



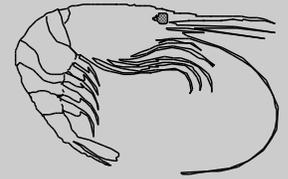
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Annual Pink Shrimp Review

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In color on the Web: <http://www.dfw.state.or.us/MRP/publications>



TO: OREGON SHRIMP INDUSTRY
FROM: Bob Hannah and Steve Jones
Subject: Opening of 2016 Commercial Fishery
Date: 15 February 2016

2015 Season Summary

The 2016 pink shrimp (*Pandalus jordani*) season will begin on 1 April and will extend through 31 October. This newsletter provides a summary of the 2015 season for your review including catch, effort and market sample information. Indicators for the 2016 season are described and discussed, along with some “hot topics” that industry participants will need to consider in 2016.

Oregon shrimpers harvested just over 53 million pounds in 2015, falling just 4 million pounds shy of the record set in 1978 (Figure 1). The 2015 total caps a five year run of near-50 million pound seasons, ranging from 47.6M in 2013 to 53.4M this year. The 2015 total was fueled by excellent hold-over of age-2 shrimp that were hatched in spring 2013.

Overall landings of pink shrimp in 2015 were simply tremendous along the west coast, with over 100 million pounds of shrimp landed into ports in California (7.1+m), Oregon (53.4m) and Washington (41.5m). It was the highest three-state total ever. Landing totals to date are not available for the British Columbia offshore fishery, but stocks are reportedly at record-high levels in areas off Vancouver Island too. Although the Oregon and Washington fleets achieved near-record (OR) and record (WA) landings in 2015, there are signs that the recent era of near-50 million pound seasons in Oregon (2011-2015) may be coming to a close.

Monthly landing totals were high from April through June, with the May total setting an all-time record for the month of 12.5 million pounds. Shrimpers started fishing during the first week in April, landing about 8.7 million pounds by the end of the month (Figure 2). Monthly landing totals moderated somewhat during July and August but declined precipitously in September and October, functionally ending the season early for many shrimpers. The high landing totals achieved through mid-season clearly resulted from high shrimp abundance, but also from a large volume of shrimp being processed as whole-frozen (“green-frozen”) shrimp. Due to this relatively new product form, monthly landing totals may have exceeded traditional processing capacity during the first three months of the 2015 season.

Hot Topics

- Eulachon Smelt Recovery Plan Status (Pg. 6)
- Draft Shrimp Fishery Management Plan (FMP) (Pg. 7)
- Proposed LED Light Requirement (Pg. 9)
- Count Issues Anticipated; OSP Ready (Pg. 9)

Coast-wide, catch by area was highest from areas near the California/Oregon border and the Washington/Oregon border (Figure 3). The Rogue River Bed in southern Oregon and the Grays Harbor Bed off southern Washington were by far the biggest producers, with each producing over 11 million

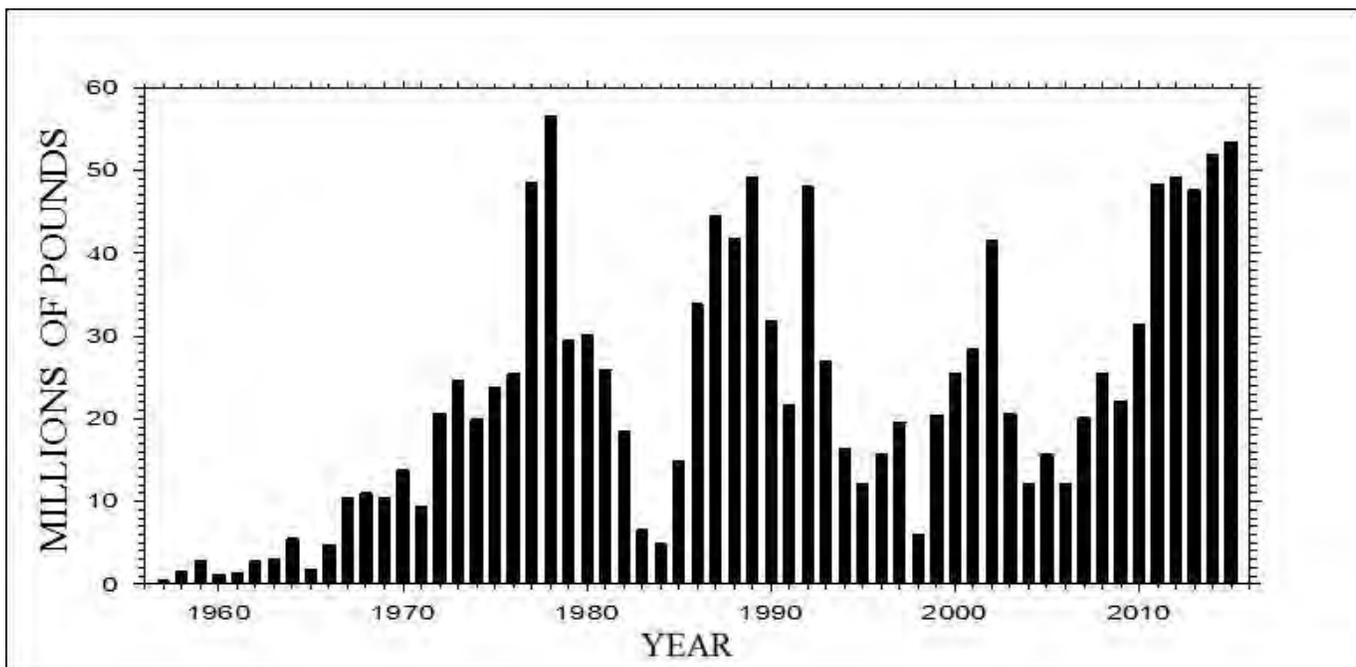


Figure 1. Annual Oregon pink shrimp landings (millions of pounds) 1957-2015.

pounds. Their adjacent areas, the Northern California and Destruction Island Beds respectively, each produced over 6 million pounds. All told, these four areas jointly produced about 68% of Oregon’s total catch for the season. Monthly landings in these regions held up fairly well through August, before dropping sharply. Areas to the north of the Rogue River Bed and south of the Columbia River only produced about 32% of Oregon’s landing total, with monthly catches declining earlier in the season in these areas.

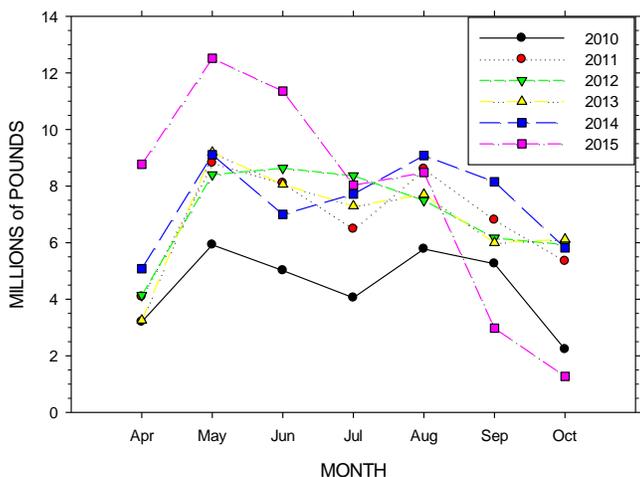


Figure 2. Monthly total weight of pink shrimp landed into Oregon (millions of pounds) during 2010, 2011, 2012, 2013, 2014 and 2015.

