fisheries (2 nd for WA, 4 th for		

	OR) the client must demonstrate that short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, have been explicitly defined within the Washington Pink Shrimp fishery's management system. (Scoring issue A)
Milestones	<p>The milestones associated with attaining this condition are:</p> <ul style="list-style-type: none"> Year 1: (aligned with year 3 for Oregon) support WDFW in their development of an FMP for pink shrimp, including short and long term objectives, and provide a status report to the certifier outlining progress. Year 2: (aligned with year 4 for Oregon): Client to demonstrate WDFW's FMP short and long term objectives, consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, have been explicitly defined within the fishery's management system
Client action plan	WDFW is in early stages of FMP development The client will work with WDFW to develop a FMP by year four of the certification (corresponding with year 2 for Washington). The FMP will contain explicit and measurable annual and long-term objectives which are explicitly defined within the fishery's management system. By the 1st annual audit, the Client will give an update on progress made. By the second annual audit a fishery management plan for the Washington State shrimp fishery will be presented.
Progress on Condition [Year 1]	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." These principles are not yet captured in a written document, but WDFW has recognized the need for a formal FMP and has committed to the development of such a plan in 2016.
Progress on Condition [Year 2]	A draft FMP reflecting the WDFW guiding principles for management is in development and undergoing internal WDFW review. The draft FMP has not yet been released by WDFW and so has not been evaluated by the assessment team.
Status of condition	The fishery is behind target in meeting the year 2 milestone for this condition and it cannot be closed at this time.

Table 9. Condition 5 (Washington only)

Performance Indicator(s) & Score(s)	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
	3.2.4	The fishery has a research plan that addresses the information needs of management.	80
Condition	<p>Section CB4.10.3 of the CR states that 'research plan' is to be interpreted to mean a written document that includes a specific research plan for the fishery under assessment.</p> <p>Based on this, by the second annual surveillance audit, the Client must develop a written formalized plan that provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC Principles 1 and 2. The format could be either a stand-alone document or a standard component of the ODFW Annual Pink Shrimp Review showing research results from WDFW and or collaborative</p>		

	research results between the two states should it exist. (Scoring Issue A)
Milestones	<p>Year 1 (aligned with year 3 for Oregon): client will provide evidence of collaboration between ODFW and WDFW in a written research plan available to management system.</p> <p>Year 2 (aligned with year 4 for Oregon): client will demonstrate that written report available to management is available and implemented.</p>
Client action plan	The client will work with WDFW to cooperate and collaborate with ODFW on pink shrimp fishery research and data collection by way of a written research plan that formalizes ODFW's existing approach to research related to pink shrimp, non-target catch, ecosystems and habitat impacts. The plan will describe the top research priorities, along with the justification for their prioritization (gaps and needs). The plan will also include a re-evaluation, every 2 years, of the existing population models. The results will be published as a component of the ODFW annual shrimp newsletter, and or in their own annual publication..
Progress on Condition [Year 1]	<p>In its 2016 Pink Shrimp Review the WDFW provides evidence of research collaboration with ODFW, NMFS and the Cowlitz Tribe. Within-agency research is also described. 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.</p> <p>This research is available to the management system through the distribution of the Pink Shrimp Review.</p> <p>The client has contracted Golden Marine Consulting to assist the WDFW in the development of a formal research plan. This activity will be conducted in collaboration with ODFW.</p>
Progress on Condition [Year 2]	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)
Status of condition	Through its annual fishery newsletter WDFW has circulated formalized research plans and a publication of research implemented. Thus the condition is considered closed and the PI is rescored at 80.

Table 10. Condition 6-Oregon

	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
Performance Indicator(s) & Score(s)	3.2.5	There is a system for 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.	70
Condition	By the 2 nd surveillance audit, the client must develop a plan for external review		

