

The prevalence of Ichthyophoniasis in southcentral Alaskan groundfish species and its relation to mushy flesh syndrome.

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MAR320 Ichthyology

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The Problem

- Increased complaints of “mushy” flesh in southcentral Alaska groundfish
- Preliminary findings of high prevalence of Ichthyophoniasis in Cook Inlet and Prince William Sound
- Unknown link to cause of “mushy” flesh

Ichthyophonus hoferi

- Histozoic parasite
- Taxonomic History
- Effects on host – reduced fitness and mortality
- Can significantly reduce quality of fillet
- Currently occurs in several species in Alaska
- Disease status in marine populations is unclear



“Mushy” or “Chalky” Flesh



http://www.thefishsociety.co.uk/binary_data/13603_halibut.jpg



http://www.adfg.alaska.gov/static/species/disease/pdfs/fishdiseases/mushy_halibut_syndrome.pdf

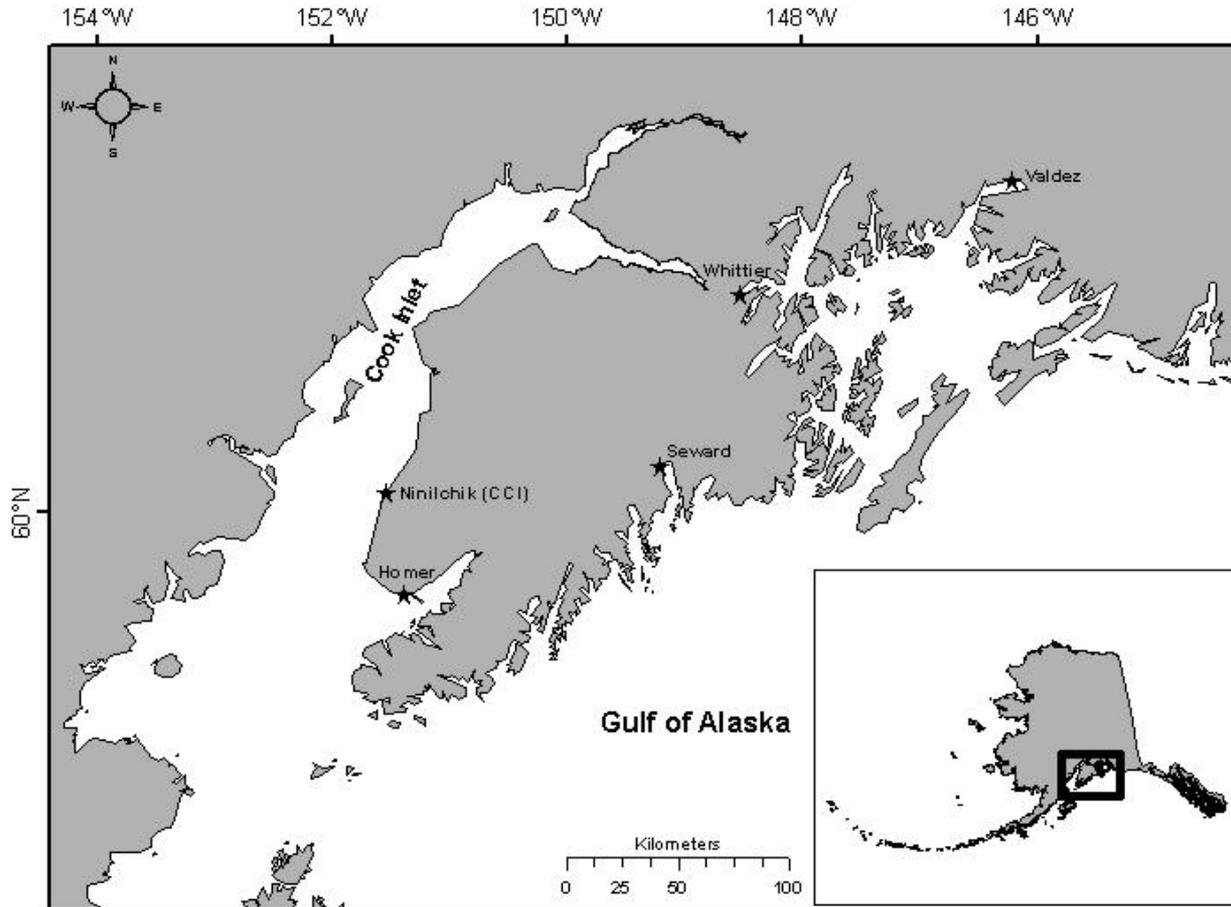
Hypotheses

- H_0 : *Ichthyophonus* prevalence is the same among different species taken in South Central Alaska ports.
- H_0 : *Ichthyophonus* prevalence is the same among species (specifically Pacific halibut) taken from the ports.
- H_0 : Prevalence of “mushy flesh” is the same in infected and uninfected individuals.
- H_0 : Prevalence of “mushy flesh” is not correlated with the presence or intensity of *Ichthyophonus* infection in the livers and hearts of Pacific halibut