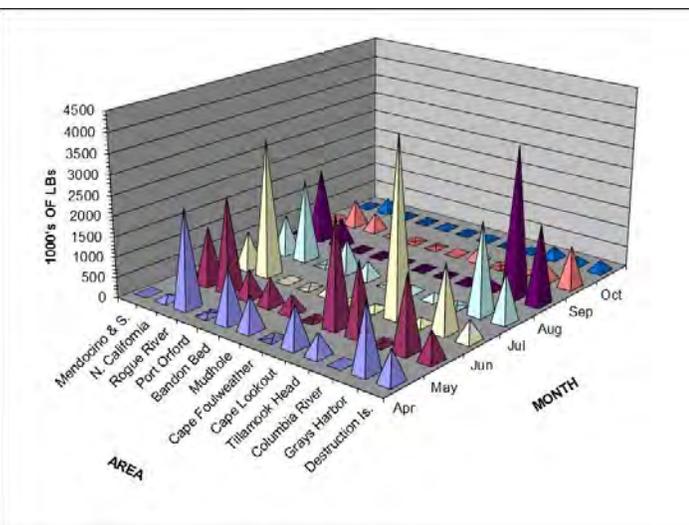


Figure 3. Estimated weight (thousands of pounds) of pink shrimp caught in each area by month that were landed into Oregon during 2015.

Fishing effort increased by several measures in 2015, each rising to levels not seen since 2002 (Figures 4, 5 & 6). Shrimpers spent 47,890 single-rig-equivalent hours (SRE) trawling in 2015, about 15,000 SRE more than in 2014. The number of vessels landing pink shrimp into Oregon increased from 60 in 2014 to 78 in 2015. Also, the number of trips made by shrimpers was 1,283 in 2015, up from 1,033 in 2014. The increases are notable since each of these effort measures is the highest since the vessel/permit buy-back in 2003.

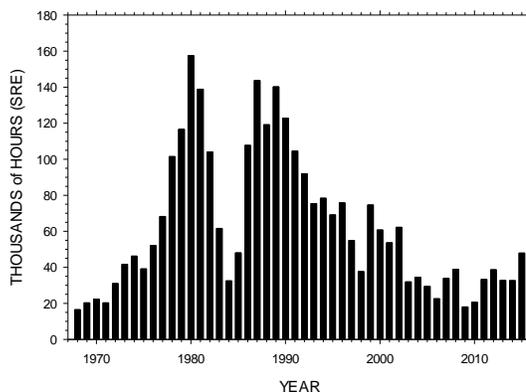


Figure 4. Annual hours (1000’s of SRE) spent trawling for pink shrimp that were landed in Oregon, 1968-2015. Note: single-rig-equivalent hours (SRE) = 1.6 X double-rig hours.

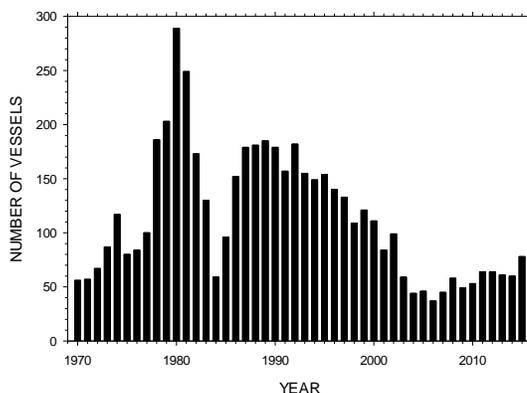


Figure 5. Annual number of vessels landing pink shrimp into Oregon: 1970-2015.

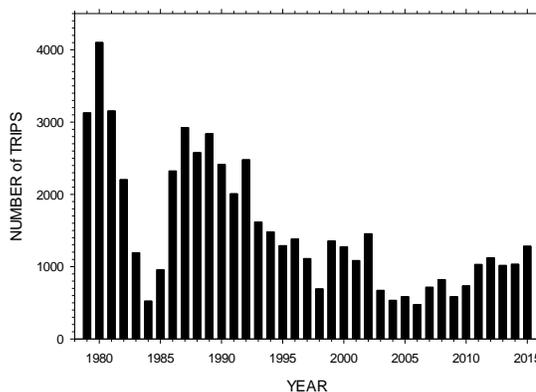


Figure 6. Annual number of trips landing pink shrimp into Oregon: 1979-2015.

Total hours (SRE) fished by area and month were relatively low and wide-spread during April and May as shrimpers found good catches in many areas (Figure 7). As the season progressed, shrimpers spent progressively more hours (SRE) fishing in southern and especially northern areas as catches in areas between Cape Blanco and the Columbia River diminished.

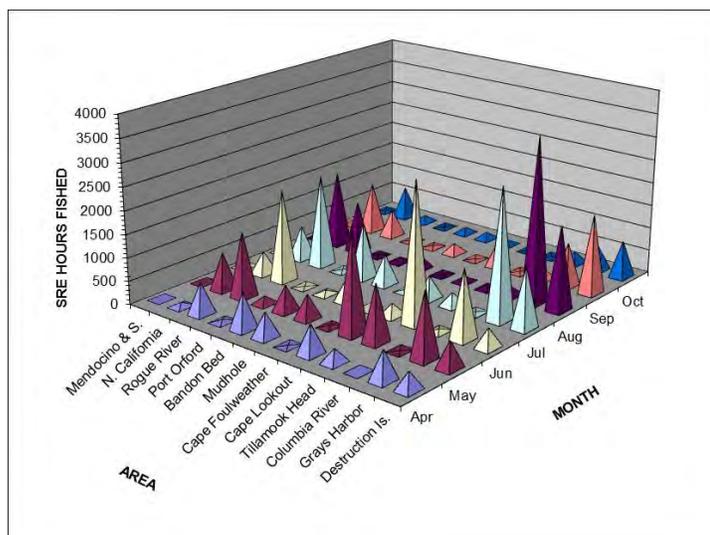


Figure 7. Estimated total hours (SRE) spent trawling for pink shrimp in each area by month during 2015. Note; single-rig-equivalent hours (SRE) = 1.6 X double-rig hours.

Overall catch-per-unit-effort (CPUE) in 2015 was relatively high historically speaking (1,115 lb/SRE) but was the lowest catch-per-hour SRE that the fleet experienced since 2009 (Figure 8). The 2015 level represents about a 30% decline from the all-time high that occurred in 2014.

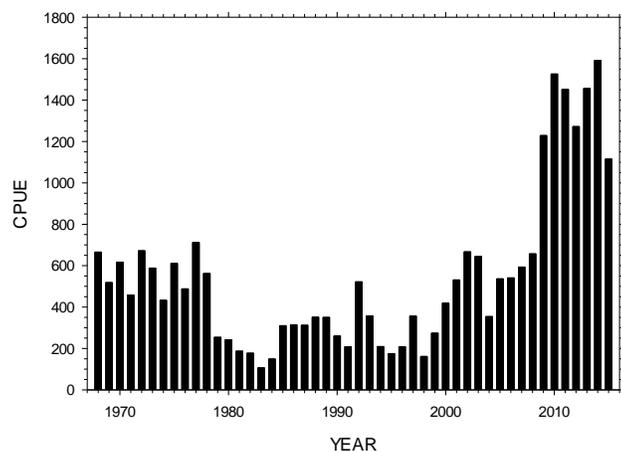


Figure 8. Annual average pounds of pink shrimp caught per hour (SRE) for vessels landing pink shrimp into Oregon; 1968-2015. Note: Catch-per-unit-effort = CPUE = pounds/SRE hour.

