

*US west coast pink shrimp, *Pandalus jordani**

2018 International Cold Water Prawn Forum

Reykjavik, Iceland



Scott Groth
Pink shrimp project leader
Oregon Department of Fish and Wildlife



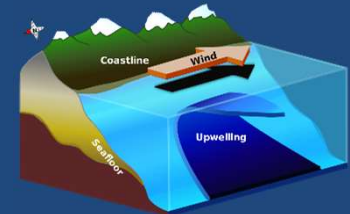
Outline



- Background
- Fishery assessment methods
- Stock dynamics and management
- Bycatch issues and management

Biology of *Pandalus jordani*

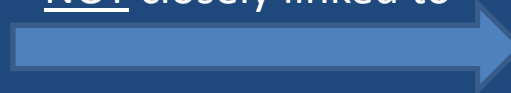
- Very short lived
- Protandrous hermaphrodites
- Eggs released in spring
- Recruitment is environmentally forced
- Spawner to recruit relationship weak



of spawners



NOT closely linked to

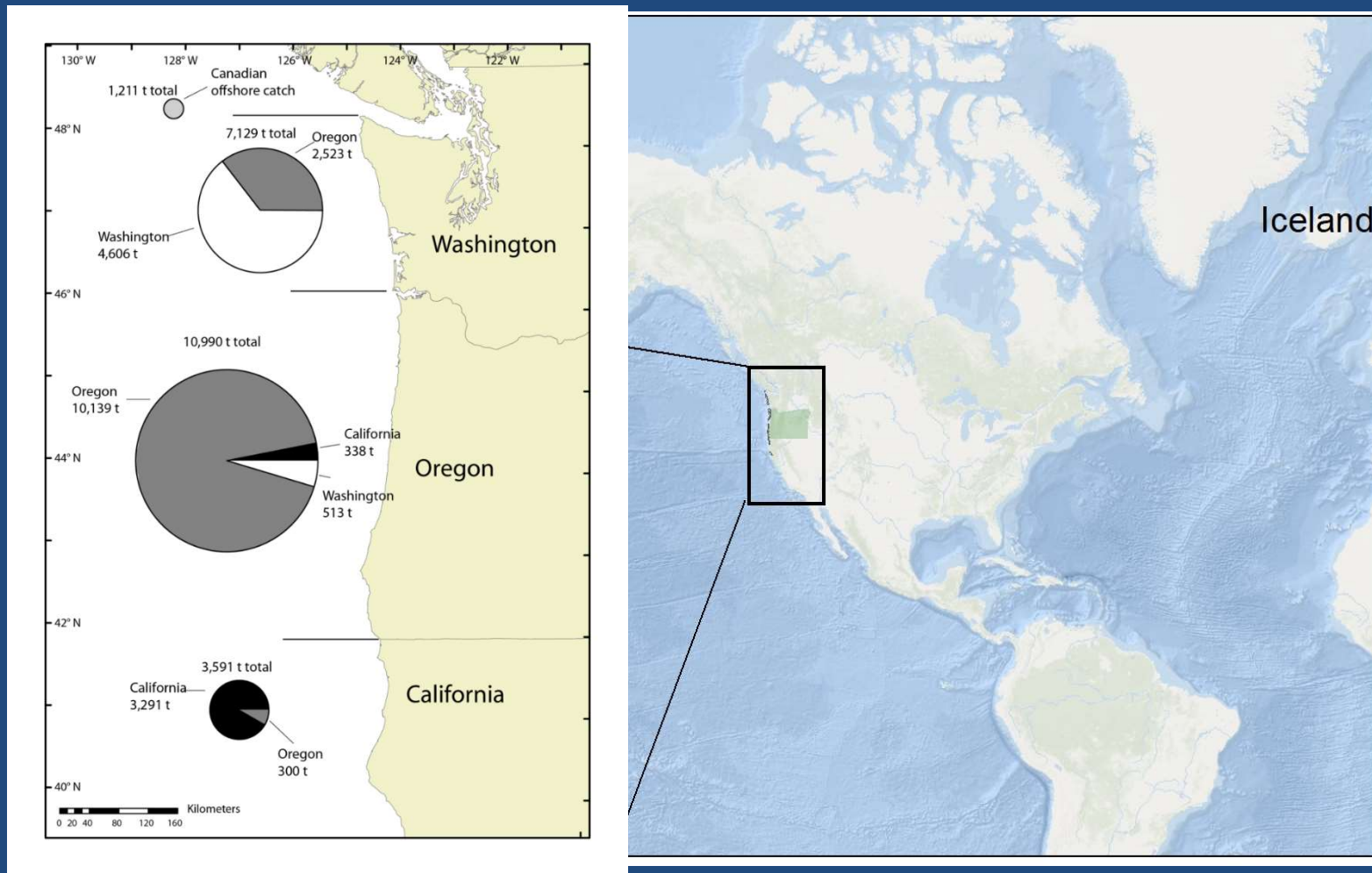


of recruits



Scope of U.S. *P. jordani* fishery

- CA, OR and WA averaged ~26,000 MT in last 10 years
- Oregon shrimp grounds and catches are the largest component of the U.S. fishery



Fishery methods

- Large vessels (15-30 meters)
- Double rigged otter trawl
- Trawling mud/sand 100-240 meters
- Typically Oregon's 2nd most valuable commercial fishery

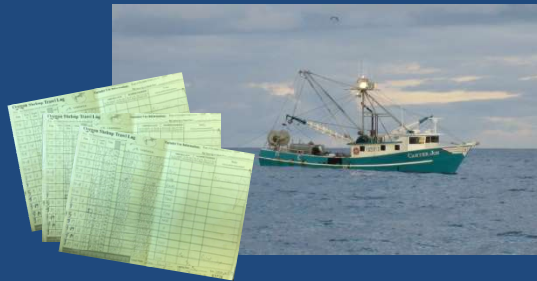


Fishery assessment tools

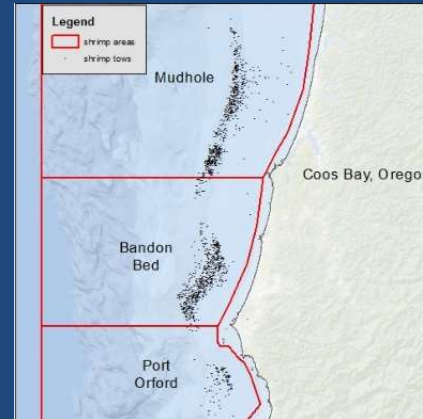
- Depends on understanding cohort strength (calculated via VPA)
- Intensive fishery monitoring: logbooks and biological sampling.