	of the management system to occur at some specified interval. The plan should consider the recommendation of the 2008 management policy review that a similar external review be conducted every 2-3 years. By the 4 th surveillance audit, the client must provide documented evidence to show that the fishery-specific management system is subject to occasional external review.
Milestones	See below under "Client action plan"
Client action plan	<p>The Client agrees to provide evidence to show that the fishery's management system is subjected to occasional external review.</p> <ul style="list-style-type: none"> • By the 1st annual audit, the Client will give an update on progress made. • By the 2nd annual audit, the client will develop a plan for an external review of the management system, as well as indicate at what interval the external review will occur. • By the 3rd annual audit, Client will have identified a qualified individual to conduct the management review. • By the 4th surveillance audit, the fishery client will provide documented evidence to show that the fishery's management system is subjected to occasional external review. The external review will be carried out by a credible management expert, hired by the OTC, who will identify any gaps and propose corrective action, along with the appropriate rationale.
Progress on Condition [Year 2]	Golden Marine Consulting has submitted a plan for the review of the management system. The review will focus on six management components: stock assessment; fishery monitoring; enforcement compliance; research; organizational integrity/viability; regulatory action. The review will be conducted through a literature search and interviews with decision makers, researchers, and stakeholders. Because the FMP will integrate several components subject to management review, it is appropriate to schedule the review after the FMP's completion.
Progress on Condition [Year 3]	As noted in 2015, the Oregon Trawl Commission has identified Golden Marine Consulting as the qualified entity to conduct the management system review. Components of the review have been identified. The scheduling of the review was put on hold until the completion of the FMP. The FMP is now in draft form and available for public review, and is scheduled to be completed and adopted in 2016.
Progress on Condition [Year 4]	An external review of the Oregon and Washington management systems was conducted in 2016 by Golden Marine Consulting. The report of the management evaluation was presented to the assessment team at the 2017 Surveillance audit.
Status of condition	The condition has been met and is now closed. PI 3.2.5 has been rescored at 80.

Table 11. Condition 6-Washington

	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
Performance Indicator(s) & Score(s)	3.2.5	There is a system for 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.	70
Condition	<p>By the 3rd surveillance audit of the combined WO fisheries (first WA surveillance audit), the client must develop a plan for external review of the management system to occur at some specified interval. The plan should consider the recommendation of the 2008 management policy review that a similar external review be conducted every 2-3 years.</p> <p>By the 4th surveillance audit of the combined WO fisheries (2nd WA surveillance audit), the client must provide documented evidence to show that the fishery-specific management system is subject to occasional external review. (Scoring Issue B)</p>		
Milestones	<p>Year 1 (aligned with year 3 for Oregon): The client will provide evidence that the appropriate individual has been identified to carry out the review, and that the details of the work have been discussed and understood by WDFW in a written plan available to the management system.</p> <p>Year 2 (aligned with year 4 for Oregon): The client will provide evidence that an external review has been conducted, and that future reviews will occur periodically.</p>		
Client action plan	<p>The Client agrees to provide evidence to show that the fishery's management system is subjected to occasional external review. By the 3rd annual audit, Client will have identified a qualified individual to conduct the management review. By the 4th surveillance audit, the fishery client will provide documented evidence to show that the fishery's management system is subjected to occasional external review. The external review will be carried out by a credible management expert, hired in conjunction with OTC and client, who will identify any gaps and propose corrective action, along with the appropriate rationale.</p>		
Progress on Condition [Year 1]	<p>An update was provided during the 2016 audit. The client has contracted Golden Marine Consulting (GMC) to conduct an external review of the management system for Washington pink shrimp. This review will be done in conjunction with the management system review of the Oregon shrimp fishery.</p> <p>The GMC review of the management system will follow the same plan for both Oregon and Washington. The review will focus on six management components: stock assessment; fishery monitoring; enforcement compliance; research; organizational integrity/viability; regulatory action. The review will be conducted through a literature search and interviews with decision makers, researchers, and stakeholders.</p>		
Progress on Condition [Year	<p>An external review of the Oregon and Washington management systems was conducted in 2016 by Golden Marine Consulting. The report of the management</p>		

2]	evaluation was presented to the assessment team at the 2017 Surveillance audit.
Status of condition	The condition has been met and is now closed. PI 3.2.5 has been rescored at 80.

5. Conclusion

The Oregon fishery has now met all conditions of certification. The Washington fishery has one condition remaining open (3.2.1) **and is therefore now behind target on the timeline for this condition**. If the open condition is not met within one year of falling behind target, the certification may be suspended. No other changes in the fishery have occurred that would detrimentally affect the performance of either state fishery against the MSC Standard and the fisheries continues to meet the requirements of MSC certification. MSC Certification should therefore continue.

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Appendices

Appendix 1. Re-scoring evaluation tables

Performance Indicator 1.1.2 was rescored again as a result of the 2016 surveillance audit (it was also rescored as a result of the 2015 audit. Updates to the text from the original report made as a result of the 2015 surveillance are given in **orange**. Updates made as a result of the 2016 audit are given in **blue**.

