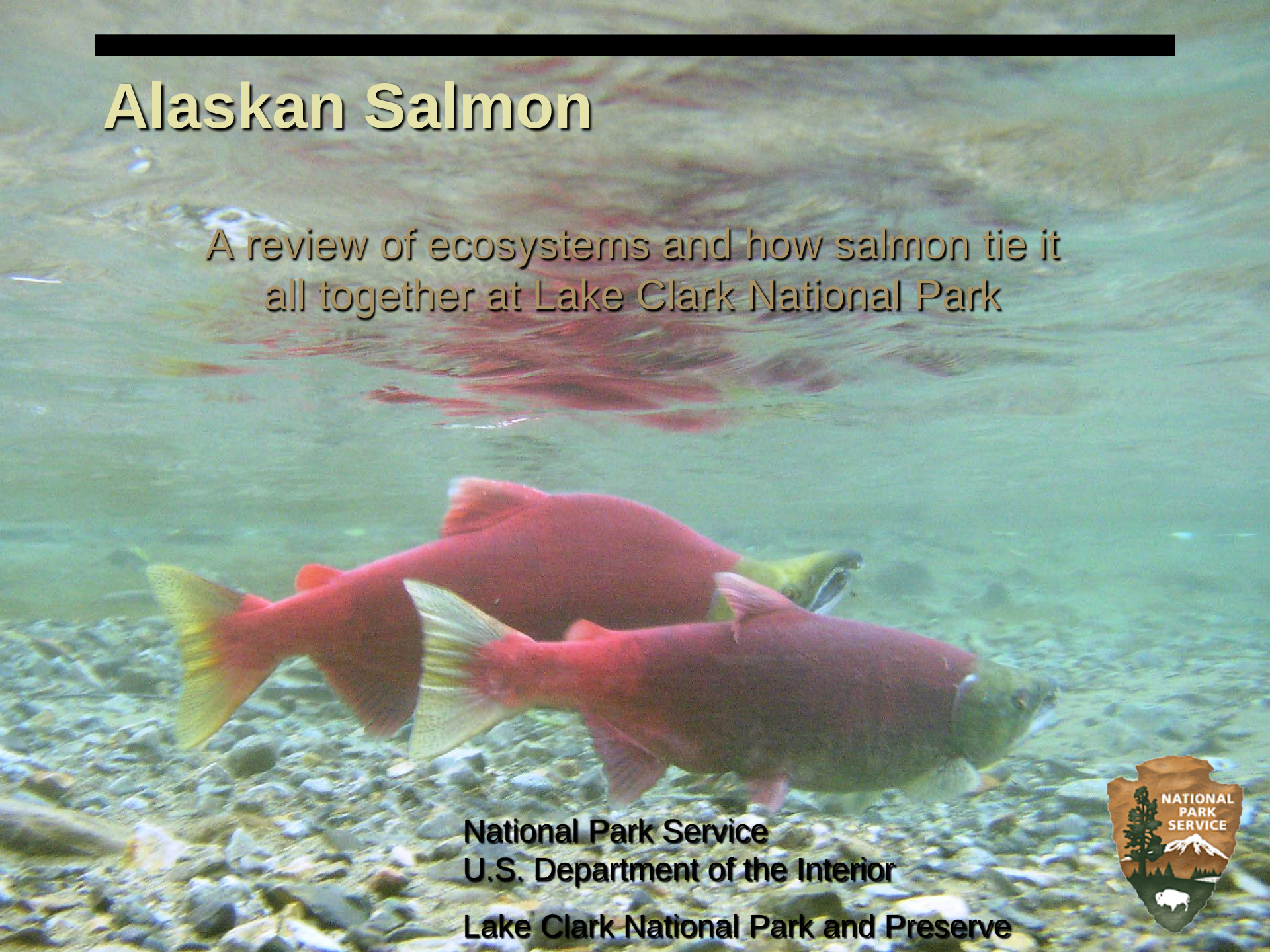
Alaskan Salmon

A review of ecosystems and how salmon tie it all together at Lake Clark National Park