Project Overview



Ports



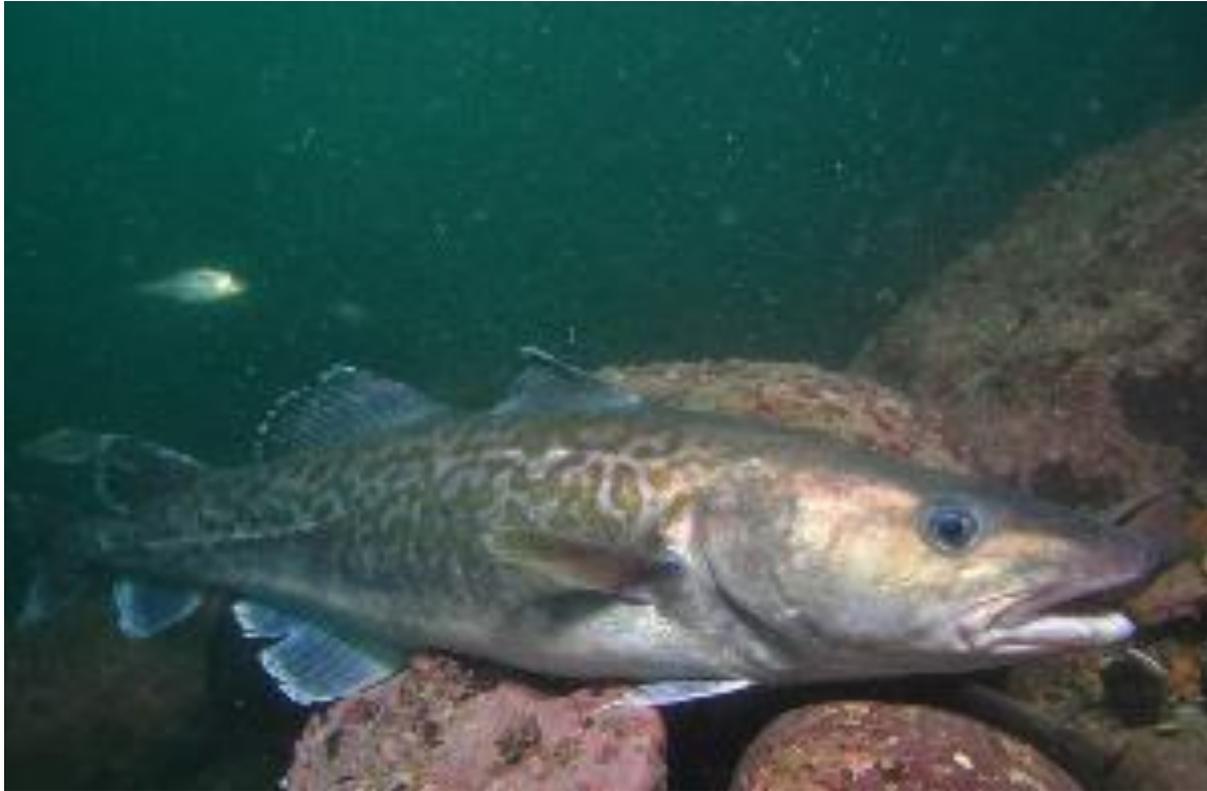
Pacific Halibut (*Hippoglossus stenolepsis*)



Lingcod (*Ophiodon elongatus*)



Pacific Cod (*Gadus macrocephalus*)



Rockfish

afsc.noaa.gov
adfg.alaska.gov
www.dfo-mpo.gc.ca



Canary (*Sebastes pinniger*)



Copper (*Sebastes caurinus*)



Quillback (*Sebastes maliger*)



Silvergray (*Sebastes brevispinis*)



Dusky (*Sebastes variabilis*)



Yelloweye (*Sebastes ruberrimus*)



Black (*Sebastes melanops*)



Dark (*Sebastes ciliatus*)

Methods: Obtaining the Samples



Methods: Port Sampler Procedure

- Targeted species
- Species identification
- Taking length and gender
- Fishing location
- Otolith removal



Methods: Student Samplers

- Data recorders
- Histological samples
 - Why?



