



Marine Resources

34th Annual

Pink Shrimp Review

2023

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This newsletter provides a summary of Oregon's 2022 pink shrimp (*Pandalus jordani*) season including trends in the fishery, its stock, and information relevant to stakeholders. Oregon's pink shrimp fishery is managed sustainably in cooperation with shrimpers, processors, and scientists.

It seems like it can be said for each season, but the 2022 pink shrimp season was different. Shrimp abundance were high, but market demand seemed low. 2022 catch volume was 41.2 million pounds, 15th highest among the fishery's 66 year history. The ex-vessel value of the fishery was high (18.8 million USD). Price per pound was low at an average of \$0.46 per pound. Catch rates were at their highest rate of all-time (1,050 pounds per hour for double rig vessels), owing to recent high recruitment of shrimp and modern fleet efficiency.

Have Questions?

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Visit Our Website:

www.dfw.state.or.us/MRP/shellfish/commercial/shrimp

2022 Season

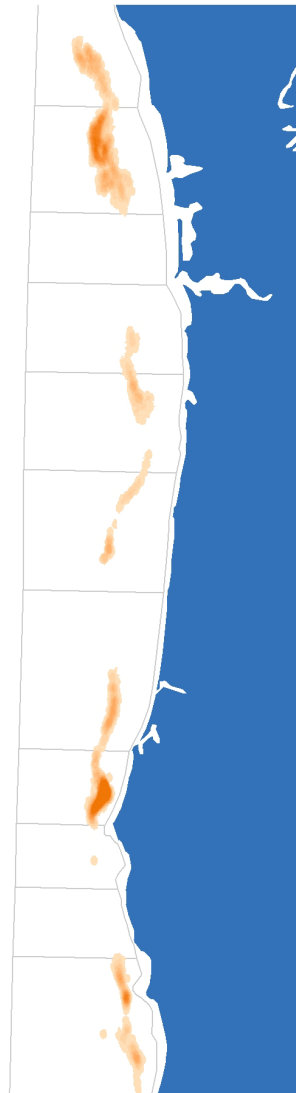
41.2 million
pounds landed

\$18.8 million
ex-vessel value



59
vessels

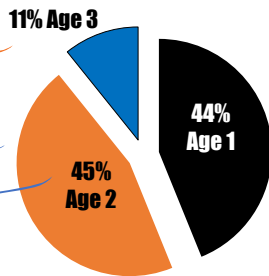
Catch
area



Shrimp age by number



Shrimp age by weight



Highest catch rate
EVER!!!

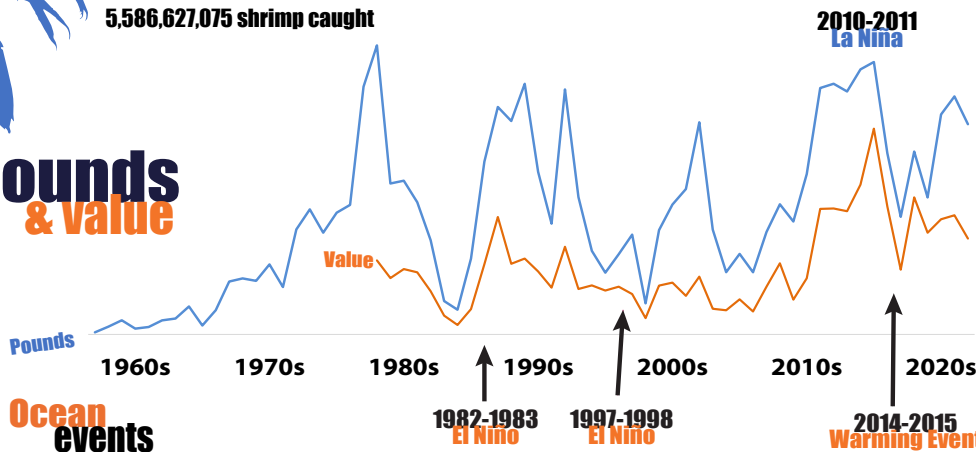


Low price/lb
Lowest since 2010



5,586,627,075 shrimp caught

Pounds & Value



Ocean events

What's new?

Staff change

Pink Shrimp Project Leader, Scott Groth (author), is the new Resource, Assessment and Management Section Leader (ODFW Marine Program). I'll be in Newport and will assist in pink shrimp project transition.

Thank you to the great people that I've been lucky to work with over the last 20 years in pink shrimp. Many skippers, deckhands, unloaders, dock crews and other industry members were kind, cooperative and good teachers. I am thankful to the many members of commissions, NGOs, and other scientists for their skill, creativity, and dedication to sustainable shrimping. I have appreciated the support of ODFW administrators and co-workers who have always been top-notch. Last, thanks to the current and previous generations of shrimp biologists who have performed 66 continuous years of careful and persistent science.



Eulachon returns

If you follow pink shrimp fishing, you know that an important part of their management is minimizing the bycatch of eulachon, so naturally we're excited to see them doing well. Eulachon are anadromous smelt (i.e., live most of their life in the ocean, but return to freshwater to spawn) which return to just a few Oregon freshwater systems in most years.

The winter of 2022 seemed to be a really good return!

While eulachon population levels have fluctuated widely throughout history, last year's returns featured some new things we haven't seen in a while in the South Coast. Tenmile Creek (near Lakeside/ Reedsport) has had occasional reports of eulachon runs. In March 2022, we saw a run of eulachon like we haven't seen in recent history. Thousands of eulachon were seen traveling up the creek to spawn! Long time residents of Lakeside reported that they hadn't seen this since they were kids. Most eulachon examined had successfully spent their eggs/roe and many bald eagles were feasting on what was left.



Eulachon in Tenmile Creek (clockwise) 1) inspecting a eulachon after spawning (this one is spent), 2) author attempting to video eulachon underwater, 3) an individual eulachon after spawning, 4) several eulachon dead after spawning -Pictures from J. Metzler.

2022 Season Summary

Landings Data

In 2022, Oregon's pink shrimp landings were high 41.2 million pounds were landed, the 15th highest among the 66 year history (Figure 1).

Fifty-nine vessels landed shrimp into Oregon in 2022(Figure 2) accounting for 752 individual trips (Figure 3). These rates are very low historically.

On average, 54,812 pounds were landed per trip, the highest in the fisheries history (Figure 4)!

Good hold-over from last year's stock combined with good age-one recruitment made for exceptional shrimping. The presence of older, larger shrimp combined with careful fishing early in the season helped make catch rates outstanding.

Landings

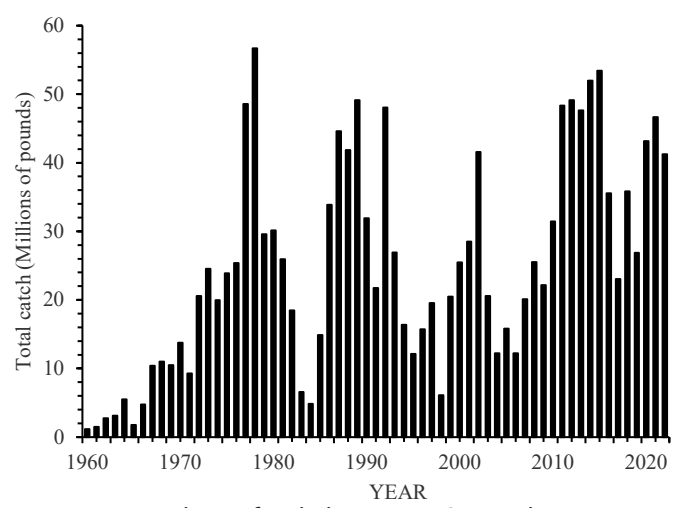


Figure 1. Landings of pink shrimp into Oregon by year: 1957-2022.