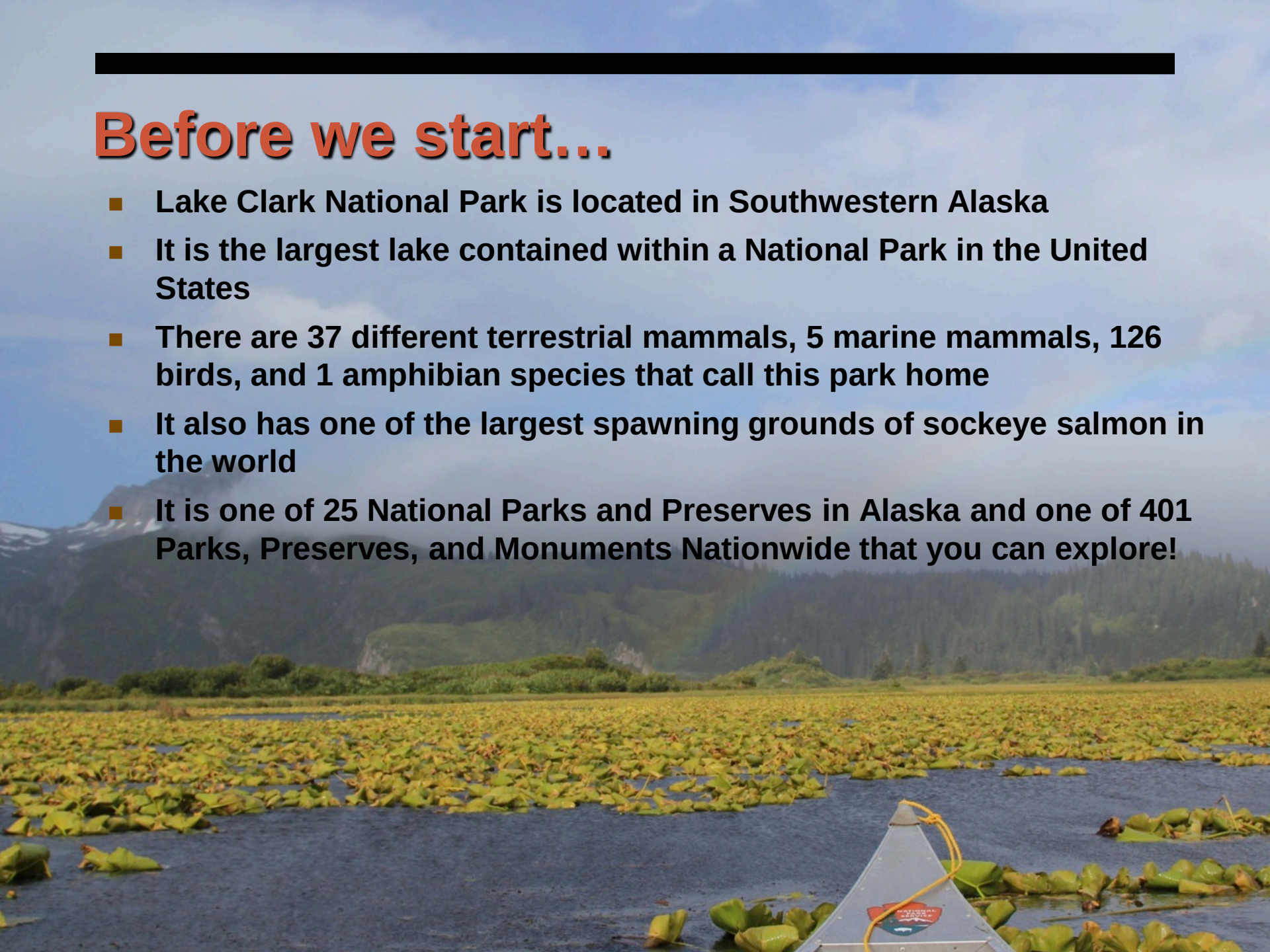


National Park Service
U.S. Department of the Interior

Lake Clark National Park and Preserve

Before we start…

- Lake Clark National Park is located in Southwestern Alaska
- It is the largest lake contained within a National Park in the United States
- There are 37 different terrestrial mammals, 5 marine mammals, 126 birds, and 1 amphibian species that call this park home
- It also has one of the largest spawning grounds of sockeye salmon in the world
- It is one of 25 National Parks and Preserves in Alaska and one of 401 Parks, Preserves, and Monuments Nationwide that you can explore!



Key Terms

- Lets see if you can define these terms dealing with salmon populations and your Biology Class.
  - Ecosystem
  - Ecological Resilience
  - Escapement (term specifically from fisheries)

Term Check

- Ecosystem
  - A level of ecological study that includes all the organisms in a given area as well as the abiotic factors with which the interact; a community and its physical environment
- Ecological Resilience
  - Measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables

www.phschool.com/science/biology_place/glossary/
www.ecologyandsociety.org/vol12/iss1/art23/table1.html

Term Check

- Escapement
  - The number of fish allowed to escape the fishery and spawn in their natural spawning grounds
    - Meaning the fish that aren't caught by sport fishermen, native subsistence fishers, other animals, or scientists

