SLIMIEST CATCH

The Biology of Black Hagfish in Southeastern Alaska

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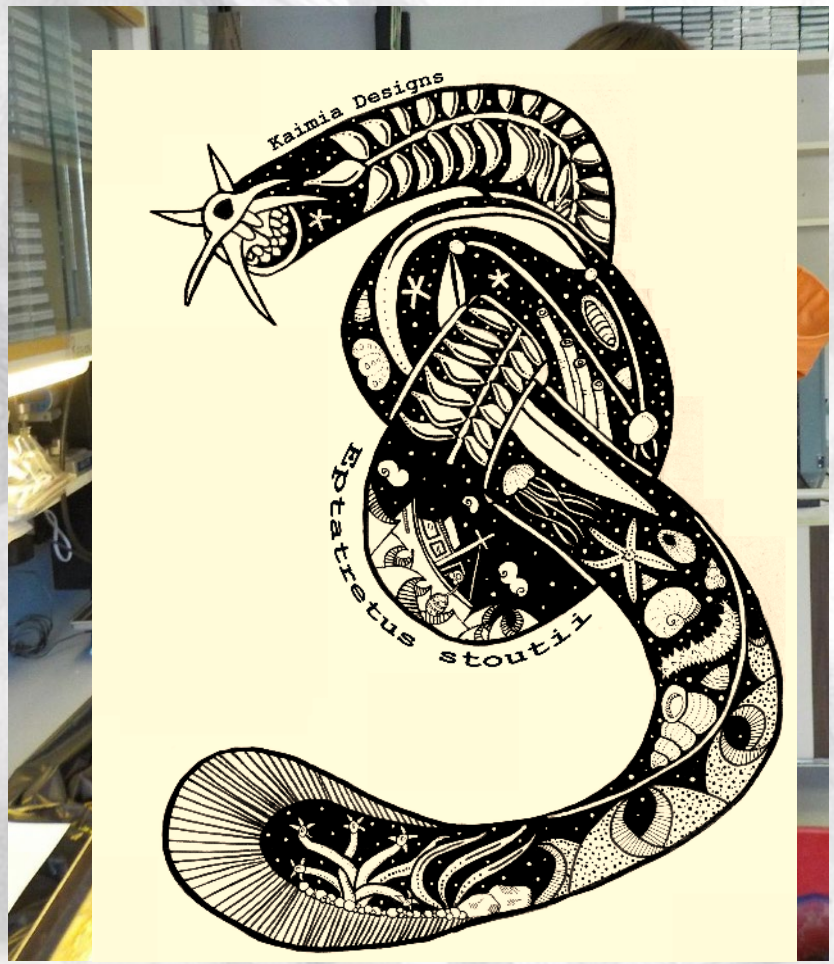
Two important facts about hagfish:

1) Hagfish are amazing and fascinating creatures

2) Hagfish are really, really gross



Hagfish design by Kellii Wood

These are NOT mutually exclusive points!

About Hagfish:

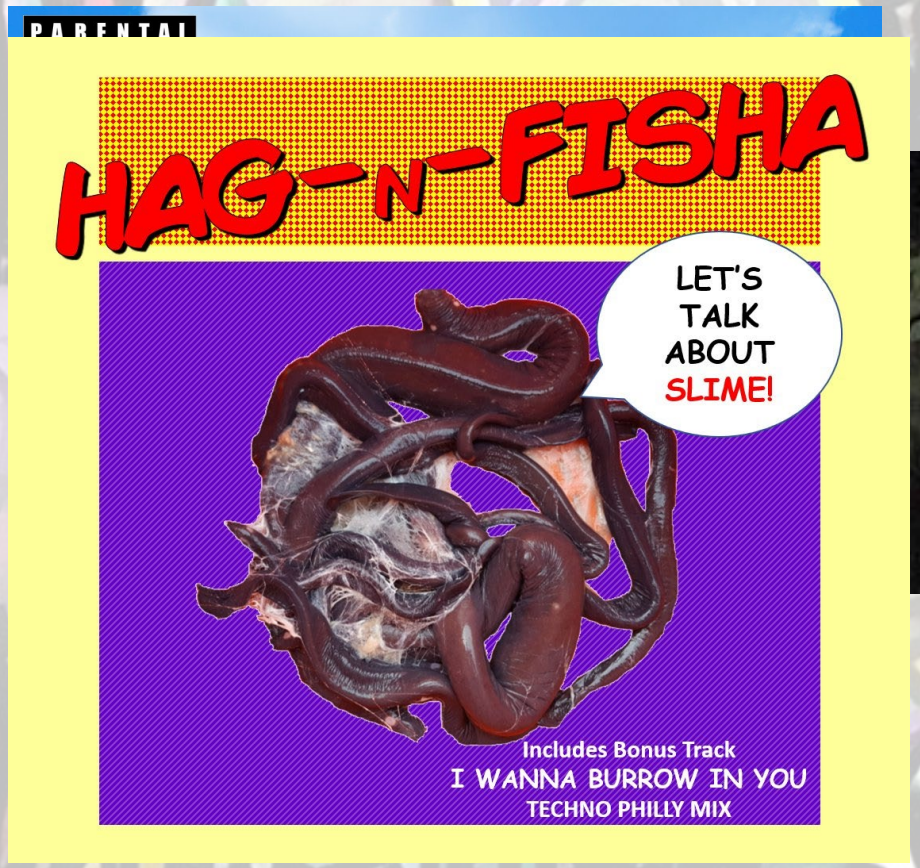
- Primitive jawless fishes related to lampreys
- Unlike lampreys, hagfish lack eyes and vertebrae
- Instead of jaws, hagfish have an eversible dental plate