PI 1.1.2		Limit and target reference points are appropriate for the stock	
SG	Issue	Met? (Y/N)	Justification/Rationale
60	a	Y	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.
			March 2015: Original PI Text for this Scoring Issue has not been updated as the scoring issue was already considered to be met after the initial assessment. However, updates given under Scoring issues (b) and (c) for the SG 80 can be considered as supplements to this and to the rationale under Scoring Issue (a) for the SG 80.
			As described in PI1.1.1 above, there are no formal reference points for this fishery. Reference points are not set based on recruitment indices or spawning stock biomass. Rather, stock status references are based on trends in CPUE and year-class strength as outlined in the Biological Points of Concern in the draft Fishery Management Plan (Abramson et al., 1981) as well as a recruitment forecast for the upcoming fishing season (ODFW, 2012). The points of concern are: 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).
			Development of a limit reference point for minimum spawning stock abundance for shrimp stocks off the Oregon coast using models that incorporated environmental variability was investigated by Hannah (1999). The study suggested a minimum spawning stock threshold of 1.3 billion pink shrimp in order to maintain a higher average recruitment. However, the author cautioned that, while identifying a spawner-recruitment threshold might be possible, it would be more advisable to base it on a retrospective study of stock size and stock recovery (Hannah and Jones, personal communication). Hannah (2010, 2011) subsequently demonstrated that transport and ultimate survival of shrimp larvae off the Oregon coast were dependent on variation in coastal upwelling. Models using CPUE and/or age composition data have failed to provide meaningful reference points for fishery management.
			Environmentally based models provide evidence of a recruitment-stock relationship that is heavily influenced by environmental conditions during the larval stage. Furthermore, it is also possible that a release of predation through the decline of Pacific whiting (<i>Merluccius productus</i>) has had a positive effect on the shrimp stock (Hannah, pers. comm.) Any negative impacts of the fishery that might have occurred are obscured by environmental noise. Therefore, setting a limit reference point for this stock is impractical at this time as there is no stock-recruitment relationship that is affected by the fishery.
			There are no fishery-independent measures of stock size (e.g. research survey

PI 1.1.2		Limit and target reference points are appropriate for the stock	
SG	Issue	Met? (Y/N)	Justification/Rationale
			<p>estimates). Survey techniques were investigated for the development of reference points for ocean shrimp off California and Washington based on the assumption that a pre-season estimate of spawning biomass would provide a metric for an appropriate harvest (e.g. TAC) for the fishing season. However, pre-season survey estimates were found to be poor predictors of shrimp biomass during the 1970's (Hannah and Jones, pers. comm.). Furthermore, weather and ocean conditions prior to the spring transition period were not conducive to survey methods.</p> <p>The standardized fishery CPUE is the only biomass index available. Performance against the long-term average CPUE (1980 - 2010) can serve as a generic reference for current stock status but, for example, there has been no determination of "healthy, cautious and critical" zones in a precautionary sense (e.g. DFO, 2011).</p>
80	a	Y	Reference points are appropriate for the stock and can be estimated.
			The trends in CPUE and year class strength, and the recruitment forecast, (described above) provide informal reference points that are appropriate for the stock.
	b	N Y	<p>The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.</p> <p>Because there is no formal limit reference point this SI is not met.</p> <p>March 2015 Update: A limit reference point has been established in 2014 for the pink shrimp fishery as summarized in the following paragraph (from Hannah and Jones 2014). Management action consisting of closing the current fishing season and delaying the start of the next fishing season will be undertaken via the temporary rulemaking procedure should the described conditions be met.</p> <p>A mean April-January Sea Level Height 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 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 2005).</p> <p>The assessment team considers this approach as appropriate and that the</p>

PI 1.1.2		Limit and target reference points are appropriate for the stock	
SG	Issue	Met? (Y/N)	Justification/Rationale
			Limit Reference Point is set above the level at which there is an appreciable risk of impairing reproductive capacity.
	c	NY	<p>The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.</p> <p>Because there is no formal target reference point this SI is not met.</p> <p>March 2015 Update:</p> <p>Suggesting an approach for target-like management is somewhat difficult for ocean shrimp. This is because the very rapid stock rebuilding potential of ocean shrimp, along with environmentally-driven recruitment and scant evidence for a stock-recruit relationship makes it difficult to specify an appropriate target reference point that is in any way related to maximum sustainable yield (MSY).</p> <p>Target reference point strategies, in general, were developed to try and strike a reasonable balance between fishing mortality rates that are too low to maximize yield and the negative consequences of overfishing, given inevitable uncertainty about stock size and productivity. Although Oregon's management strategy for ocean shrimp is less precautionary than those applied to many longer-lived fishery resources, a less precautionary approach is appropriate for ocean shrimp because the consequences of overfishing this stock are much less severe than for most fish stocks. Moreover, the consequences, in terms of lost yield, of too conservative harvest management, are much greater for ocean shrimp (Hannah and Jones 2014).</p> <p>However, it should be recognized that environment-recruitment models frequently break down over time (Myers 1998), and also that there are indications that global climate change could significantly alter recruitment patterns of ocean shrimp over time (Hannah 2011). Therefore, a target reference point has been established that is based primarily upon in-season catch rates, providing a "back-stop" for the possibility of unexpected environmental changes that could result in persistent low levels of recruitment. A June catch per trip value of less than 12,500 lbs, regardless of the ocean conditions during the larval year, indicates the need for additional precautionary management of spawning stock biomass (Hannah and Jones 2014). Therefore, should June catch per trip drop below this level, the ocean shrimp season should close October 15th and not reopen until April 15th of the following year, to provide increased protection for egg-bearing females. Should these conditions arise, this management action will be implemented through emergency rule, as described above for the LRP.</p> <p>This approach is an alternative to a B_{msy} abundance-based approach—it is an 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. Such an approach is considered by the assessment team to be similar in intent to a target reference point designed to maintain high long term yield. However without further clarification from the MSC on their intent with respect to TRPs for species with this type of population dynamics and life history, and/or better justification as to how the above-described TRP is meeting the intent of this Scoring Issue in relation to the requirement to "maintain the stock at a level consistent with B_{MSY} or some measure or surrogate with similar intent</p>