The CPUE by month followed a distinctly different pattern than we've seen in recent years, declining rapidly through the season as catches diminished and trips became longer. The steadily declining CPUE and the low levels seen in September and October indicate that marketable shrimp were scarce on the grounds near the end of the season (Figure 9). It is possible that the decline was due to harvest, but the decline seemed too abrupt and widespread for this to be the primary cause. We suspect that shrimp transport off the grounds may have occurred due to El Niño/warm-water "Blob" related currents, making the shrimp unavailable to shrimpers. We heard credible reports from the Whiting fleet that pink shrimp were being caught mid-water offshore in deep water late in the

season. Another possibility is that shrimp may have been transported north to waters off British Columbia, but evidence for such transport is weak.

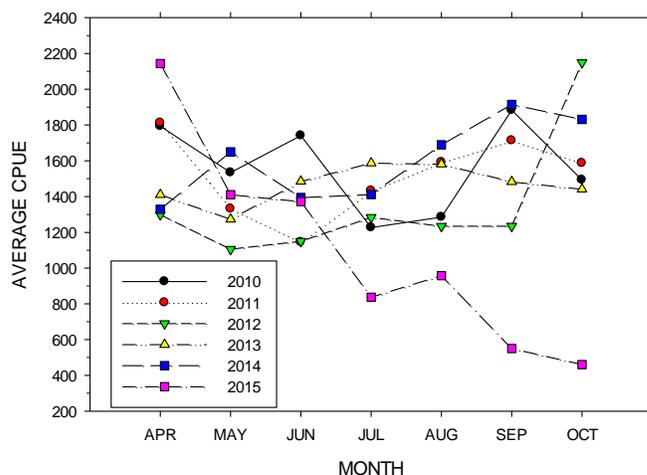


Figure 9. Monthly average pounds of pink shrimp caught per hour (SRE) for vessels landing pink shrimp into Oregon in 2010, '11, '12, '13, '14 and 2015. Note: Catch-per-unit-effort = CPUE = pounds/SRE hour)

Catch rates were highest in many areas during April, May and June, generally followed by substantial declines for the remainder of the season (Figure 10). The declines in CPUE were most pronounced from July through October, in areas south of the Columbia River and north of the Rogue River Bed. By September, most areas fished produced the lowest CPUE's that the fleet has experienced since the 2008 season.

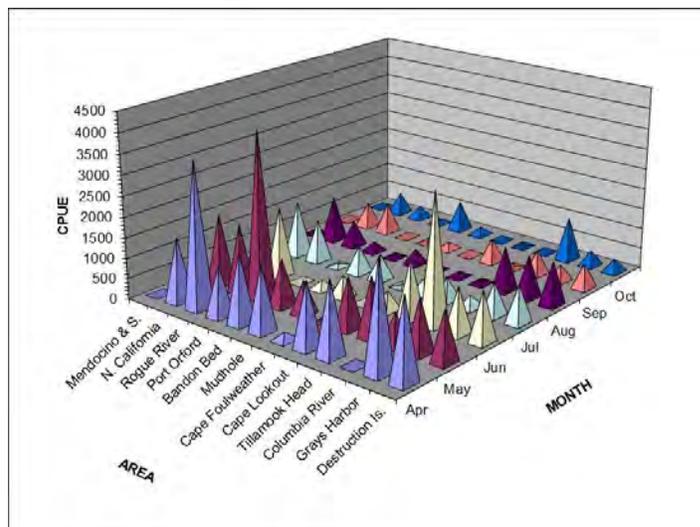


Figure 10. Estimated average pounds of pink shrimp caught per hour (SRE) by area and month for vessels landing pink shrimp into Oregon in during 2015. Note: Catch-per-unit-effort = CPUE = pounds/SRE hour).

Pounds caught per trip in 2015 declined to the lowest level since 2009 (Figure 11). Overall, it was about a 17% decline over the 2014 season. Trips were in the 50K range through June, declined to about 40K in July and August and then continued the decline to about 18K in October (Figure 12). Conversely, the number of hours it took shrimpers to catch "an average load" of shrimp increased sharply and steadily from April through July, doubling the time it took to catch a load and reflecting decreasing shrimp availability (Figure 12).

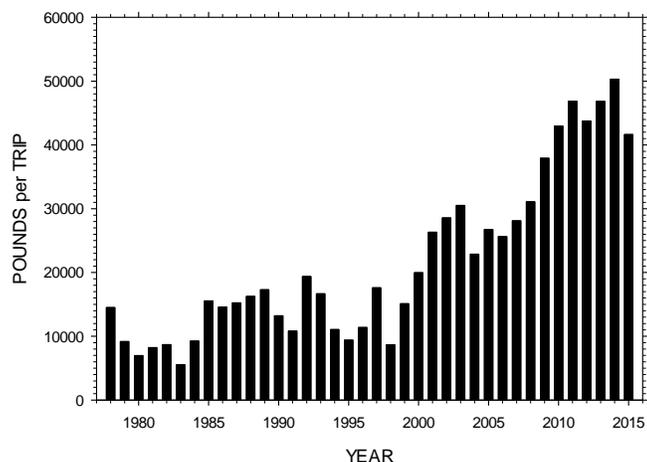


Figure 11. Annual average shrimp catch-per-trip (pounds) for shrimp vessels landing into Oregon; 1978-2015.

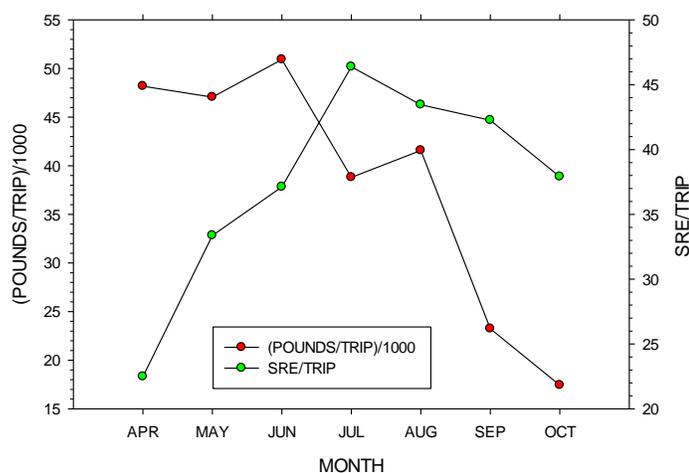


Figure 12. The average monthly shrimp catch-per-trip (1000's of pounds) landed into Oregon during the 2015 season versus the average number of SRE hours of trawling it took to catch a load of shrimp during each month of the 2015 season. Note: single-rig-equivalent hours (SRE) = 1.6 X double-rig hours.

The back-to-back 50 million pound seasons that the Oregon fleet has just produced resulted from the huge shrimp year-class hatched in spring 2013. Shrimpers harvested them heavily at age-1 in 2014, and again at age-2 in 2015. Almost 67% of the shrimp landed in Oregon during 2015 were age-2, sharply higher than the 25% seen in 2014 (Figure 13). The 2015 percentage of age-2 harvested wasn't a record per se, but it was the highest we've experienced in a high-volume season.

The average count-per-pound (count) of shrimp landed into Oregon ports during 2015 was 114 shrimp/pound, down sharply from the count of 136 seen in 2014 (Figure 14). The relatively low count experienced in 2015 resulted from the high abundance of age-2 shrimp in the catch. The average count would have been lower, but shrimp were relatively small at-age in 2015, functionally increasing the count. The reduced size-at-age may have resulted from high shrimp densities on the grounds, or reduced food sources or food quality on the grounds resulting from El Niño/ warm-water "Blob" affects.

