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April 2, 2019

### MEMORANDUM

**TO: Council Members**

**FROM: Lynn Palensky**

**SUBJECT: Briefing on Columbia River Eulachon**

#### **BACKGROUND:**

**Presenter:** Laura Heironimus, Biologist, Washington Department of Fish and Wildlife, SW Washington Regional Office.

**Summary:** Laura Heironimus will report on Columbia River Eulachon, including a brief overview of:

- history and status update of Eulachon smelt, *Thaleichthys pacificus*;
- cultural importance of Eulachon to tribal communities;
- recreational and commercial fisheries;
- significance of Eulachon in the ecosystem as a forage fish;
- major threats and effects of hydropower on reproductive success;
- research and monitoring efforts; and
- recovery plan implementation priorities and Eulachon as an emerging priority.


**Relevance:** This information is relevant to our high-level indicators. It gives the region a status report on smelt populations and a preview for what is expected for smelt returns in the coming year. The Program is not currently funding any Eulachon work.

Workplan: This reporting task is captured in the Division's work plan under Adaptive Management - Annual Reports. See Program language for Eulachon [here](#).

Background: The 2014 Program called for the Council, in collaboration with Bonneville, the Corps, NOAA Fisheries, and agencies and tribes, to help organize and facilitate a science/policy forum in 2015 to address the biological requirements of eulachon, combined with related inquiries into the relationship between flow, current hydropower dam operations, and the biological requirements of lamprey and sturgeon. The *Columbia River Eulachon (smelt) State of the Science and Science to Policy Forum* was held in August 2015. The goal was to report to the region on the state of the science, the reasonable next steps in the assessment process, and a recommendation for how to incorporate those steps into the recovery plan. The information generated from this forum was used to help inform NOAA's Eulachon Recovery Plan.

More Info:

- [2017](#) NOAA's Final [Eulachon Recovery Plan](#)
- 2019 Smelt season – February [Blog](#) on Outdoor Line
- March 2017 Eulachon Report to Council: [presentation](#)
- 2015 Eulachon Forum final [report](#)



# Southern DPS Eulachon: Current Population Status and Recovery Plan Implementation Efforts



Laura Heironimus  
Washington Department of Fish and Wildlife  
Ridgefield, WA

# Outline

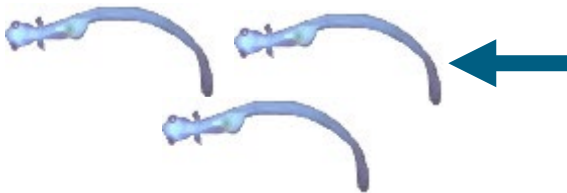
- Eulachon Life History and Ecosystem Significance
- History of Eulachon Fishery
  - Cultural importance to tribal communities
  - Popularity of recreational and commercial fisheries
- Major threats
- Monitoring and Current Status
- Recovery Goals and Recommendations



