

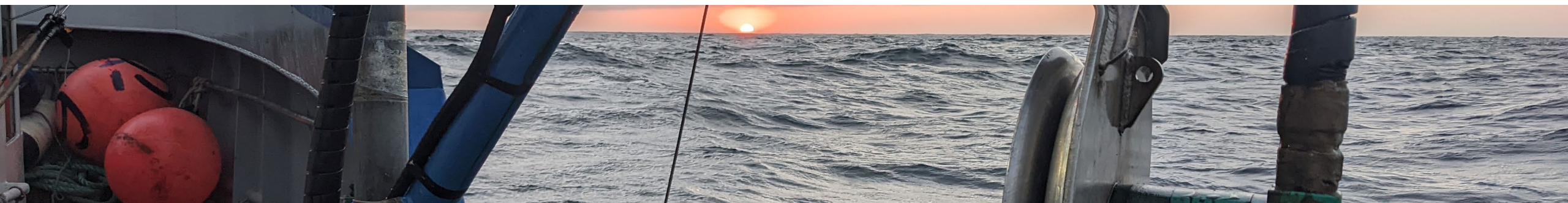
# Testing of Hook Sizes and Appendages to Reduce Yelloweye Rockfish Bycatch in a Pacific Halibut Longline Fishery

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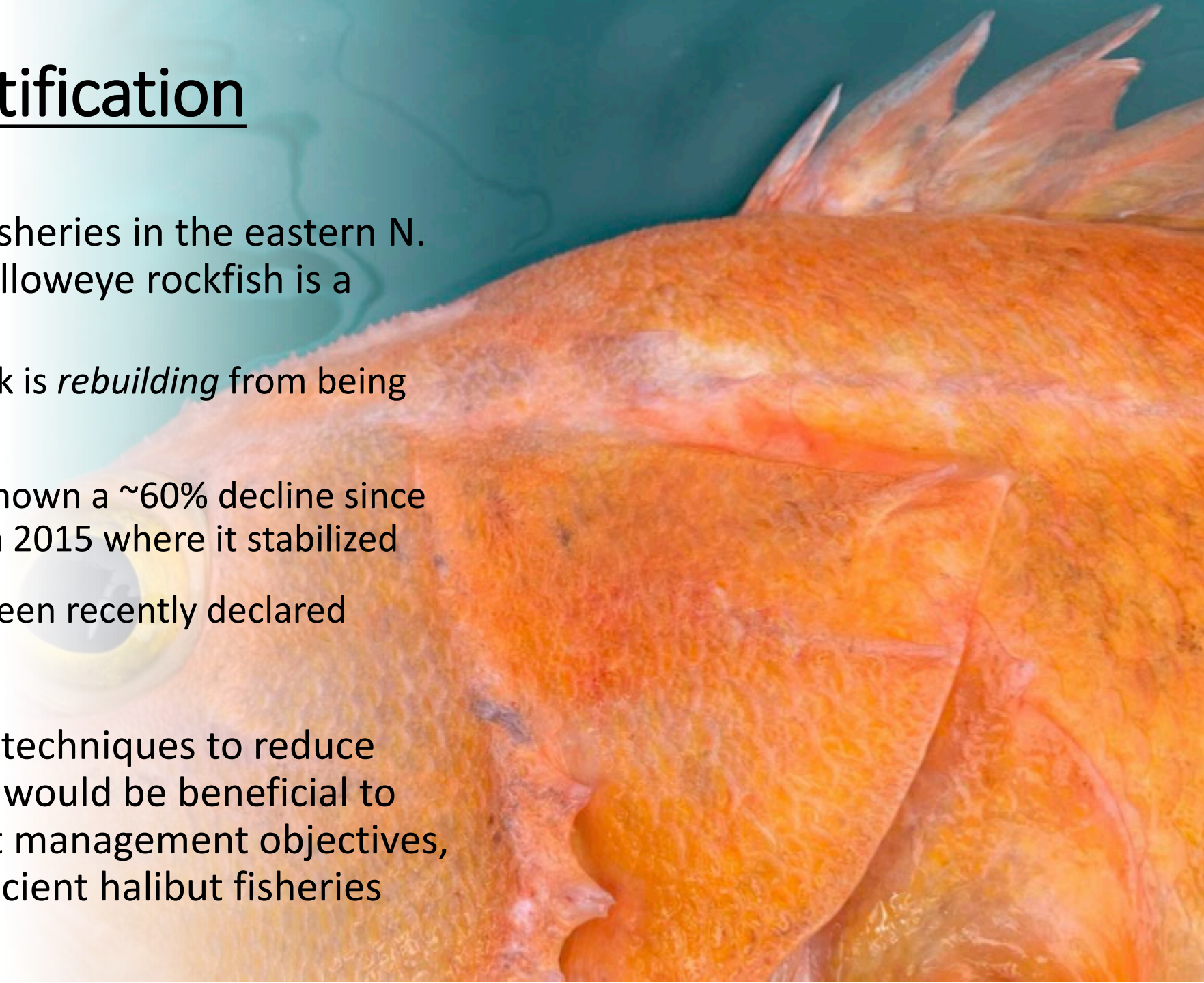
<sup>1</sup>Pacific States Marine Fisheries Commission; <sup>2,3</sup>Oregon State University Marine Resource Management Program & Cooperative Institute for Marine Ecosystems and Resources Studies; <sup>4</sup>International Pacific Halibut Commission; <sup>5</sup>SINTEF Ocean; <sup>6</sup>UiT

Western Groundfish Conference - Juneau, AK – 25 April 2023



# Background & Justification

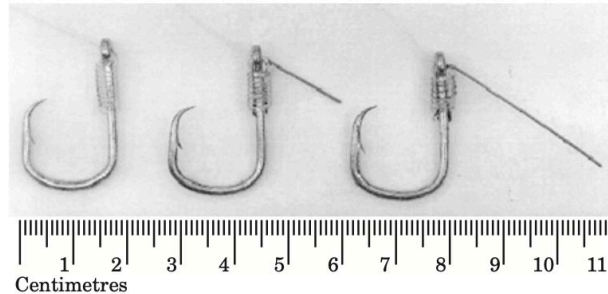
- In Pacific halibut longline fisheries in the eastern N. Pacific Ocean bycatch of yelloweye rockfish is a concern as:
  - The U.S. West Coast stock is *rebuilding* from being *overfished*
  - The SE Alaska stock has shown a ~60% decline since at least 1994 and through 2015 where it stabilized
  - The Canadian stock has been recently declared *threatened*
- Thus, developing & testing techniques to reduce yelloweye rockfish bycatch would be beneficial to their conservation, support management objectives, and contribute to more efficient halibut fisheries