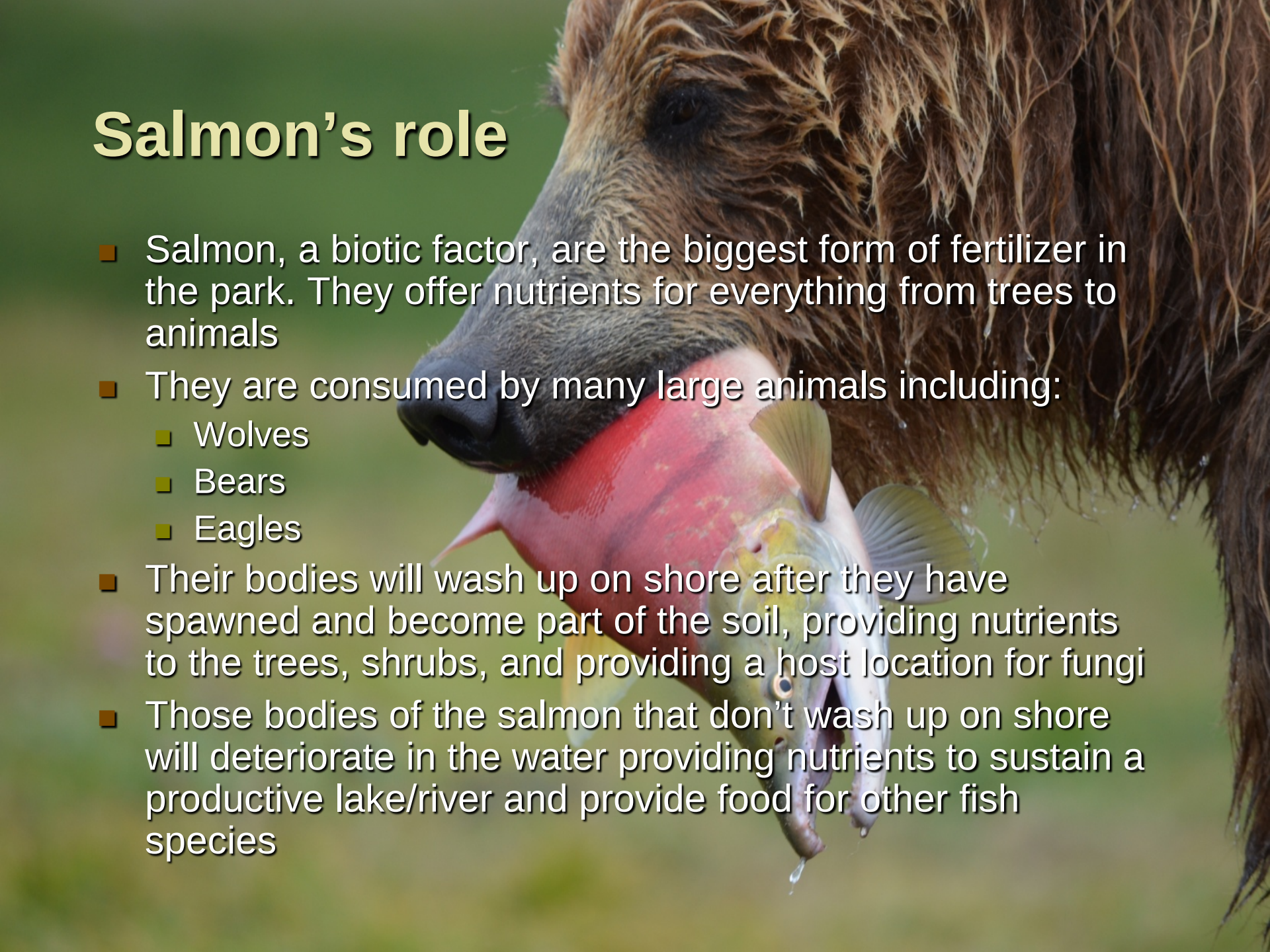
Facts about Lake Clark Salmon

- Lake Clark and the Newhalen River are spawning grounds for sockeye salmon coming in off Bristol Bay
- Bristol Bay is one of the last wholly wild salmon runs in the United States
- The salmon are running between June and August
- Even though the salmon are running in the summer some won't spawn until November in glacial rivers because there's too much sediment in the water

The ecosystem of Lake Clark

- Lake Clark National Park is a subarctic terrain
- At the top of the food chain are: Humans, Bears, Wolves, Lynx, and Bald Eagles
- Lots of small mammals, voles, martins, etc.
- There are 6 main fish species in the lake, only the salmon lives fresh to salt to fresh water
- The plants range from low bush berries, to liverworts and lichens, to shrubs (dwarf birch, alder, willow), ferns, and fireweed, through black and white spruce and birch trees with pockets of aspen and cottonwood trees
- There are a variety of beetles, mosquitos, white socks, and flies
- A variety of mushrooms act as decomposers