# Life History



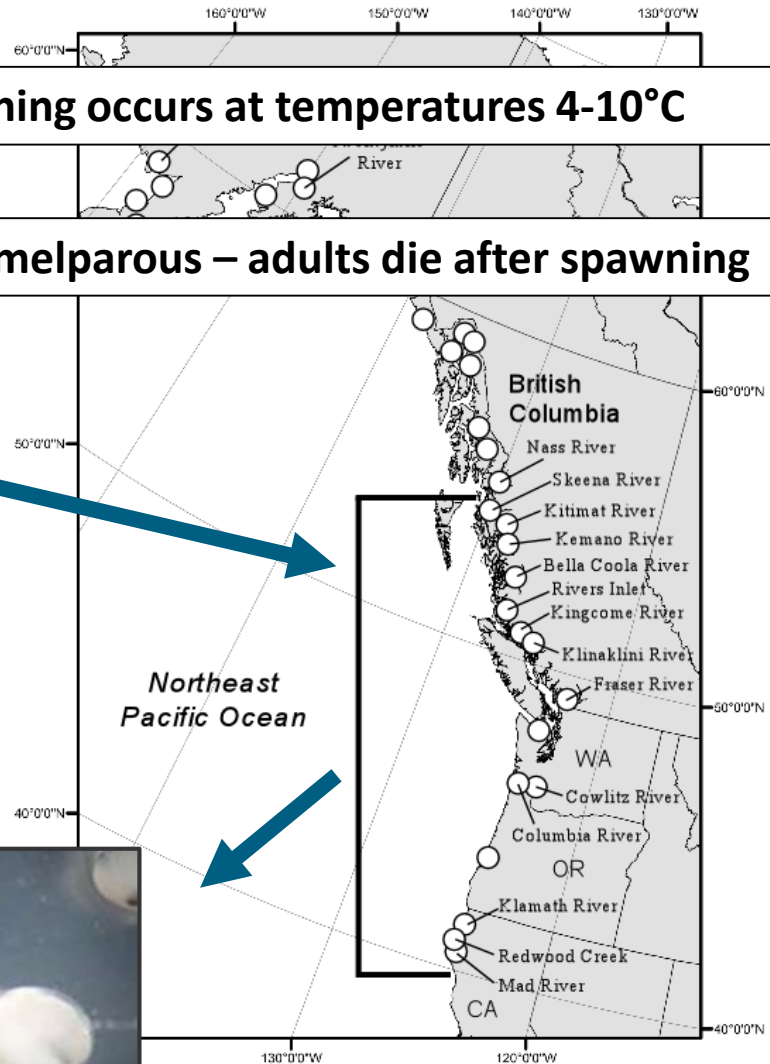
2–5 years in saltwater



4–7 mm

Spawning occurs at temperatures 4-10°C

Semelparous – adults die after spawning



Northeast Pacific Ocean

70 nm

“mobile incubation” – eggs incubate and develop while drifting downstream

# Ecosystem Role, forage fish

**Pacific Whiting (Hake)**



**Humpback Whales**



**White Sturgeon**



**Seals and Sea Lions**



**Chinook smolts**



**Seagulls**



# Cultural Importance

- Eulachon are a culturally-important species for Indians and First Nations people all along the Northwest Coast.
- Cowlitz Indian Tribe petitioned for a listed status in November 2008.



HARDWOOD OR BONE TEETH  
SET INTO DRILLED HOLES,  
OR HAMMERED IN FROM THE BACK.  
LENGTHS VARY FROM 2.5cm - 4.0cm.  
SPACING FROM 1.5 cm - 2.8 cm.



A VARIATION HAS ANGLED TEETH. 12-X  
WHEN NAILS BECAME AVAILABLE, THESE REPLACED  
TEETH OF WOOD AND BONE. RAKES ARE ALSO  
USED FOR TAKING SMELT AND EULACHON.