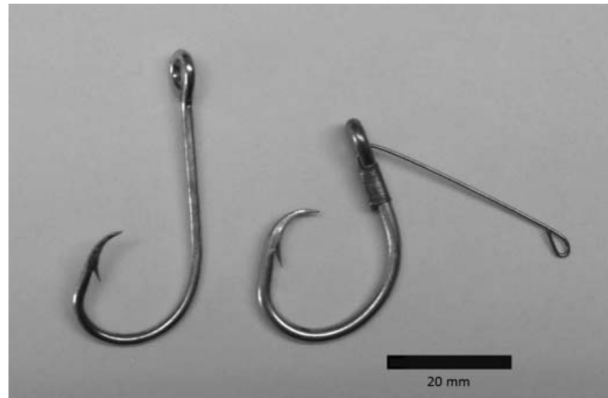
# Modified Hooks



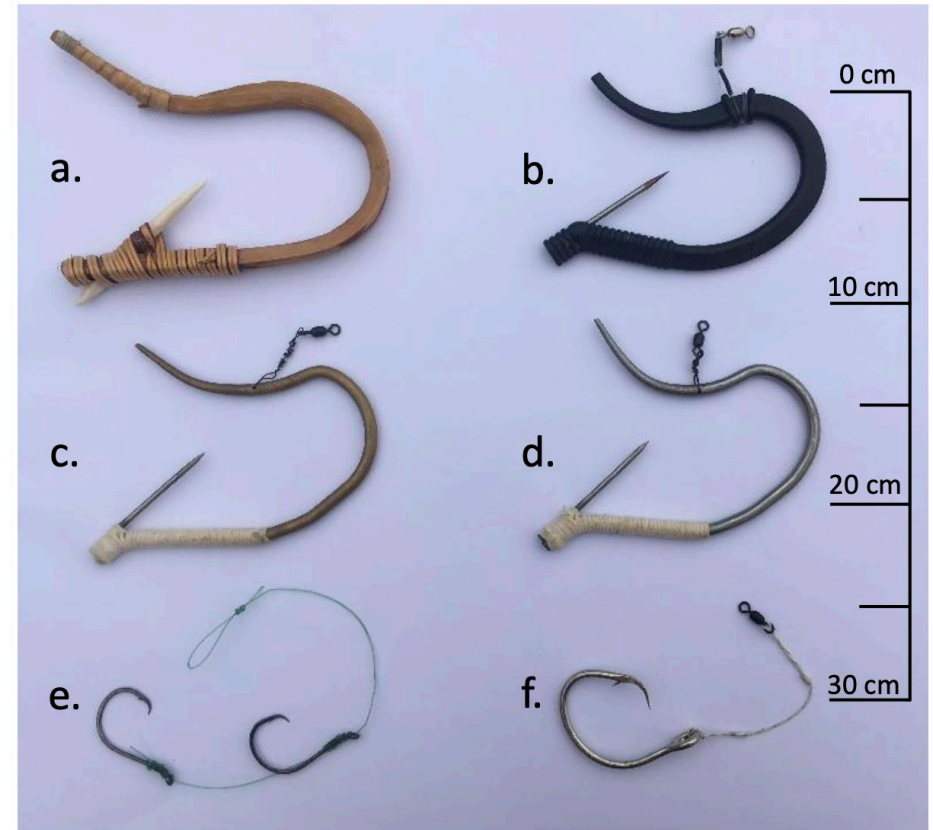
Swimmer et al., 2011



Willis & Millar 2001



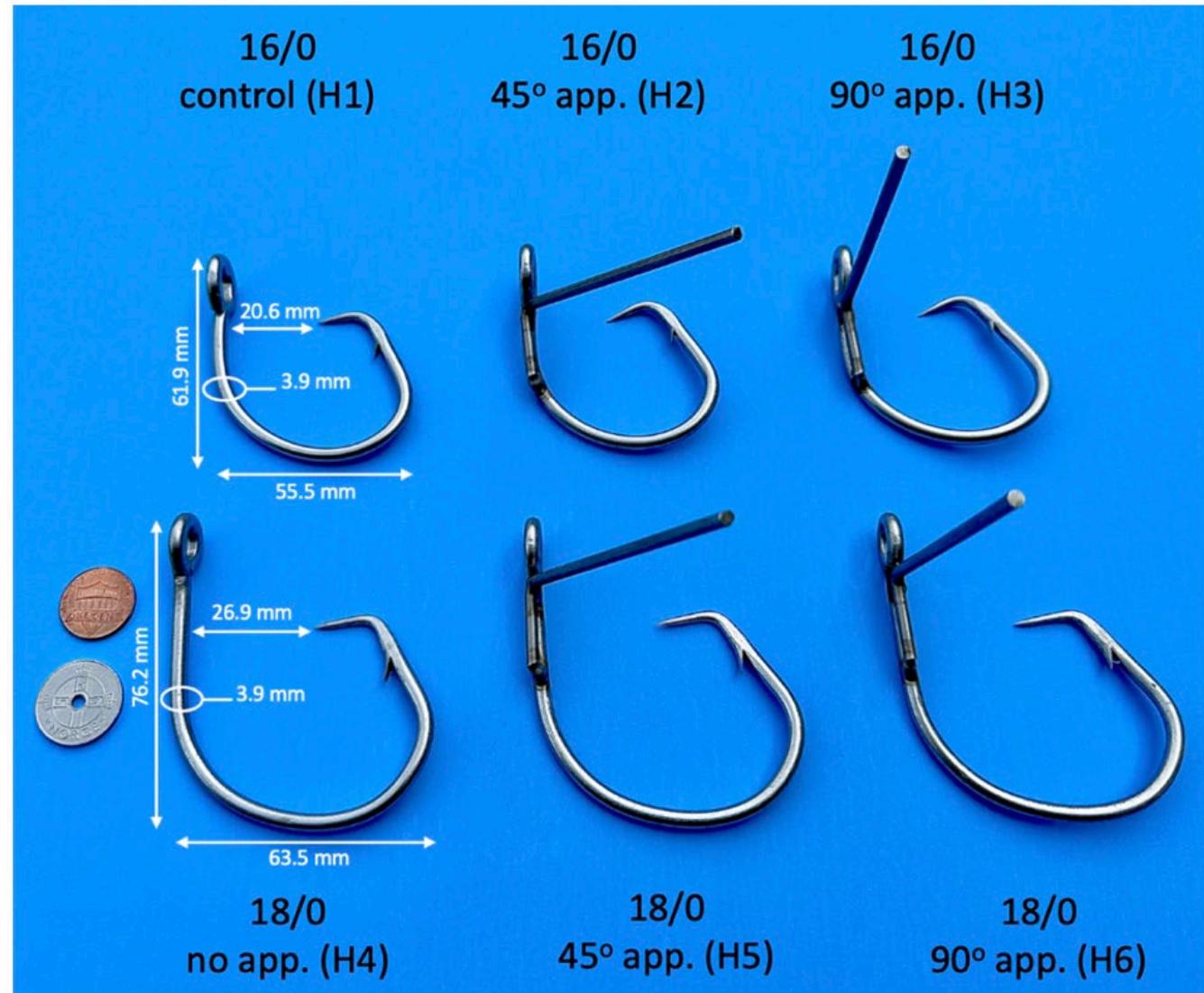
Bergmann et al., 2014



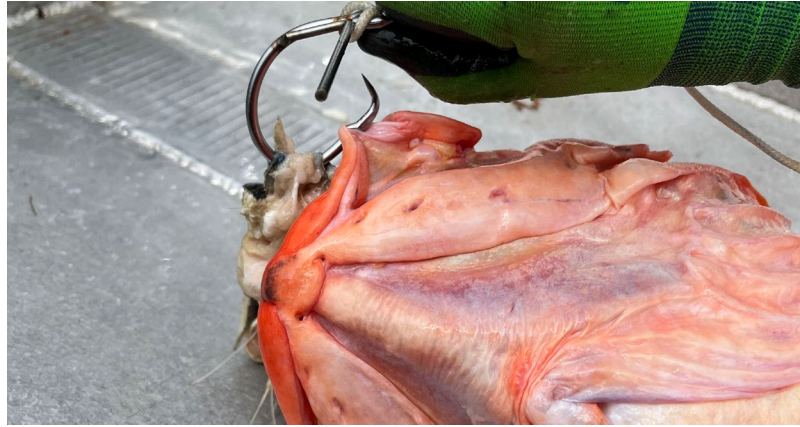
Petersen et al., 2020

# Objective - 1

- Evaluate how 16/0 and 18/0 circle hooks affect the catch efficiency of Pacific halibut and yelloweye rockfish