PI 1.1.2		Limit and target reference points are appropriate for the stock	
SG	Issue	Met? (Y/N)	Justification/Rationale
			<p>or outcome", the assessment team considered this scoring issue as still not met.</p> <p>Further clarification has since been provided by the MSC (Hoggarth pers. comm.) for such circumstances, stating the following (emphasis added to the relevant sections):</p> <p><i>The section quoted is from v2.0 GSA 2.2.3. The following subsection 2.2.3.1 includes the following text:</i></p> <p><i>Where proxies are used that are not expressed as percentages of B₀, teams should generally ensure that:</i></p> <ul style="list-style-type: none"> <i>Any reference point used as a proxy for scoring the PRI is set above the point where there is an appreciable risk of recruitment failure; and</i> <i>Any reference point used as a proxy for the MSY level maintains the stock well above the PRI and at levels of production and stock sizes consistent with B_{MSY} <u>or a similar highly productive level.</u></i> <p><i>Where proxy reference points are defined in this way, teams should take account of the difference between the reference point and the required (PRI or MSY) levels in their scoring.</i></p> <p><i>We refer in various places in the GFCR to such 'MSY or a similar highly productive level'. Although we allow the use of proxy reference points and expect that teams should take account of the difference between the reference point and the required (PRI or MSY) levels in their scoring (SA 2.2.3.1), our use of the underlined text above recognises that MSY may not always be reliably estimable, and it may be sufficient in these cases to ensure that the stock is fluctuating around a 'highly productive' level that is clearly above any likely PRI. One approach here is the use of B_{MSY}trigger as a lower threshold (not a target, and not MSY) in EU fisheries. Another approach may be to simply say that productivity is unrelated to stock size above the limit reference point, and therefore any productivity higher than the limit point is acceptable. Other approaches such as setting F=M, or working to achieve an annual escapement of around 40% are all pragmatic proxies for MSY.</i></p> <p>Based on this clarification from MSC, the assessment team considers the implemented TRP as consistent with MSC requirements in that there is clearly a difference in productivity, or expected productivity between the LRP and TRP, and since productivity is unrelated to stock size above the limit reference point in this case, any productivity higher than the LRP is acceptable as a TRP. Thus the TRP is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome. Thus the 80 scoring guidepost is met for this scoring issue.</p>
	d	N/A	Key low trophic level species, the target reference point takes into account the ecological role of the stock.

PI 1.1.2		Limit and target reference points are appropriate for the stock	
SG	Issue	Met? (Y/N)	Justification/Rationale
			The pink shrimp is not considered to be a low trophic species.
100	b	N	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues .
			Because there is no formal limit reference point this SI is not met.
	c	N	March 2015 Update: There is not sufficient evidence presented in Hannah and Jones 2014 to suggest that the LRP conditions triggering management action take extra precaution into consideration.
			The target reference point is such that the stock is maintained at a level consistent with B _{MSY} or some measure or surrogate with similar intent or outcome, or a higher level , and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty .
		Y	Because there is no formal target reference point this SI is not met.
			March 2015 Update: There is not yet sufficient evidence presented in Hannah and Jones 2014 to suggest that the TRP conditions triggering management action are designed to keep the stock status at a level higher than a Bmsy equivalent with a high degree of certainty, although as described above, it is difficult to apply a Maximum Sustainable Yield concept to a short lived, highly variable and highly resilient stock such as pink shrimp. The additional clarification provided by MSC cited above enables the assessment team to accept the TRP as consistent with the intent and outcome of a Bmsy level; however, there is not yet sufficient evidence to determine that this takes into account all relevant precautionary issues such as the ecological role of the stock with a high degree of certainty, thus the SG100 level is not met for this scoring issue.
References		Abramson et al., 1981; DFO, 2011/12; Hannah, 1999; 2010; 2011; ODFW, 2012; Hannah and Jones 2014; Hoggarth pers. comm, 2015)	
OVERALL PERFORMANCE INDICATOR SCORE:			65 75 80
CONDITION NUMBER			1--Closed