Vessels

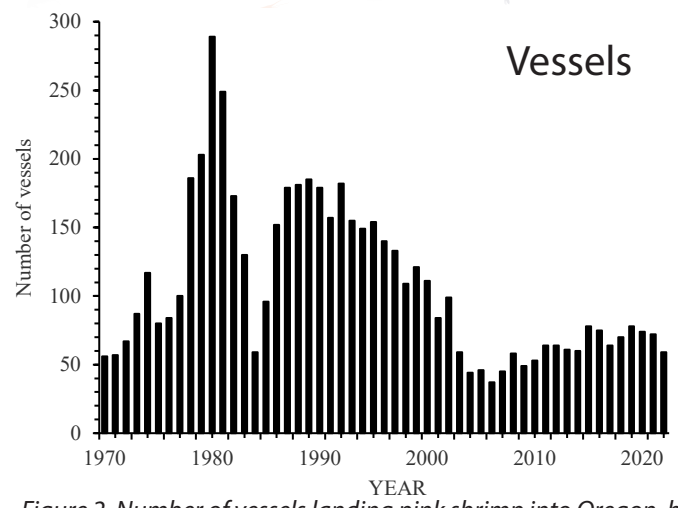


Figure 2. Number of vessels landing pink shrimp into Oregon, by year: 1970-2022.

Trips

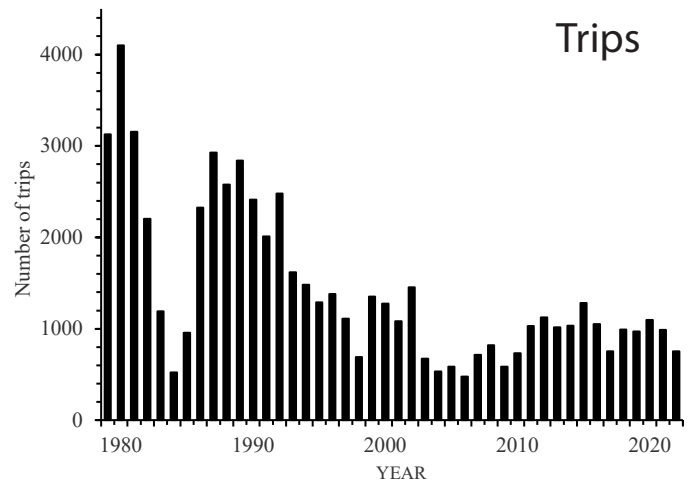


Figure 3. Number of trips landing pink shrimp into Oregon, by year: 1979-2022.

Pounds per Trip

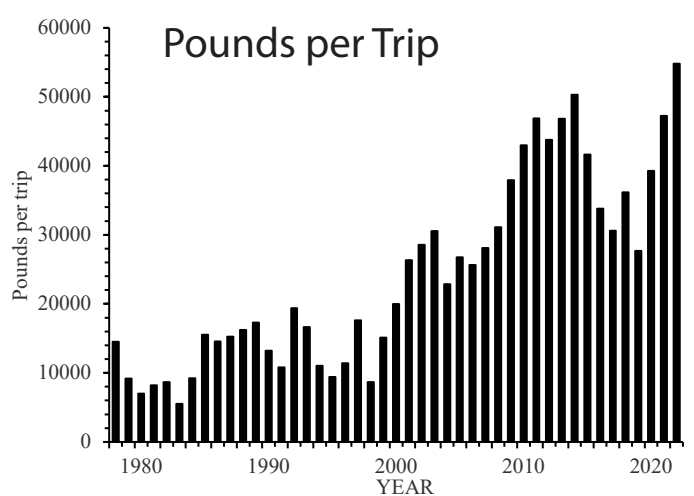


Figure 4. Average catch-per-trip (pounds) for pink shrimp vessels landing into Oregon, by year: 1978-2022.

2022 Catch Area

Catch in 2022 was highest near Bandon and in southern Washington, but excellent throughout the region and the season. Catch started out slow as price was negotiated and count per pound issues decreased (Figure 5).

Figure 7 shows a heat map of tow locations for Oregon landed pink shrimp catch.

Pounds by Area

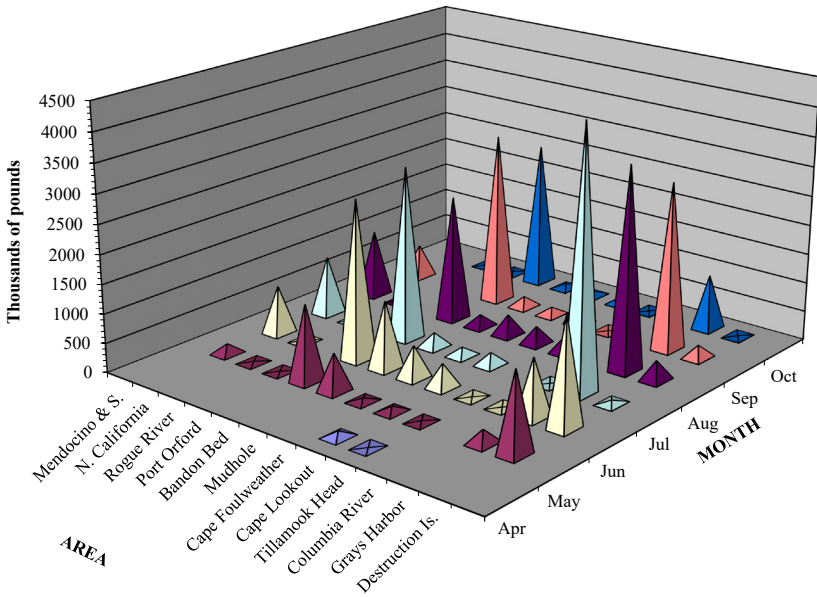


Figure 5. Total pounds of pink shrimp caught in each area and month landed into Oregon, 2022.

Trips were very short in 2022, vessels averaged 20 hours (in double rig equivalent hours) of tow time per trip, similar to the high efficiency years in the early 2010s (Figure 6). Overall, the amount of time fishing per trip has reduced over time, as the fleet continues to become more efficient.

These guys are great!

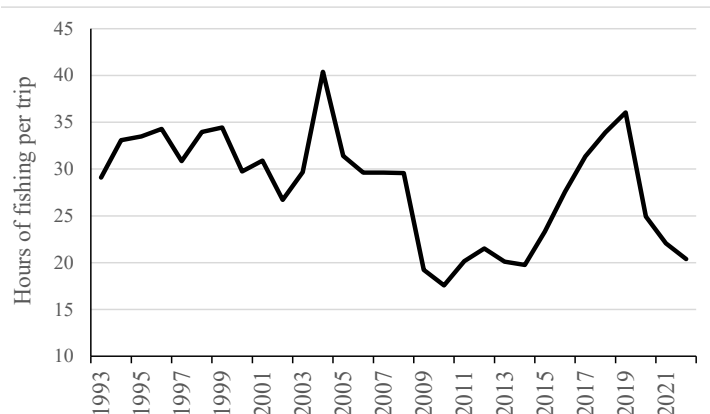


Figure 6. Hours (expressed in Double Rig Equivalent (DRE)) of fishing per trip into Oregon, 1993-2022.