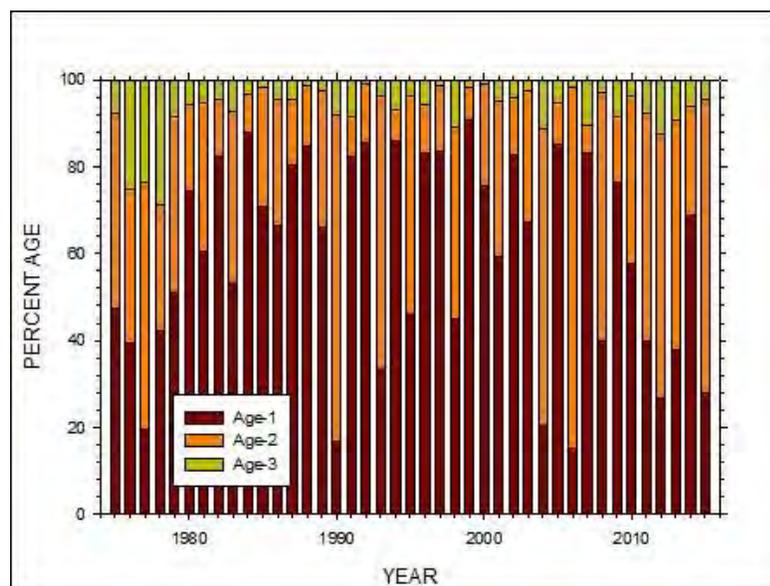


Figure 13. Annual percent age composition of pink shrimp (#'s of shrimp) landed in Oregon, 1975-2015.

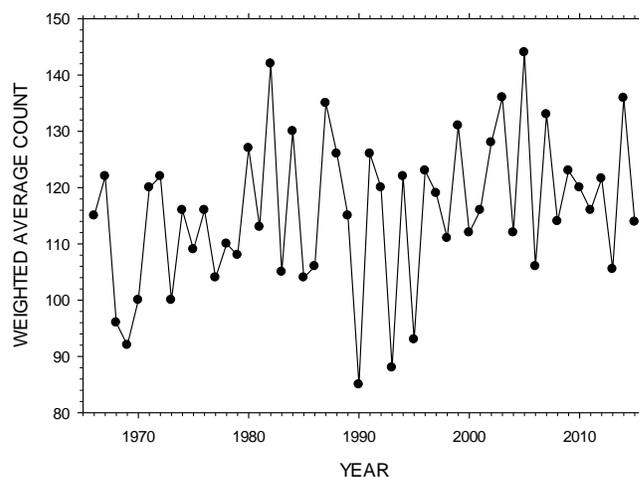


Figure 14. Annual average (catch weighted) count-per-pound (count) of pink shrimp landed into Oregon; 1966-2015.

Oregon shrimpers received an average ex-vessel price of \$0.76/pound in 2015, the highest average price (not adjusted for inflation) since the fishery began in the late 1950's (Figure 15). The high price apparently resulted from high market demand fostered by weak production of cold-water shrimp in east-coast Canadian and U.S. shrimp fisheries, among others. The total ex-vessel value of pink shrimp landed into Oregon ports in 2015 was \$40,338,316; far exceeding the value of previous annual shrimp harvest totals (Figure 16).

Price negotiations at the beginning of the 2015 season led to an opening average price of about \$.71/lb, about \$.20/lb more than the April opener in 2014 (Figure 17). The average price remained stable through June, before increasing monthly to a season-high of \$0.88/lb in October. The incremental price jumps seen from July-on occurred as shrimp became progressively scarce through the season. The price for the best grade of shrimp in October was generally \$1.00/lb while the poorest grade received about \$.40/lb.

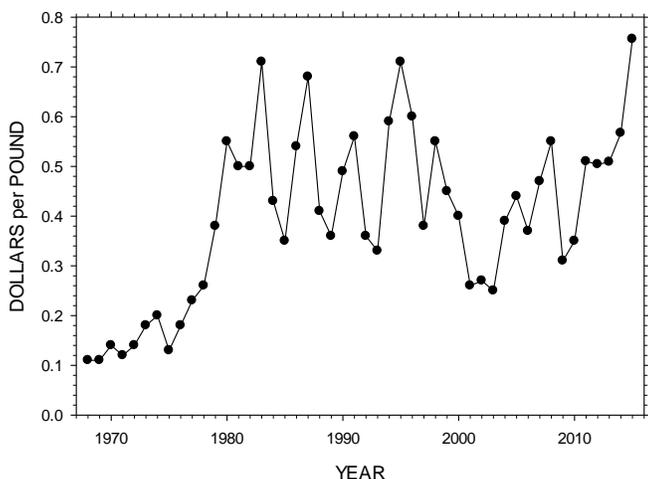


Figure 15. Annual average ex-vessel price-per-pound paid for pink shrimp landed in Oregon; 1968-2015.

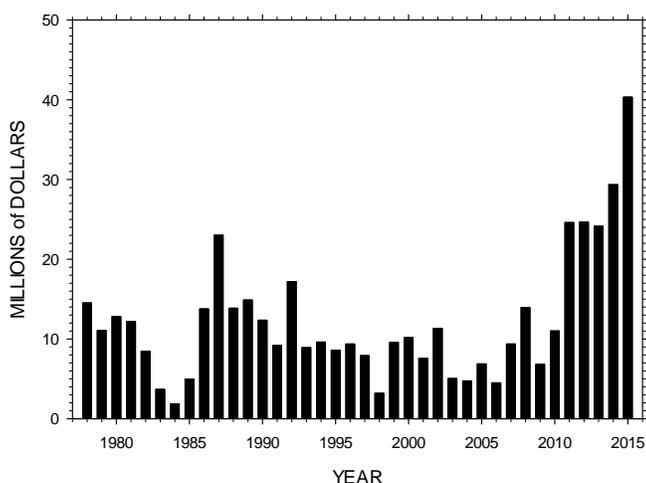


Figure 16. The annual ex-vessel value (millions of dollars) of pink shrimp landed into Oregon from 1978 through 2015. Values not adjusted for inflation.

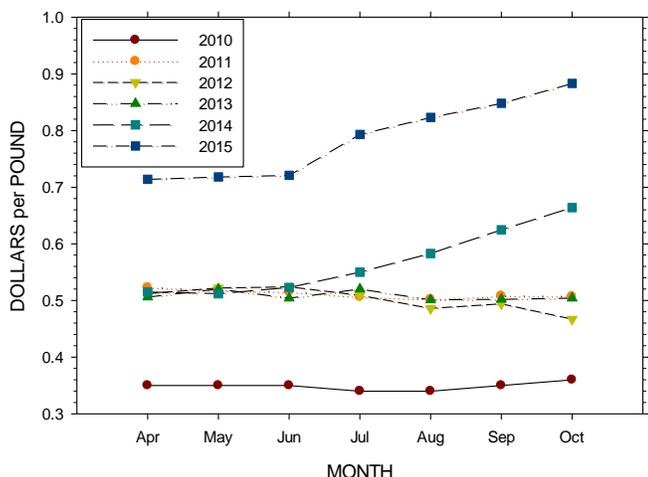


Figure 17. Monthly average ex-vessel price-per-pound paid for pink shrimp landed in Oregon; 2010 through 2015.