Methods: For *in vitro*

- Aseptic sampling
- Tool sterilization



Methods: Sampling 'Mushy' Tissue



Methods: Sample Care in Field



Methods: In the Lab

- Chiller
- Aseptic splits and transfers



Methods: In the Lab

- Culture readings



http://3.bp.blogspot.com/_e-1wQ0FYaXU/TCKxUqco3HI/AAAAAAAAABB8/ruX08gru3d0/s1600/L1030302.JPG



http://www.rapidsresearch.com/Ich_Heart_Half_large.jpg

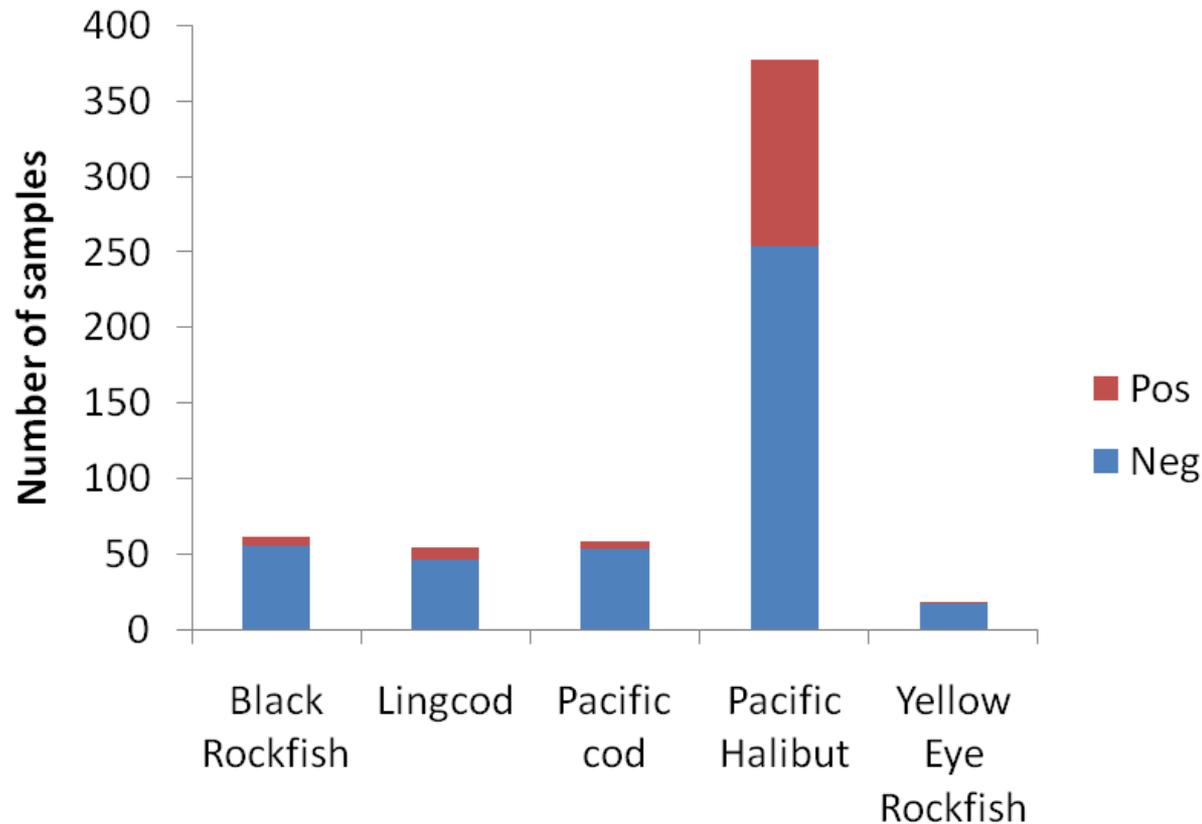