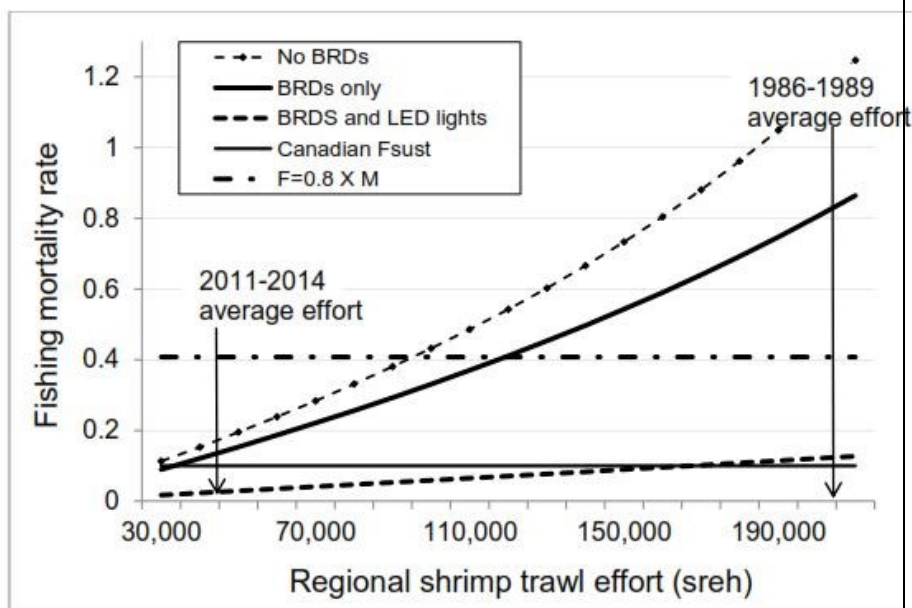
Evaluation Table PI 2.3.1.

The original text of the full assessment report for Oregon is given here in black. Changes and additions resulting from the 2016 surveillance audit are given in blue.

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species. The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species	
SG	Issue	Met? (Y/N)	Justification/Rationale
60	a	Y	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.

		<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 was recently 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 (as per CB3.11.4).</p>
b	Y	<p>Known direct effects are unlikely to create unacceptable impacts to ETP species.</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 pink shrimp fishery between 2007 and 2010. 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 Fraser and Columbia) is not large (Hay and McCarter, 2000).</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>In conclusion, this SG is met for a number of reasons. Eulachon by-catch in offshore shrimp fisheries was not ranked as the top threat in all sub-areas of the DPS (BRT, 2008). The fishers and ODFW are reducing the bycatch of</p>

			<p>eulachon by use of BRDs 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 OPS 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.</p> <p>When more information on the status of the eulachon DPS becomes available, additional, more specific effects of the shrimp fishery and their magnitude may become known. In addition, new federal regulations on the fishery may be developed and implemented as a result of this additional information.</p>
80	a	N/A	<p>The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.</p> <p>Not applicable, as per CR CB3.11.4.</p>
	b	NY	<p>Direct effects are highly unlikely to create unacceptable impacts to ETP species.</p> <p>This is true for all ETP species except eulachon. There is not enough information to rule out unacceptable impacts to eulachon from the fishery.</p> <p>Based on experimental fishing with green LED lights beginning in the 2014 shrimp season (see above for more details), The paper “Tests of artificial light for bycatch reduction in an ocean shrimp (<i>Pandalus jordani</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%.</p> <p>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 (<i>Thaleichthys pacificus</i>) from bycatch mortality in the ocean shrimp (<i>Pandalus jordani</i>) trawl fishery. The following figure, 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; sreH), using the “conservative” parameter set assuming:</p> <ol style="list-style-type: none"> 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. <p>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 $F=0.8 \times M$)</p>



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. 2011, 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

		<p>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.</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 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.</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 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 Electrolume 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</p>
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			<p>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 previous surveillance audit (see above under year 2 conditions progress for 2.3.1). 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. Thus the SG80 scoring guidepost is met for this issue.</p>
	c	Y	<p>Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.</p> <p>The OPS 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.</p>
100	a	N	<p>There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.</p> <p>See SG 80a</p>
	b	N	<p>There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.</p> <p>See SG 80b</p>
	c	N	<p>There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.</p> <p>See SG 80c</p>
References			<p>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).</p>
OVERALL PERFORMANCE INDICATOR SCORE:			<p>70 80</p>
CONDITION NUMBER (if relevant):			2-Closed

Evaluation Table: PI 2.3.3

The original text of the full assessment report for Oregon is given here in black. Changes and additions resulting from the 2017 surveillance audit are given in blue.