Virtual Population Analysis (VPA)

Pounds of shrimp



entry



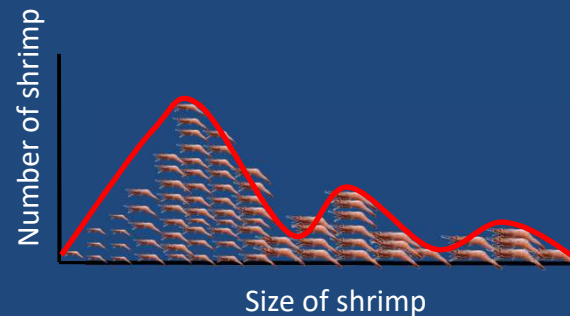
Pounds by
area

Expansion

Age of shrimp



measurement

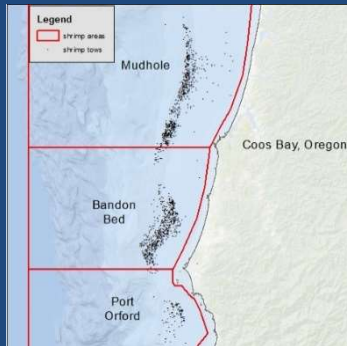


% of shrimp
per month
and area

% of each age

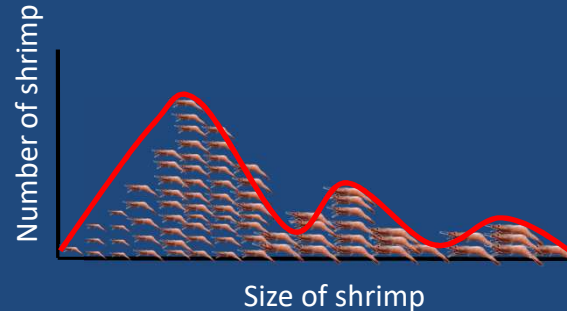
Virtual Population Estimate (VPE)

Pounds by area



% in each age class per area and month

X



=

of shrimp
in each age
class, each
year

How many shrimp successfully recruited in 2013?

Age:	2013	2014	2015	2016
Age 0	12,499,377	5,392,593	25,434,225	16,237,145
Age 1	1,280,762,464	2,596,051,840	765,176,665	2,165,778,990
Age 2	1,757,216,083	942,055,405	2,278,561,153	213,262,023
Age 3	308,537,544	226,392,518	158,379,736	174,753,765