# Commercial Fisheries

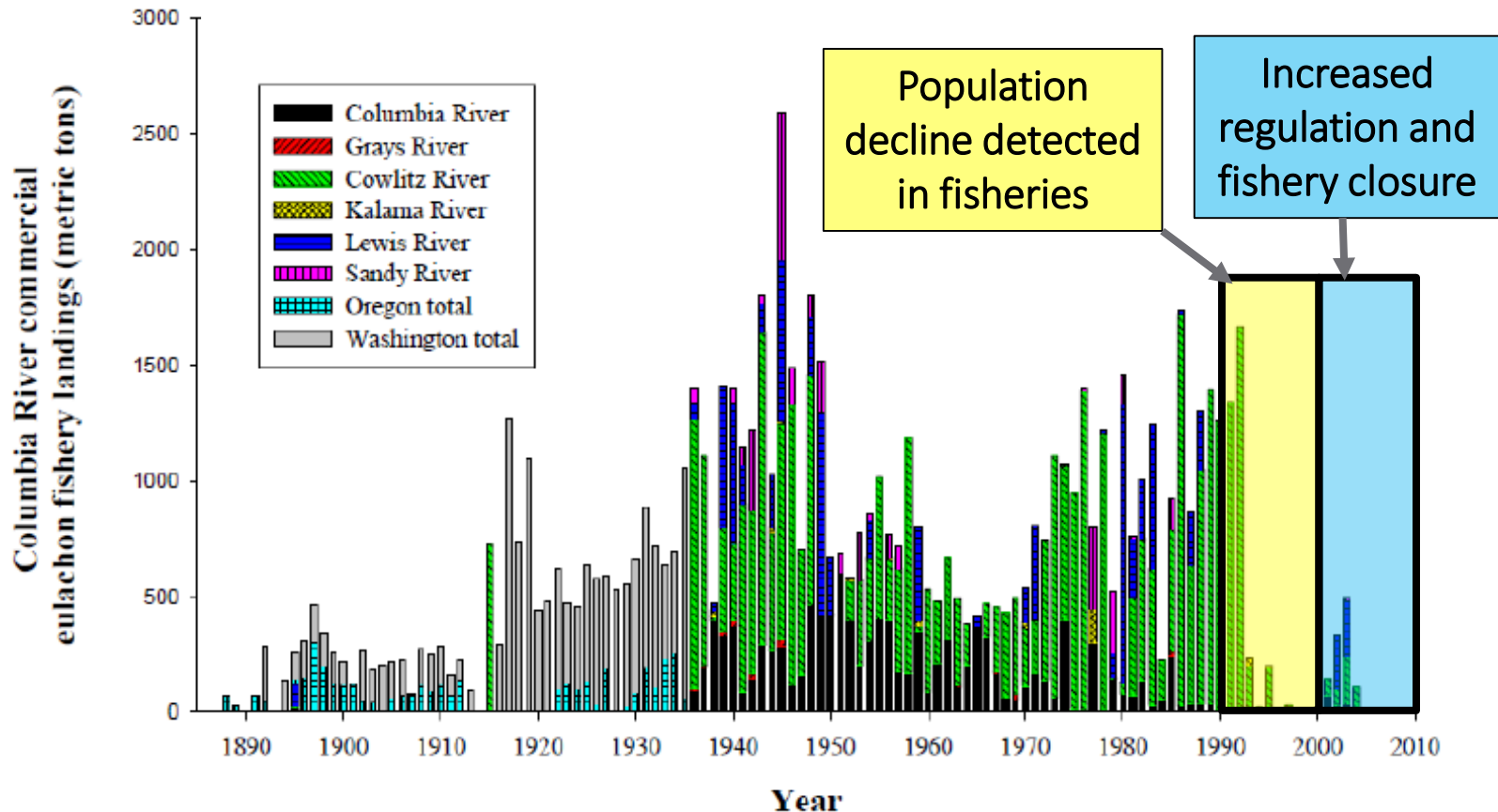
- Local communities honored and celebrated the smelt arrival.
  - Longview Smelt Festival and Smelt Queens
- Washington State landings have accounted for most of the commercial smelt harvest since the late-1800s.
  - Commercial landings data are the only way to assess historical abundance.
  - Landings data can be very biased due to variation in fishing effort and market demands.





# Fishery Monitoring

- Fisheries declined in mid-1990s which prompted management action.
- The Washington Oregon Eulachon Management Plan was implemented in 2001.
- Eulachon listed as a threatened species under ESA on March 18, 2010.



# Recreational Fisheries

- Recreational dipping generally occurs along the Cowlitz River in Washington and Sandy River in Oregon.
- According to the 1978 creel survey, the sport tributary harvest was estimated as similar in magnitude to the commercial tributary harvest.
- In 2016, there was an estimated 16,700 angler trips and 141,000 pounds of smelt harvested in a single day.



# Factors of Decline

## Top 5 Factors of Decline in the Columbia River:

1. Climate change impacts on ocean conditions
2. Eulachon by-catch
3. Climate change impacts on freshwater habitats
4. Dams/water diversions
5. Water quality

\*Eulachon qualitative threats rankings by subpopulation (BRT 2010)