Methods: In the Lab

- Mushy Flesh samples



Preliminary Results: *Ichthyophonus* by Species

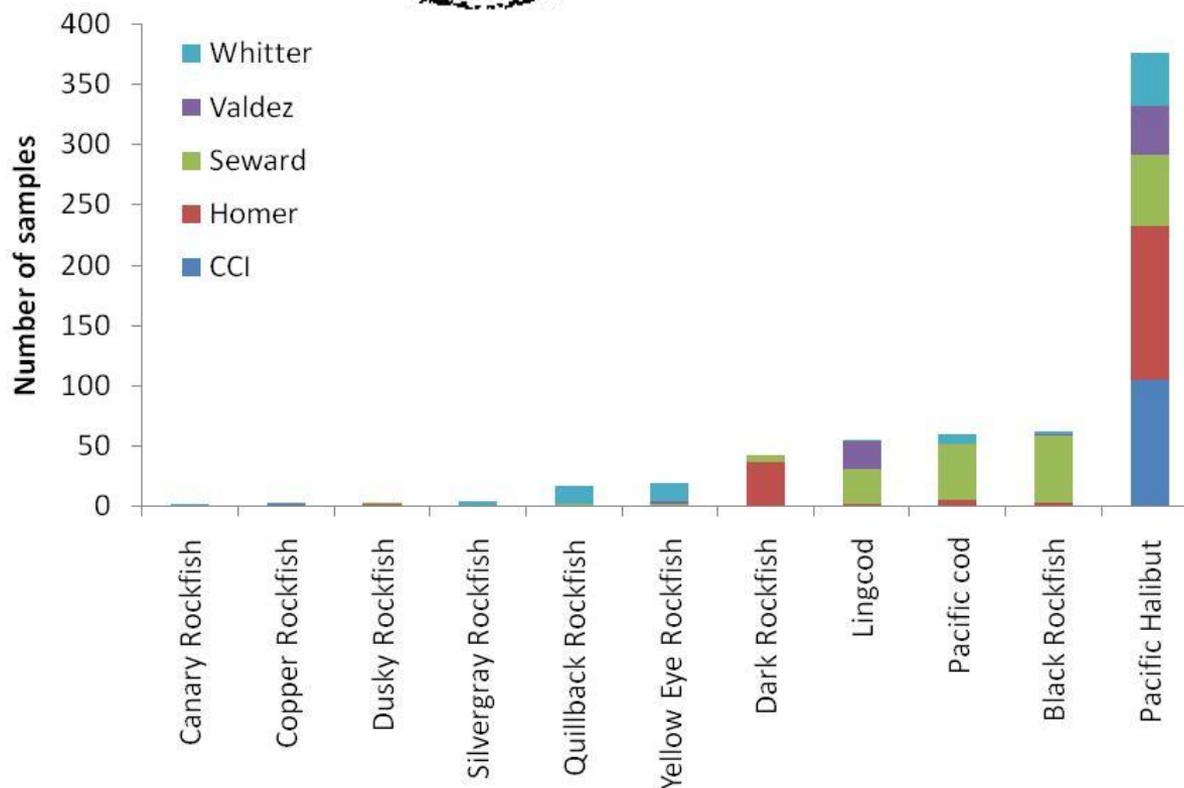
H_0 : *Ichthyophonus* prevalence is the same among different species taken in the five ports.



Ichthyophonus prevalence differed strongly by species, $\chi_c^2 = 23.72$, $df = 4$, $p < 0.001$

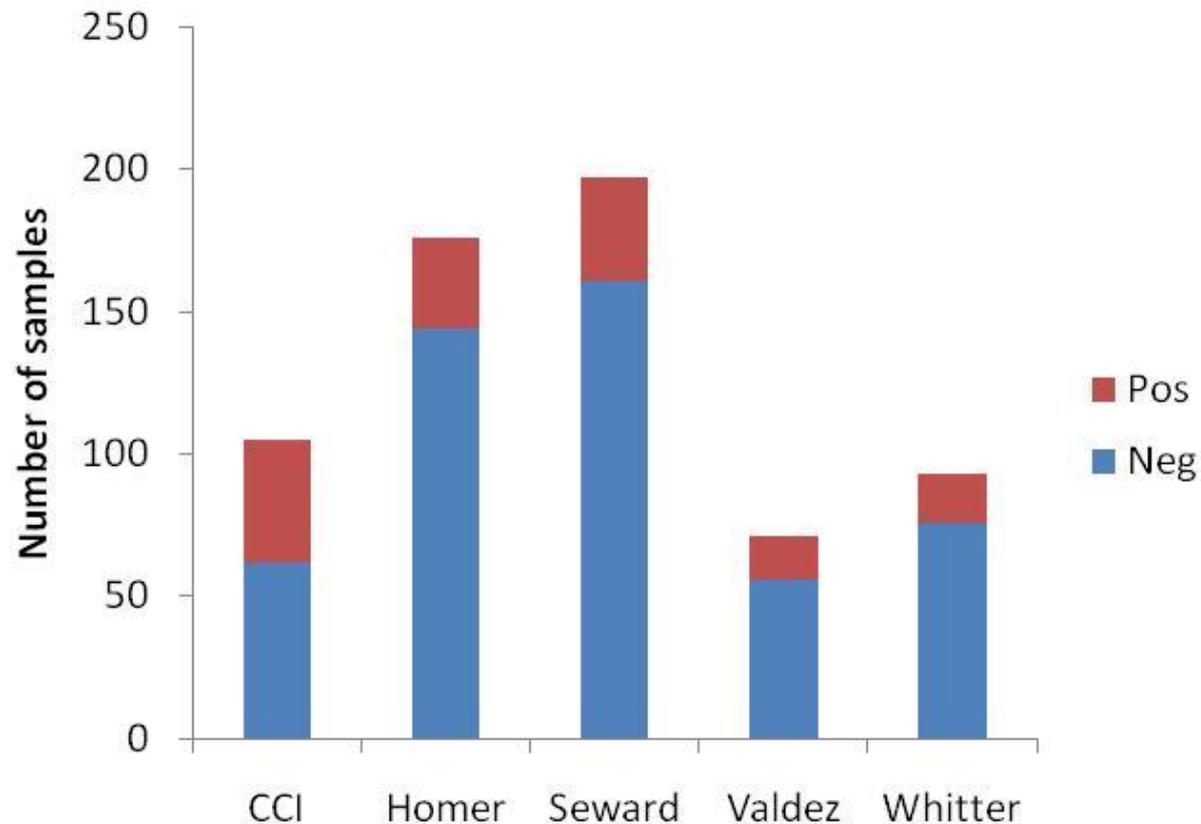
Preliminary Results: Total Species by Port