PI 2.3.3		<p>Relevant information is collected to support the management of fishery 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. 	
SG	Issue	Met? (Y/N)	Justification/Rationale
60	a	Y	<p>Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.</p> <p>See scoring rationale presented in 80a.</p>

PI 2.3.3		Relevant information is collected to support the management of fishery 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. 	
SG	Issue	Met? (Y/N)	Justification/Rationale
	b	Y	<p>Information is adequate to broadly understand the impact of the fishery on ETP species.</p> <p>Observer coverage in the pink shrimp trawl fishery had remained relatively consistent at 7% coast wide through 2009, and increased to 12% in 2010. 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 by the Biological Review Team (2008) and updated in the Federal Register (2011).</p> <p>See scoring rationale presented in 80b.</p>
	c	Y	<p>Information is adequate to support measures to manage the impacts on ETP species.</p> <p>Results of the at sea monitoring are compiled and analyzed to estimate catch and associated impact of the fishery on ETP species, which managers use to manage impact. See rationale under 100c</p>
80	a	Y	<p>Sufficient data are available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.</p> <p>There are several sources of quantitative information available which contribute to the ability to estimate eulachon mortality the impact of the Oregon 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 use of LED lights, footrope configuration, and landings documentation.</p> <p>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 2010 2015 (beginning in 2010 for Washington vessels; Somers et al, 2016) so far (Al-Humaidhi et al., 2011).</p>
	b	NY	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.

PI 2.3.3		Relevant information is collected to support the management of fishery 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. 	
SG	Issue	Met? (Y/N)	Justification/Rationale
			<p>Information is not sufficient to determine to what degree the fishery may be a threat to protection and recovery of eulachon. Because of documented no or very low bycatch of all other 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 (Somers 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. by the Biological Review Team (2008) and updated in the Federal Register (2011). This constitutes sufficient information to determine whether the pink shrimp fishery may be a threat to the protection and recovery of eulachon.</p>
	c	Y	<p>Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.</p> <p>The WCGOP provides information on location and time of bycatch of EPT species. Estimates of total catch of can be expanded based on fishery logbook data and fish ticket information.</p> <p>See rationale under 100c</p>
100	a	N	<p>Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.</p> <p>Information is sufficient to estimate outcome status of all ETP species with a high degree of certainty, except eulachon.</p>
	b	N	<p>Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.</p> <p>This element is being studied (Hannah and Jones, in preparation)</p>
	c	NY	<p>Information is adequate to support a comprehensive strategy to manage impacts, minimise mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.</p>

PI 2.3.3		Relevant information is collected to support the management of fishery 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. 	
SG	Issue	Met? (Y/N)	Justification/Rationale
			<p>Fisheries scientist and managers are developing a recovery plan for eulachon.</p> <p>The WCGOP provides information on location and time of bycatch of ETP species. Estimates of total catch of can be expanded based on fishery logbook data and fish ticket information.</p> <p>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, with a number of other threats also identified. 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.</p> <p>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):</p> <ul style="list-style-type: none"> • 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. <p>This comprises information adequate to support a comprehensive strategy to manage impacts, minimise mortality and injury of the ETP species eulachon, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.</p>

PI 2.3.3		Relevant information is collected to support the management of fishery 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. 	
SG	Issue	Met? (Y/N)	Justification/Rationale
References			<p>Al-Humaidhi et al., 201; Hannah and Jones, in preparation; Biological Review Team 2008; and Federal Register 2011.</p> <p>Hannah, R.W. (2016). Modeling the effect of changing fishing effort and bycatch reduction technology on risk to eulachon (<i>Thaleichthys pacificus</i>) from bycatch mortality in the ocean shrimp (<i>Pandalus jordani</i>) trawl fishery. Oregon Department of Fish and Wildlife Information Report Series, Fish. No. 2016-02. 20pp.</p> <p>National Marine Fisheries Service (NMFS) (2016a). Recovery Plan for Eulachon (<i>Thaleichthys pacificus</i>) National Marine Fisheries Service, West Coast Region, Protected Resources Division, Portland, OR. 97232 [DRAFT], accessed at http://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html</p> <p>NMFS (2016b). 2016 5-year Review, Summary & Evaluation of Eulachon. National Marine Fisheries Service, West Coast Region, Protected Resources Division, Portland, OR. 97232. Accessed at http://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html</p> <p>Somers, K.A., Y.-W. Lee, J.E. Jannot, & J. McVeigh. 2016. FOS coverage rates, 2002-2015. Last updated: 16 August 2016. NOAA Fisheries, NWFSC Observer Program, 2725 Montlake Blvd E., Seattle, WA 98112.</p>
OVERALL PERFORMANCE INDICATOR SCORE:			7585
CONDITION NUMBER (if relevant):			3