About Hagfish:

- Found in all of the world's oceans, often in very deep water
- About 80 known species in one family (Myxinidae)
- Best known for their thick slime

About Hagfish

- Only vertebrate with no vertebrae (but they kind of have a skull)
- Cannot osmoregulate well (Feature or a flaw?)
- Little is known about their reproductive or developmental biology



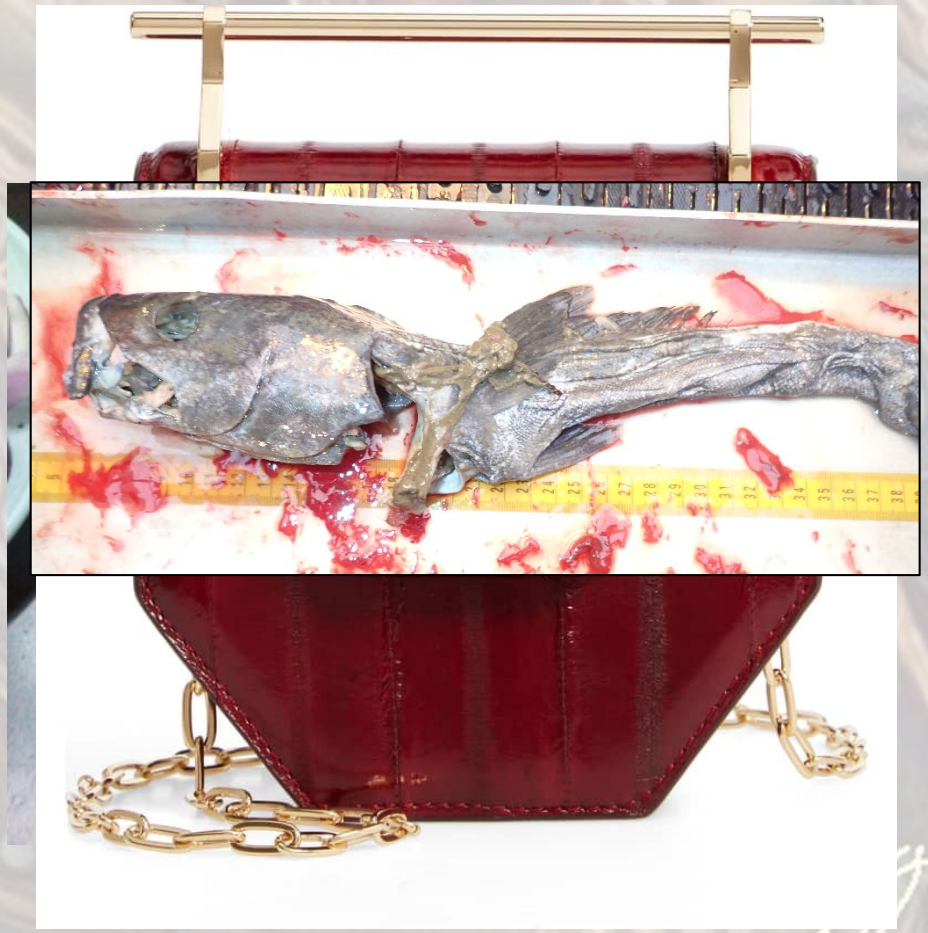
LIBERTY
IN GOD WE TRUST
1982

Ecology

- Hagfish are voracious benthic predators and scavengers
- Wherever found they tend to exist in large numbers
- Despite initial high abundance several populations have experienced collapse

Why do we care?