Species	Total
<i>Canary Rockfish</i>	2
<i>Copper Rockfish</i>	2
<i>Dusky Rockfish</i>	3
<i>Silvergray Rockfish</i>	4
<i>Quillback Rockfish</i>	17
<i>Yellow Eye Rockfish</i>	19
<i>Dark Rockfish</i>	42
<i>Lingcod</i>	55
<i>Pacific cod</i>	59
<i>Black Rockfish</i>	62
<i>Pacific Halibut</i>	377
Total	642



Preliminary Results: *Ichthyophonus* by Port

H_0 : *Ichthyophonus* prevalence (all species combined) is the same among the ports.

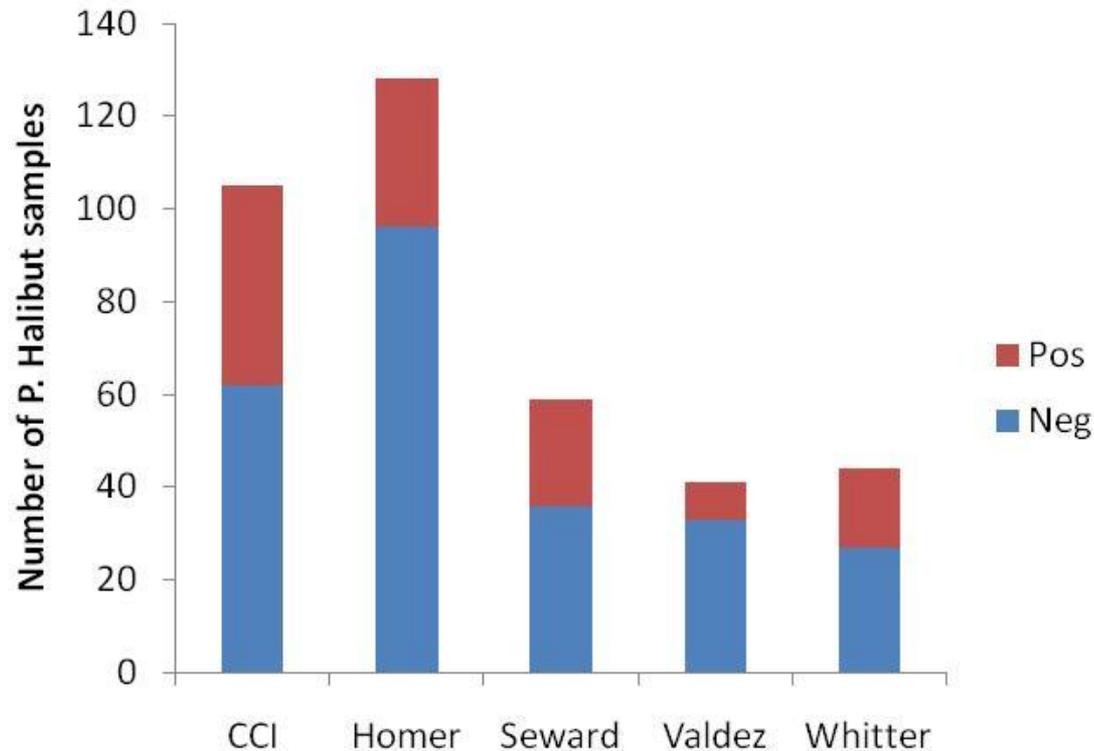


Ichthyophonus prevalence differed strongly by port , $\chi^2 = 19.89$, $df = 4$, $p = 0.0005$

Preliminary Results:

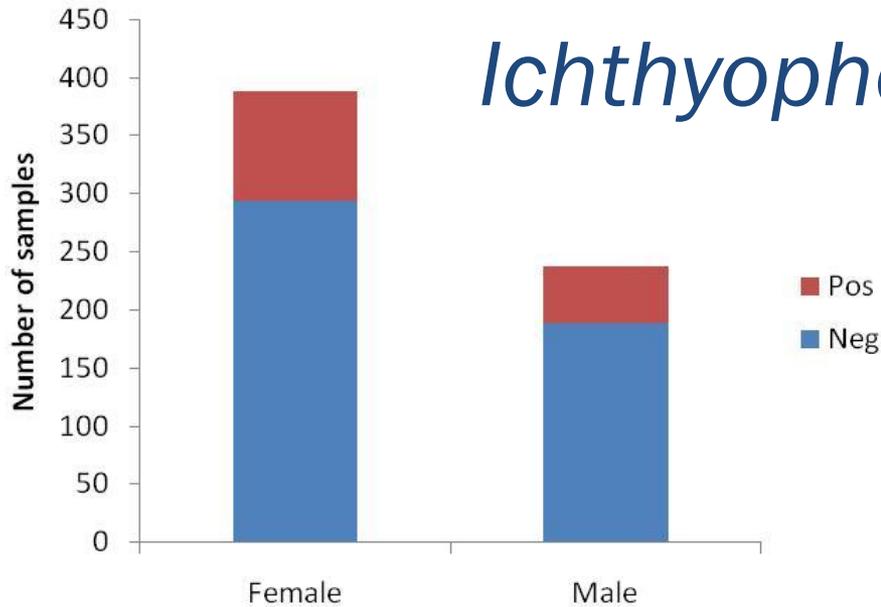
Ichthyophonus in Pacific Halibut by Port