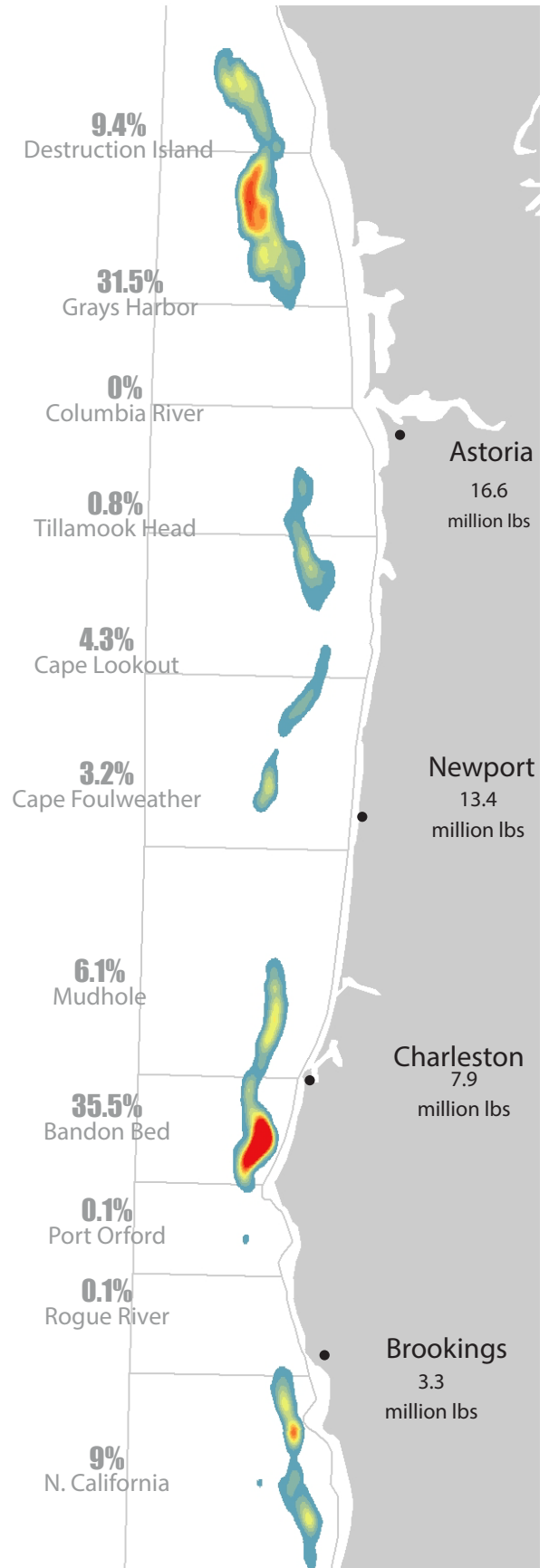


Figure 7. Heat map of pink shrimp catch by state statistical areas for 2022 Oregon landings, and amount of pounds delivered to each port.

Effort (number of hours the fleet fished) continued to be low when compared to historical rates. In 2022, effort was at its lowest level since 2010 (Figure 8). Effort was most focused in Bandon and Grays Harbor during summer (Figure 9).

Effort was low due to a combination of factors including: 1) high efficiency of the modern fleet, 2) negotiating prices in a difficult market, deeply affected by 2022 USD to Euro exchange rates, 3) processing constraints (e.g., labor), and 4) high fuel prices.

Hours of effort are displayed in units of Single Rig Equivalent (SRE) hours, meaning that single rig hours are counted 'as is' and double rig hours are multiplied by 1.6.

Effort by Area and Month

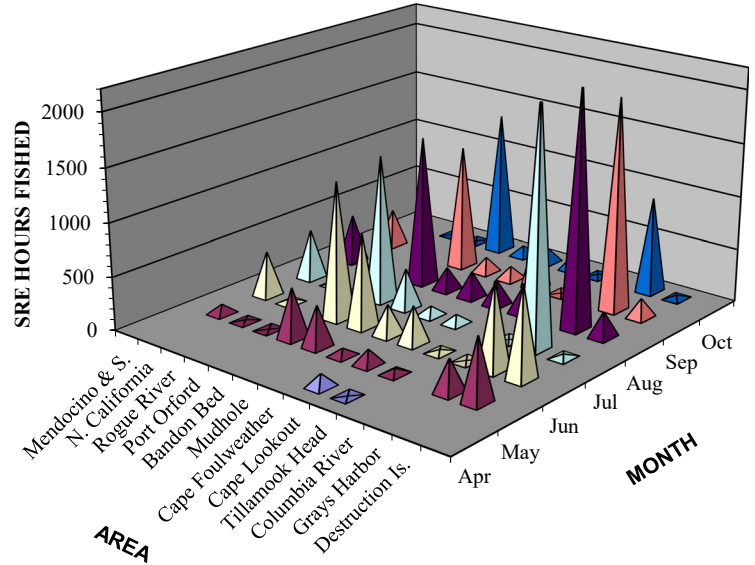
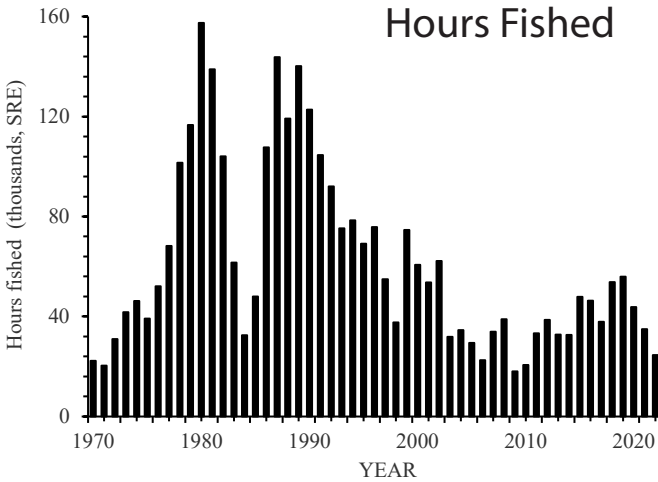


Figure 8. Total hours (SRE) fished for pink shrimp landed into Oregon, by year: 1968-2022.

Figure 9. Total hours (SRE) fished for pink shrimp landed into Oregon, by area and month, 2022.

Efficiency

Efficiency, expressed in Catch Per Unit of Effort (CPUE) was THE HIGHEST EVER RECORDED! Shrimp were caught at a rate of 1,681lbs of shrimp/hour SRE (1,050/hour in double rig terms) (Figure 10). Highly efficient shrimpers working a massive stock of shrimp drove this amazing catch rate.

Catch was excellent just about everywhere; however, the productivity of Bandon and Grays Harbor was particularly awesome (Figure 11).

CPUE by Area and Month

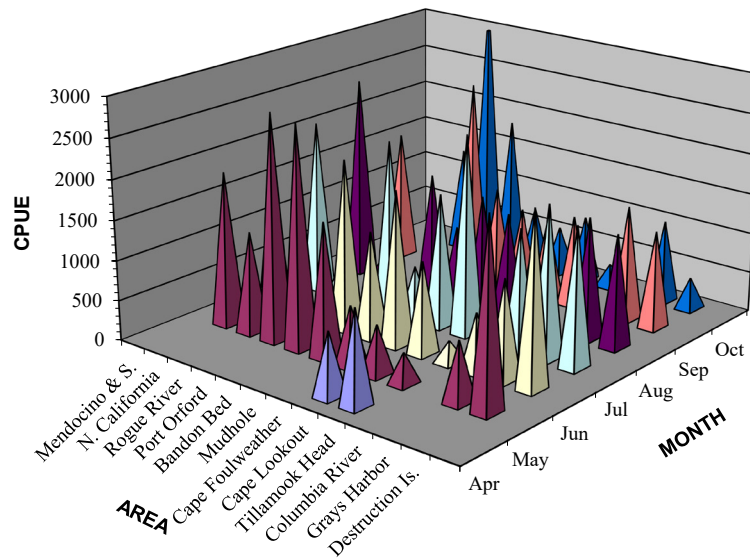
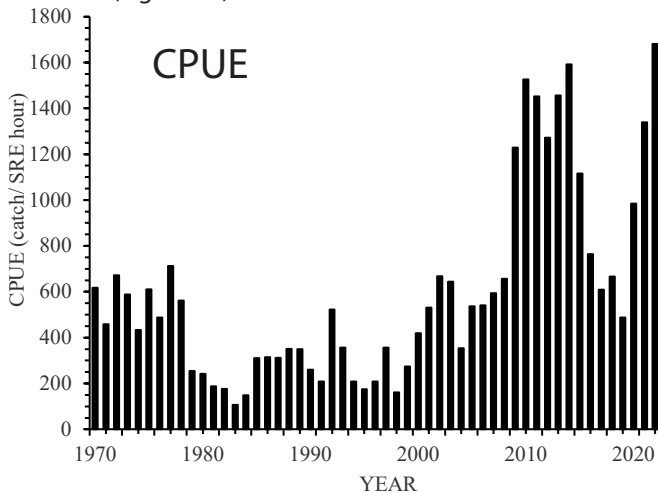


Figure 10. Average CPUE (SRE) for Oregon pink shrimp landings, by year: 1968-2022.

Figure 11. Average CPUE (SRE) by area and month for Oregon pink shrimp landings, 2022.

Value

Ex-vessel value was high in 2022 (18.8 million USD), despite the low price per pound. Nominal fishery value was the 12th highest value of all time (Figure 12).

At \$0.46 per pound, the average price was the lowest since 2010 (Figure 13). Values are nominal (i.e. not adjusted for inflation).