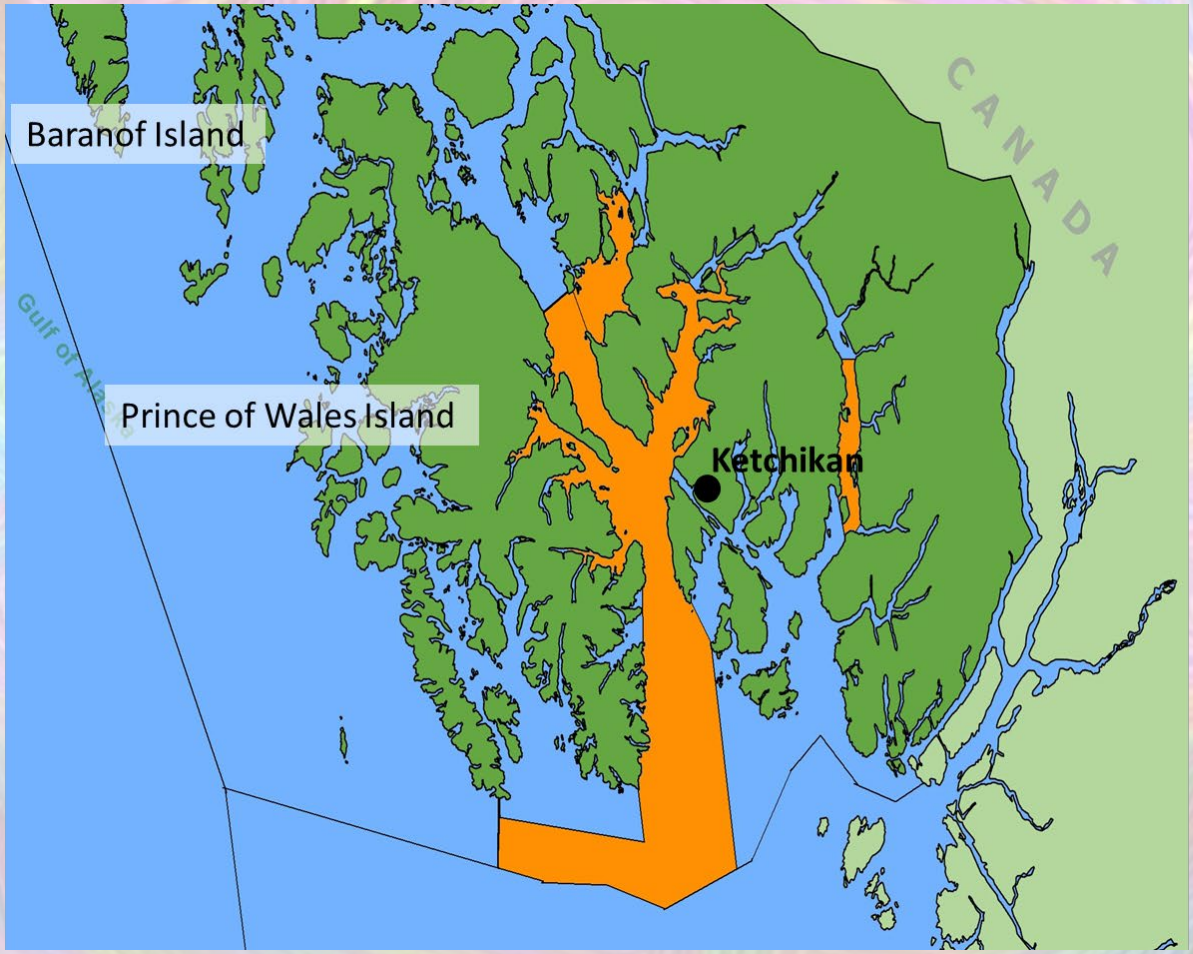
- Hagfish are major depredators of hooked and trapped fish
- They are also the target of a valuable fishery
- Harvested for meat and for leather

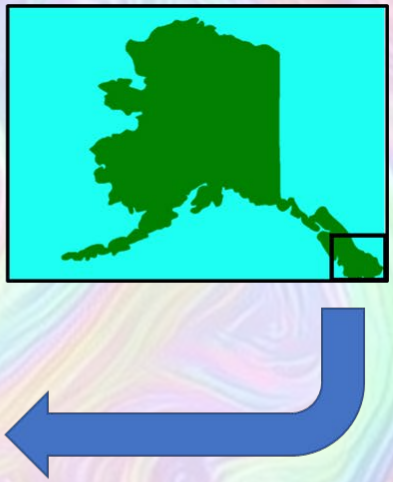


Now on to Alaska…

- In the 1980s and 90s profitable hagfisheries developed in the NE Pacific
- Interest in developing an Alaskan fishery
- AK hagfish very poorly known

Southern Southeastern Alaska Inside





Southern Southeastern Alaska Inside

- Two species of hagfish
- Like in many parts of the world, hagfish are generally considered a pest in finfish fisheries
- Feed on hooked fish, remove bait, foul gear

Pacific hagfish – *Eptatretus stoutii*
Black hagfish – *Eptatretus deani*

Management

- Currently by Commissioner's Permit
- Area divided into seven management areas with total GHL set at 170,000 lbs
- Gear limit – trap total 3,000 gallons per vessel