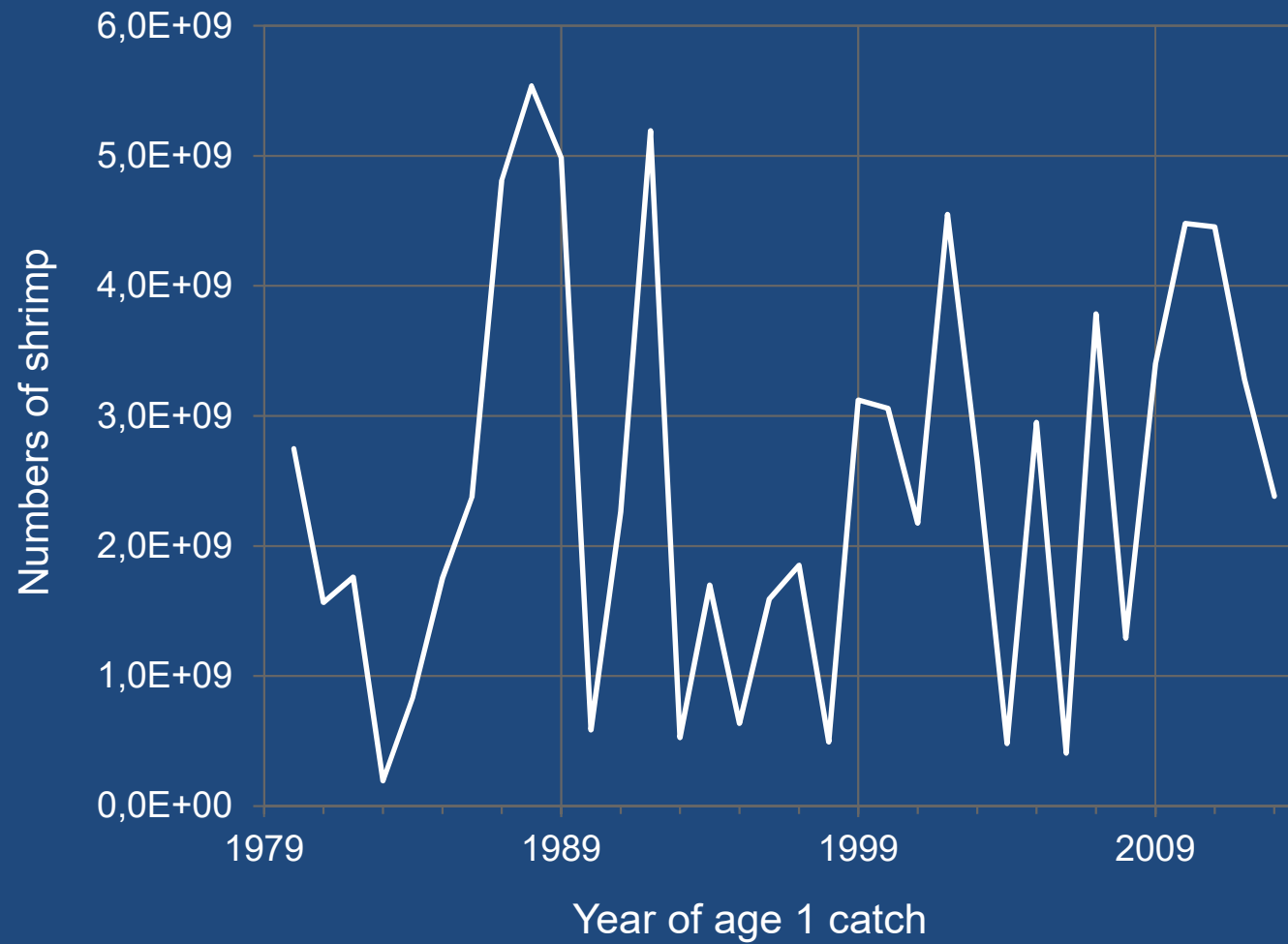
5,061,866,135

Shrimp from 2013 recruitment

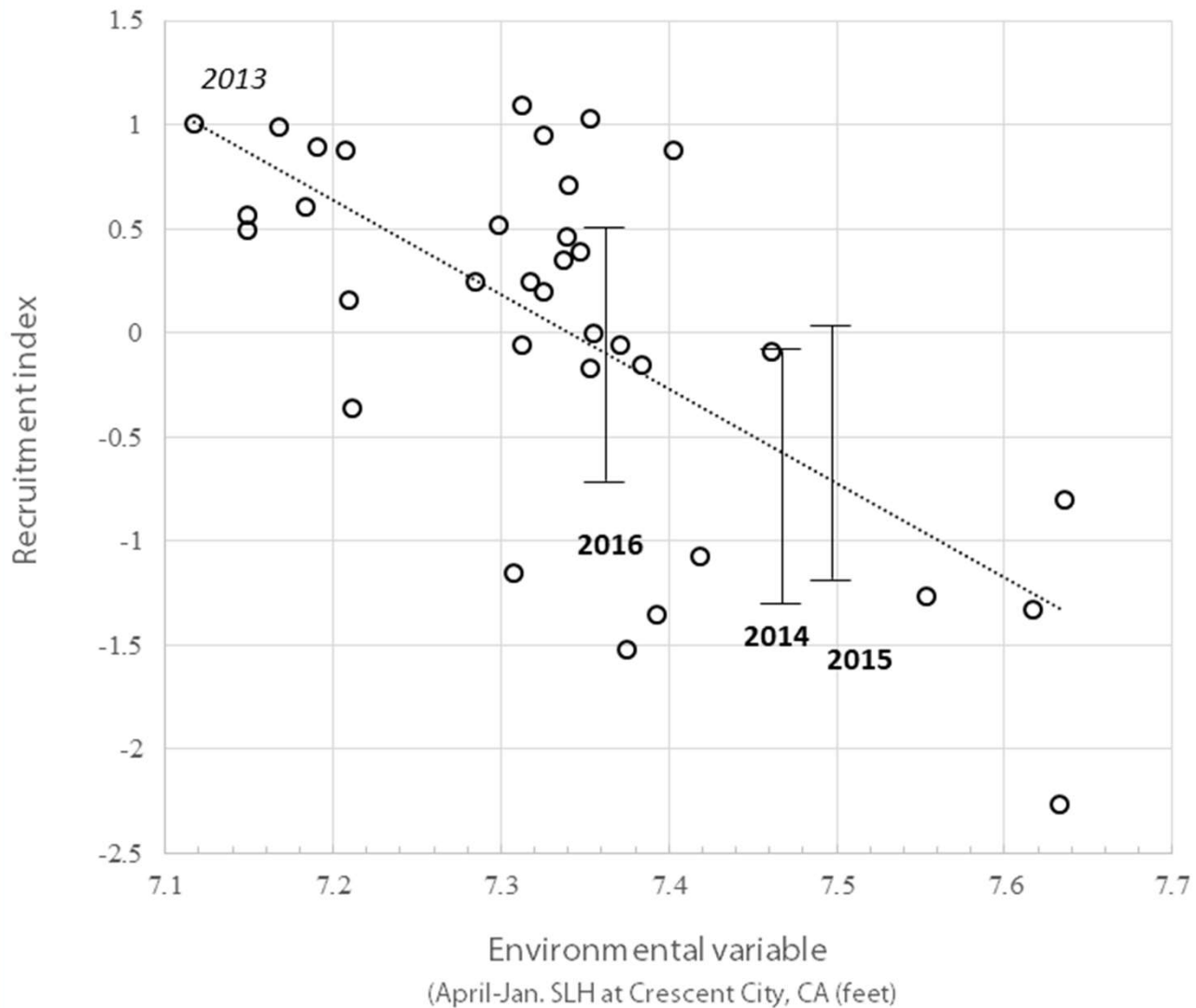
Stock dynamics and management

- VPE used to understand stock drivers.
- How is this applied to management?