- Examine the catch efficiency of these hooks modified with a stiff 3.1 mm stainless-steel wire appendage extending 7.6 cm from their shank at either a 45° or 90° angle





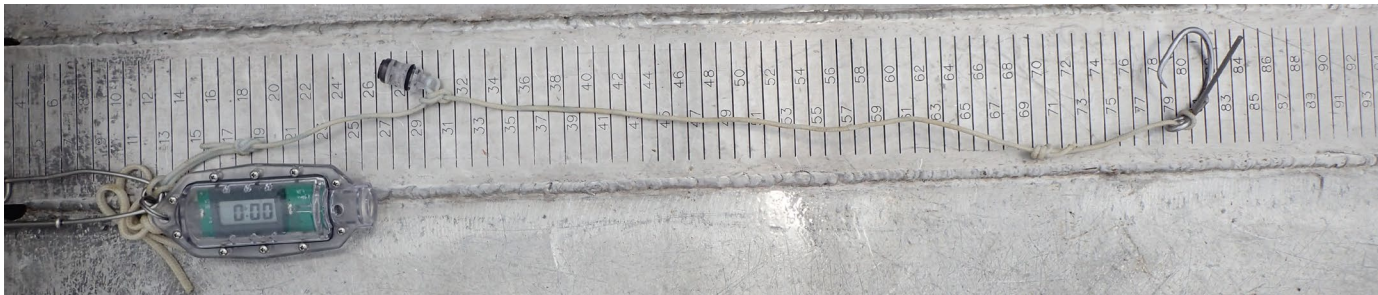


Objective – 2: Document Hooking Location Probabilities

## Objective - 3:

Test if there is a difference in the time of capture between halibut and yelloweye rockfish