H_0 : *Ichthyophonus* prevalence is the same in Pacific halibut taken in the different ports.



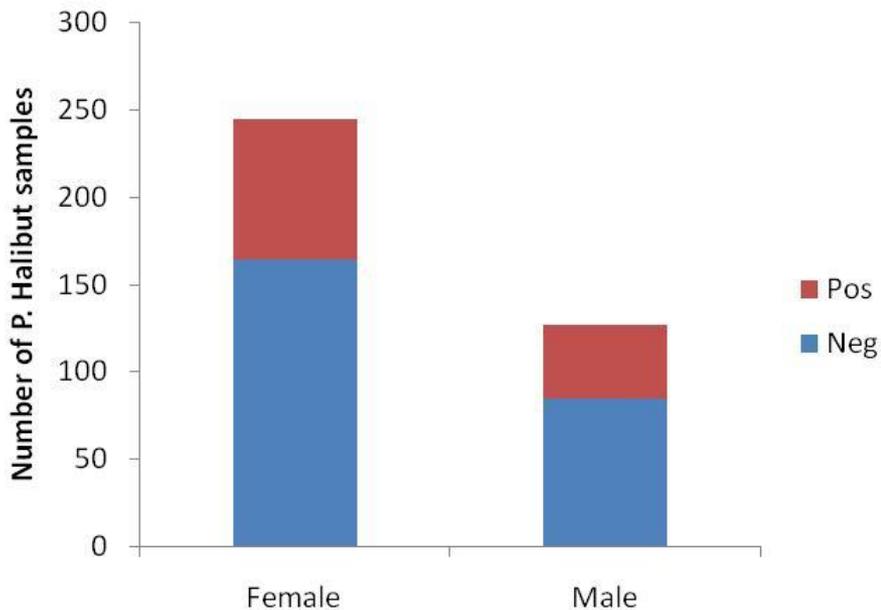
Ichthyophonus prevalence was the same in *P. Halibut* from different ports,
 $\chi^2 = 0.00$, $df = 1$, $p = 0.095$

Preliminary Results: *Ichthyophonus* by Sex



H_0 : *Ichthyophonus* prevalence is the same among males and females of all species.