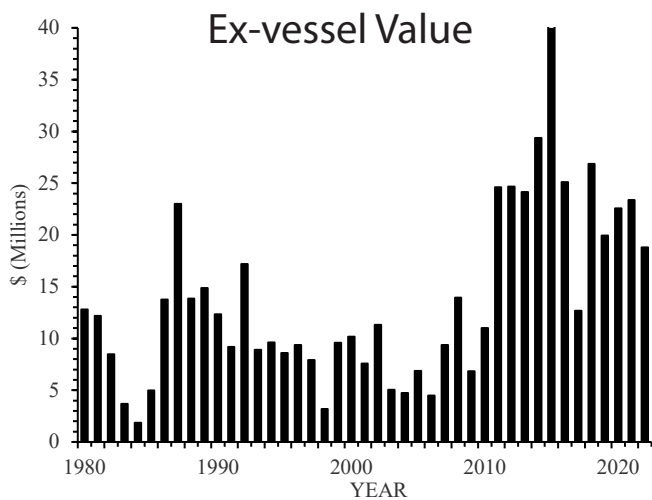


Figure 12. Ex-vessel value (USD) of pink shrimp landed into Oregon, by year: 1978-2022.

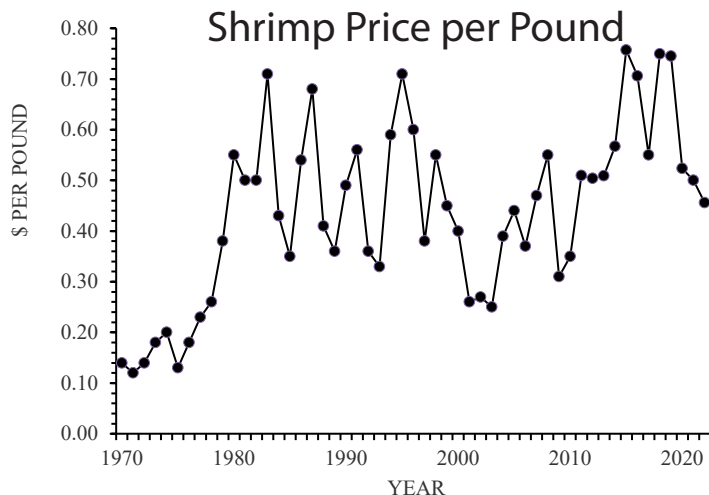


Figure 13. Average ex-vessel price-per-pound of pink shrimp landed into Oregon, by year: 1968-2022.

Age and Size

Pink shrimp live short lives and grow quickly; catch is typically composed of three year classes (age one, two and three). In most years, catch depends heavily on age one shrimp.

By number of (individual) shrimp, 66.5% were age one, 29.5% were age two, and 4.0% were age three (Figure 14).

By weight, older shrimp (age two and three) made up about 56% of the catch (Figure 15), despite only being about 34% of the catch by individual numbers.

Mean count per pound was 136 shrimp/lb, the highest since 2005 (Figure 16). Higher average counts were likely affected by the high density of shrimp (causing slower growth) and strong age one shrimp recruitment in 2022.

Weight of Shrimp by Age

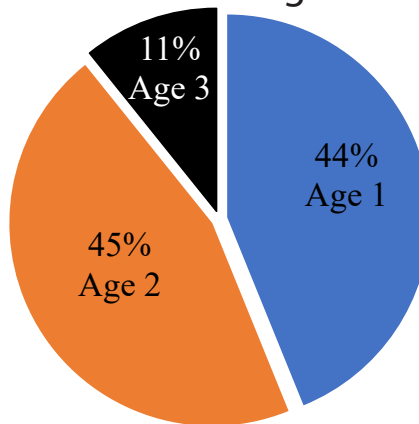


Figure 15. Weight of pink shrimp, landed into Oregon, 2022.

Age Distribution by Year

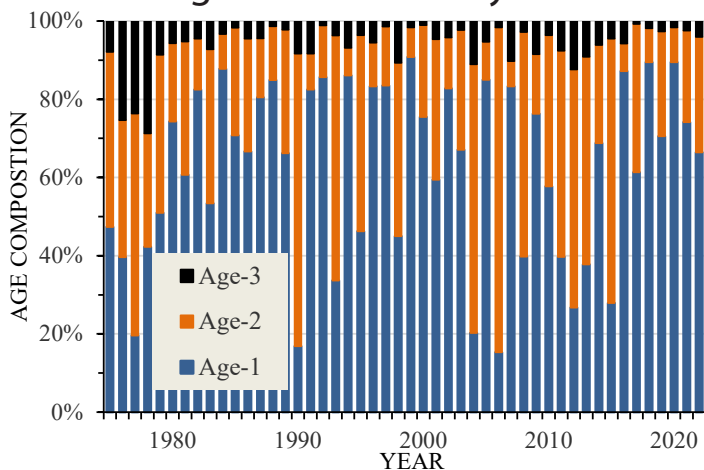


Figure 14. Age composition of pink shrimp landed into Oregon, by year: 1975-2022.

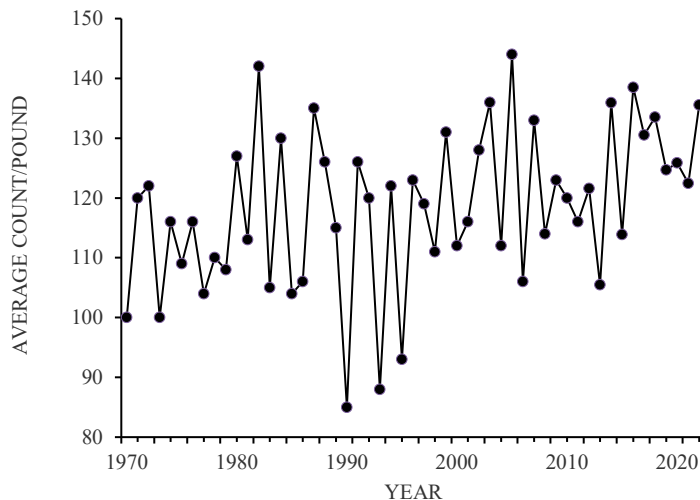


Figure 16. Average count per pound of pink shrimp landed into Oregon, by year: 1966-2022.

2023 Indicators

Here we describe some of the indicators which provide a forecast of what to expect next season.

"When you're good at something, you'll tell everyone. When you're great at something, they'll tell you."
-Walter Payton

Environmental Conditions

By comparing past pink shrimp population levels to past environmental condition, we can forecast future pink shrimp abundance based on current environmental conditions. Pink shrimp recruitment has a strong relationship to oceanographic conditions during their larval period (Figure 17). Specifically, sea level height (SLH) at Crescent City, CA during the pink shrimp's larval period has shown a strong link to recruitment levels in Oregon; the lower the sea level, the greater recruitment.

Why sea level? While it may not matter to a pink shrimp if there are a few extra inches of water above their head or not, the average height of the sea does correlate to environmental conditions that are known to affect pink shrimp larvae (larval transport, food supply from upwelling, etc.), thus providing a single indicator to predict recruitment.

In 2023, pink shrimp catch will be composed of three year classes (those born in 2020, 2021, and 2022).

2022 year class: The environmental conditions which larval pink shrimp experienced in 2022 were very good. When compared to the past 44 years it was in the 70th percentile. Age one recruitment is typically the largest component of the fishery, by number.

2021 year class: The excellent environmental conditions of 2021 delivered a good recruitment class. Over 2 billion age one shrimp were caught last year in Oregon alone. In 2023, this year class will be age two and are expected to be a strong component of catch.

2020 year class: In 2023, we're hopeful that a good proportion of the catch will be these three year old shrimp. Historically, there are few three year olds left to catch, but they are so large that they have an unequal part of the catch by weight.

Worth noting is that more age zero shrimp were caught in 2021 and 2022 than any other years, certainly a good sign.