Lindgren-Pitman hook timers set at 1 kg of release tension



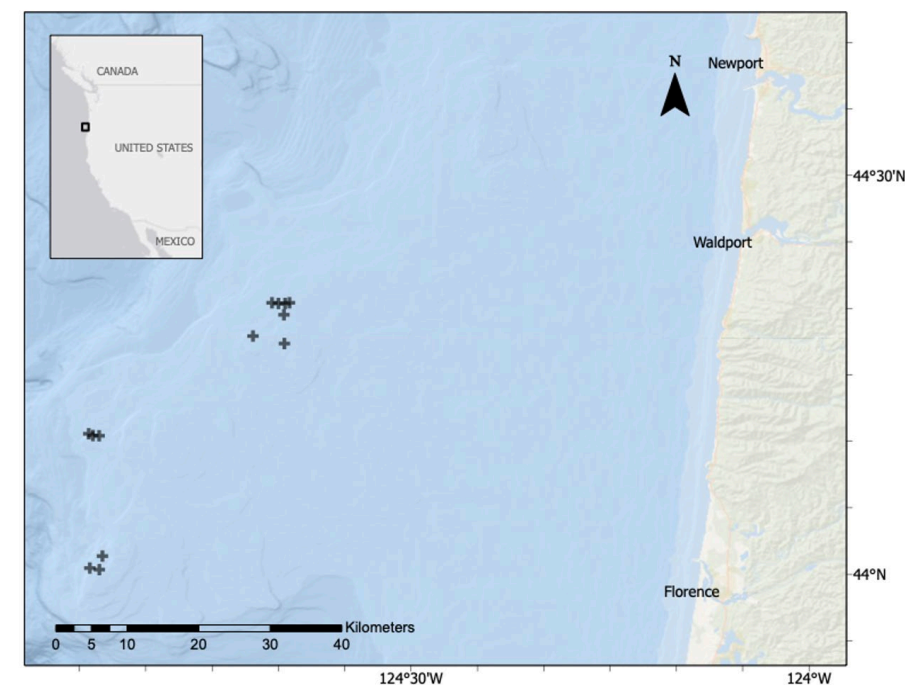
# Gear Trials





# Gear Trials

- Fishing occurred off central Oregon in July 2022
  - 7 fishing days during daylight hours
- Hooks were manually baited with 0.11 to 0.15 kg Chinook salmon and coiled into tubs
- Two groundline sets of 1,647 m in length were fished each day
- Soak durations ranged from 5 to 7 hours
- Data collected: L-W, hook type, hooking location, hook timer, hook condition, & bait status





*R/V Pacific Surveyor*  
17 m LOA, 380 hp  
Florence, OR

**PACIFIC SURVEYOR**

RESEARCH

EQUALIZER

OR 333 AET



# Results



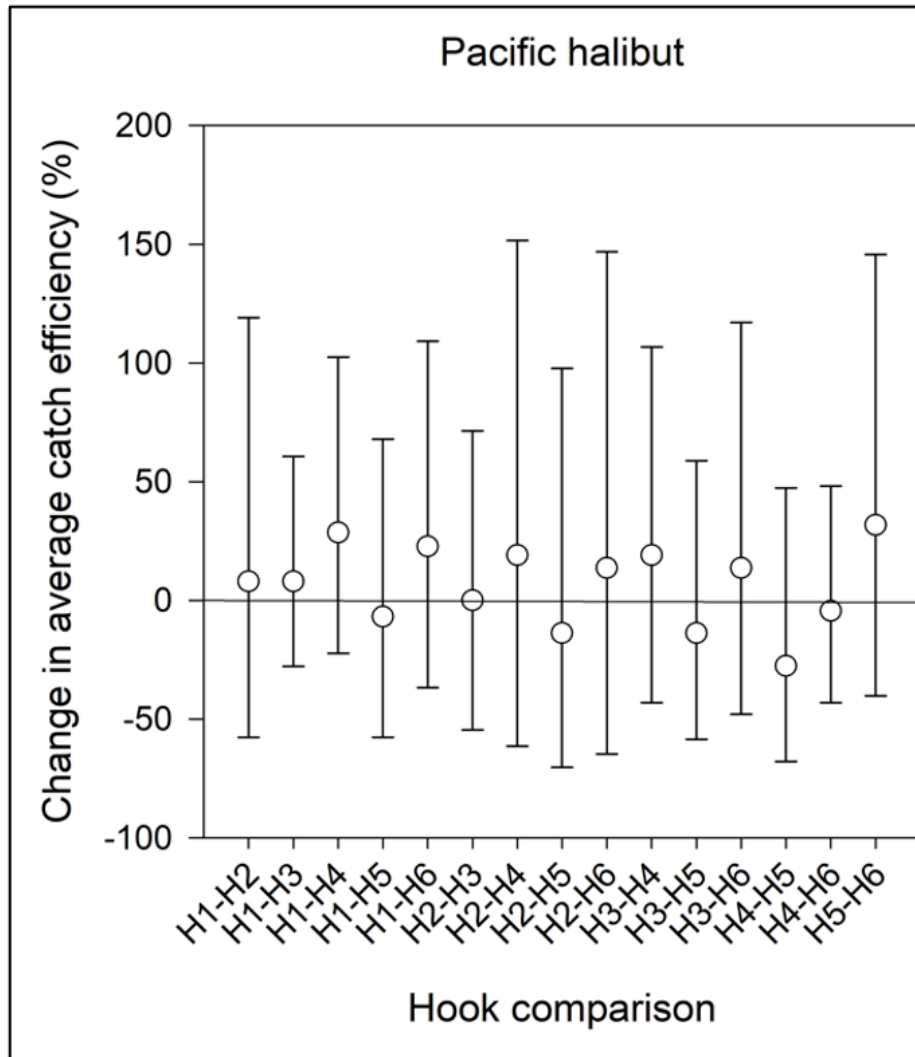
# Fishing Effort

- Overall, 14 sets were completed with a total of 4,189 hooks fished
- By hook type, the number of hooks fished was:
  - 726 – 16/0 control
  - 706 – 16/0 45° app.
  - 660 – 16/0 90° app.
  - 738 – 18/0 no app.
  - 685 – 18/0 45° app.
  - 674 – 18/0 90° app.
- Hook timers were deployed 907 times
  - ~25% of each hook typed fished daily included a hook timer