## Without Lights



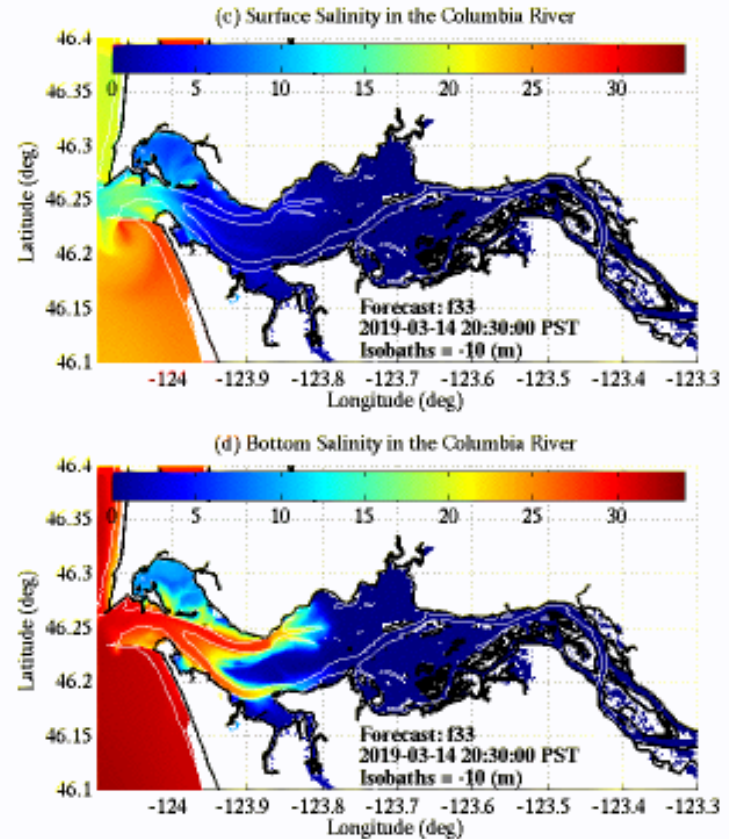
## With LED Lights



# Factors of Decline

## Effects of the Federal Columbia Hydropower System:

- Hydrograph – significantly altered timing, magnitude, and duration.
- Columbia River Plume – reduced in size, shape, and intensity.
- Migration – Bonneville Dam impedes migration to historical spawning habitat above the dam (Hood River and Klickitat River).



Center for Coastal Margin Observation & Prediction  
[www.stccmop.org](http://www.stccmop.org)

\*Recovery Plan for Southern DPS Eulachon (NMFS 2017)

# Recovery Priority Actions

Continue to implement limited-opportunity fisheries to:

- Provide essential context for interpreting historical harvest data
- Filling critical information gaps
- Support the cultural traditions of Northwest tribes
- Provide commercial and recreational fishery to maintain connection between people and the resource.



# Recovery Priority Actions



- Develop outreach and education strategies
- Foster stewardship of the marine ecosystem
- Expand funding and research partnerships
- Increase involvement of regional organizations

# Recovery Team

Eulachon Technical Recovery and Implementation Team

Cape Blanco to Grays Harbor Coordination Group  
(Includes Columbia River and tributaries)

- Tribal Partners:
  - Cowlitz Indian Tribe
  - Quileute Tribe
  - Yakama Nation
- State Partners:
  - Oregon Department of Fish and Wildlife
  - Washington Department of Fish and Wildlife
- Federal Partners:
  - National Marine Fisheries Service, NOAA

# NOAA Research

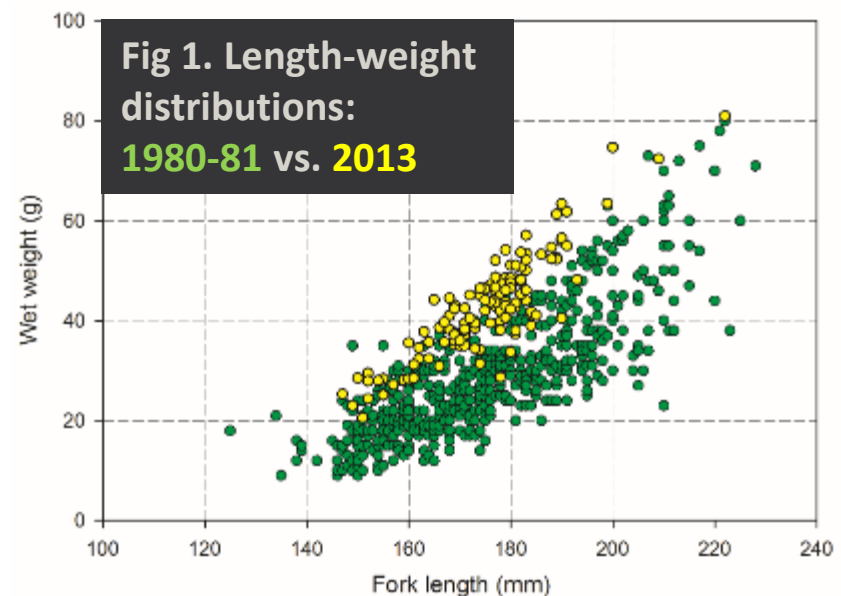


Trawl surveys used to live capture to support WDFW SSB estimates and address critical uncertainties in recovery:

- Fishery-independent run timing
- Representative sampling of age, size, fecundity, genetics, sex ratio
- Live specimens (e.g. tagging)
- Estuary habitat use
- Preliminary evidence:
  - changing size distribution
  - Sex ratios close to 1:1



Trawl vessel *R/V Murrelet*





# NOAA Research



## Pilot study in 2020 to explore potential acoustic biomass:

- Proven technique for many managed forage fish stocks
- Provides data on run-timing, distribution, biomass, size composition
- Preliminary images of:
  - Single-species, bottom-oriented shoals during upstream migration
  - Well-defined aggregation boundaries

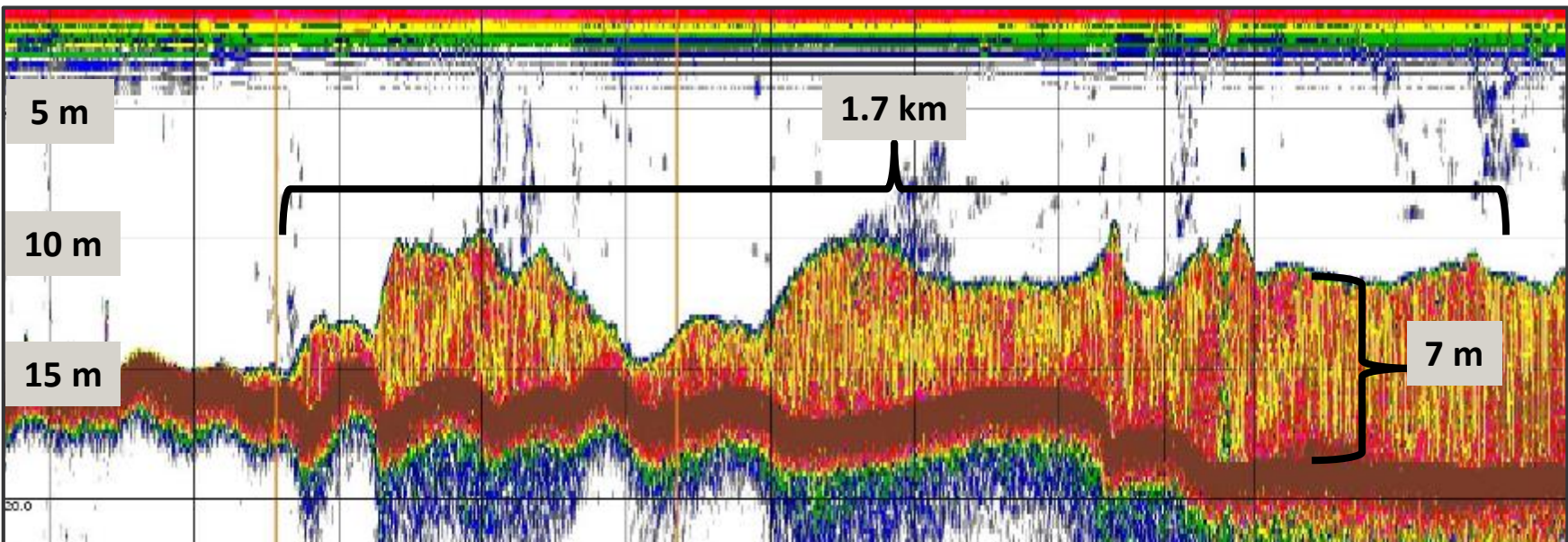


Image of eulachon shoal, 07 Mar 13, 1329 local time, near Wauna, OR – Columbia Mainstem

# Cowlitz Tribe Monitoring



- **Fyke Net:**

- Near mouth of Cowlitz River
- December through May
- Male:Female Ratio
- Female length and weight



- **Plankton Tow:**

- Near mouth of Cowlitz River
- December through May
- Egg and larvae densities
- Estimate Cowlitz River SSB



# State Monitoring



- Fishery Dependent Data:

- Commercially harvested smelt are purchased for biological data.
- Recreationally dipped smelt are sampled through a creel survey
- Male:Female Ratio
- Length, weight, fecundity
- Total pounds harvested