As in recent years, most shrimp were sold under a four-tiered price structure in 2015 and were destined for the traditional cooked-and-peeled market. But there was a major twist this year. Reportedly, a fairly large (but undetermined by us) amount of pink shrimp were sold under a single-price structure for a whole-frozen (“green-frozen”) product. The price was rumored to be significantly lower than the average price received for traditional processing. The relatively new product form is reportedly sold by processors as-is, or is held in cold storage for a period of time for cooking and peeling later. Industry opinions we heard varied widely over whether a shift to this product form would be good for the Oregon shrimp industry in the long term. With lower season totals anticipated in upcoming years, processors may be less inclined to deal with the new product form. We’ll see.

Indicators for 2016

Looking Back

Frankly, looking back we anticipated a significant drop in shrimp production in 2015 due to relatively low age-1 recruitment; a drop that didn’t occur. Instead, the Oregon fleet landed the second highest volume season on record. In hindsight, we now know that we misjudged the amount of age-2 shrimp that might have been available. Age-1 shrimp did come in fairly weak in 2015, but age-2 shrimp hold-over from the age-1’s remaining after the 2014 season, appears to have been anomalously strong. The age-class, hatched in spring 2013, comprised about 67% of the number of shrimp caught in 2015 by Oregon shrimpers. Our recruitment model, based on sea level height, appears to have correctly predicted exceptional survival to age-1 in 2014 (and much weaker in 2015) and landing totals for 2014 and 2015 are a legacy of that exceptional recruitment event (Figure 18).

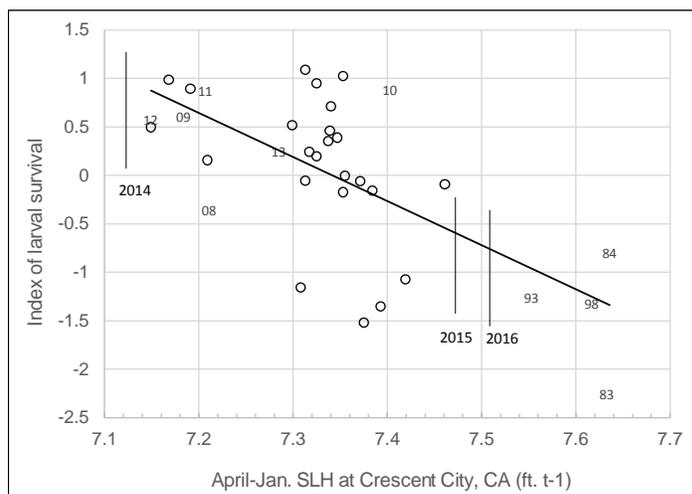


Figure 18. Index of larval survival vs. April-January average sea level at Crescent City, CA. Points shown indicate the year of age-1 catch. The vertical lines indicate the range of larval survival that might be expected given the sea level height (feet) for the years identified.

Looking Ahead

With that said, we’re now faced with assessing the prospects for the 2016 season in light of a strong El Nino in progress and possible influences of the warm water “Blob” affecting northwest waters for the last two seasons. Both of these

phenomena have the potential to have affected the survival and distribution of all shrimp age-classes. The abrupt and widespread decline in CPUE mid-season (Figure 10) may have been an example of a distribution shift, making the shrimp less available to shrimpers. With the exception of the fact that pink shrimp have done very poorly recruitment- and survival-wise during the last two strong El Nino events (1982-'83 & 1997-'98), we really know very little about how the stock may fare during the current event.

With the uncertainty brought about by the recent ocean conditions, it's difficult to predict what shrimping will be like in 2016. The indicators that we normally consider are more conflicting than most years. Catches at the end of 2015 suggest that older shrimp (age-2 & -3) probably will be relatively scarce in 2016. Market sample analysis from 2015 shows that zero-age shrimp were detected during June on the south coast, which was unusually early. The zero's (Figure 19) grew quickly and appeared to be quite abundant toward the end of the season, making up 20-30% of market samples (numbers of shrimp) from several areas ranging from the Mudhole Bed south into northern California. They were high from areas north of the Columbia River as well. Reports of tows dumped due to large numbers of zero's were fairly common, especially in-shore on the south coast. The zero's were good sized coast-wide at the end of the season suggesting that ocean conditions hadn't negatively affected them up to that time. All of this information points toward the possibility of a large in-coming crop of age-1 shrimp in 2016. The big "IF" is whether the zeros will survive well over the winter under the current El Nino conditions.



Figure 19. A photo of zero-age pink shrimp caught during June from the Rogue River Bed off southern Oregon. June is unusually early for zero's to be caught. They usually are high in the water column and unavailable to trawl gear. Photo courtesy of Justin Yeager.

The higher than average catches of age-zero shrimp suggest that recruitment of age-1 shrimp could be good. If that happens, the result would be a significant decline in the total volume of shrimp harvested in 2016, with catch rates picking up through the season as abundant age-1 shrimp grow. In other words; abundant small shrimp on the grounds, but harvest slowed early-on due to high shrimp counts.

On the other hand, our recruitment model suggests that the zero's present in fall 2015 may not survive well over the winter, leading to below average recruitment of age-1 shrimp in 2016. We emphasize "may" this year because the daily sea

level data from Crescent City, California, that the model relies on is incomplete for December and January, the months when big effects from El Nino events tend to show up. Utilizing the data points that were recorded though, the model suggests that the April 2015 – January 2016 average sea level height will be about 7.5 feet or higher (Figure 18). The last two big El Nino events (1982-'83 & 1997-'98) led to high sea levels and shrimp survival to age-1 was poor. We'll see.

Eulachon Developments

Recovery Planning Efforts

NOAA's Eulachon Recovery Team currently plans to make a draft Eulachon recovery plan available for public review and input in late February or early March 2016. A five year eulachon status review is also due out in March. Once released, the documents should be available on NOAA's Eulachon web page at "http://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html". We encourage shrimpers and other shrimp industry stakeholders to become familiar with their proposals, especially those that apply to the marine environment. We currently are not privy to what will be proposed regarding the shrimp fishery, except that we've been told that all shrimpers may be required to use ¾" grates and LED lights on their footropes in the near-future.

Columbia Returns/Ocean Abundance;

According to news accounts, the Columbia River System had another strong eulachon run in 2015. The run was large enough to support limited sport and commercial opportunities in Oregon and Washington.

Shrimpers reported that eulachon seemed abundant and widespread on the shrimp grounds in 2015. Some said the eulachon seemed to be all about the same size (4-6"), suggesting that one age-class was dominant. Many said they were mighty glad the LED lights worked so well.

Light (LED) Developments/Innovations

LED Use

To our knowledge, all shrimpers that fished in 2015 used LED (Light Emitting Diode) lights when trawling. We didn't conduct a formal assessment, but talked with LOTs of shrimpers throughout the season. Regardless of their State of origin; all said they used lights and were happy with the resulting bycatch reduction.

Nearly all shrimpers used Lindgren-Pittman (LP) LED lights, which is the brand we tested in 2014 (Figure 20). Overall, shrimpers seemed generally satisfied with the performance and durability of LP lights, but many said they'd had light failure problems, primarily with leakage and breakage at the attachment points. Some thought that LP's, purchased in 2015 were not lasting as long as those initially purchased in 2014. Other shrimpers didn't have many failures at all and were very pleased with LP's. We think the jury's still out on the long-term durability issues of LP's since the fleet's only been using them for just over one season. We'll learn more about their durability and replacement rates as time goes on. In the meantime, it's the most effective proven LED light currently available that we know of.