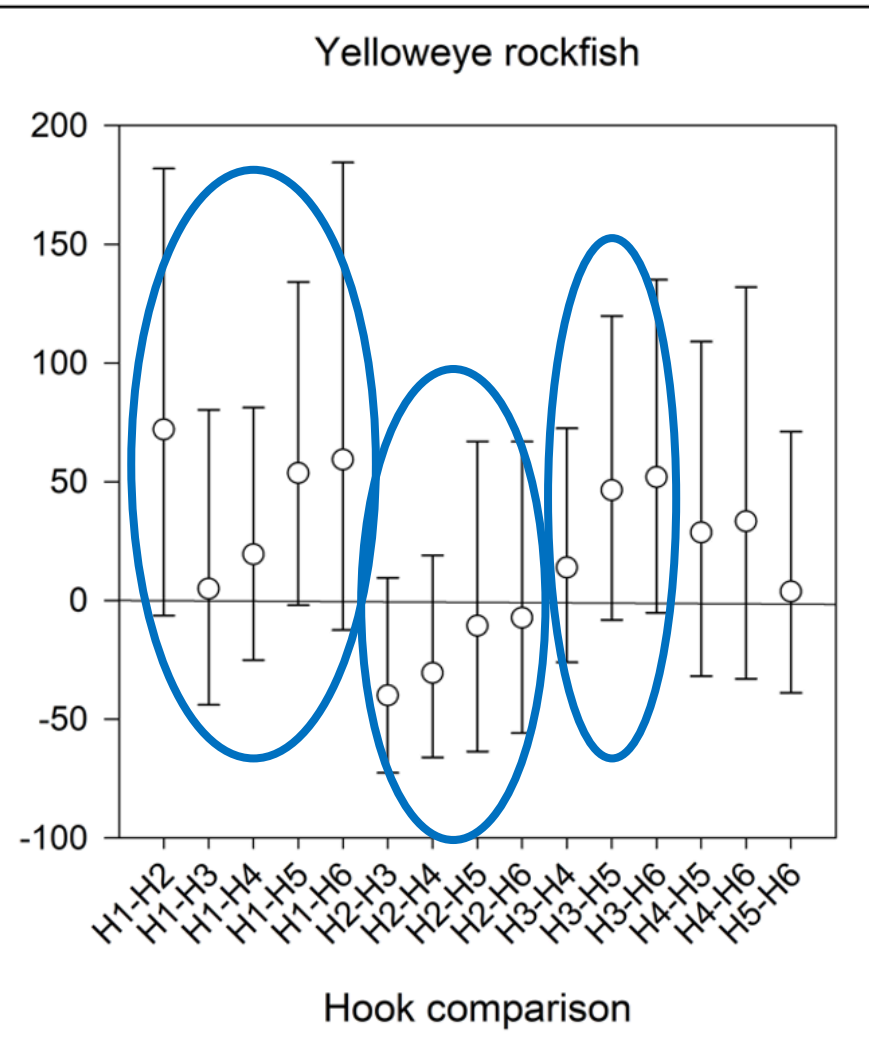


# Catch Comparison

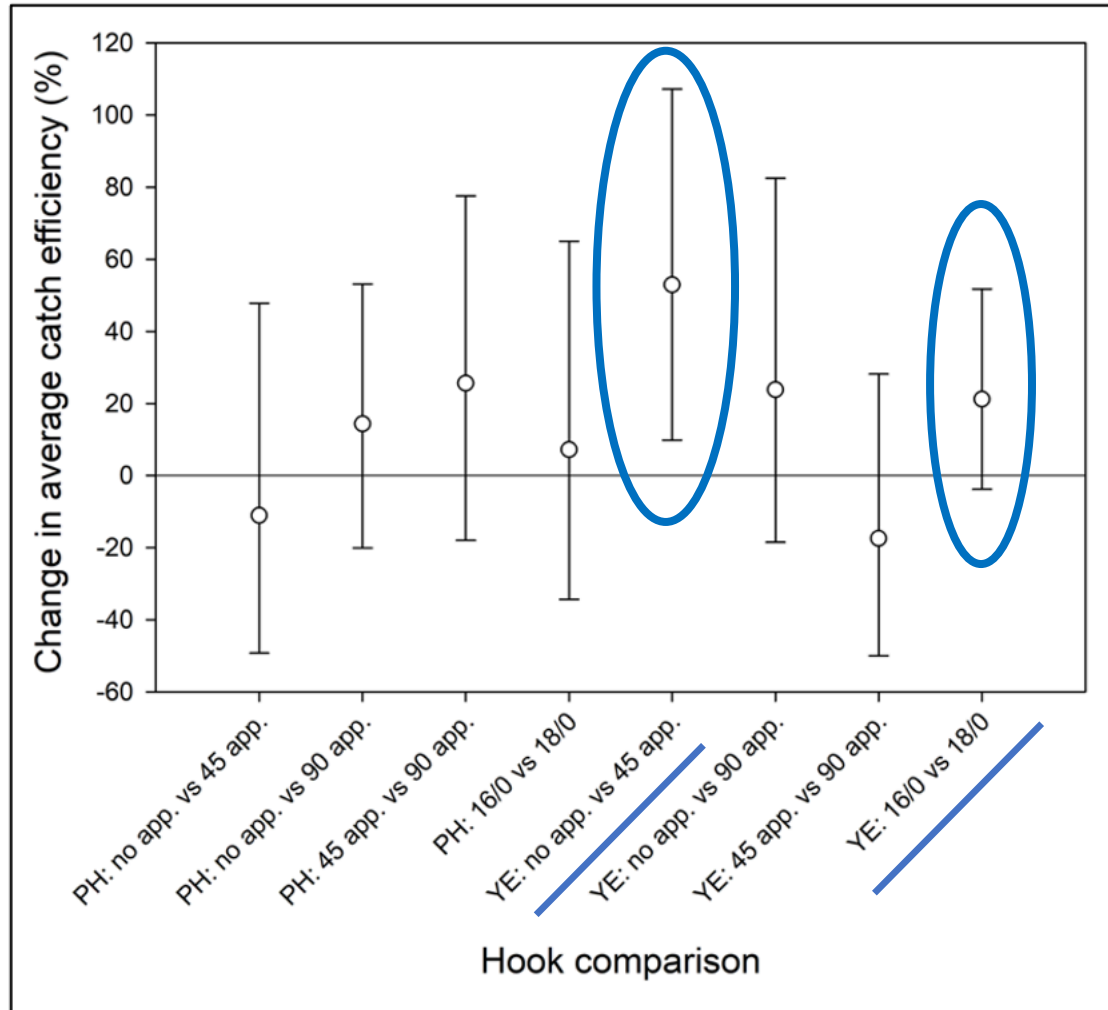
n = 145



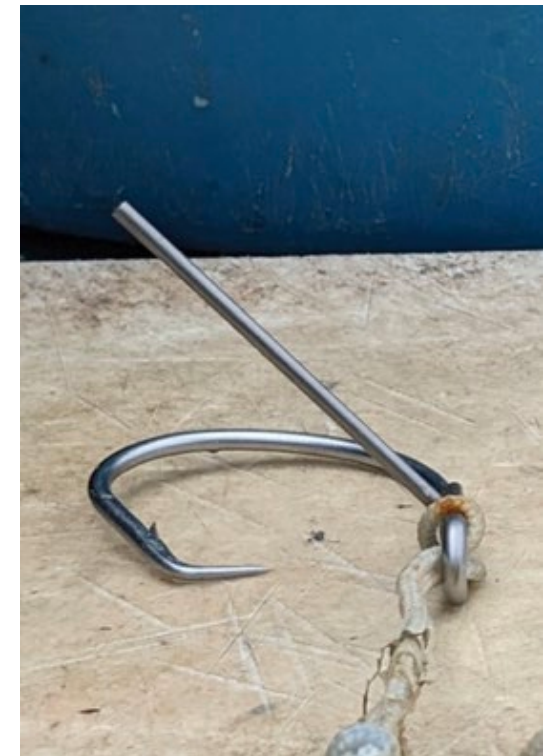
n = 188



# Catch Comparison Cont.



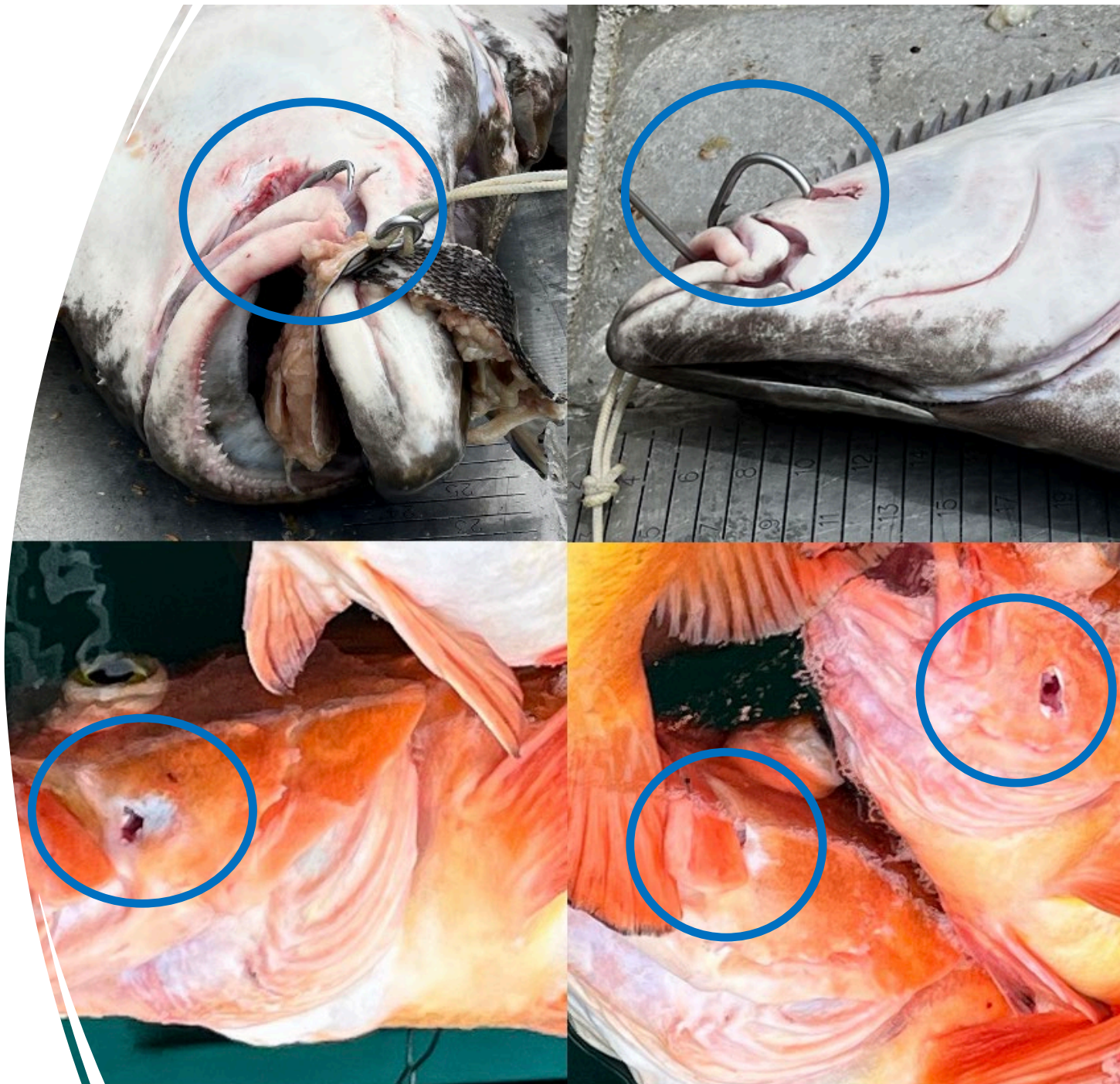
16/0 45° app. hook