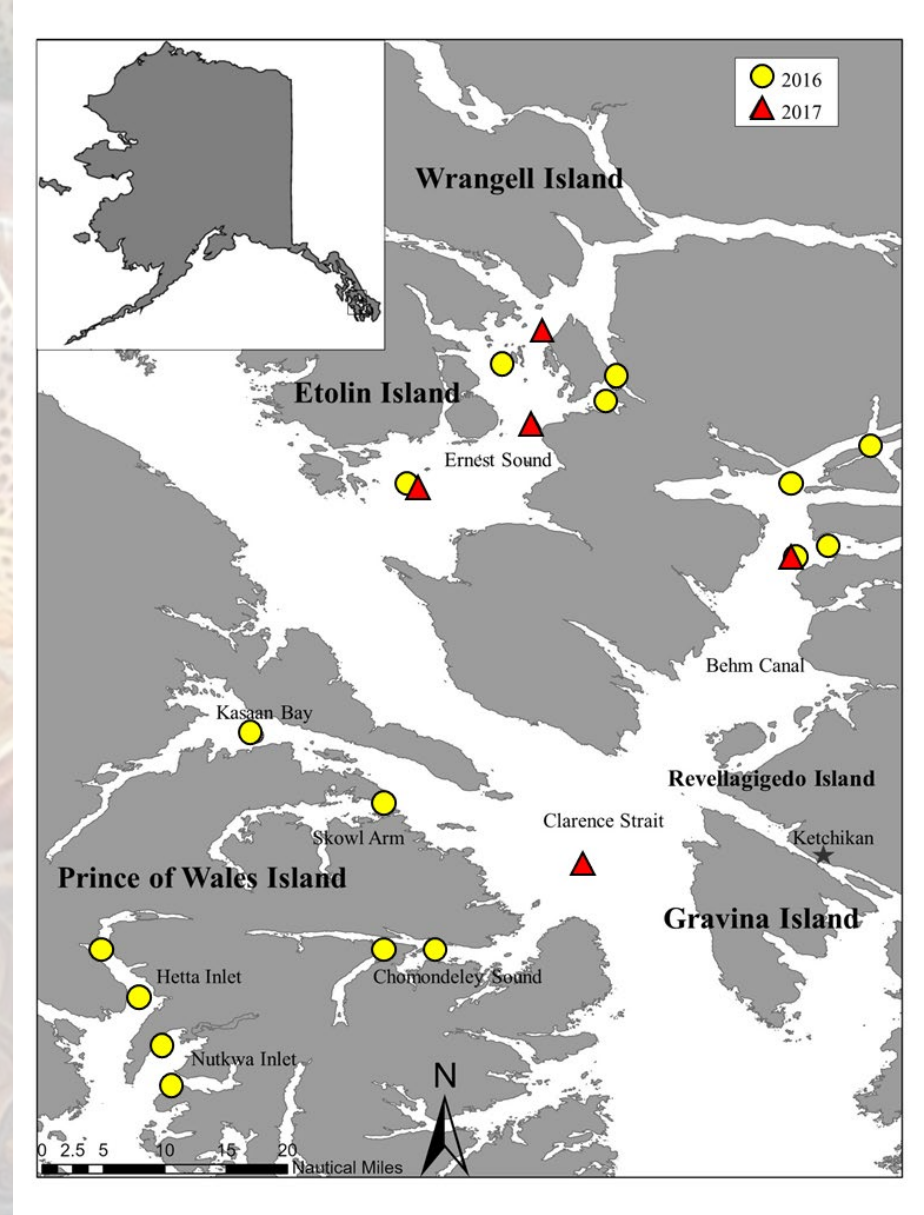
2016 Hagfish Pilot Study

Hagfish Pilot Study Objectives

- Determine range within SSEI subdistrict – including depth
- Get baseline biological data on relatively unfished population (length, weight, sex, maturity…)
- Determine if more than one species present

2016-2017 Hagfish Pilot Study

- Set strings of 25 hagfish pots in southern SE (Cordova Bay, Clarence Strait, Behm Canal)
- 16 sets in 2016, 5 sets in 2017
- Entire catch was weighed and counted by pot, five specimens from each pot collected and frozen



2016-2017 Hagfish Pilot Study

- **Specimens were brought to Juneau where they were measured, weighed, and dissected to determine species, sex, and maturity**

- **Information used to determine species composition, determine length at maturity, and to standardize sampling procedures**

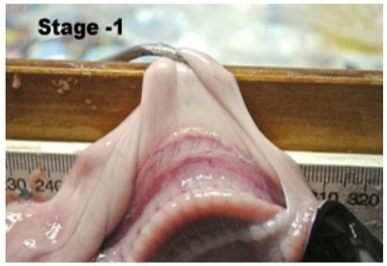
Meme sent to Kevin McNeil in 2016:

Hagfish Pilot Study

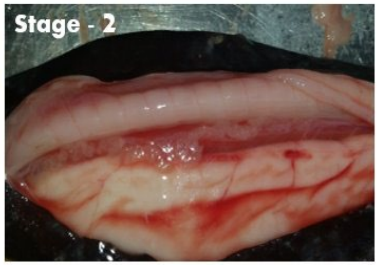
- Total of 3,500 hagfish were captured, ~828 retained
- Of that 828, a total of 806 were included in analysis
- 325 identifiable females, 216 identifiable males, and 265 were sexually indeterminate

2016-2017 Hagfish Pilot Study

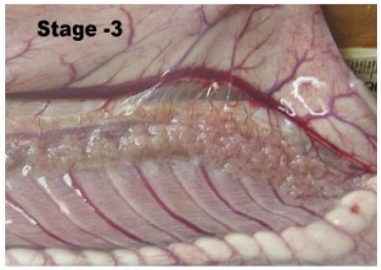
Hagfish maturity Guide - Male



Maturity Code 1 – Immature
Posterior end of gonad small and colorless (≤1 mm in width).