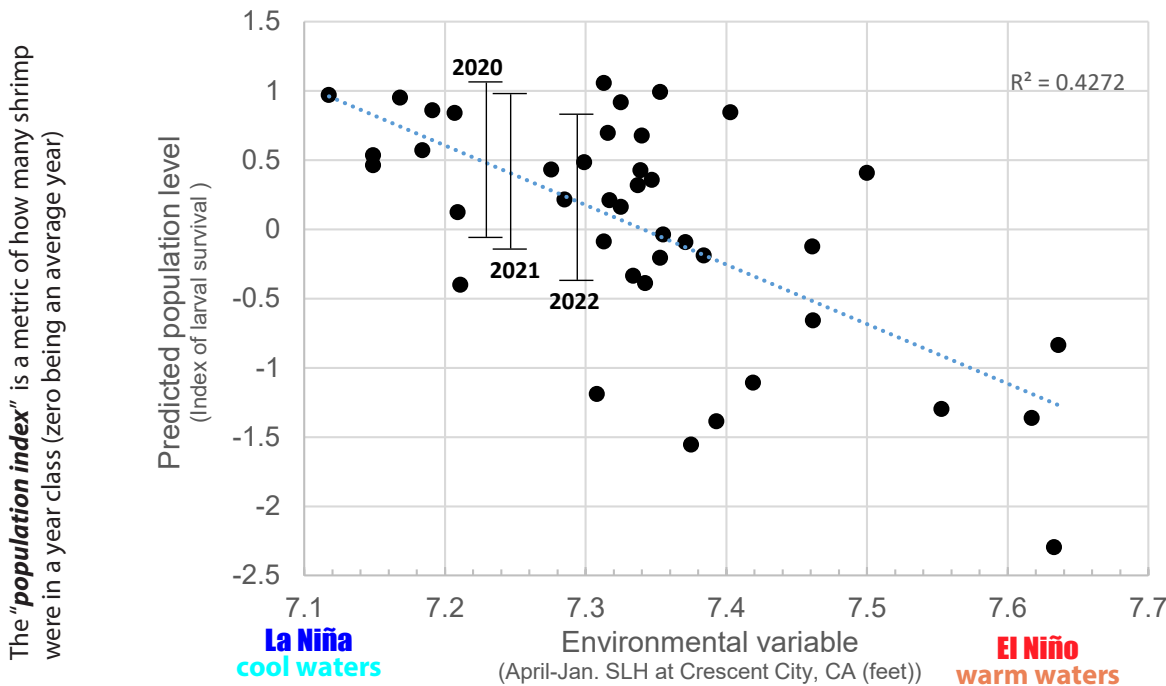


Figure 17. Pink shrimp population/ environmental model.

Each dot on this graph represents a year (1979-2019).

Vertical lines labeled with year represent the range of population expected, given the environmental conditions in the year they are released as larvae.

The "environmental variable" used is sea level height (SLH) from April to January in Crescent City, CA.

Sampling Data

Crustaceans lack hard structures for aging, such as ear bones (otoliths) used in fish aging, thus other means must be used. Pink shrimp simultaneously release eggs, grow quickly, and live short lives. These three attributes allow for age assignment using statistical (multi-modal distribution) analysis. In this way, ages of shrimp are determined by bulk measurement of their size over time. Size measurements (carapace lengths (CL)) are aggregated then compared to other time periods to determine age and growth.

Each graph tells a story; in the example below (Figure 18), there are many age one shrimp, then a few age two and three. While a single graph is like a snapshot, comparing changes in these graphs over time tells a story. The horizontal (X) axis of these graphs indicates the size of the shrimp (larger as you move to the right); the vertical (Y) axis shows the relative amount of each size group (not total abundance). The “lumps” of these graphs are caused by the central tendency of each age group; thus changes to relative amounts of age classes can be tracked along multiple graphs. Arrows track year classes and indicate rate of growth as time goes on. These graphs look a little complex at first, but once understood, it becomes easy to visualize (Figure 19).

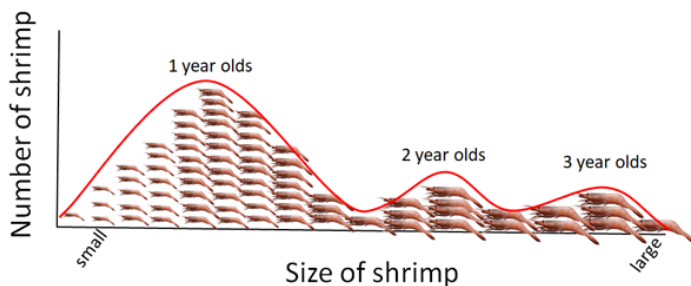


Figure 18. Hypothetical multi-modal size distribution of pink shrimp.

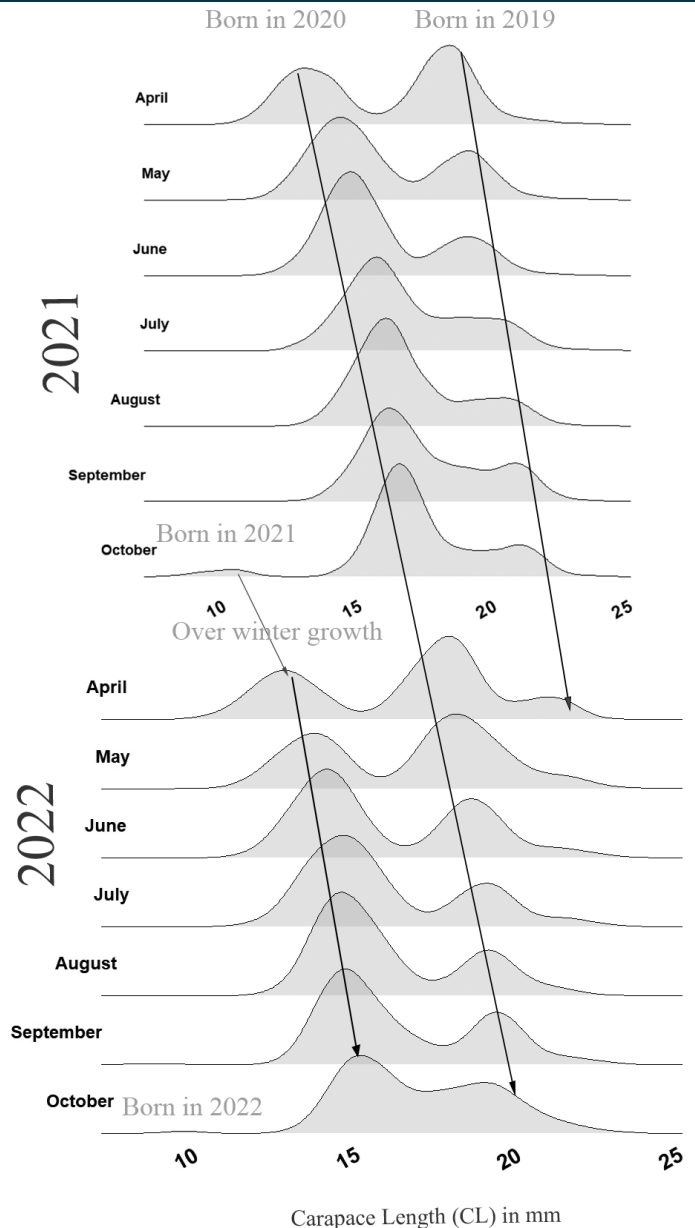


Figure 19. Pink shrimp size distributions by month (2021 and 2022) from Oregon landings.

Forecasting Methods

We forecast next year's catch in two different ways.

1. Forecast from environmental data:

We examine environmental conditions over the past few years then weight a forecast of each year depending on expected contribution of each year class (e.g., age one shrimp are typically the primary component of catch; therefore, environmental data from that year are more heavily weighted, whereas environmental conditions from three years ago are less heavily weighted).

2. Forecast from sampling data:

In this forecast, we look at last year's catch of each age class, rank them according to previous generations of shrimp, then weight each rank to project what next season might be like.

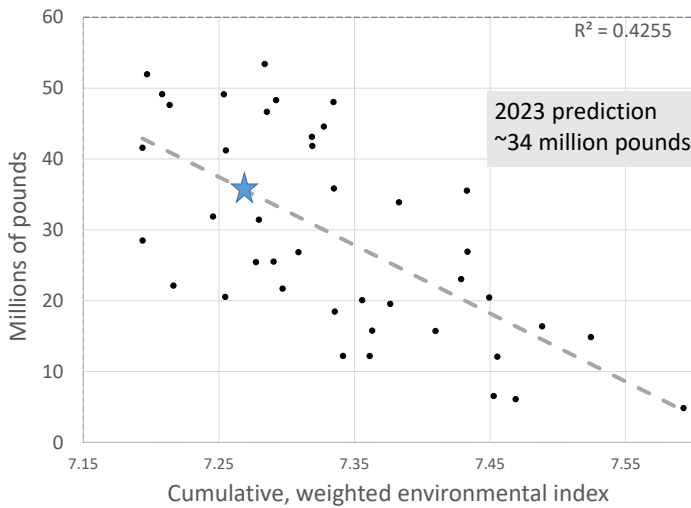


Figure 20. Cumulative, unified forecast of Oregon pink shrimp catch based on environmental factors.