Evaluation Table: PI 3.2.1 for Oregon

The original text of the full assessment report for Oregon is given here in black. Changes and additions resulting from this (2017) surveillance audit are given in blue.

PI 3.2.1		The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2	
SG	Issue	Met? (Y/P N)	Justification/Rationale
60	a	Y	Objectives , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system.

PI 3.2.1		The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2	
SG	Issue	Met? (Y/P/N)	Justification/Rationale
			<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).</p> <p>Actions taken proactively to by the MRP in coordination with the fleet to develop BRDs also reflect implicit objectives on bycatch and ETP species.</p> <p>See justification under 100a.</p>
80	a	N Y	<p>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's management system.</p> <p>A state pink shrimp fishery management plan has not been developed, although Oregon Administrative Rules provide guidance for the contents of such FMPs, and several other Oregon fisheries operate under an FMP (OAR 2012a). The pink shrimp fishery is managed under the umbrella objectives for all Oregon food fish (ORS 506.109, 1975). Accordingly, there are no short or long term objectives that explicitly and specifically apply to the pink shrimp fishery.</p> <p>See justification under 100a.</p>
100	a	N Y	<p>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's management system.</p>

PI 3.2.1		The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2	
SG	Issue	Met? (Y/P/N)	Justification/Rationale
			<p>A draft FMP has completed internal ODFW review and public comment. (Hannah and Jones 2016a). The FMP comprises three major sections, each with several subsections:</p> <ol style="list-style-type: none"> 4. Resource Analysis <ul style="list-style-type: none"> • Species • Description of the shrimp resource • Available data • Stock status • Known threats to the resource • Sustainable harvest levels • Prioritized list of research needs 5. Harvest Management Strategy. <ul style="list-style-type: none"> • Species • Management objectives • Current issues • Description of the fishery • Other social and/or cultural uses of the resource • Biological reference points and fishery controls 6. Glossary of terms and literature cited <ul style="list-style-type: none"> • Glossary of terms • Literature cited <p>The draft FMP for pink shrimp in Oregon includes clearly specified short-term and long-term objectives for the management of the fishery. Although the FMP was not formally adopted and implemented by the end of the 2016 season, the fishery is being managed according to the framework of the plan and is on a clear path for FMP adoption in November 2017. The delay of FMP adoption and implementation until a final season of LED experiments has a clear and supportable rationale.</p>
References			Abramson et al., 198; Hannah, 2012; NMFS, 2005; ORS 506.109, 1975; OAR, 2012a
OVERALL PERFORMANCE INDICATOR SCORE:			60 100
CONDITION NUMBER (if relevant):			4

Evaluation Table: PI 3.2.5-For Oregon

The original text of the full assessment report for Oregon is given here in black. Changes and additions resulting from this (2017) surveillance audit are given in blue.

PI 3.2.5		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	
SG	Issue	Met? (Y/N)	Justification/Rationale
60	a	Y	The fishery has in place mechanisms to evaluate some parts of the management system.

			Some components of management performance are evaluated annually by ODFW and reported in the Annual pink shrimp review under six section heads season summary, indicators for the upcoming season, issues updates, research results, regulatory changes and enforcement issues (ODFW, 2008, 2009, 2010, 2011, 2012).
	b	Y	The fishery-specific management system is subject to occasional internal review.
			Annually the ODFW conducts 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.
80	a	Y	The fishery has in place mechanisms to evaluate key parts of the management system
			The fishery has in place mechanisms to evaluate key 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 (ODFW 2008, 2009, 2010, 2011, 2012, 2013, 2014 , 2015 , 2016 , 2017).
	b	NY	The fishery-specific management system is subject to regular internal and occasional external review.