There are currently at least two other LED products being developed that may prove to be effective alternative LEDs in our shrimp fishery. One, that's been developed by the marine supply company WESMAR is potted in solid acrylic and is advertised as "completely sealed and virtually indestructible 250 fathom rating" (Figure 20). The device is meant to provide up to 300 days of continuous illumination before being discarded. It has an on-off switch but recharging isn't possible.



Figure 20. A comparison photo of a WESMAR model BRD-3 LED (left) next to a Lindgren-Pitman (LP) Electralume LED (right). The BRD-3 lights are sold at Englund Marine stores. Inquiries about price, specifications and other sources are available from WESMAR at (425) 481-2296. The LP lights are also sold at Englund Marine stores. Inquiries about price, specifications and other sources are available from Lindgren-Pitman, Inc. at (954) 943-4243. Photo courtesy of WESMAR.

A second device, being developed and tested by an Oregon shrimper, is a string of LED lights potted in a clear flexible tube that extends from the inside door and out along the fishing line. A battery canister mounted on a door shoe houses rechargeable batteries (Figure 21). He's still working out some bugs relating to stress on the tubing and connectors when it's strung out along the fishing line, but he thinks it's going to work well. The light intensity can be adjusted with this device, which he finds useful. He claims that "brighter is better" for increasing eulachon escapement.

LED Test Success Causes International Ruckus

Just like U.S. shrimpers on the West coast, British Columbia shrimpers were quick to pick up on the potential benefits of using LED's in their shrimp fishery to reduce eulachon bycatch. Eulachon is a listed species there too under the Species At Risk Act (SARA), and high eulachon catch has severely curtailed their shrimp fishery in recent years. The odd thing is that the use of lights for fishing is prohibited in Canada. Canadian officials did issue temporary permits to three shrimp vessels in their "offshore" fishery, allowing those selected to verify the LED effectiveness. Reportedly, the shrimpers that tested them were so impressed that they threatened to continue fishing with lights after their temporary permits expired. We've heard that there are currently private and government efforts being made to allow the use of LED's in the shrimp fishery, and hopefully it won't take long. It turns out that British Columbia currently has a record-high biomass



Figure 21. ODFW shrimp project leader Bob Hannah (right), views an early version of the LED light system developed by Cory Rock (left), owner and skipper of the F.V. Kylie Lynn. He's worked out a number of "bugs" that led to design changes, but says the current system is working well and is holding up to the rigors of trawling.

of pink shrimp in areas off the west coast of Vancouver Island which could be exploited more if all vessels used LED's.

Darkblotched Rockfish Savings

It turns out that shrimpers aren't the only fishermen to benefit from the use of LED's in the shrimp fishery. As we documented in our 2014 LED study (see Reports Available pg. 11), the catch of juvenile Darkblotched Rockfish in a shrimp net is sharply reduced (82.2%) when LED's are used. Well, the Whiting Fishery hit their cap of Darkblotched Rockfish in late 2015 and the Pacific Fishery Management Council was faced with shutting the fishery down for the season or finding a savings of Darkblotched Rock elsewhere. In the end, the savings could be demonstrated in the shrimp fishery, which were transferred. The 2015 Whiting Fishery was able to continue. The process underscores how bycatch reduction can have major, unexpected economic benefits within a complex system of seemingly unrelated fisheries.

MSC News

Washington Certification

The Washington state pink shrimp fishery became Marine Stewardship Council (MSC) certified in October 2015. The MSC conducted an "expedited assessment" of Washington's fishery in conjunction with Oregon's annual performance review. The quick assessment was apparently possible due to commonalities between the states shrimp fleets and Washington's willingness to restart and enhance aspects of their shrimp program.

Draft Oregon FMP Available for Review

The Oregon shrimp fishery was recertified for five years in 2013. One of the conditions of recertification was the development and adoption of a formal pink shrimp Fishery Management Plan (FMP). To meet this requirement, we have developed a draft FMP and seek industry input. We plan to share the draft with the MSC during our next fishery audit (probably in March). We encourage industry members to read the plan and to comment to us (Bob Hannah or Steve Jones, 541 867-4741) by May 31. The draft document's short introduction provides a good overview of what it covers, so we'll quote it here:

“The Oregon trawl fishery for ocean shrimp (*Pandalus jordani*) is managed by the Oregon Department of Fish and Wildlife (ODFW) as a sustainable fishery, however, historically it has been managed without a written state fishery management plan. The purpose of this initial fishery management plan is to document ODFW’s management objectives, regulations, fishery controls and fishery monitoring activities that are designed to maintain the long-term sustainability of the fishery. It is anticipated that this management plan will be updated whenever there are significant changes in the fishery or the regulatory environment or at least every 10 years. The structure of this draft management plan follows, to the extent practicable, the draft framework for Oregon Fishery Management Plans.”.

The draft document is available on the ODFW web site at [“http://www.dfw.state.or.us/MRP/publications/#Shrimp”](http://www.dfw.state.or.us/MRP/publications/#Shrimp).

2015 Research

The ODFW shrimp project will likely have some major personnel changes sometime in 2016, as two biologists may retire. We’ve been doing what we can to help ensure continuity of the project. With that in mind, our research efforts in 2015 focused on our number-one priority; maintaining routine shrimp fishery data collection and updating long-term databases, analyses and reports. The efforts also included updating our analysis of how the population structure of pink shrimp, including effects on growth and age and sex composition, have varied throughout the 50-year history of the fishery. A report describing this work will be available soon on-line at [“http://www.dfw.state.or.us/MRP/publications/”](http://www.dfw.state.or.us/MRP/publications/).

2016 Research Priorities

Starting in 2013, we changed the format of this section presenting our research plans for the upcoming year. The change addresses an MSC requirement that the shrimp project formalize its approach to planning for the fishery-related research that we do. In our new format, we address three research areas briefly every year: shrimp population dynamics, non-target catch and ecosystem effects. Note that although we address each priority every year, we don’t necessarily have planned activities for all three every year. In interpreting the 2016 plan presented below, it should be noted that regardless of what priority is assigned to any particular research plan component, the completion of work in any given year will always depend on staff and equipment availability and the amount and type of funding available. The availability of research funding can be highly variable from year to year.

Shrimp Population Dynamics (Priority 1);

Our ongoing efforts to sample the fishery, analyze sample and logbook data and periodically evaluate our environmental models, trends in the fishery and any new evidence relating to fishery-driven stock declines is our top priority. This work is our top priority because it is the basis for managing the fishery the way we do, using primarily just a 7-month season, limited

entry system and a maximum count-per-pound regulation. In 2016, this component of our research plan will consist of two primary activities. First, we will continue with our basic monitoring program consisting of fishery sampling and collecting and analyzing logbook data to estimate total catch-at-age and effort by area. Second, we will update our shrimp population models and re-evaluate how environmental effects continue to influence shrimp recruitment.

Non-target catch (Priority 2);

Due to the very successful LED light research completed in 2014, and the rapid adoption of this technology by virtually the entire U.S. west coast fleet, the shrimp fishery’s bycatch of eulachon, slender sole and juvenile rockfishes has been significantly reduced (again). At this point in time, ODFW does not have any scheduled activities for bycatch reduction research for 2016. However, Mark Lomeli, of Pacific States Marine Fisheries Commission, the co-principal investigator on the 2014 LED light research, has submitted research funding proposals to continue investigations of LED light performance on shrimp trawl footropes. If any of these proposals are funded, additional research on this new bycatch reduction technology, likely in collaboration with ODFW and NWFSC staff, may take place in 2016.