This cumulative, unified forecasting is based on the typical percentage of weight contribution of each age class to the current year's catch. The environmental model predicts 2023 to be a 34 million pound season (Figure 20), while the sampling data model predicts a 38 million pound season (Figure 21).

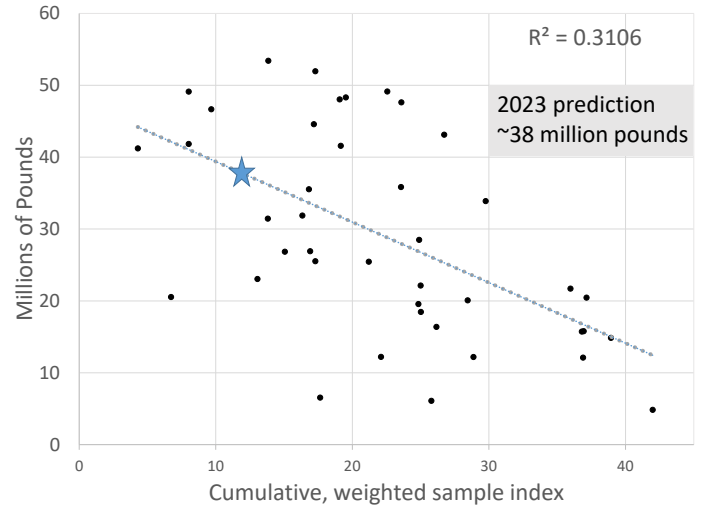


Figure 21. Cumulative, unified forecast of Oregon pink shrimp catch based on sampling data.

To give some context of the variability expected, for last year's 41.2 million pound season, the predictions were 35 (environmental model) and 42 million pounds (sampling model).

Regulation Info

Key regulations that apply to **Oregon** pink shrimp deliveries

		Fishing off CA*	Fishing off OR**	Fishing off WA***
Areas	0-3 miles	No fishing	OR permit needed	No fishing
	3-200 miles Key closed areas	Delgada Canyon, Tolo Bank, other closed areas (see CA regs)	Nehalem Bank, Daisy Bank, Stonewall Bank, Heceta Bank, Coquille Bank	Grays Canyon (see WA regs)
Mesh size		Minimum 1-3/8"	No minimum	
BRD		≤ 3/4" spaced rigid grate		
LEDs		5 LEDs in central 16 feet of each net, spaced 4 feet apart (More LEDs may be used)		
Count per pound		≤160 shrimp/ pound		
VMS declaration		Required		
Season		April 1- October 31		

*CA Regulation details: [CA Fishery Management Plan](#)
 **OR Regulation details: <https://www.dfw.state.or.us/OARs/index.asp>
 ***WA Regulation details: <https://wdfw.wa.gov/fishing/commercial/shrimp#>
 **** [NMFS groundfish limits](#)

Research Priorities

Here, we address three research areas in priority order: 1) shrimp population dynamics, 2) non-target catch and 3) ecosystem effects.

Priority 1: Shrimp Population Dynamics

Our documentation and analysis of pink shrimp population dynamics is the highest priority of our program. Understanding changes in the shrimp population and comparing it to past populations, environmental data and other factors is critical to our ability to detect and address overfishing. ODFW's pink shrimp program has a thorough, long-term dataset of shrimp populations, which is central to our ability to assure it is fished sustainably.

2022 Analysis

Every other year we examine the tenability of our recruitment model. In 2022, we examined the model which compares environmental conditions and spawner levels upon recruitment of shrimp to determine the interactions. Specifically, we look to determine if the fishery affects recruitment. In our past analysis, we've determined that environmental conditions drive recruitment, not fishing effort (Groth, 2022).

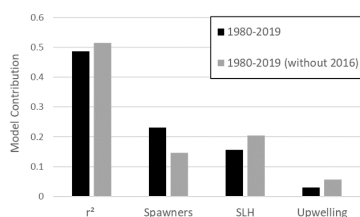


Figure 8. Model results (Table 4, model 4) from southern Oregon waters (1980-2019) and relative contribution by each regressor, with (black) and without (grey) the age one recruitment year 2016.

The shrimp model is holding up, but the 2014-15 warm water event threw a bit of a wrench

The 2022 analysis corroborated past findings, using data from 1979-2019, available [here](#).

The model remains very strong, although like many models there has been deterioration. We intend to bring new techniques to this analysis, using some new methods.

2022 Sampling:

We calculated annual indices on the number of shrimp using fish ticket, logbook and biological sample data. ODFW biologists entered data for 7,192 shrimp tows and measured 26,001 shrimp.

We continued to convert raw data to digital from past years. Staff have worked all the way back to 1967! We only have a few years left to enter, when the entire history of pink shrimp samples will be available raw and digitally. The very long term and continuous dataset, ~ late 1950s to 2022, allows some unique analysis that we're excited about.

Priority 2: Non-Target Catch

Eulachon 5-year review:

Eulachon, *Thaleichthys pacificus*, have always been common bycatch to the U.S. west coast shrimp fishery and are considered "threatened" under the Endangered Species Act (ESA). As such, industry and science have made great strides in reducing their bycatch. Research conducted collaboratively among industry and scientists resulted in methods, then applied rules which reduce eulachon bycatch substantially.

In 2022, NOAA fisheries completed its five year review of the southern Distinct Population Segment (DPS) of eulachon, which is available [here](#).

Pertinent to the U.S. west coast ocean (pink) shrimp fishery, the review recognizes strides made in bycatch reduction, recommends: 1) analysis of bycatch effects on eulachon recruitment, 2) improvements to eulachon/pink shrimp habitat knowledge, and 3) improved quantification of bycatch reductions consequent to recent research. The review recommends that the southern DPS of eulachon remain classified as a threatened species (Anderson, et al. 2022).

LEDs used in new areas

California Department of Fish and Wildlife (CDFW) made big strides, developing and adopting a [Fishery Management Plan \(FMP\)](#) for pink shrimp. Highlights of this FMP include the adoption of Harvest Control Rules (HCRs) and new requirements which reduce the take of eulachon, including the use of LEDs.

In addition, British Columbian pink shrimp fisheries now require the use of LED fishing lights as well ([see link](#)).

Priority 3: Ecosystem Effects

While the first two priorities are often visited and clearly evaluated, habitat effects of fishing activity is more challenging to evaluate. ODFW has periodically compared areas fished to non-fished to understand the effect and recovery rate of habitats in relation to fishing activity. We carry this out in the area of Nehalem Banks, Oregon where shrimping was excluded in 2006. Remote Operated Vehicles (ROV) are used to view these habitats at fished and non-fished sites over the course of time. We've done this work in 2007, 2012 and 2022. Recent surveys succeeded in performing most of these transects.

ROV image from Nehalem Banks, OR.

Note the numerous pink shrimp in the scene; 2022 was full of shrimp!



Enforcement

In 2022, Oregon State Police (OSP) performed several enforcement actions including regular inspections, count per pound checks, and response to wastage issues.

OSP Troopers made contact with a number of pink shrimp vessels at-sea, but found everything to be in compliance aboard those boats.

On the docks, OSP's Marine Fisheries Team made a full investigation on a shrimp vessel regarding count per pound; however, it was found to have a marginally legal count per pound and was warned. Many other landings were spot checked in 2022, but no big issues were found. Good shrimp counts were a result of careful fishing and strong cohorts of age two and three shrimp (see cover page info-graphic) which were more than half the catch, by weight.

Last, troopers responded to three vessels which brought in under iced shrimp, becoming spoiled and wasted. Citations were issued for "Wanton Waste of Commercial Food Fish".

In 2022, OSP troopers spent 64 hours making 29 contacts during pink shrimp enforcement work.