Shrimp recruitment widely variable— has varied by 28 fold

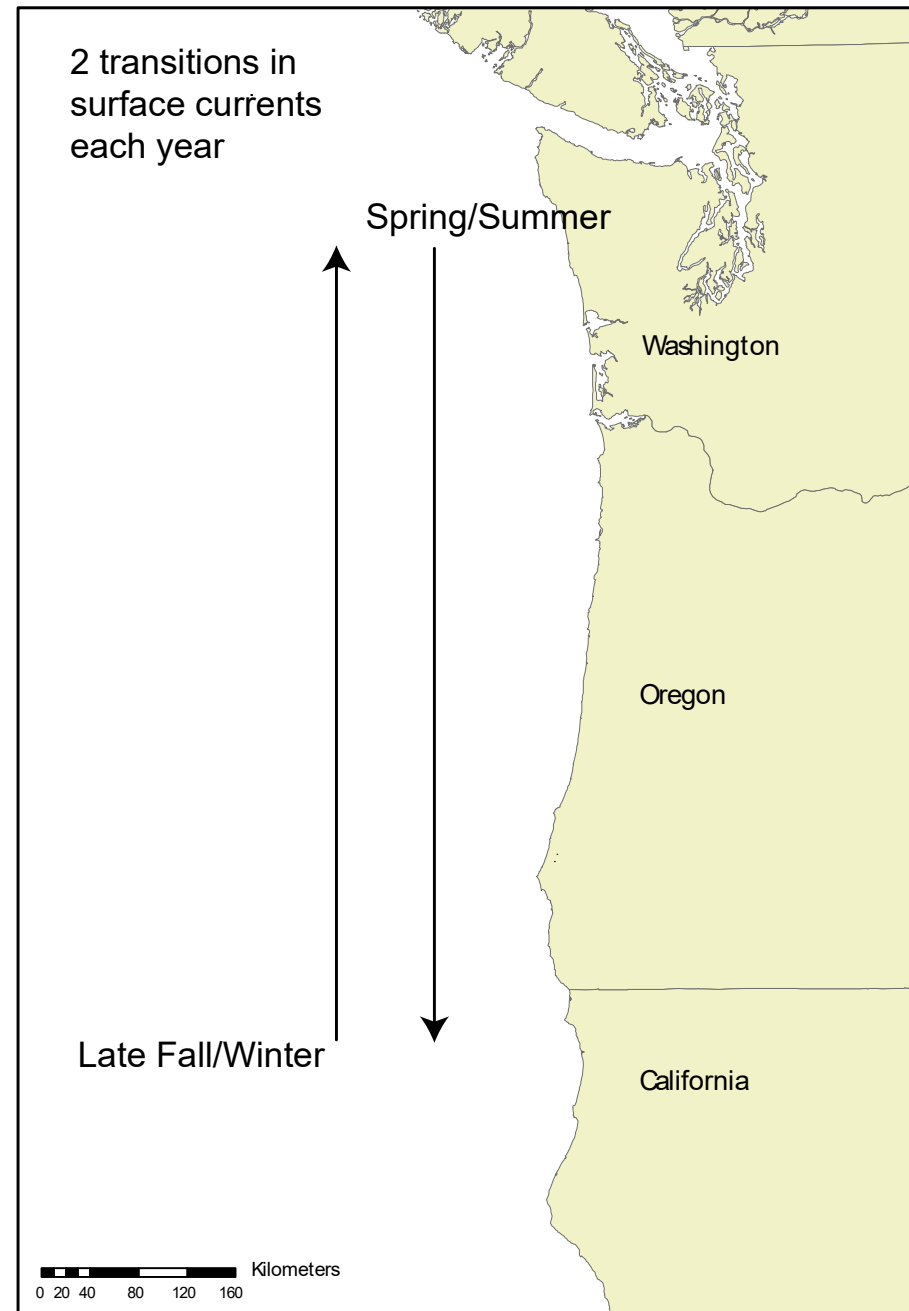


Variation in recruitment is environmentally forced

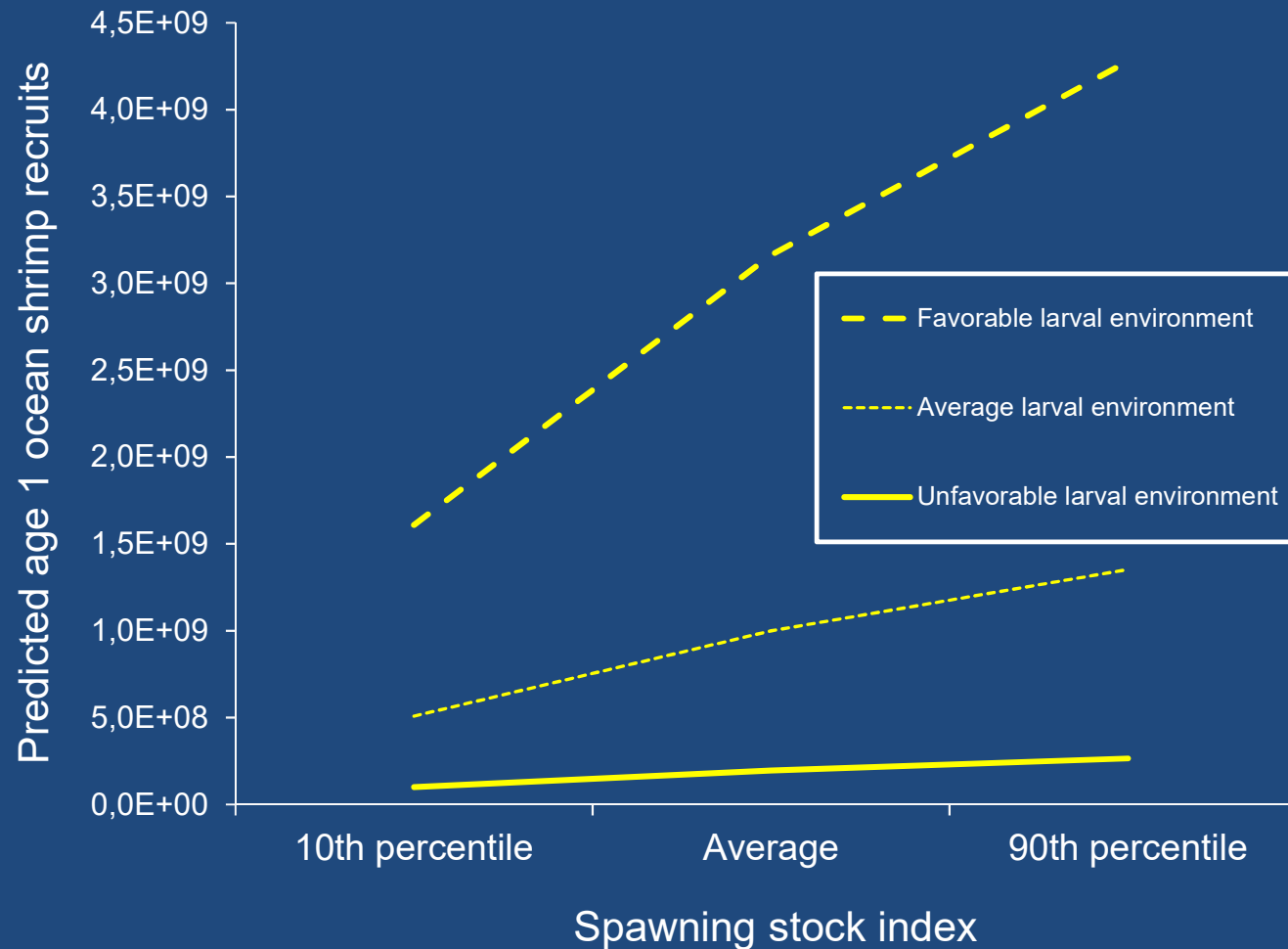


Why sea level?

- Sea level is related to the spring transition in coastal currents, also to the strength of the southward flowing California Current
- Shrimp larvae are released in March-April, just prior to the spring transition
- An early spring transition and strong southward flow benefit larval survival and/or retention in Oregon waters

