Fish of Alaska

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Evolution of Fish

- Jawless fish first
  - Early Paleozoic (over 500 million years ago)
- First jawed fish appeared in late Silurian
- Chondrichthyes appeared 450 million years ago
- Osteichthyes appeared in Devonian period
- All in subphylum Vertebrata
What is a fish?

- Basic biological definition
- “Marine or aquatic animal
- That has
  - A backbone
  - Gills
  - Fins” (“Types of Fish” 2011)
What is a fish? (Continued)

- Includes shellfish in fisheries
- Fish that fit biological definition are finfish or true fish

Groups of finfish

- **Class Osteichthyes**
  - Bony Fish
- **Class Chondrichthyes**
  - Cartilaginous fish
- **Superclass Agnatha**
  - Jawless fish

Osteichthyes and Chondrichthyes both Gnathostoma
Agnatha

- Most primitive of fish
- Do not have jaws
- Elongated bodies
- No paired fins
- No scales
- Types found in Alaska include
  - Arctic Lamprey
  - Pacific Lamprey

https://www.hakaimagazine.com/article-long/defenders-forgotten-fish
Chondrichthyes

- Have cartilage instead of bone
- Lack swim bladders
- Instead, oil in liver to keep from sinking
- Tiny scales
- Well-developed jaws
- Types found in Alaska include
  - Salmon Shark
  - Pacific Sleeper Shark
  - Alaska Skate

http://www.alaskasealife.org/aslc_resident_species/52
Osteichthyes

- Boned fish with jaws
- Have swim bladder
- Extremely diverse
- 96% of known fish
- Almost half of vertebrates
- Types found in Alaska include
  - Salmon
  - Halibut
  - Rockfish
Pacific Halibut

Scientific Name: Hippoglossus stenolepis

Region: Found throughout much of northern Pacific Ocean by continental shelf

Size: Up to 500 lb, up to 8 ft long

Diet: Plankton (when young), other fish, octopus, crabs, clams

Spawning: 8-12 years, ocean to coastal waters, few thousand to several million eggs, November through March

Extra Info: Start in upright position, eventually both eyes on one side of head; Swim sideways; largest Rockfish

Importance: Highly sought for food
The Salmon of Alaska

Pacific Salmon Species

Chinook
Chum
Coho
Pink
Sockeye

https://www.fws.gov/alaska/cybersalmon/identification.htm
Salmon 101

- Ray finned, Salmonidae
- Latin salmo
- Anadromous
- Migration
- Runs/stocks
- Small survival rates

https://www.flickr.com/photos/katmainps/16333875678
The lifecycle of a salmon

- Fertilized Egg: freshwater incubation
- Hatched Alevin: yolk sacs nourish
- Feeding Fry: starts swimming, parr marks
- Migrating Smolt: brackish waters
- Feeding Adult: open ocean
- Returning Spawners: physical changes, upstream migration, fertilization
- Post Spawn: death

http://www.adfg.alaska.gov/index.cfm?adfg=wildlifenews.view_article&articles_id=714
How to remember five species of Pacific Salmon:

1. CHUM
   - Chum rhymes with thumb
   - [Link](http://wdfw.wa.gov/fishing/salmon/chum.html)

2. SOCKEYE
   - Sockeye, because it's #1!
   - [Link](http://wdfw.wa.gov/fishing/salmon/sockeye.html)

3. MACAULAY SALMON
   - Macaulay, because it's the biggest
   - [Link](http://wdfw.wa.gov/fishing/salmon/chinook.html)

4. HATCHERY
   - Silver, for your ring finger
   - [Link](http://wdfw.wa.gov/fishing/salmon/coho.html)

5. PINK
   - Pink, for your pinky
   - [Link](http://wdfw.wa.gov/fishing/salmon/pink.html)

[Link](https://www.juneaufoodtours.com/a-tour-with-taste/)
Chum/Dog salmon

Scientific Name: *Oncorhynchus keta*

Region: largest distribution worldwide, largest population in Yukon river

Average Size: 10-15 lbs, up to 3.5’ long

Diet: Copepods, fish, mollusks, squid, tunicates

Spawning: 3-6 years, Coastal streams/rivers, closer to saltwater, share with Coho, 2500+ eggs, May-July