- Fishery Independent Data:

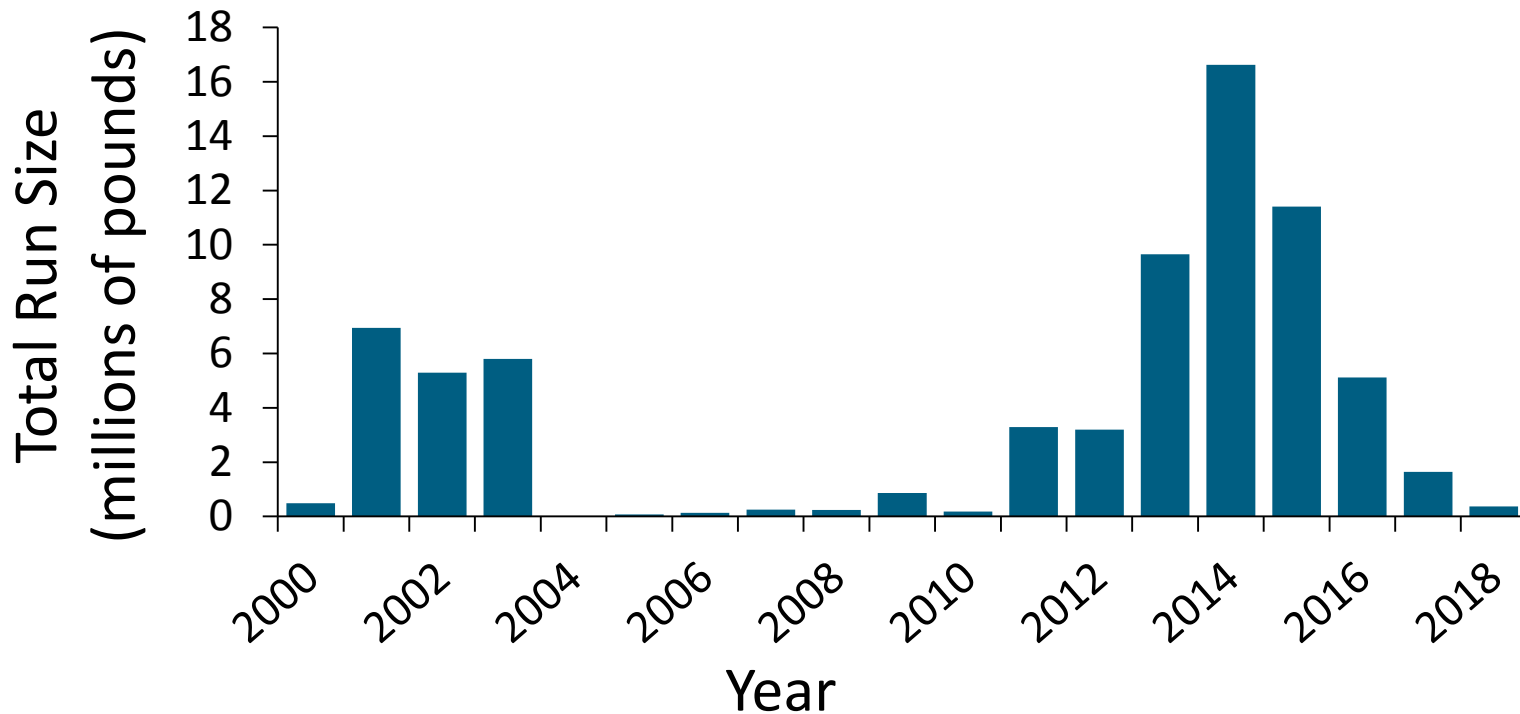
- Plankton Tows
  - Egg and larvae densities
- Pilot studies in coastal rivers and tributaries, 1996-2018
- Standardized transect in Columbia River at RM 34, 2000-2019



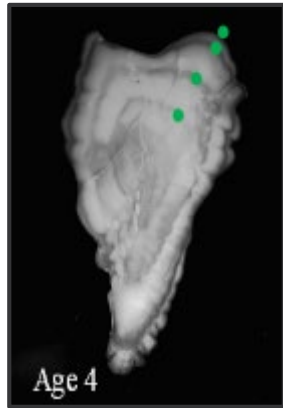
# Run Size Estimate

**Spawning Stock Biomass (SSB):** An estimate of the minimum number of spawning adults needed to have produced the eulachon larval outflow observed.