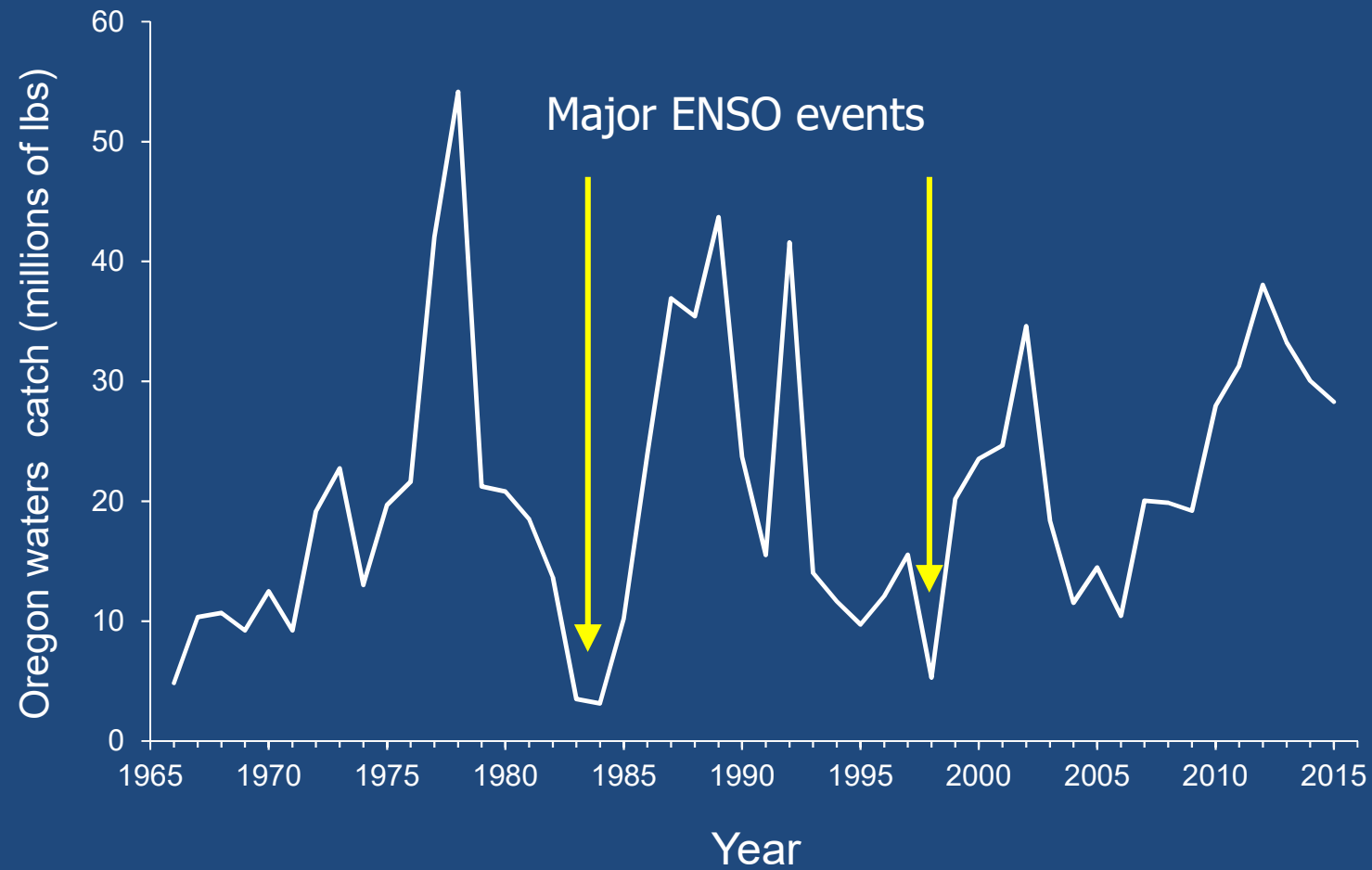


Comparing influences on shrimp recruitment



Ability to stabilize the stock by restraining fishing is inherently very limited!

Annual Catch



Fishery Management

OVERALL

- No shrimp quota (limited ability to stabilize stock)
- Intensive fishery monitoring (detect and address overfishing)
- Resilient stock
 - Short lived
 - Spawner to recruit relationship weak
- Reasonable limitation of efforts
 - Have T&L reference points – limit fishing (low population levels)
 - Season- April 1-October 31 (7 months)
 - Size- Maximum Count (160 shrimp/lb)
- Bycatch issues
 - Gear requirements: BRDs and LEDs

Bycatch issues and management

Two major physical exclusion devices in last 20 years

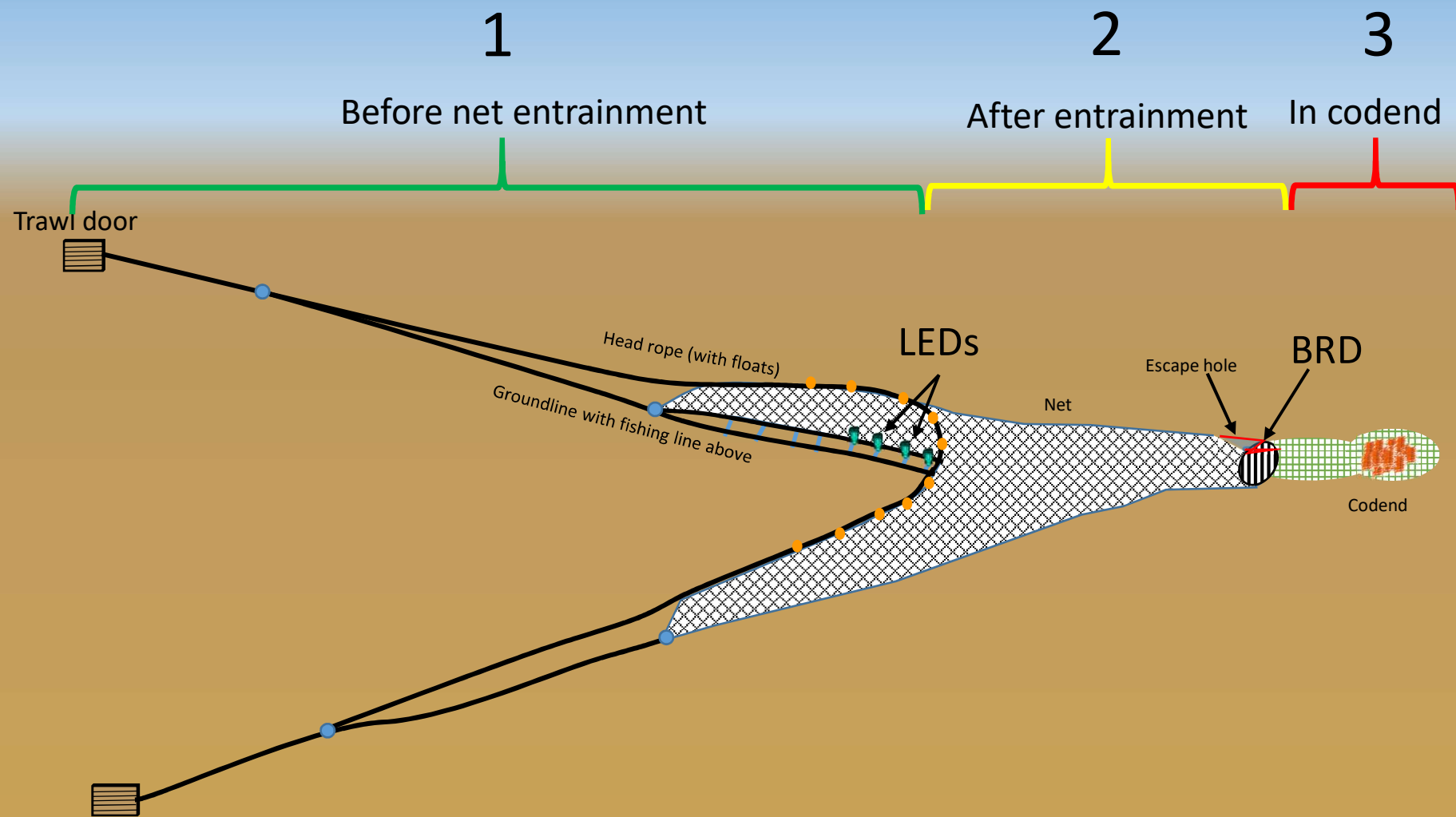
1. Bycatch Reduction Devices (BRDs)



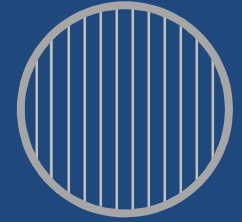
2. Light Emitting Diodes (LEDs)



Exclusion from a trawl



Bycatch Reduction Devices (BRDs)



- Physical exclusion, in the same way as TED devices
- Developed to avoid limitation of rockfish bycatch
- Refined for exclusion of smaller fish