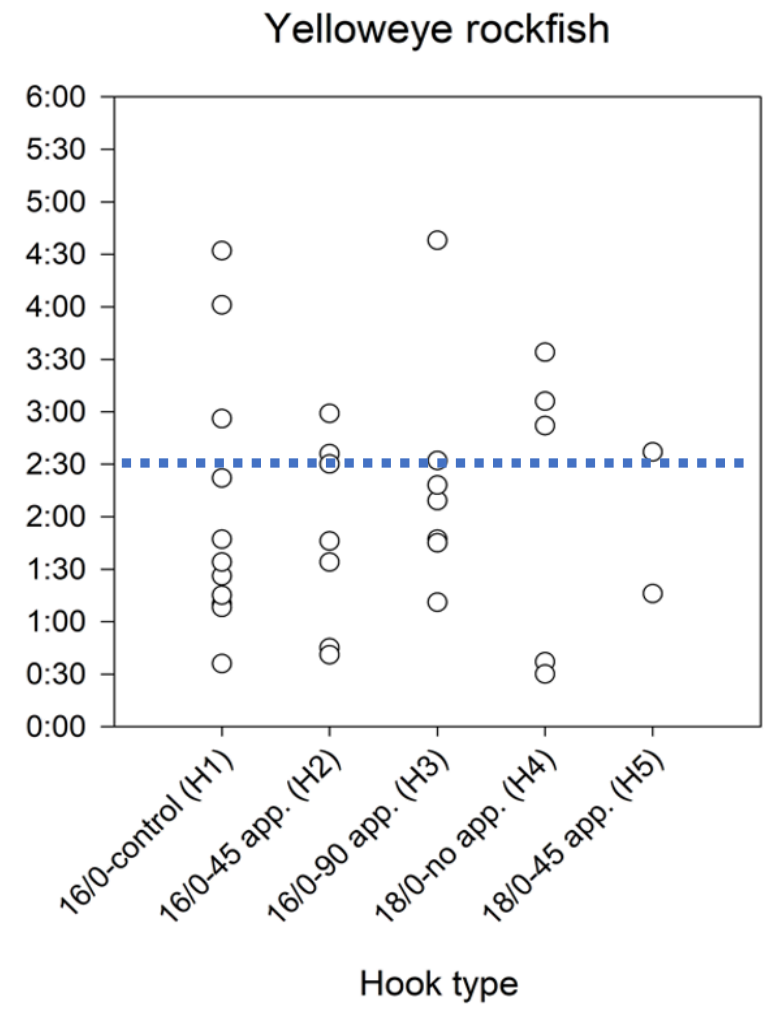
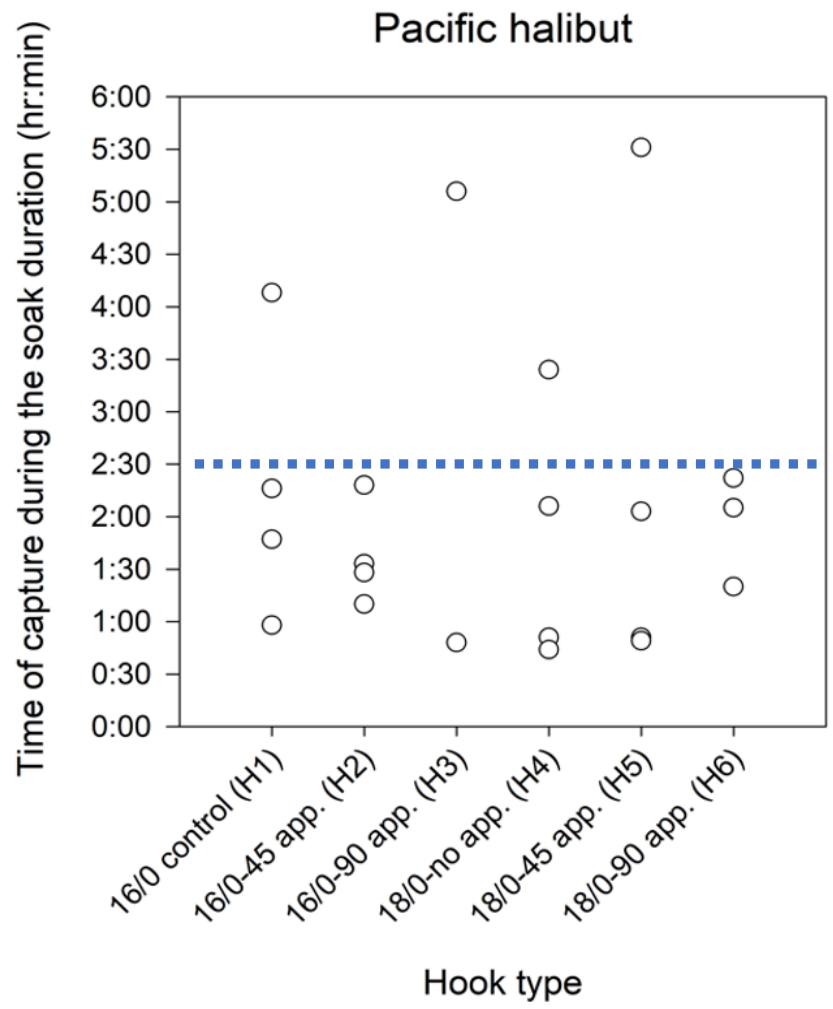
18/0 45° app. hook

# Hooking Location Probabilities

- *Hook through cheek* – most frequent
- *Hook in cheek* – second frequent
- Combined, these hooking locations accounted for 76% and 88% of all halibut and yelloweye rockfish capture locations, respectively







- Fish caught on hook timers
  - 21 halibut
  - 32 yelloweye
  
- For both species most captures (75%) occurred within 2:30 (hr:min) of the gear being deployed