Oregon State Police (OSP) counting and weighing pink shrimp to determine if a shrimp delivery is legal (<160 shrimp/lb).

Shrimp and Ice

ODFW staff worked with shrimp processors to develop approved protocols for landing shrimp with ice. Shrimp must be iced at the time of landing; however, the weight of shrimp is what is reported. Accordingly, proper procedures must be documented to account for the ice weight at the dock, as required by OAR 635-006-0205. In 2022, all Oregon shrimp processors were able to develop an approved plan with ODFW, good job!

We expect to work with processors more in the future on this issue. In 2022, we sought personnel to aid in developing a conventional plan; however, we were unsuccessful. We'll investigate this more in the future.



Shrimp and ice sampling at processing plant

MSC News

In 2007, Oregon's pink shrimp fishery became the first shrimp fishery in the world to become certified "sustainable" by the Marine Stewardship Council (MSC). Each year since, annual surveillance is undertaken, where experts in the field of fisheries and sustainability review the condition of the fishery and the progress of science and management. A more thorough review is required each five years.

In 2022, Oregon pink shrimp underwent its third recertification. During this process, the fishery was closely scrutinized by a panel of worldwide fishery sustainability experts and re-certified as sustainable!

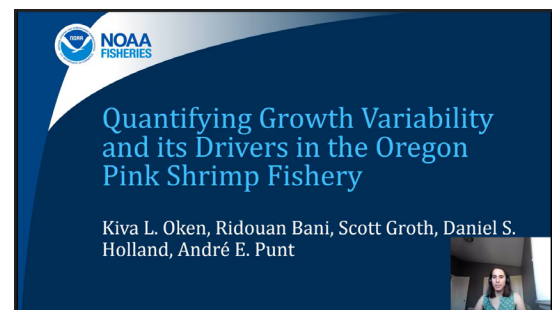
In the future, the U.S. west coast region will be evaluated as one. This is a very impressive feather in the cap for the work of industry and managers in California, Oregon, and Washington.



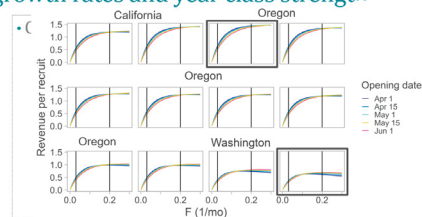
See the announcement and more information [here](#).

Bio-economic Analysis

Development and organization of raw data has facilitated some new, very cool analysis. Kiva Oken, NOAA Stock Assessment Scientist revisited bio-economic modeling to understand optimal season start times in shrimp, accounting for growth and mortality. She presented this information at a American Fisheries Society (AFS) meeting in 2022. Findings included that delays in the north may optimize revenue; however, in the south a delay may not be as critical.



Optimal opening date depends on regional growth rates and year class strength



Page 36 | U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service



Slides from Kiva Oken's (NOAA) presentation at American Fisheries Society regarding aspects of pink shrimp bio-economics.

Collaboration

International Coldwater Prawn Forum

In November 2022, a small group from the U.S. west coast attended the International Cold Water Prawn Forum (ICWPF) in Tromsø, Norway. The forum convenes delegates from many countries to share and discuss issues with “cold water prawns”, basically meaning “small shrimp”. Most the attendees are from the North Atlantic region (New England, Canada, Greenland, Iceland, Norway, etc.) since the highest component of the “small shrimp” market is *Pandalus borealis*, similar to our *Pandalus jordani*, but are found principally in the North Atlantic.

The ICWPF has done a great job integrating *P. jordani* into the consideration of a worldwide audience and improving its status as a sustainable, delicious, and valuable fishery product. Attendance at such events has truly helped industry and managers understand broad issues that affect shrimping. ODFW staff presented a talk on research regarding the use of Body Condition Index (BCI) as a metric to understand contemporary stock levels. ODFW staff Scott Groth and Eric Anderson are preparing a manuscript describing the use of BCI in assessing shrimp stock levels; be on the look out for some cool information!



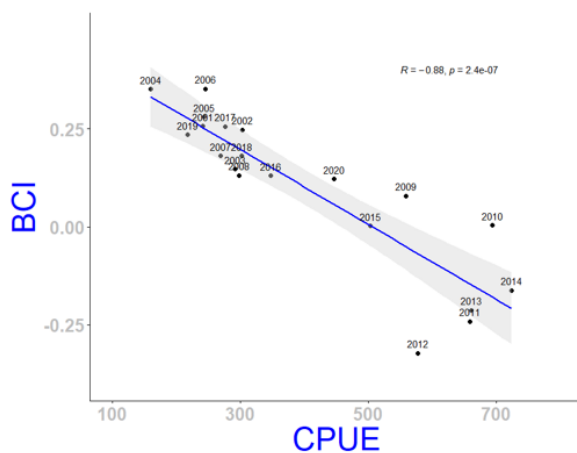
Members of the U.S. west coast delegation at the 2022 ICWPF- Ted Gibson (F/V Lady Kaye), Nick Edwards (F/V Carter Jon), Kevin Larsen (Bornstein Seafoods), Scott Groth (ODFW), and Charlie Kirschbaum (Pacific Seafoods).



Scott Groth (ODFW) presenting information on the U.S. west coast *P. jordani* fishery.



Northern lights (*Aurora borealis*) over Tromsø, Norway.



On-going work (Groth and Anderson, in press) presented shows the strong relationship between shrimp BCI and the fishery CPUE, two independent factors that could aid stock assessment.

Interstate Cooperation

ODFW, WDFW, and CDFW pink shrimp fishery managers met several times in 2022. The three states discussed data management issues, rules coordination and various other topics. CDFW increased the sustainability of their fishery, helping allow it to be considered as a regional fishery by MSC.

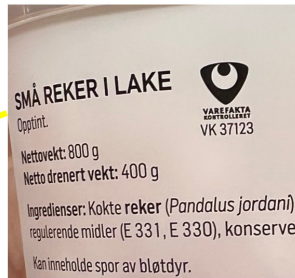
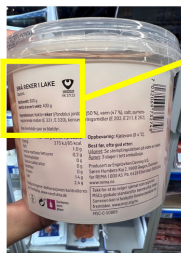
For the third year in a row ODFW and WDFW were able to data share biological samples, improving both state's sampling rates and allowing consistent aging methodology.

Shrimp/prawns Overseas

While most of the world calls our favorite crustacean “prawns”, we North Americans say “shrimp”. There really isn’t a taxonomical difference; however, North Americans tend to call big shrimp “prawns” and little shrimp “shrimp”. To most of the rest of the world, it’s all “prawns”.

Sustainability certified U.S. west coast pink shrimp, *Pandalus jordani*, are found in many supermarkets in Europe, especially Scandinavian countries. Norwegians call our shrimp “Små reker” simply meaning “small shrimp”. Common products include:

1. Processed and stored in brine.
2. Supermarkets will even feature raw, whole frozen Pandalid shrimp, quickly turning into a delicious, fun meal.
3. “Prawn sandwiches” are very popular throughout Europe. Most restaurants and even vending machines feature this simple recipe of bread, mayonnaise and shrimp. Prawn sandwiches are delicious and (for this author) under appreciated in the US. Pretty similar to lobster rolls; however, much cheaper and closer to home!



1. Små reker i lake = Small shrimp in brine

U.S. west coast pink shrimp at a Norwegian matbutikk!



2. Frozen shrimp at the matbutikk (food store)



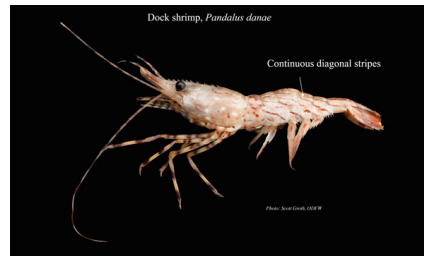
2. Cooked, whole *Pandalus borealis* served for individual peeling



3. Author eating a prawn sandwich

“Tiger Prawns”

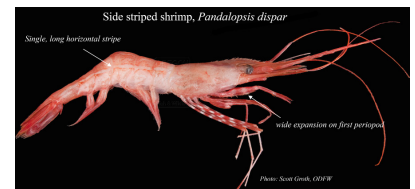
“Tiger prawns” are something that are caught from time to time by pink shrimp vessels in Oregon and I’ve always found some mystery in them. Most often, the ones I’ve seen have been coonstripe shrimp (*Pandalus danae*) and they are very big versions of those. In addition to this, there are some reports from past years of a slightly different species, sidestripe shrimp (*Pandalopsis dispar*). Oregon is on the fringe of the sidestripe shrimp’s range; however, it wouldn’t be surprising for it to be occasionally in high numbers here. Let us know if you find some of these, it’d be good to know more about them.