We also hope to continue to gather feedback from fishermen in 2016 on how the lights are best installed, effectiveness, maintenance and durability. If eulachon abundance drops off in 2016, please don’t stop using the LED lights! Eulachon bycatch mortality that seems minimal to a shrimp operator won’t necessarily be viewed that way by NMFS Protected Resources Division when they evaluate how this fishery will need to be operated going forward. If fishermen have ideas on how to best install or utilize LED lights on their fishing lines to improve durability and maintain trouble-free operation, we would very much appreciate hearing about it so we can help “spread the word”.

Ecosystem Effects (Priority 3);

Research on ecosystem effects is our lowest research priority simply because our research program is small and the issue of ecosystem effects of west coast fisheries is large and complex (large spatial scales, effects from multiple fisheries, a generally poor understanding of many species that are not the focus of major fisheries, etc.). We do hope to conduct an analysis of recent NMFS trawl survey data in 2016 to see if bycatch reduction in the shrimp trawl fishery has resulted in changes in the local abundance of small demersal fishes on the shrimp grounds.

Observer News

No major changes are anticipated in 2016 regarding the West Coast Observer Program activities in the shrimp fishery. Selected Oregon, Washington and California shrimp vessels will continue to be required to accommodate observers. Observers will be documenting the use of lights on all trawls this year (both shrimp and groundfish trawls), in addition to their other duties. Please give the observer an accurate description of the type of lights you use, and their arrangement on your nets.

Enforcement News

Count-per-pound (count)

Count was generally not a concern during the 2015 season. Age-2 shrimp dominated catches in most areas throughout the season, producing relatively low counts. One count case from 2014 came up for trial in August, but the defendant pleaded guilty before the trial convened.

The count outlook for the 2016 season seems unusually ominous, based on market sample age information. The stage appears to be set for poor holdover of shrimp to age-2, and age-1 shrimp may be relatively more abundant, if the zeros from fall 2015 survive the winter. The result could be high counts through much of the season. We strongly encourage shrimpers to be ready for this scenario by being ready to switch areas when counts are too high, and having a good scale handy for determining counts frequently.

OSP “Marine Team” Requests Count Training

The Oregon State Police (OSP) recently formed a specialized “Marine Fisheries Team” “to better align fisheries and habitat enforcement throughout the Oregon Coast”. “Based out of Newport, the team comprises seven Fish & Wildlife Troopers and one Sergeant working from offices located in Astoria, Tillamook, Newport, Florence and Coos Bay”. The Team is aware of our concerns about count problems in 2016 and have requested an in-depth training session covering aspects such as shrimp sampling procedures, count determination, documentation, personnel needs and equipment needs. The Team will be ready coast-wide to address count cases should they occur.

For more information about the “Marine Fisheries Team”, take a look at the July 2015 OSP Newsletter at “<http://www.oregon.gov/osp/FW/docs/Newsletter/July2015.pdf>”.

Regulation Info

Proposed LED Regulation

We suspect that LED lights on all shrimp footropes may be a requirement for the pink shrimp fishery in the upcoming National Marine Fisheries Service (NMFS) Recovery Plan for the Southern Distinct Population Segment (SDPS) of eulachon. Shrimp fishery managers in Oregon, California and Washington may be expected to adopt regulations requiring the use of this highly effective bycatch reduction technique in order to allow pink shrimp fisheries to continue at current levels in their respective states.

Why an LED light regulation? The thing is, two effective methods of reducing eulachon bycatch in the fishery have been identified and are currently widely used. Population modeling work suggests strongly that the use of both grate BRDs and LED lights is sufficient to protect eulachon from bycatch-driven limitations on population recovery. Grates with ¾” bar spacing have been required in Oregon since 2012. Now we need to have a regulation requiring LED lights in place in order to assure that lights are used, even in years of low eulachon abundance.

We propose the following simple regulation that would be inserted into Oregon Administrative Rule 635-005-0630 (<http://www.dfw.state.or.us/OARs/05.pdf>). The simplicity of this proposed rule acknowledges the effectiveness of the LP lights tested, yet allows for the development and use of devices that may be brighter, more durable or utilize a different power source than LP lights (i.e. Figures 20 & 21).

“(2.5) 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 footrope lighting devices include:

(a) Lindgren-Pitman 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).”

We envision a fairly flexible EGP process, with the goal of identifying alternative lighting devices that are at least as effective as LP lights at reducing eulachon and other bycatch in the shrimp fishery. Each EGP will be customized depending on the specifications of the light system. A shrimper fishing under an EGP will be required, under the conditions of the permit, to perform some tests of the experimental light configuration while fishing and to report the results of the testing back to us.

We want to get your feedback regarding the proposed LED rule. Please give us a call or send us an email with your comments. The timeline for rule adoption is uncertain, but will likely occur sometime before or during the 2017 season.

Groundfish Limits

The NMFS proposed 2016 groundfish limits for shrimpers are listed below.

- The groundfish TRIP LIMIT for shrimpers is 1500 lb./trip, not to exceed 500 lb./day.
- The weight of groundfish landed may not exceed the weight of shrimp landed.
- Canary Rockfish, Thornyheads and Yelloweye Rockfish are prohibited.
- Lingcod, 300 lb./month with a 24” minimum size limit.
- Sablefish; 2000 lb./month.
- All other groundfish; Landings of these species count toward the per-day and per-trip groundfish limits and do not have species-specific limits.
- Limited entry groundfish vessels possessing pink shrimp permits and harvesting pink shrimp must stay within the daily/monthly limits established for the shrimp fishery. They must also include any fish catch taken while shrimping toward their species limits for the limited entry groundfish fishery.

Essential Fish Habitat Trawl Closures

The Pacific Fisheries Management Council (PFMC) has designated several Essential Fish Habitat (EFH) areas off the Oregon coast as no-trawl zones. The areas are set aside to protect hard-bottom habitats and associated species. Shrimpers are cautioned NOT to trawl within these areas. The NMFS will enforce the EFH no-trawl areas via the Vessel Monitoring System. The area-closure that may affect Oregon shrimpers most is the Nehalem Bank/Shalepile EFH. Other EFH no-trawl areas near commonly shrimped grounds are Daisy Bank, Stonewall Bank, Heceta Bank and Coquille Bank. The coordinates delineating the Nehalem Bank and other EFH areas are listed on the PFMC web page at "<http://www.pcouncil.org/groundfish/fishery-management-plan/fmp-appendices/>", under Appendix C #3: Coordinates for EFH Conservation Areas.

CA/OR Shrimp Trawl Mesh Regulations

Although fewer than in recent years, many Oregon shrimpers traveled below the California/Oregon border to harvest shrimp in 2015. We heard no reports of shrimping violations during 2015, but we want to remind Oregon shrimpers again of the need to be thoroughly aware of shrimp trawl regulations in both California and Oregon before they shrimp below the border.

California regulations require all California permitted pink shrimp trawlers fishing below the Oregon border to use trawls with a mesh size no smaller than 1-3/8" between the knots when shrimp trawling from 3-200 miles offshore. No trawling is allowed within California state waters (0-3 miles). Also, these vessels may not have any mesh smaller than 1-3/8" between the knots anywhere on-board (including extra codends). Oregon permitted pink shrimp trawlers fishing below the Oregon border that don't have a California permit must also use nets (including codends) with mesh no smaller than 1-3/8" between knots. If there is any other mesh in their nets or on-board (i.e. stored codends), such a vessel may not legally transit within California state waters (0-3 miles) at any time during the trip. Details on pertinent regulations can be found on the California Department of Fish and Wildlife website at: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=94111&inline>, pages 82-85.