Rearing: Short time as fry, several months as a smolt

Importance: Food for Native peoples, least economically important

Fishing Type: Purse seines, Gill nets

http://wdfw.wa.gov/fishing/salmon/chum.html
How to identify: Chum/Dog

Ocean: White mouth, No spots on tail/back, Dull gray back, Silver sides, Large pupil that takes up eye

Spawning: Olive green color, Maroon sides and red markings (especially males), Large canine teeth and small hump on males

https://www.fws.gov/alaska/cybersalmon/chum.htm
**SOCKEYE/RED SALMON**

Scientific Name: *Oncorhynchus nerka*

Region: Oregon to Alaska and Japan to Siberia on Pacific side, most common in Canada and Bristol Bay in southern AK

Average Size: 5-8 lbs, up to 26” long

Diet: Amphipods, copepods, plankton- filter feeders

Spawning: 2-6 years, near lake, up to 4300 eggs in 3-5 redds, July-October

Rearing: Several months as Alevin, can spend 1-4 years as fry, exclusively in lake

Importance: Known as the most flavorful, most economically important due to high prices and quality, Native Alaskans

Fishing Type: Gill Nets, Beach Seines

http://wdfw.wa.gov/fishing/salmon/sockeye.html
**How to identify: Sockeye/Red**

**Ocean:** White mouth, Dark blue/black back, Silver sides, No distinct spots on back/tail, Gold eye

**Spawning:** Dulle green/yellow-brown colored heads and fins, Brick red bodies, Small hump on males

https://www.fws.gov/alaska/cybersalmon/chum.htm
King/Chinook Salmon

Scientific Name: *Oncorhynchus tshawytscha*

Region: Southern California to Northern Alaska, very abundant in Yukon river

Average Size: 10–50 lbs (can be 100+, largest Pacific salmon), up to 5’ long

Diet: Crustaceans, amphipods, smaller fish

Spawning: 2–5 years, July to August, migrate hundreds of miles inland to main stream/river, 2–3 weeks as Alevin

Rearing: ~1 year as a fry, several months as a smolt

Importance: Economically important due to size, interior Native Alaskan subsistence, sport fishing

Fishing Type: Gill Nets, Beach Seines, Fish Wheels

http://wdfw.wa.gov/fishing/salmon/chinook.html
How to identify: King/Chinook

Ocean: Black mouth, Black/gray back and fins, Silver sides, Black spots on back and fins

Spawning: Light maroon to olive brown color all over

https://www.fws.gov/alaska/cybersalmon/chin.htm
http://www.eikojonesphotography.com/chinook-salmon/
Silver/Coho Salmon

Scientific Name: *Oncorhynchus kisutch*

Region: Southern California to Chukchi Sea, east along Asian coast

Average Size: 8-12 lbs, up to 36 lbs, 24-30” long, second largest

Diet: Small fish, squid

Spawning: 2-3 years, usually small coastal streams, August-November, in schools for weeks, 2400-4500 eggs

Rearing: 1-4 months as fry, about a year as a smolt

Importance: Delicacy in Europe, Subsistence along coast and interior rivers, sport fishing

Fishing Type: Troll, Gill Nets, Seines, Fish Wheels

http://wdfw.wa.gov/fishing/salmon/coho.html
How to identify: silver/coho

Ocean: Black mouth with lower white gums, Green/blue back, Silver sides, Black spots on tail and fins,

Spawning: Green to black heads and fins, Dark brown to deep red bodies

https://www.fws.gov/alaska/cybersalmon/coho.htm
PINK/HUMPY SALMON

Scientific Name: *Oncorhynchus gorbuscaha*

Region: Found in Pacific from California to Arctic and over to Siberia, found east to Mackenzie River in Canada

Average Size: 2-7 lbs, 20-25” long, the smallest

Diet: small fish, squid, plankton

Spawning: 2 years, June-September, most in coastal streams, sometimes in saltwater, 800-2000 eggs, 4 months as Alevin

Rearing: Very little time as fries, one month as smolts

Importance: Canning due to low quality, millions of pounds caught annually, food for Natives along coast

Fishing Type: Gill Nets, Beach Seines

How to identify: Pink/Humpy

Ocean: White mouth, Gray/silver light blue body, Dark gray to black fins, Very small scales, Large black spots on back and tail

Spawnning: Dull gray/green back and sides, Off white to light pink on lower body, Males have large hump on back

https://www.fws.gov/alaska/cybersalmon/pink.htm
CONSERVATION: WHY SHOULD WE CARE?