Counter-clockwise: coonstripe shrimp (*Pandalus danae*),

Captains platter, and

Sidestripe shrimp (*Pandalopsis dispar*)



Zero Value Shrimp

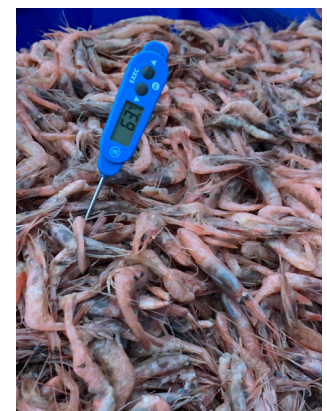
2022 featured some new problems with shrimp landings we haven’t seen recently.

Some zero-value shrimp was landed in Oregon in 2022, due to some odd causes. Broken glass, uncovered on some shrimp grounds and problems with icing made a handful of loads simply discarded.

Broken glass was found a couple times in the shrimp beds just north of Coos Bay. Attentive plant and vessel staff were able to detect and mitigate this problem before the shrimp made it to the peelers. Experienced shrimpers posited that this glass may be remnant of a long gone fleet and methods (from historic Russian fishing activity).

Be aware and on the lookout for this issue if you are shrimping there in 2023.

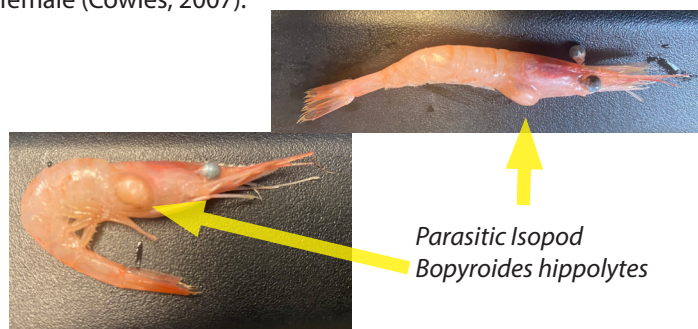
A few loads of shrimp were mostly discarded after icing procedures failed to keep the product at acceptable temperatures. Shrimpers are normally very good at this; however, big catches in 2022 probably made things more difficult.



Under-iced pink shrimp

Bopyroides hippolytes

In 2022 we saw a few *Bopyroides hippolytes*, a parasitic isopod (think of a “pill bug”) in our biological sampling. We see these isopods on shrimp from our biological samples in some years, but most commonly when densities are high. The last time they were seen in any numbers was 2015, one of our highest shrimp abundance years. These parasitic isopods live on the gills of the shrimp, underneath the shell covering the “head” (carapace). Viewed from the outside, it appears as a blister on the carapace of a shrimp. Cutting away the blister reveals the isopod. Reported detrimental effects on host shrimp include slower growth rates and retarded sex change from male to female (Cowles, 2007).



Science Gear in WA

Through funding received from the National Science Foundation, the Quinault Indian Nation and Quileute Indian Tribe in collaboration with the Northwest Association of Networked Ocean Observing Systems (NANOOS): Explorer plan to deploy several wave sensor buoys over the next few years. The Mooring Buoys will be located on the Washington shelf between Moclips and Cape Johnson. These Buoys measure just over 12 inches in height and 16 inches across.

These instruments are designed to:

- Provide real-time, publicly accessible wave data
- Provide safety for coastal fishers
- Improve understanding of hydrodynamic processes
- Inform coastal management best practices

Once deployed, the location coordinates will be provided in updates to all ocean users. Questions?

Contact info:

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jshumacker@quinault.org



SOFAR Spotter buoy
<https://sofarocean.com>

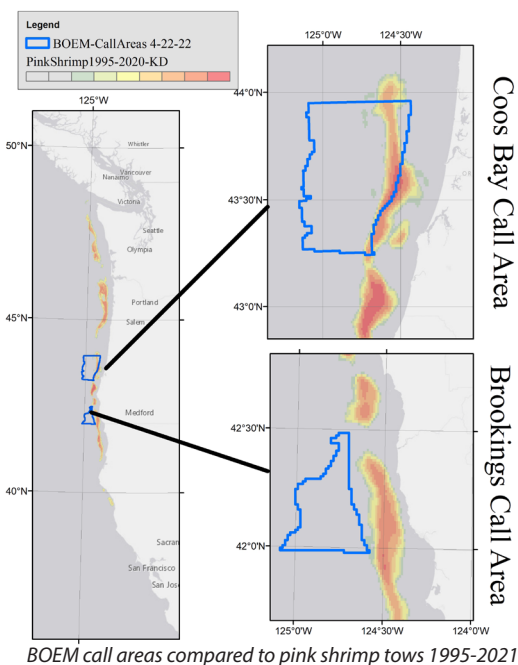
Wind Energy Call Areas

In 2022, ODFW staff compiled shrimp logbook data from 112,913 tows representing almost a half billion pounds of catch from the years 2011-2021 to understand historical shrimping in the areas of two new “call areas”.

Thanks to the many hard working years of cooperative logbook work between shrimpers and biologists, robust data allows the impact of potential call areas to be visualized (Figure below).

This data and much more can be found at <https://offshorewind.westcoastcoceans.org/visualize/>

Questions? Check in with Delia Kelly, ODFW Ocean Energy Coordinator. Delia.R.Kelly@odfw.oregon.gov
https://www.dfw.state.or.us/MRP/ocean_energy/index.asp



Literature Cited

Anderson, R., R. Gustafson, K. Richerson, K. Somers, V. Tuttle and J. Jannot (2022). 2022 5-Year Review: Summary & Evaluation of Eulachon, Southern DPS, National Marine Fisheries Service West Coast Region: 74 p.

Cowles, D. (2007). “*Bopyroides hippolytes*.” Invertebrates of the Salish Sea, 2023, from <https://inverts.wallawalla.edu/index.html>.

New reports available:

Groth, S. (2022). An Evaluation of Fishery and Environmental Effects on the Recruitment Levels of Ocean Shrimp (*Pandalus jordani*) through 2019. ODFW Science Bulletin: 26 p.

How to cite this report:

Groth, S. (2023). Oregon’s Annual Pink Shrimp Review. Newport, OR, Oregon Department of Fish and Wildlife. 34: 16 p.

Who We Are

ODFW's mission is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations.

The pink shrimp fishery project is managed with the following long term objectives:

1. Maximize biomass yield from the pink shrimp fishery, consistent with detecting and addressing any significant growth or recruitment overfishing that develops.
2. Operate the fishery, to the extent possible, under a stable regulatory environment that allows vessel operators maximum flexibility in deciding where, when and how to fish for pink shrimp.
3. Through collaborative research with vessel operators and the sharing of research findings, develop and implement measures to minimize direct bycatch mortality, the unseen mortality of animals that escape capture, and any adverse effects on seafloor habitat from the operation of the fishery.

Oregon's pink shrimp project is spread out among the major ports of Oregon to:

1. Collect fishery dependent data (biological samples and logbooks)
2. Assist and communicate with shrimpers.

**Good Luck
Shrimping in 2023!**



Questions?

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Jill Smith, Assistant Project Leader (503) 325-2462

Licensing: (503) 947-6101
Fish Tickets: Nadine Hurtado (503) 947-6247



Marine Resources

ODFW Pink Shrimp Team

Astoria: Jill Smith



Astoria

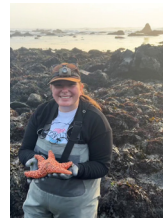
Newport:
Eric Anderson



Newport

Charleston:

Meaghan Palmer, Scott Groth,
Joel Prickett, and Katlyn Lockhart
(clockwise)



Charleston



Brookings

Brookings:
Valerie Stephens and
Camille Ayrea



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