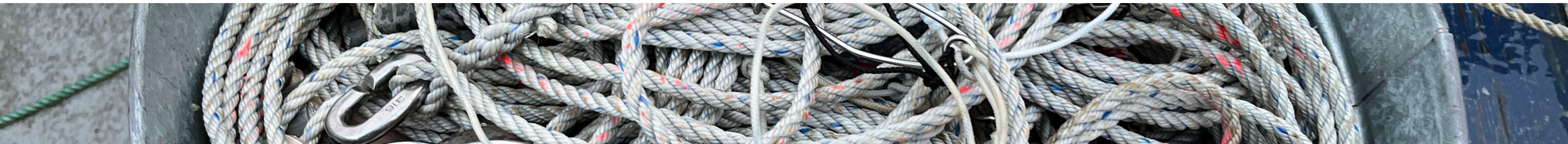




## Summary & Conclusions

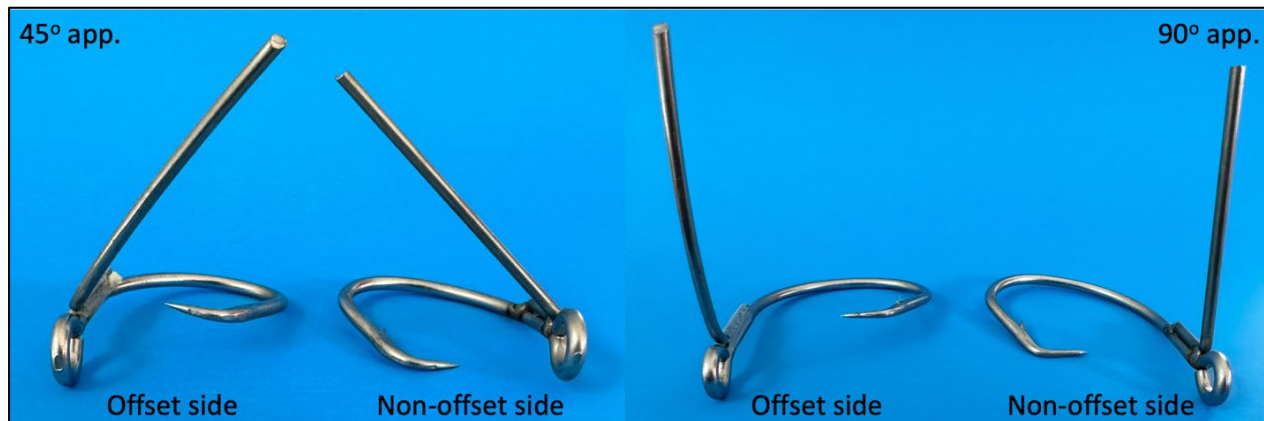
# Summary & Conclusions

- Hooks with a 45° app. caught significantly less yelloweye than hooks without an appendage, irrespective of hook size, without impacting halibut catches
- As we found the modified hooks did not interfere with the manual hook baiting process or the deployment/retrieval of skates, our study presents practicable procedures that can be replicated under most commercial fishing operations
- Although we encountered a relatively small sample size, our encouraging results suggest that appendages could have potential use in minimizing yelloweye rockfish bycatch
  - However, continued research is needed to better understand their efficacy
- While our study occurred off Oregon, our research could have applications in Canadian and SE Alaskan waters where yelloweye rockfish bycatch is also a management concern



# Next Steps

- Evaluate how demersal and semi-demersal longline configurations affect halibut and yelloweye catch rates
  - *R/V Pacific Surveyor*, June 2023
- Proposed research seeking funding to further examine hook appendages (positioned offset & non-offset) and their catch efficacy of halibut and yelloweye
- Our research has been submitted to the journal *Ocean & Coastal Management* for publication consideration (status: *under revision-1 review*)



# Oregon State Univ. Marine Resource Management Program Conservation Engineering Graduate Students

Meagan Abele

Greg Christie

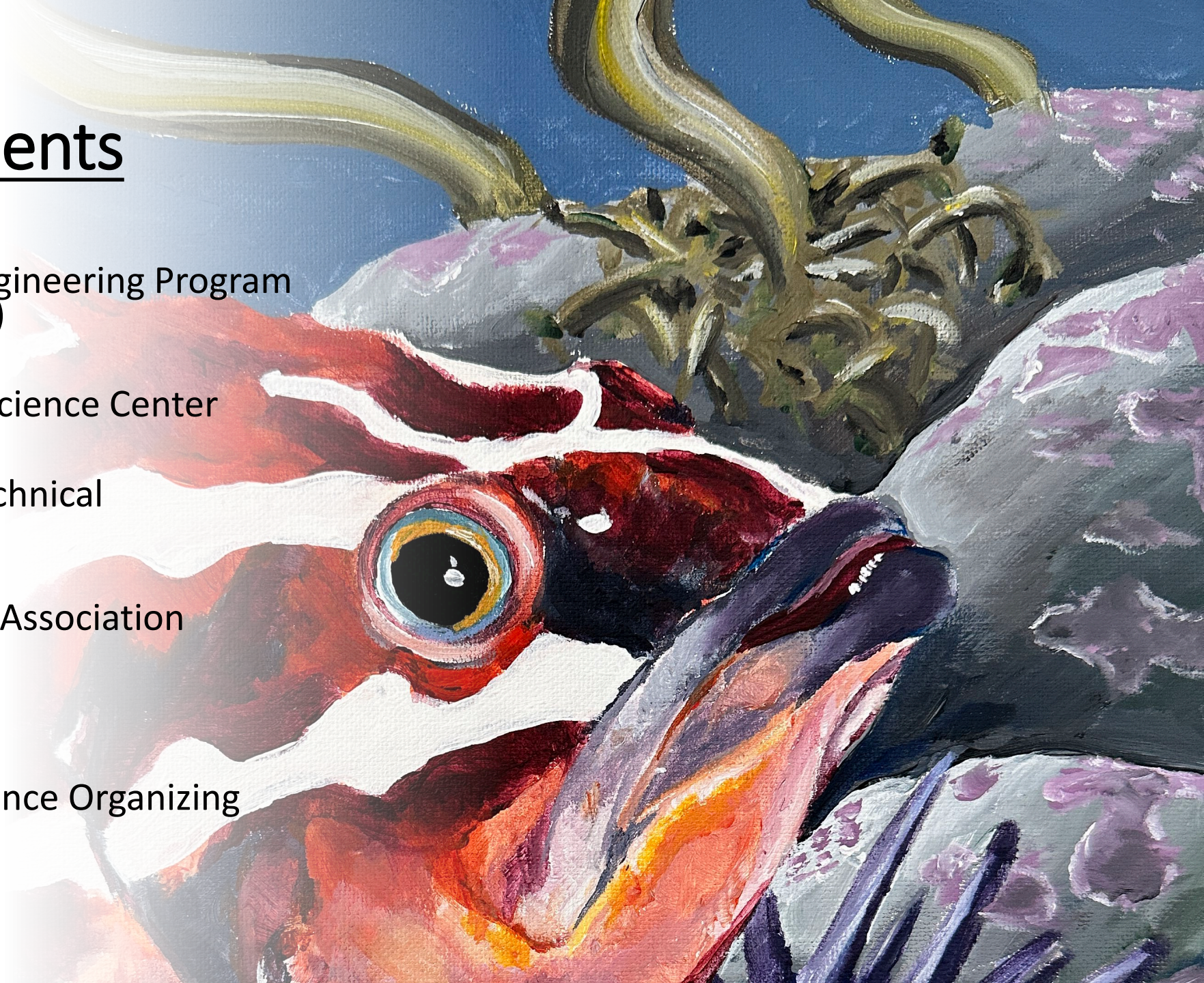


<https://www.psmfc.org/bycatch>

<https://ceoas.oregonstate.edu/mrm>

# Acknowledgements

- NOAA Bycatch Reduction Engineering Program (Award #NA21NMF4720540)
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- OSU CEOAS Machine and Technical Development shop
- Alaska Longline Fishermen's Association
- Mi Familia
- Western Groundfish Conference Organizing Committee





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Thank You

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