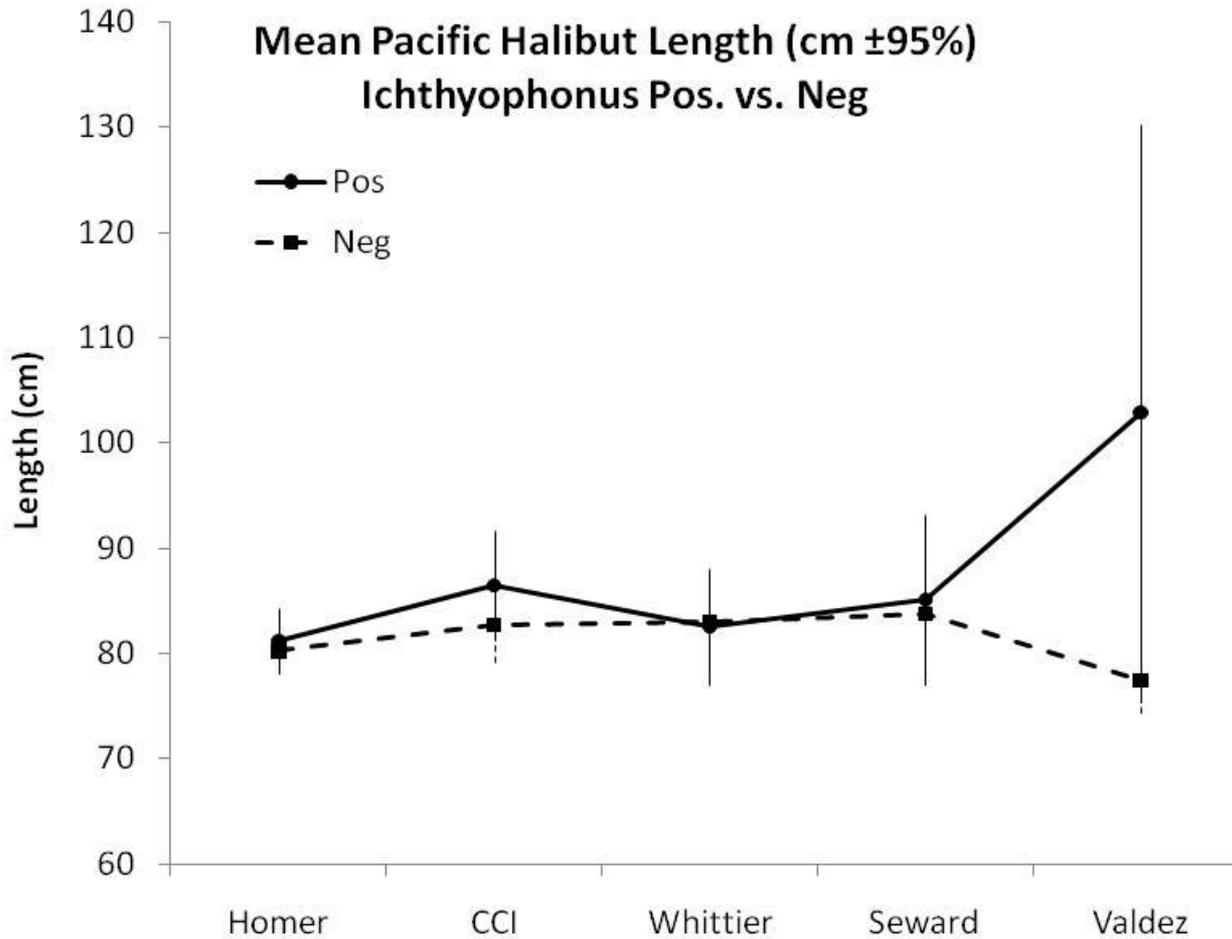
-*Ich* prevalence was the same in females and males overall, $\chi^2 = 0.85$, $df = 1$, $p = 0.35$



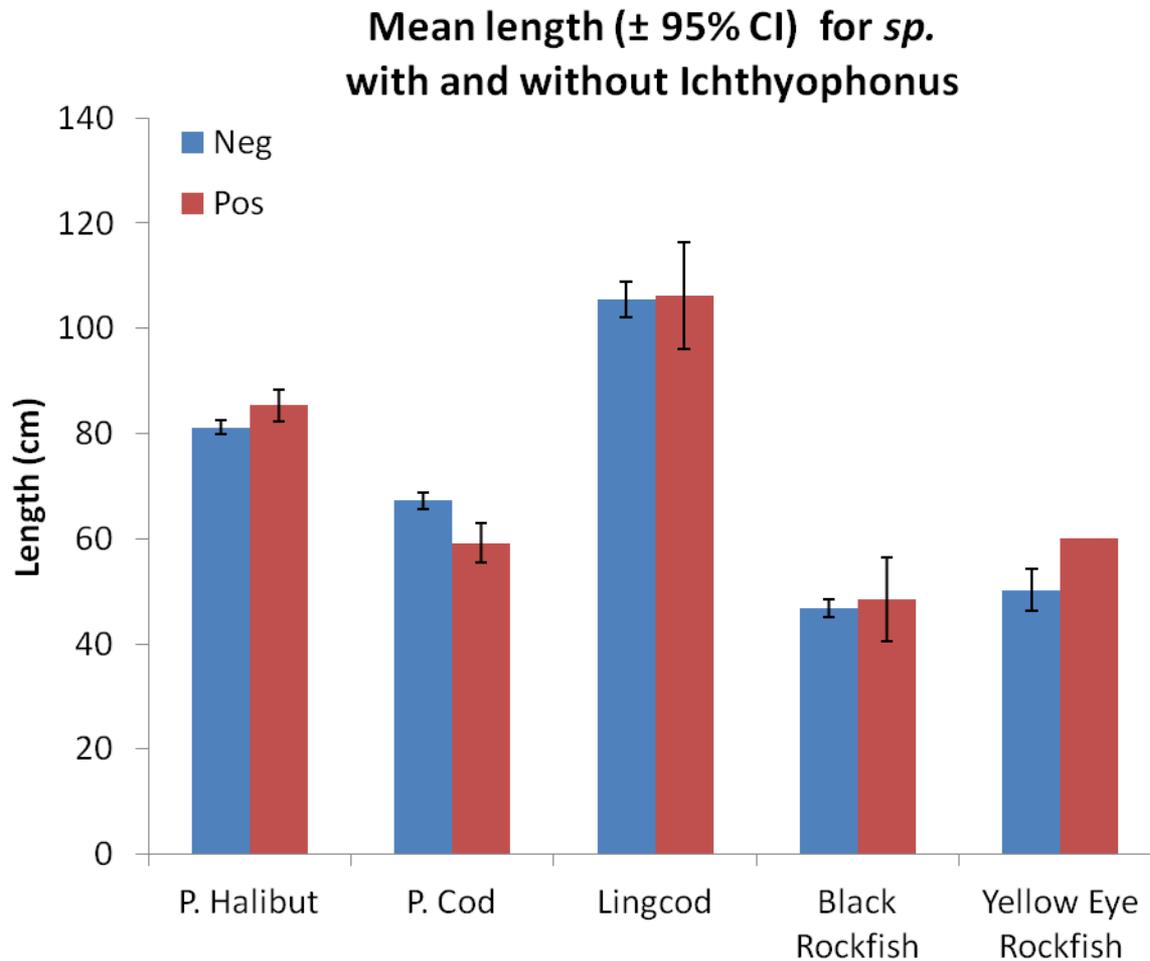
H_0 : *Ichthyophonus* prevalence is the same among males and females of Pacific Halibut.