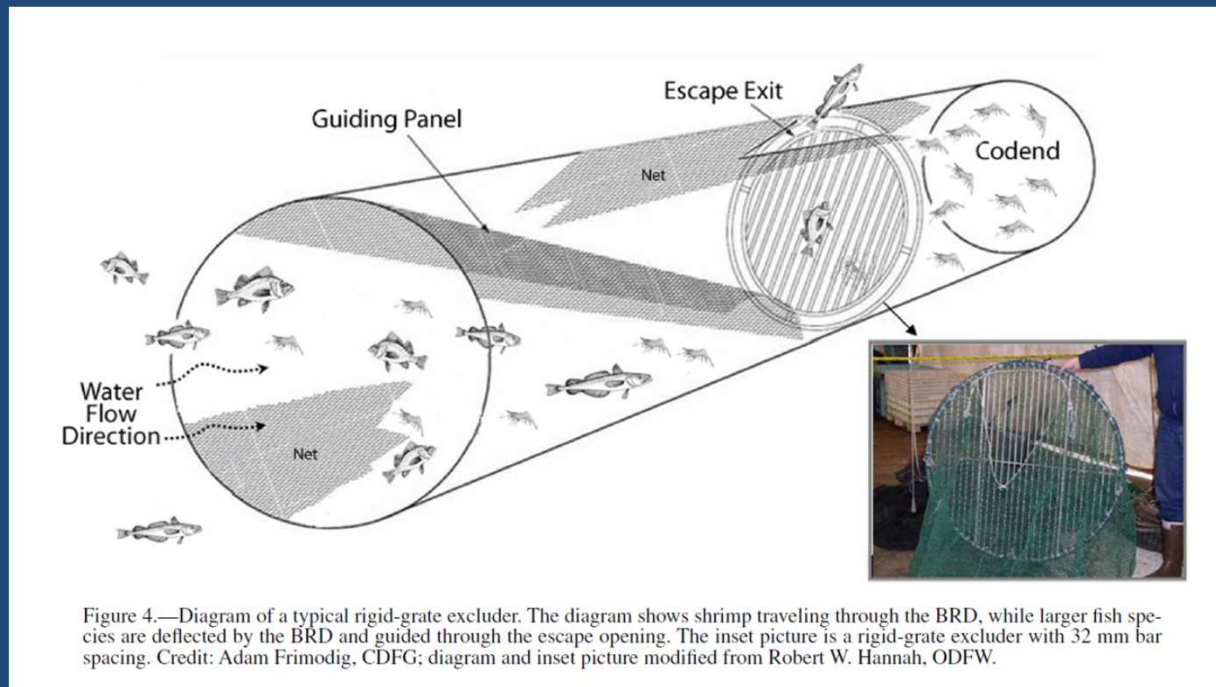


Figure 4.—Diagram of a typical rigid-grate excluder. The diagram shows shrimp traveling through the BRD, while larger fish species are deflected by the BRD and guided through the escape opening. The inset picture is a rigid-grate excluder with 32 mm bar spacing. Credit: Adam Frimodig, CDFG; diagram and inset picture modified from Robert W. Hannah, ODFW.





Eulachon smelt



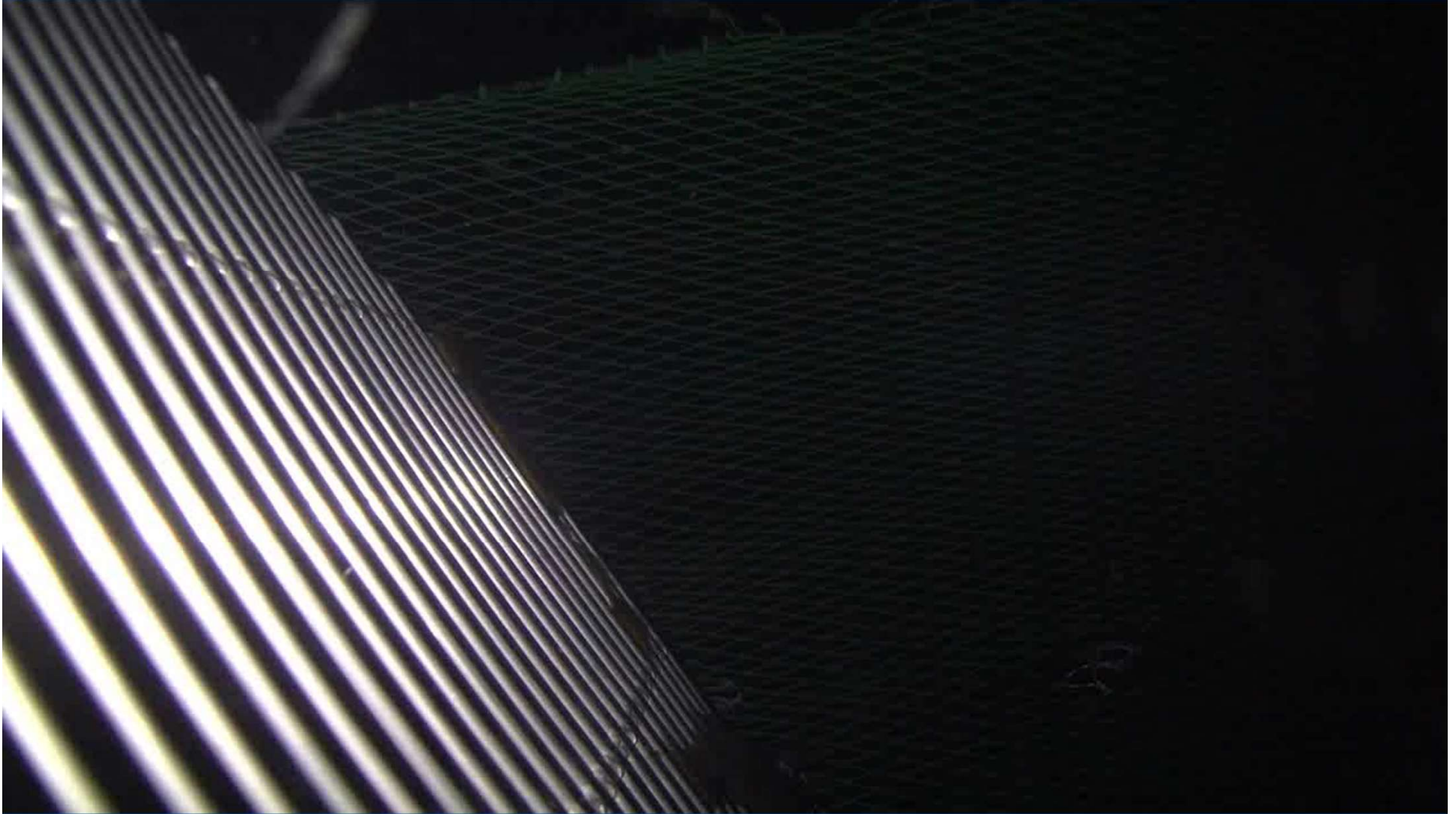
- Anadromous forage fish.
- Listed as “Threatened” by US Endangered Species Act in 2010.
- Bycatch from shrimp fishery identified as “high threat” to recovery
- ODFW focused on on reducing bycatch rates:
 - Footrope modifications
 - Bycatch Reduction Devices (BRD)
 - LEDs