$$\text{Run Size} = \text{SSB} + \text{Fishery Harvest Data}$$

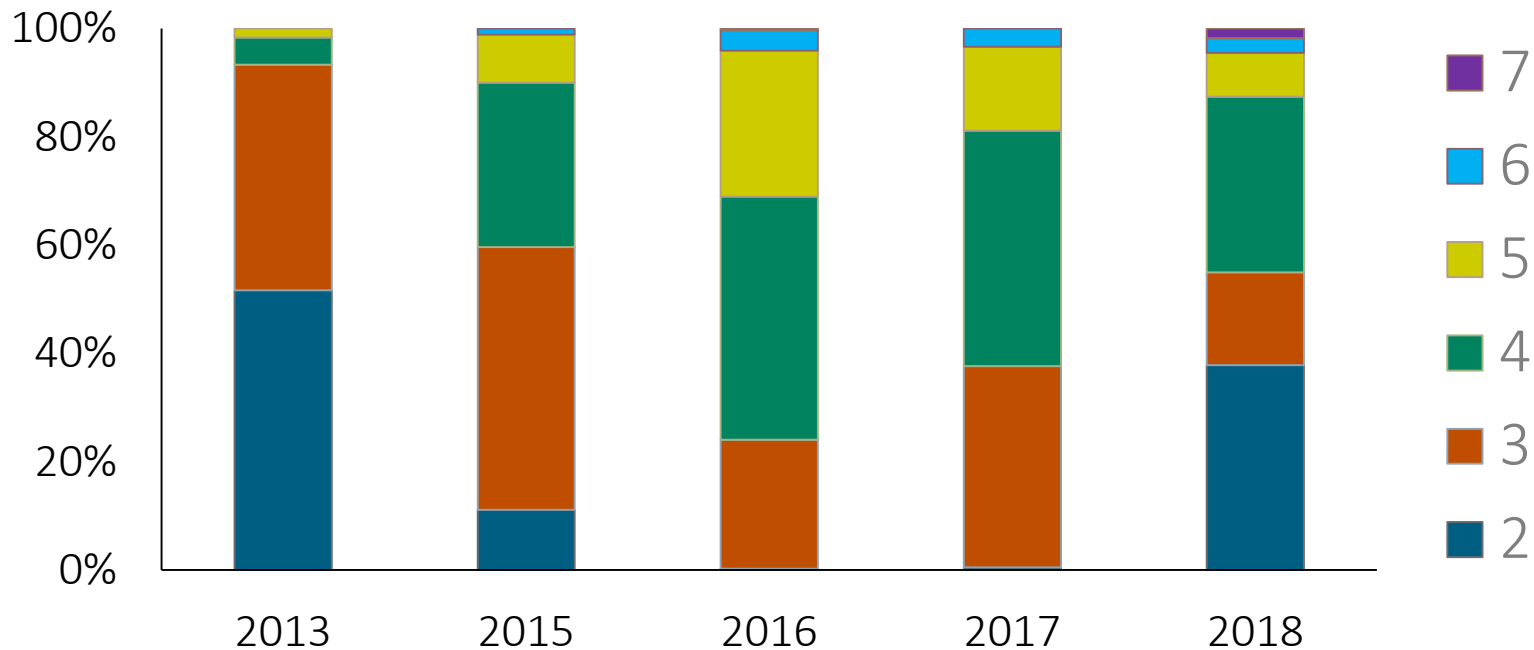


# State Monitoring



## Ageing Study:

- Evaluation of age-at-length and the contribution of different age-classes represented.



# Biological Monitoring

- Commercial and recreational test fisheries aid in biological monitoring.
- Tribal, state, and federal partners work together to identify funding for baseline biological monitoring to assess run size.
- No consistent funding has been identified to aid in monitoring eulachon.



# WDFW Recommendations

- Update the F&W Program measures and language to reflect NOAA's eulachon recovery plan.
- Include eulachon spawning stock biomass as the first high-level indicator for this species, and fund annual monitoring of eulachon spawning stock biomass.
- Add eulachon in the emerging program priorities and address critical uncertainties/questions for this species