#1. Alaska fishing accounts for over half of all domestic seafood production in the United States.

https://wearechefs.com/2016/08/17/alaska-seafood/
Commercially Harvested Seafood of Alaska

- King Salmon (Chinook)
- Coho Salmon (Silver)
- Pink Salmon
- Keta Salmon (Chum)
- Sockeye Salmon (Red)
- Pacific Herring
- Pacific Halibut
- Arrowtooth Flounder
- Yellowfin Sole
- Flathead Sole
- Rock Sole
- Pacific Dover Sole
- Greenland Turbot
- Red Sole
- Alaska Pollock
- Pacific Cod
- Yelloweye Rockfish
- Quillback Rockfish
- Dusky Rockfish
- Black Rockfish
- Widow Rockfish
- Black Cod (Sablefish)
- Shortspine Thornyhead Rockfish
- Rougheye Rockfish
- Southern Rockfish
- Atka Mackerel
- Pacific Ocean Perch
- Shortraker Rockfish
- Northern Rockfish
- Lingcod

List of commercially harvested Alaska fish at the Alaska Sealife Center: Lydia Hendrick 2017
#2. Fish are the foundation for many Alaskan ecosystems.
Salmon conservation

Salmon are especially important because:

- At least 137 species of animals depend on them for nutrients
- Just Pacific salmon is a $3 billion industry
- Salmon runs bring nutrients from the ocean upstream, which is important for the vegetation nearby.

http://mymodernmet.com/jason-ching-alaskan-salmon-run/
Major Threats to Alaska Fish

1. Bycatch
2. Offshore Drilling for Oil and Gas
3. Ocean Acidification
4. Overfishing and other Harmful Fishing Methods
Bycatch

Bycatch: catching untargeted animals when commercial fishing and throwing them back, dead or dying.

- Ex. Large boats fishing for crab and catching a school of halibut with them.

http://www.sitkawild.org/halibut_bycatch_a_disappointing_update
Solutions?

- Gulf of Alaska Bycatch Management Program: allocating certain areas of water for only one group to fish to reduce competition (share-catch/IFQ).

- Fishery Observer Program: tracking groups of fish to more accurately choose where to fish.
"One drilling platform normally drills between 70-100 wells and discharges more than 90,000 metric tons of drilling fluids and metal cuttings into the ocean."

Quote: [http://usa.oceana.org/impacts-offshore-drilling](http://usa.oceana.org/impacts-offshore-drilling)
Image: [https://www.ospar.org/work-areas/oic/chemicals](https://www.ospar.org/work-areas/oic/chemicals)
Solutions?

Prevention:

Ex. In 2014, former President Obama permanently withdrew the Bristol Bay area, an important area for Alaska fishing, from consideration for oil and gas drilling.

Ocean Acidification

- Industrialization releases a large amount of carbon dioxide into the air, which is absorbed by the ocean and lowers the pH of the water.

- It reduces available calcium carbonate used by animals for shells or skeletons, like corals, which are shelter for many small fish.
Solutions?

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Overfishing and Harmful Fishing Methods

- As of 2010 it is estimated that 109 million metric tons of fish are caught per year, or 240 billion pounds of fish.

- Trawling fishing includes dragging nets along the ocean floor and destroys coral and other ocean floor animals.
Solutions?

- Caps and Regulations on Fishing

- Modified technology that sweeps 2-4 inches above the ocean floor

Citations - Evolution/Halibut


Citations - Types of Salmon


- *How to Identify the Five Salmon Species Found in Alaska*. Alaska Department Of Fish And Game, Division Of Sport Fish, 2017. Web.


Citations - conservation issues

- "Overview: Definition, Responsibilities and Management." Alaska Department of Fish and Game. Web. 16 June 2017.