BRDs and eulachon

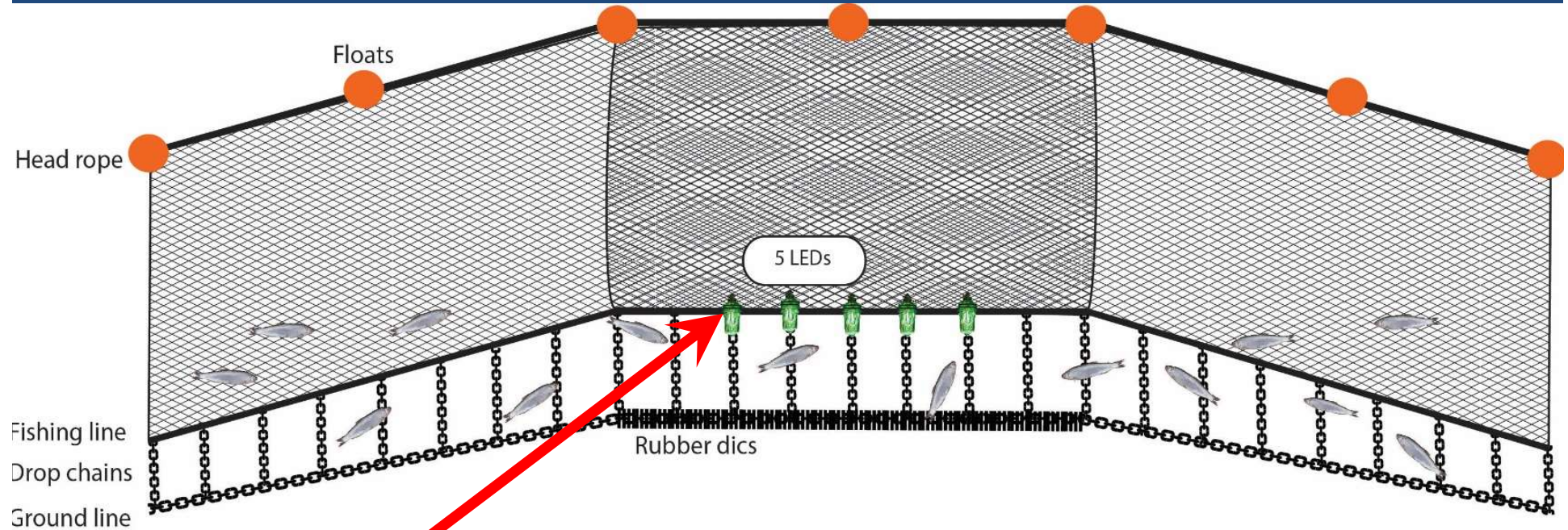


- Reducing spacing from 25mm to 19mm reduced eulachon take by 17% while not affecting shrimp catch
- Eulachon “optimized” small space BRD (19mm) became rule in 2012

Do eulachon survive the BRD?



LED research



5-20 small, inexpensive (\$40 USD), LED fishing lights, attached at bottom of fishing (or bosch) line.

Thought to "show the way" out

LEDs



2014- Huge population of eulachon

LED use show 91% eulachon reduction!

100% voluntary use immediately.