-*Ich* prevalence was the same in female and male *P. Halibut*, $\chi^2 = 0.00$, $df = 1$, $p = 0.99$

Preliminary Results: *Ichthyophonus* by Length



Preliminary Results: *Ichthyophonus* by Length



“Mushy” Flesh Syndrome

- Port Sampling vs. Boat Sampling
- *Ichthyophonus* in Mushy Halibut
- Only in Halibut
- Only in CCI and Homer
- Male: Female Ratio
- Size of Mushy Halibut



Summary of Preliminary Results

- Ichthyophonus in all 5 ports and in 5 of 11 species examined.
- Prevalence
 - differed strongly among species
 - differed strongly by port
 - was the same in P. Halibut from different ports
 - was the same in females and males overall, and in P. Halibut
- First record of Ichthyophonus in Yelloweye and Black Rockfish, Lingcod, and Pacific cod!
- Corroborates Preliminary findings of USGS/ADF&G and IPHC for Pacific Halibut
- Only 1 fish of 14 with mushy flesh was positive for Ichthyophonus.
 - Insufficient data for statistical testing.

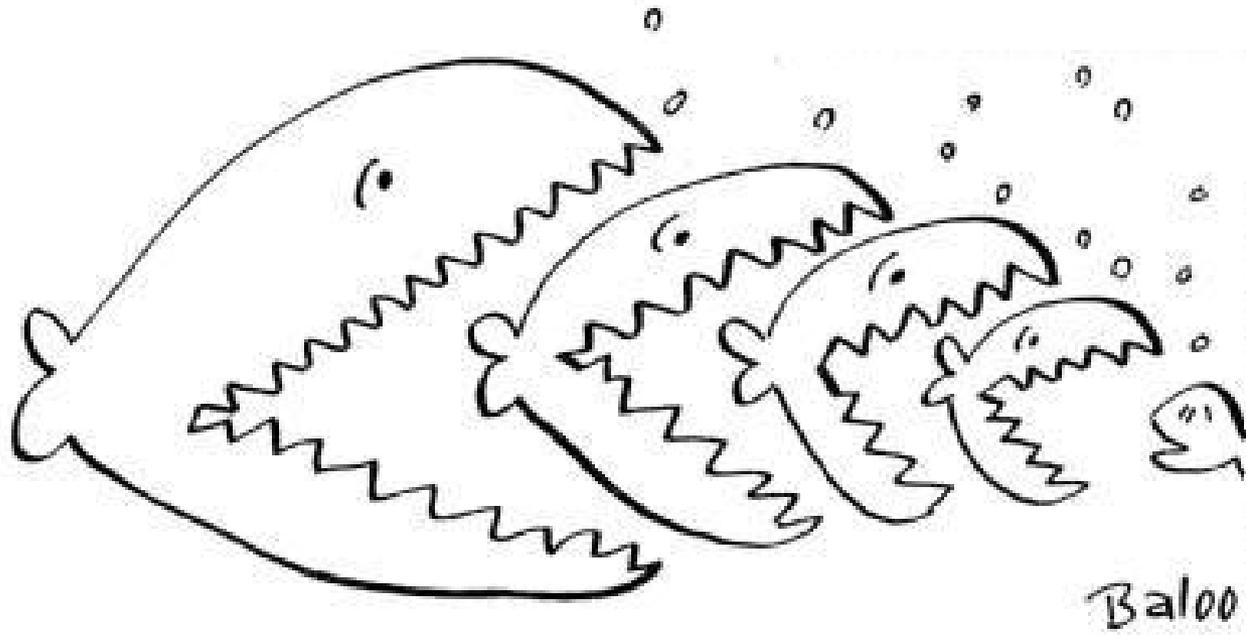
Potential Errors, Biases, and Future Research



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- APU ES Dept.
- Robin Bartlett

Questions



"I'm warning you guys-
I have Ichthyophonous!"