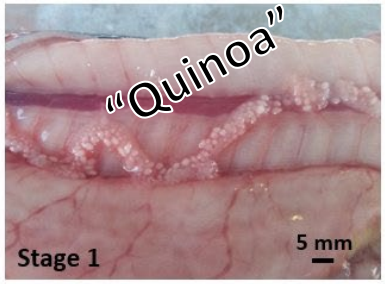
Maturity Code 2 – Immature Developing
Gonad with round white follicles about 1-2 mm in width. Follicles contain fluid.



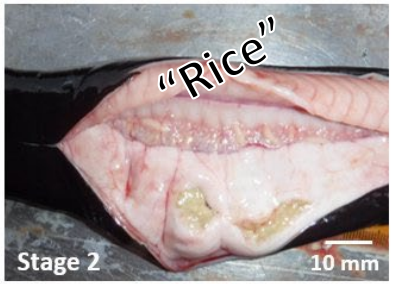
Maturity Code 3 – Mature-Developed
Gonad with large round brown to white follicles. Gonad developed in posterior half to one-third of body.

Maturity Code 4 – Mature-Spawning
Gonad with large round brown to white follicles. Gonad tends to be confined to extreme posterior end of body

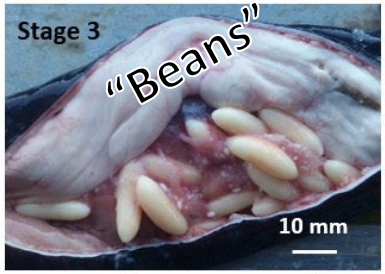
Hagfish maturity Guide - Female



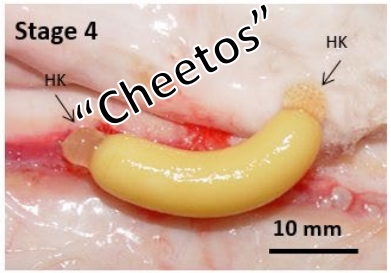
Maturity Code 1 – Immature
All round eggs ≤3mm, eggs may appear as round or oval bubbles in anterior half of narrow gonad.



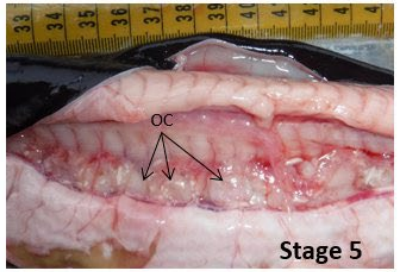
Maturity Code 2 – Immature Developing
Oblong eggs between 5-10 mm (rice).



Maturity Code 3 – Mature Developing
Oblong eggs between 10-40mm (Beans). Egg fattest in middle.



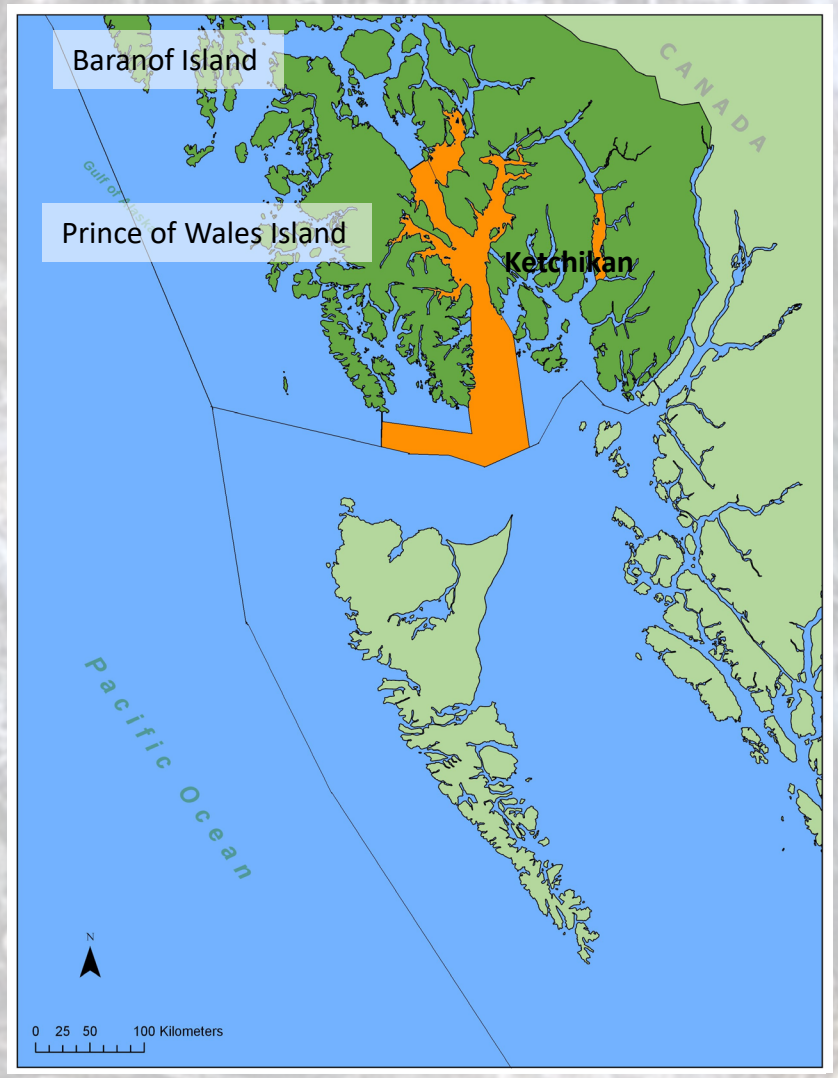
Maturity Code 4 – Mature Developed
Large eggs, >20mm (Cheetos) w/ hooks (HK) in gelatinous capsule. Egg evenly as wide throughout.