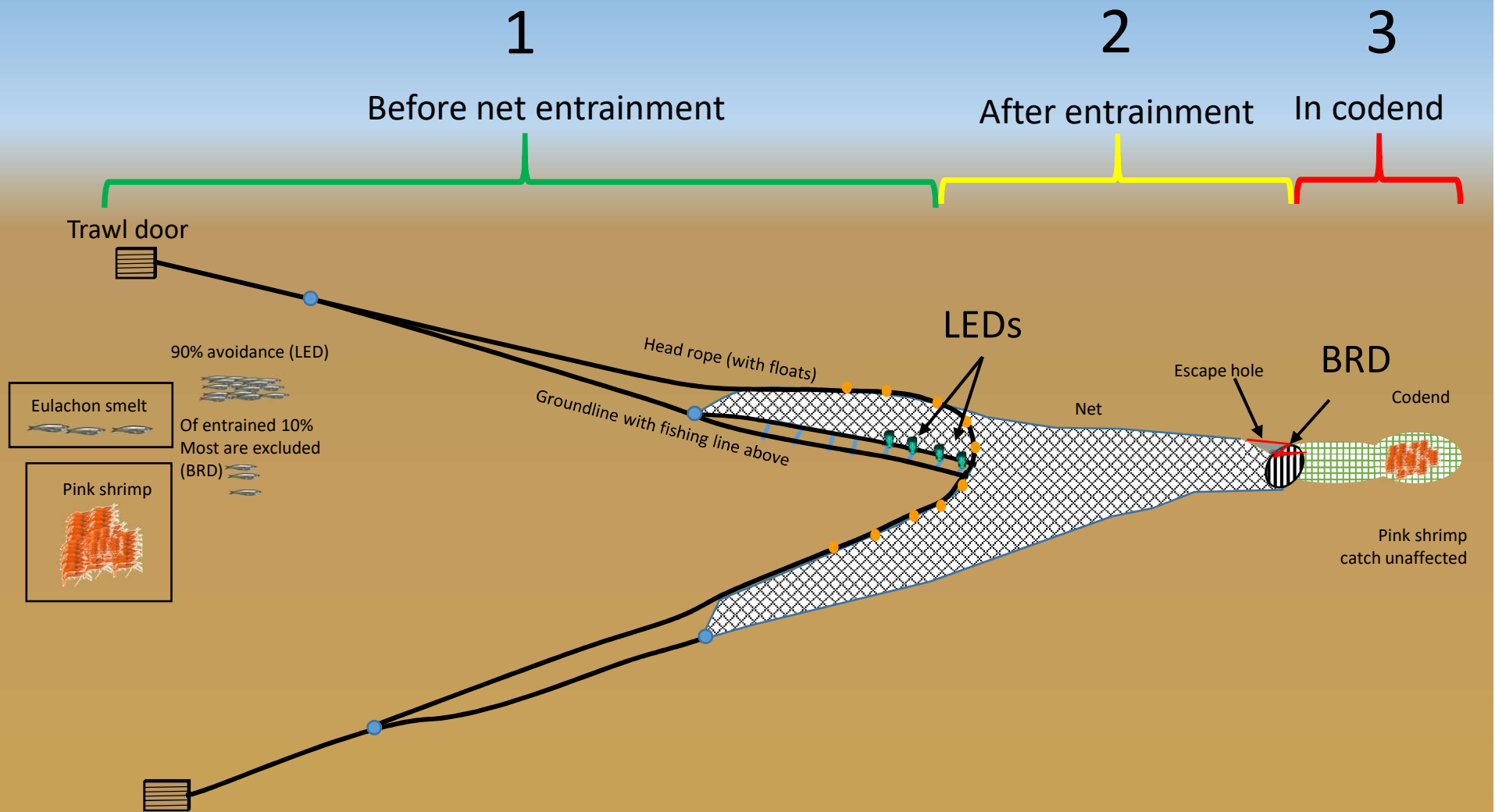


2017- Low population of eulachon

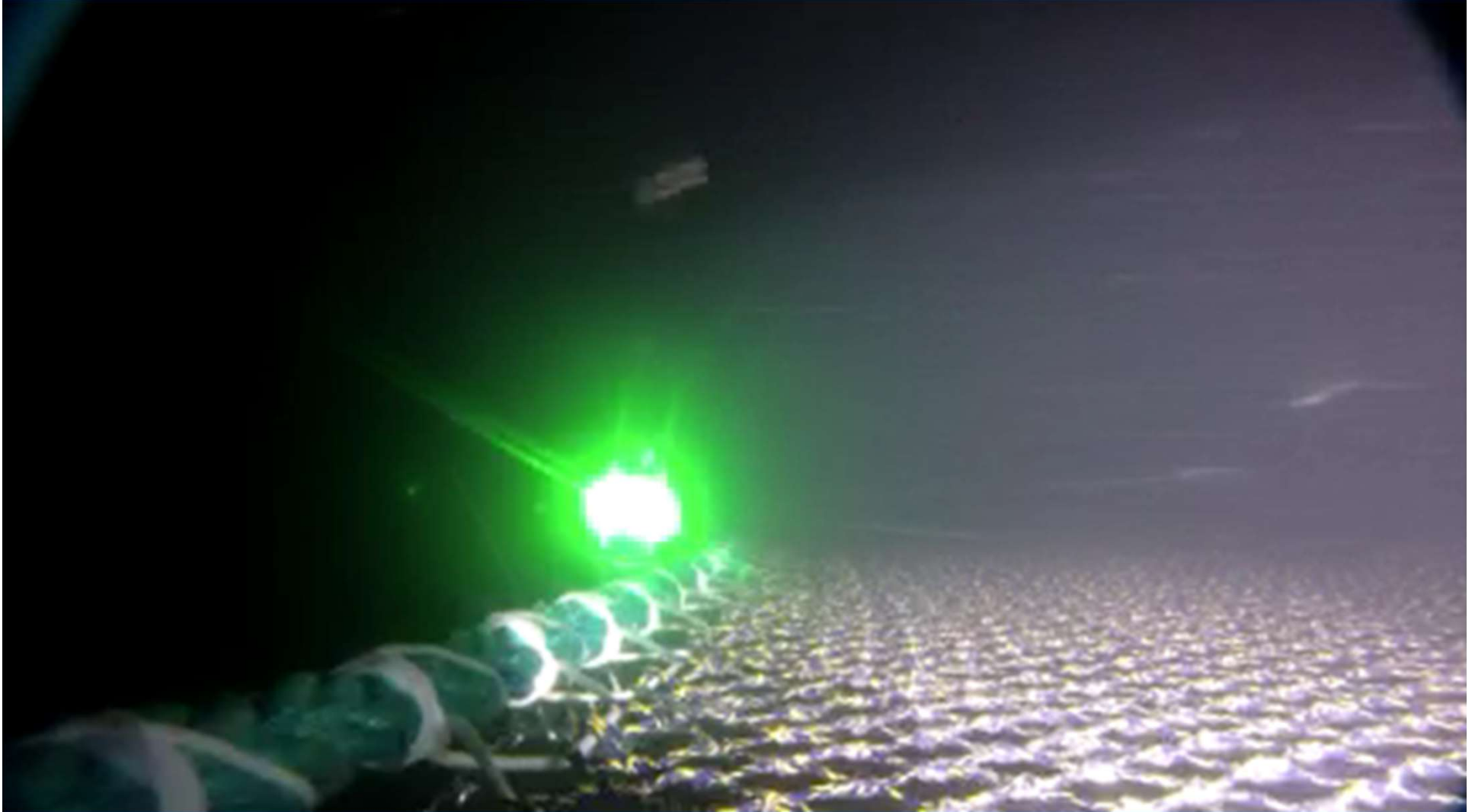
Confirm dramatic eulachon reduction (85%)

Voluntary use reduced ☹️

Exclusion of eulachon smelt



LEDs in action!



Video courtesy of Bryson Burns, F/V Coho

LEDs



- Key in conservation
 - easy, inexpensive, strong effect on key species
- Fleet initially voluntarily adopted use at nearly 100% rate, however have reduced use as eulachon populations lowered
- 2018 management proposal

Conclusions

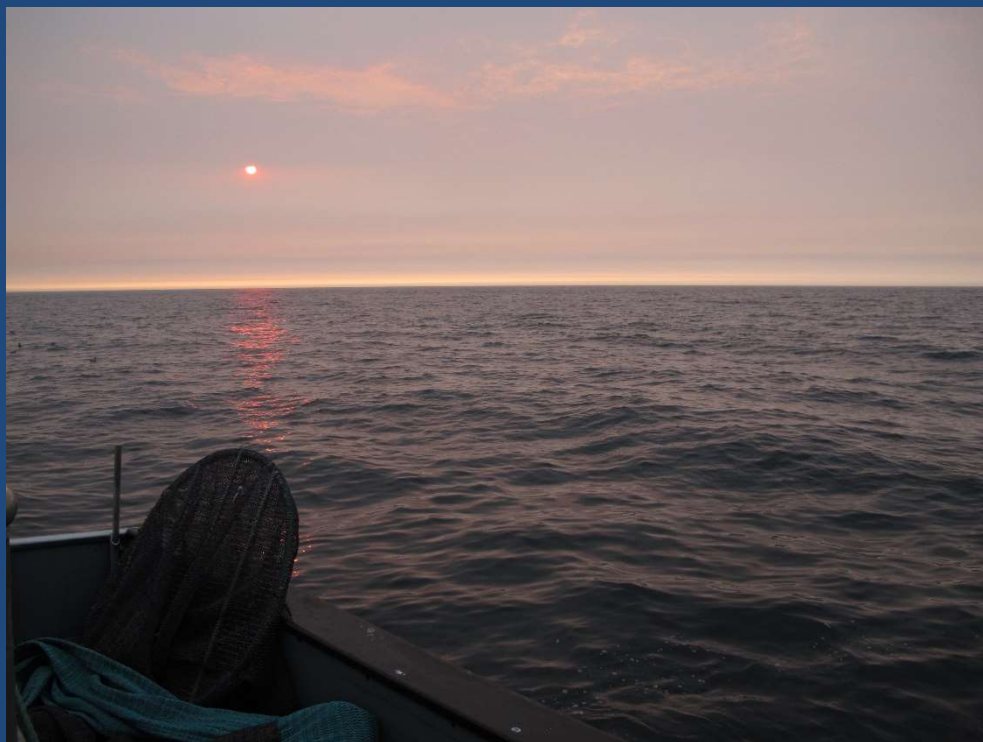
Uncomplicated management due to:

1. A resilient stock
2. Successful cooperation between industry and management
3. Success in physical exclusion of key species

Oregon and Washington pink shrimp fisheries certified “sustainable” by Marine Stewardship Council (MSC).



Thank you!



- Oregon's pink shrimp fleet
- ICWPF- Jens!
- OTC- Brad Pettinger, Nick Edwards
- Pacific Seafood- Charlie Kirschbaum
- Mark Lomeli, PSMFC
- Bob Hannah, Steve Jones, Jim Heinrich, Jill Smith, Matt Blume, Kelly Lawrence, Craig Good ODFW