			<p>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.</p> <p>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). A single external review of the management policy has been performed as a condition of the 2007 certification (TAVEL Certification, 2007; Golden, 2008). A recommendation of the management policy review was that a similar external review be conducted every 2-3 years. To date, another review has not been conducted, nor has there been any stated plan to conduct external reviews on a regular or occasional basis.</p> <p>While the fishery has met the “regular internal review” portion of the SG80, it fails to meet the “occasional external review” requirement of this scoring indicator, therefore this indicator is not considered met as partial scoring is not permitted.</p> <p>An external review of the Oregon and Washington management systems was conducted in 2016 by Golden Marine Consulting (Golden, 2016). The report of the management evaluation was presented to the assessment team at the 2017 Surveillance audit. The intention is to repeat this external review process every 5 years, coinciding with the MSC reassessment of the fishery. However, since only one such review has been completed to date, this does not yet qualify as ‘regular’ external review, thus the SG100 is not met.</p>
100	a	N	<p>The fishery has in place mechanisms to evaluate all parts of the management system.</p> <p>See SG 60a & 80a</p>
	b	N	<p>The fishery-specific management system is subject to regular internal and external review.</p> <p>See SG 60b & 80b</p>
References			<p>Golden, 2008; 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. Golden, 2016.</p>
OVERALL PERFORMANCE INDICATOR SCORE:			70 80
CONDITION NUMBER (if relevant):			6

Evaluation Table: PI 3.2.5 for Washington

The original text of the scope extension report for Washington is given here in black. Changes and additions resulting from this (2017) surveillance audit are given in [blue](#).

PI 3.2.5		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	
SG	Issue	Met? (Y/N)	Justification/Rationale
60	a	Y	The fishery has in place mechanisms to evaluate some parts of the management system.

			Some components of management performance are evaluated annually by ODFW and reported in the Annual pink shrimp review under six section heads season summary, indicators for the upcoming season, issues updates, research results, regulatory changes and enforcement issues (ODFW, 2008, 2009, 2010, 2011, 2012).
	b	Y	The fishery-specific management system is subject to occasional internal review.
			Annually the ODFW conducts 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.
80	a	Y	The fishery has in place mechanisms to evaluate key parts of the management system The fishery has in place mechanisms to evaluate key 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 (ODFW 2008, 2009, 2010, 2011, 2012).
	b	N Y	The fishery-specific management system is subject to regular internal and occasional external review.

			<p>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.</p> <p>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). A single external review of the management policy has been performed as a condition of the 2007 certification (TAVEL Certification, 2007; Golden, 2008). A recommendation of the management policy review was that a similar external review be conducted every 2-3 years. To date, another review has not been conducted, nor has there been any stated plan to conduct external reviews on a regular or occasional basis.</p> <p>While the fishery has met the “regular internal review” portion of the SG80, it fails to meet the “occasional external review” requirement of this scoring indicator, therefore this indicator is not considered met as partial scoring is not permitted.</p> <p>An external review of the Oregon and Washington management systems was conducted in 2016 by Golden Marine Consulting (Golden, 2016). The report of the management evaluation was presented to the assessment team at the 2017 Surveillance audit. The intention is to repeat this external review process every 5 years, coinciding with the MSC reassessment of the fishery. However, since only one such review has been completed to date, this does not yet qualify as ‘regular’ external review, thus the SG100 is not met.</p>
100	a	N	<p>The fishery has in place mechanisms to evaluate all parts of the management system.</p> <p>See SG 60a & 80a</p>
	b	N	<p>The fishery-specific management system is subject to regular internal and external review.</p> <p>See SG 60b & 80b</p>
References			<p>Golden, 2008; 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; Golden, 2017.</p>
OVERALL PERFORMANCE INDICATOR SCORE:			70 80
CONDITION NUMBER (if relevant):			6

Appendix 2. Stakeholder submissions

No written or verbal stakeholder submissions were received.

Appendix 3. Surveillance audit information

N/A

Appendix 4. Additional detail on conditions/ actions/ results

N/A

Appendix 5. Revised Surveillance Program

The following surveillance program will be followed for the 4th audit for OR (2nd audit for WA) and reassessment of both.

Table 5.1 : Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
4 OR 2 WA	<i>On-site audit, plus reassessment site visit.</i>	3	<i>This will be held commensurately with the full reassessment of the fishery, thus it is anticipated that a full team on-site will be necessary at that time.</i>

Table 5.2: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
4 OR 2 WA	<i>February 2017</i>	<i>March 2017</i>	<i>Updated information from the 2016 shrimp season is available from February 2017. March is the anniversary of the previous surveillance audit.</i>

Table 5.3: Fishery Surveillance Program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
<i>Level 4</i>	<i>On-site surveillance audit</i>	<i>On-site surveillance audit</i>	<i>On-site surveillance audit</i>	<i>On-site surveillance audit & re-certification site visit.</i>