Oregon regulations require that shrimp harvested below the California/Oregon border and landed into Oregon be caught with California-legal nets. The regulation reads; "It is unlawful to land shrimp taken south of the Oregon-California border with nets having a mesh size of less than 1-3/8 inches between the knots". Oregon regulations pertaining to shrimp trawling can be found at: "<http://www.dfw.state.or.us/OARs/05.pdf>", page 31.

VMS and Declarations required

The National Marine Fisheries Service (NMFS) permanently requires shrimp vessels to have an approved and operating Vessel Monitoring System (VMS) on-board. For VMS-related information, please consult the NMFS "Compliance Guide for the Pacific Coast Groundfish Fishery Vessel Monitoring Program" at the following website: <http://www.westcoast.fisheries.noaa.gov/fisheries/management/vms.html>, or call NMFS OLE at 206-526-6133.

Additionally, NMFS requires shrimpers to file a declaration report before the vessel is used to fish in any Rockfish Conservation Area (RCA). Shrimpers need to declare before leaving for their first shrimp trip of the season. Only one declaration is required for the season, providing that the vessel doesn't engage in another fishery during the season. For details about declaration procedures, please visit the NMFS website listed above. Declarations may be made via phone by calling 1-888-585-5518.

Notable Observations/Events

Washington Harvest

Washington State shrimpers set a new state pink shrimp fishery landing record of about 41.5 million pounds in 2015, far surpassing the previous record of about 30 million pounds set in 2014. Most of these shrimp were harvested in areas off Washington. Like in Oregon, a significant portion of the shrimp in 2015 was reportedly processed initially as whole-frozen ("green-frozen") product for later sale or traditional processing. Up-to-date detailed Washington landing information and regulations are available on the web at "<http://wdfw.wa.gov/fishing/commercial/shrimp/>".

Bottom Slime Reports

Many shrimpers trawling in the Columbia River and Tillamook Head Beds during mid-summer reported that large amounts of a "very thick & gooey slime" were fouling their nets. The slime was tenacious; not washing out of the net easily, even with a pressure washer. The reports coincided roughly with sharply reduced CPUE in the areas, and some shrimpers speculated that the slime resulted from decomposing shrimp. We saw examples of the slime and our thinking is that most likely it was the product of decomposing micro-algae and/or jellyfish. The cause remains unknown and the event apparently dissipated over time.

Dead Shrimp Caught

One skipper asked us if we'd heard of any dead pink shrimp being caught. He'd been shrimping on the south side of Grays Canyon during October and had tows that had a mix of live small pink shrimp and dead larger pink shrimp. The 'heads' of the dead shrimp were dark, indicating that they'd been dead a while. No other shrimpers were near the area at the time. He wondered if it might have resulted from poisoning by a toxic algal bloom. We have never heard of this occurring before, but are glad to document the report. If any other shrimpers saw dead shrimp in their catch, please let us know.

Whales Feeding on Zero's?

On a calm day, one shrimper reported seeing whales feeding at the surface on shallow shrimp grounds near the CA/OR border. He described whales (probably Humpback) making large subsurface "bubble rings" and then surfacing within the rings. He concluded the whales were feeding on zero-age pink shrimp because he'd just had to dump a large tow of zero's. We don't see why not. Thanks for the report!

Vessels Lost

Two long-time Oregon shrimp vessels were lost during the 2015 season, but fortunately no lives were lost. The F.V. Corsair, out of Newport, capsized in April off Westport, Washington. The F.V. Jamie K, out of Charleston, ran aground in July near the Cape Blanco lighthouse in southern Oregon.

At-Sea Processing

Processing pink shrimp at-sea became a hot issue for a period of time in 2015. A south-coast port biologist received reports from local shrimpers that a Washington shrimp vessel was actively shrimping and processing off the Oregon south coast. The activity was reported to OSP, which investigated before the vessel proceeded to waters off Washington. The vessel did not land in Oregon and did not have an Oregon shrimp permit.

ODFW's stance on at-sea processing of pink shrimp has been, and currently is, that it's illegal in Oregon. Freezing product is considered processing and Oregon requires shrimp to be landed before processing. Landing frozen product would severely interfere with ODFW's ability to evaluate the count-per-pound (count) of a load of shrimp and count is one of the main tools Oregon uses to effectively manage the shrimp fishery. Many shrimpers we talked to disapproved of processing at-sea as well.

The Washington Department of Fish and Wildlife (WDFW) took a different legal stance than Oregon on the issue, after initially prohibiting at-sea processing. Apparently the vessel in question was issued a special Washington permit mid-season allowing at-sea processing for the remainder of the 2015 season with a number of stipulations requiring fishing/landing notifications and count sampling access to the product. We're anticipating that 2016 Washington permits will incorporate new language allowing at-sea processing with stipulations.

Basically, the at-sea processed product in question is a twist on the whole-frozen ("green-frozen") product put out by land-based Oregon and Washington processors in 2015. Some processors dabbled in this product form during the last few years, but several "jumped in with both feet" this past year. We suspect that in the future processors may decide to put less (or zero) shrimp up as "green-frozen" product. As season totals decline to more average historical levels, traditional cooked/peeled product may be more lucrative.

We've heard that one big disincentive to processing shrimp at-sea is that vessels landing processed product into a U.S. port need to be unloaded by members of the Longshoreman's Union. Such workers are generally not available at most processors in Oregon. The Washington vessel that was at-sea processing in 2015 reportedly made special arrangements to be offloaded by Union members.

Parasite Observations/Reports

As readers may recall from last year's newsletter, a shrimp parasite recognizable by a sac-like structure attached to the underside of the abdomen was reported to be quite common in shrimp catches north of the Columbia River (Figure 22). Affected shrimp were reportedly so abundant at times that processing lines were slowed. We frequently saw afflicted shrimp in market samples taken north of the Columbia River, further indicating relatively high abundance during the 2014 season. Our staff hadn't observed them before.



Figure 22. Photo of the characteristic sac-like structure (externa) apparent on afflicted shrimp is the external part of the parasitic barnacle (*Sylon hippolytes*).

We heard very few reports from shrimpers or processors of the *Sylon* parasite sightings during 2015 and we didn't observe any in our market samples either. Considering the extremely high volume of shrimp harvested off Washington this year, affliction rates in the shrimp population must have been sharply lower in 2015. We don't know what caused the *Sylon* "outbreak" in 2014, but it did coincide with the warm-water "Blob" event that was widespread off the Washington coast at the time.

Reports Available

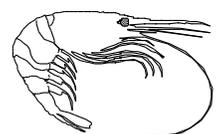
The following reports are posted on the ODFW Marine Resources Program web page at <http://www.dfw.state.or.us/MRP/publications/>.

Hannah, R. W., M. J. M. Lomelli and S. A. Jones. 2015. 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. *Fisheries Research* 170:60-67.

Hannah, R. W. 2016. Modeling the effect of changing fishing effort and bycatch reduction technology on risk to eulachon (*Thaleichthys pacificus*) from bycatch mortality in the ocean shrimp (*Pandalus jordani*) trawl fishery. Oregon Dept. Fish Wildl., Information Rept. Ser., Fish. No. 2016-02. 20 p.

Hannah, R. W. and S. A. Jones. 2016. Draft Fishery Management Plan for Oregon's Trawl Fishery for Ocean Shrimp (*Pandalus jordani*).

Good Luck Shrimping in 2016!



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