Maturity Code 5 – Mature Spent
Empty ovarian capsules (OC) and small eggs (spent).

Hagfish Distribution

- **Black Hagfish widely distributed in southern Southeast Alaska**
- **Most distribution information based on slime so just presence/absence**
- **Likely occur in other areas with appropriate depth/substrate**



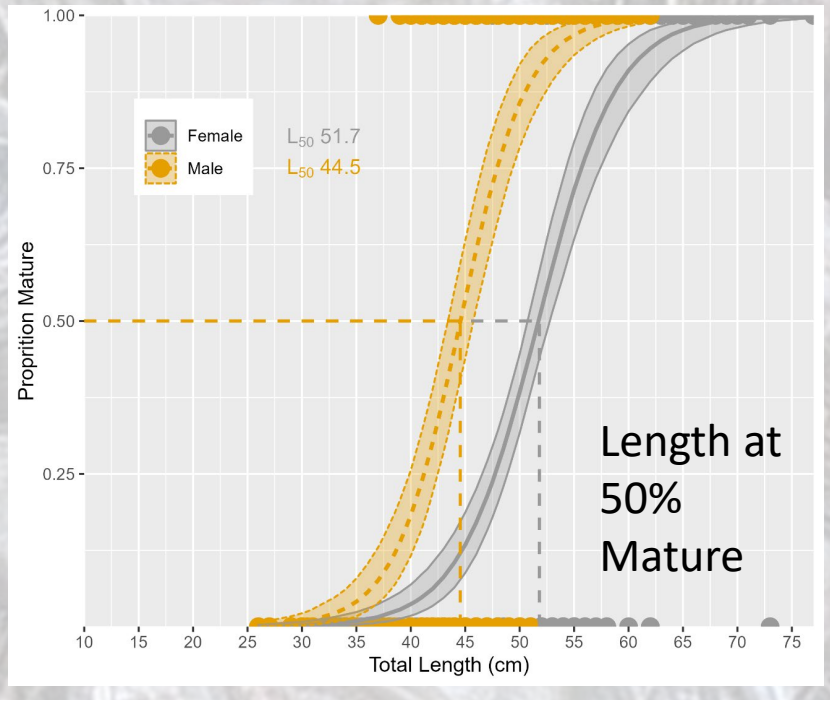
First confirmed Pacific Hagfish from Alaska!

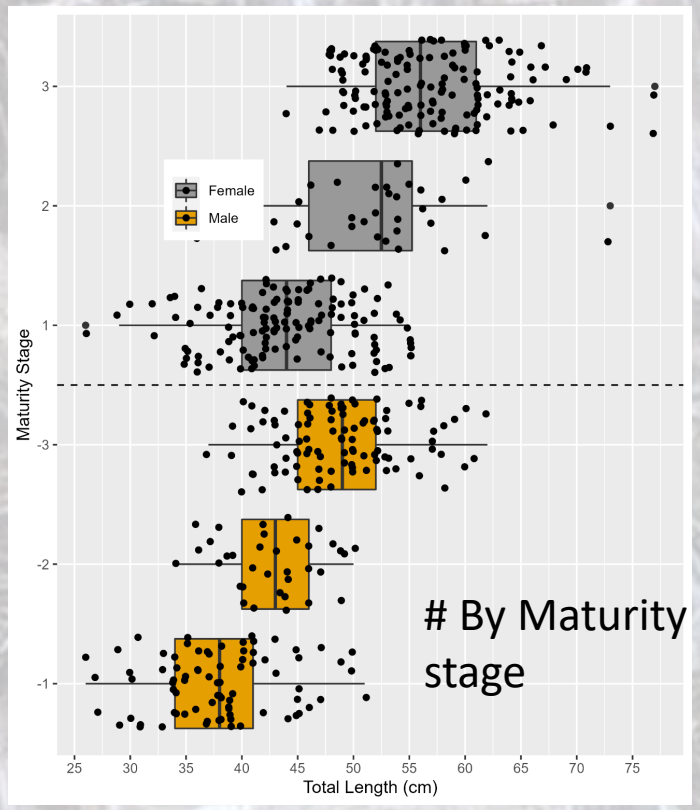
Comparison to other studies:

	California	Oregon	British Columbia	Alaska
Mean Length (All)				
Mean Length (Male)				
Mean Length (Female)				
50% Mature (Male)				
50% Mature (Female)				

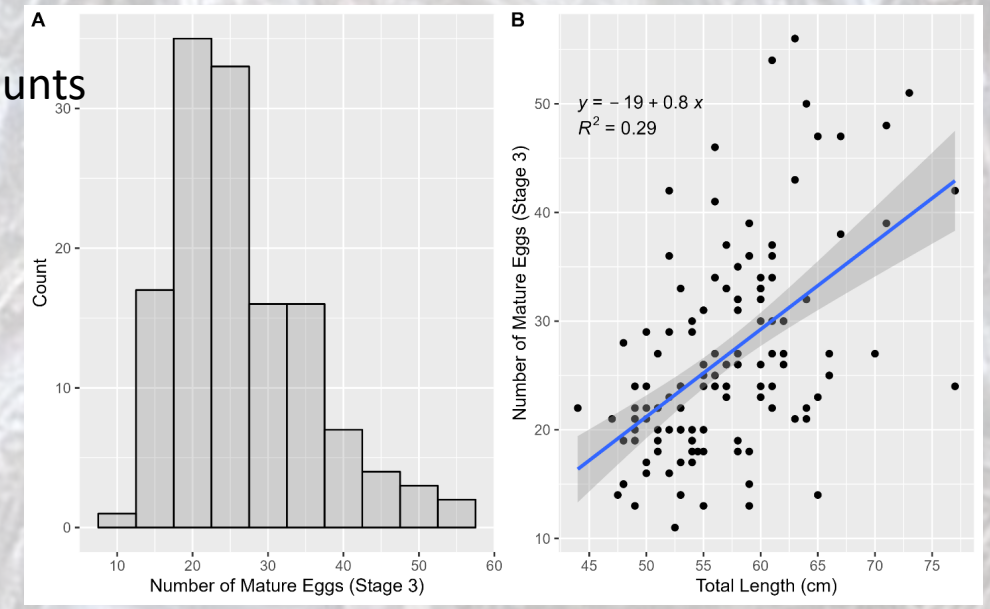
Johnson, 1994 Barrs, 1993 Fleury, 2021 This study

If there is time…

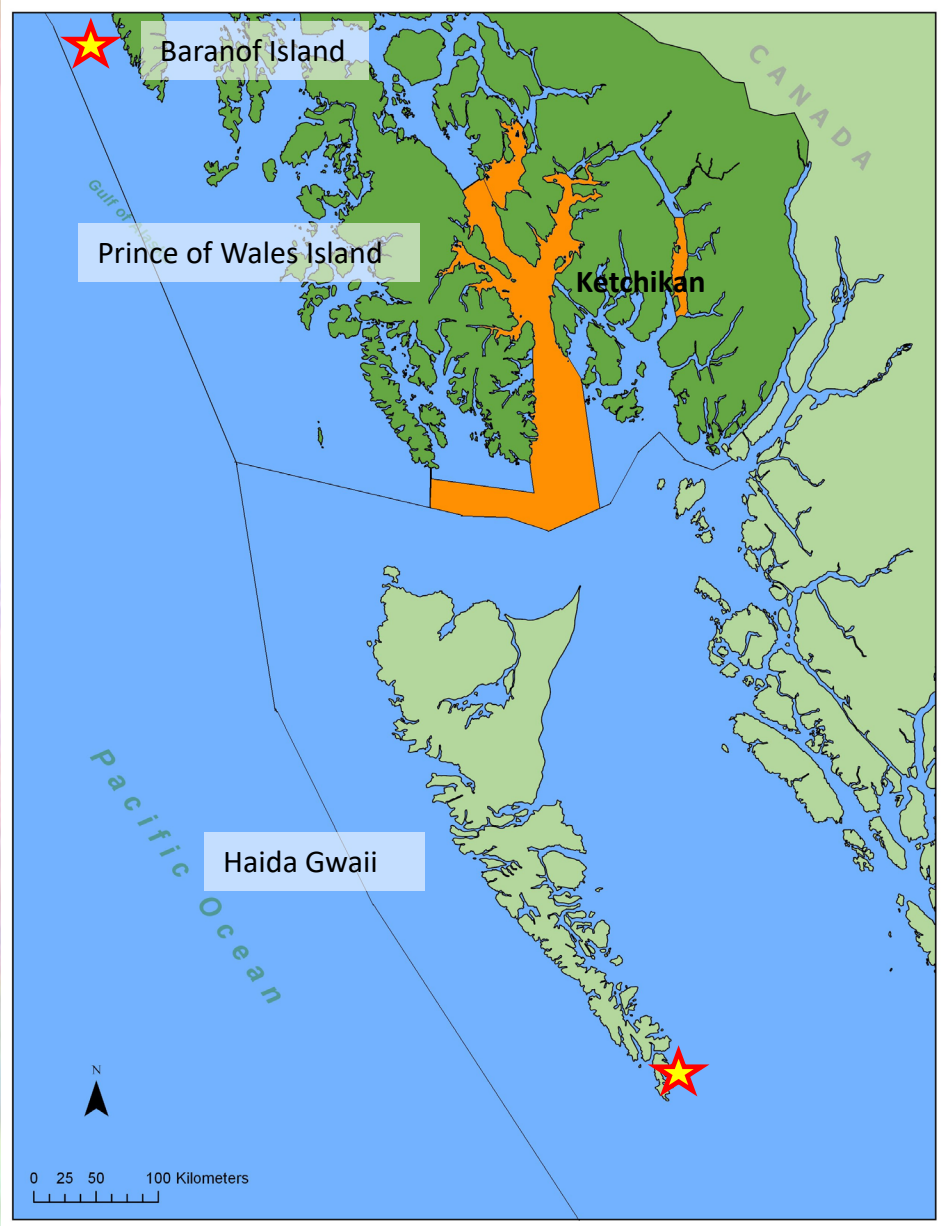




Egg Counts



Distribution question:




“Hagfish produce slime the way humans produce opinions—readily, swiftly, defensively, and prodigiously” – Ed Yong

Thanks to:

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Quinn Smith
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The Crew of the FV Kestrel
The Crew of the FV Medeia
Jill Walker
Scott Walker
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Ben Williams
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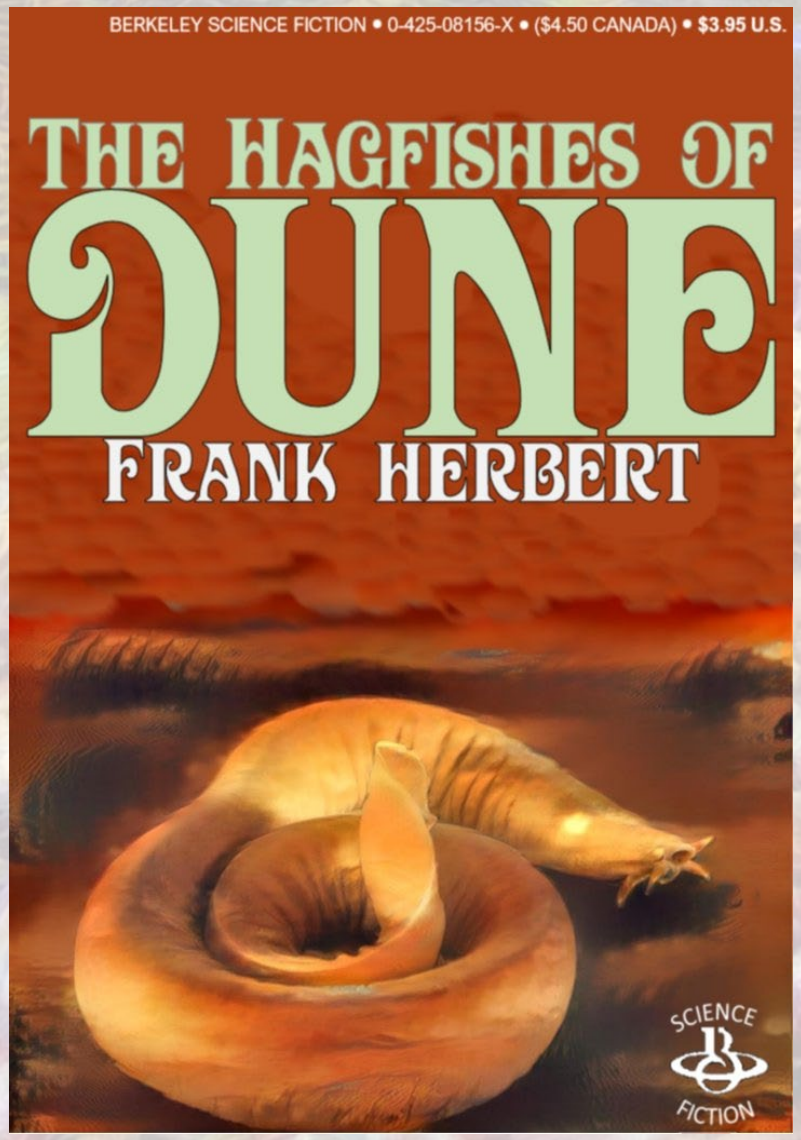
Questions?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