Salmon's role



- Salmon, a biotic factor, are the biggest form of fertilizer in the park. They offer nutrients for everything from trees to animals
- They are consumed by many large animals including:
  - Wolves
  - Bears
  - Eagles
- Their bodies will wash up on shore after they have spawned and become part of the soil, providing nutrients to the trees, shrubs, and providing a host location for fungi
- Those bodies of the salmon that don't wash up on shore will deteriorate in the water providing nutrients to sustain a productive lake/river and provide food for other fish species

Ecological Resilience

- “Salmon have an amazing natural resilience to human and natural disturbance. Salmon in Alaska are doing well compared to the lower 48 because Alaska has a largely intact natural system. Bristol Bay sockeye returns are a good example of that stability and resilience. The region has large and stable returns despite high levels of commercial exploitation. Individual watersheds and rivers in the area have a large amount of variability in the amount of salmon over time. That natural variation (and sometimes decline) is often viewed by the public with concern, but is a normal part of a healthy system.” –Andrew Kirby Fish Technician

Newhalen River Escapement Project

- Dan Young is the biologist spearheading the escapement project at Lake Clark
- His goal is to create an index tabulating the amount of fish that are passing through the different watersheds to see:
  - How many are going through
  - Where the fish are going
  - What population is male/female
  - How old the fish are
  - How long they spent in fresh water vs. saltwater

Newhalen River Escapement Project

- The project has been going on since 1980.
  - There was a break from 1984 until Dan and his crew picked the project up again in 2000.
- The index is very important because it gives us, not only the daily counts so that we can see how many salmon are passing, but also if we are anywhere near the numbers from previous years
  - This can help us see:
    - Environmental impacts (volcanoes erupting, climate changes, etc.)
    - Human impacts (over fishing – sport fishing, waste or pollution, etc.)
    - Changes in other animal populations – effects of the number of salmon on bear and wolf populations
    - Salmon's resilience despite commercial fishing in the area

Newhalen River Escapement Project

Fish crew can see the salmon easier by the white mesh on the river bed.

There are clickers to count when the runs come in. Sometimes they are counting over 1,000 fish in a 10 minute period.

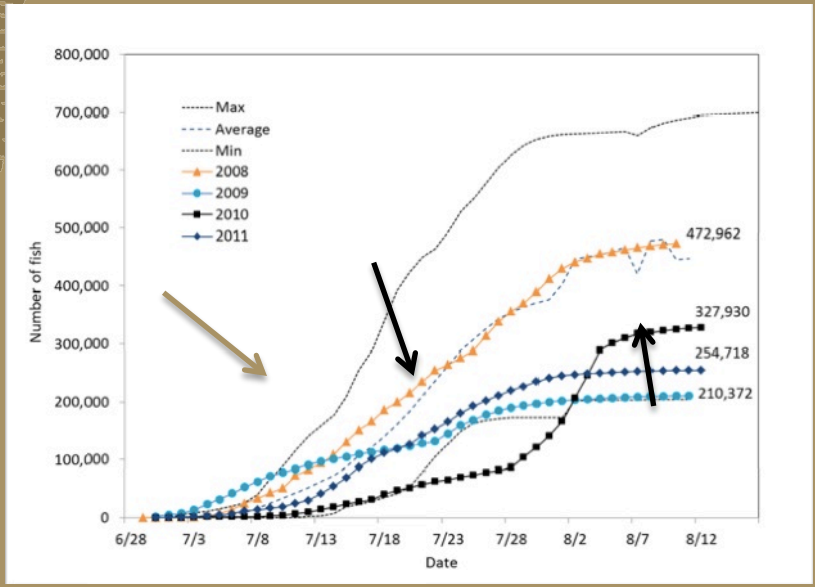
- The Newhalen river is one of the sites monitoring salmon as they pass from Bristol Bay.
- There are counting towers on either side of the river
  - Fish crew will stand in the counting towers 10 minutes every hour and count salmon as they pass by
  - They take the data and extrapolate to account for the amount of fish that would have passed in an hour

Newhalen River Escapement Project

- The project has seen some pretty stable numbers over the years
  - Usually ranging from 7%-15% off normal
- We have seen a common trend in the data gathered at the Newhalen
  - The run tends to lasts from the end of June until the middle of August.
    - Some runs start earlier in June and end earlier, some will start later and run well into September

Newhalen River Escapement Project

- If you look at the graph you can see the trends of the Newhalen river, there is an
  - initial spike,
  - a plateau,
  - a final spike
- before the graph evens out and the run is over.



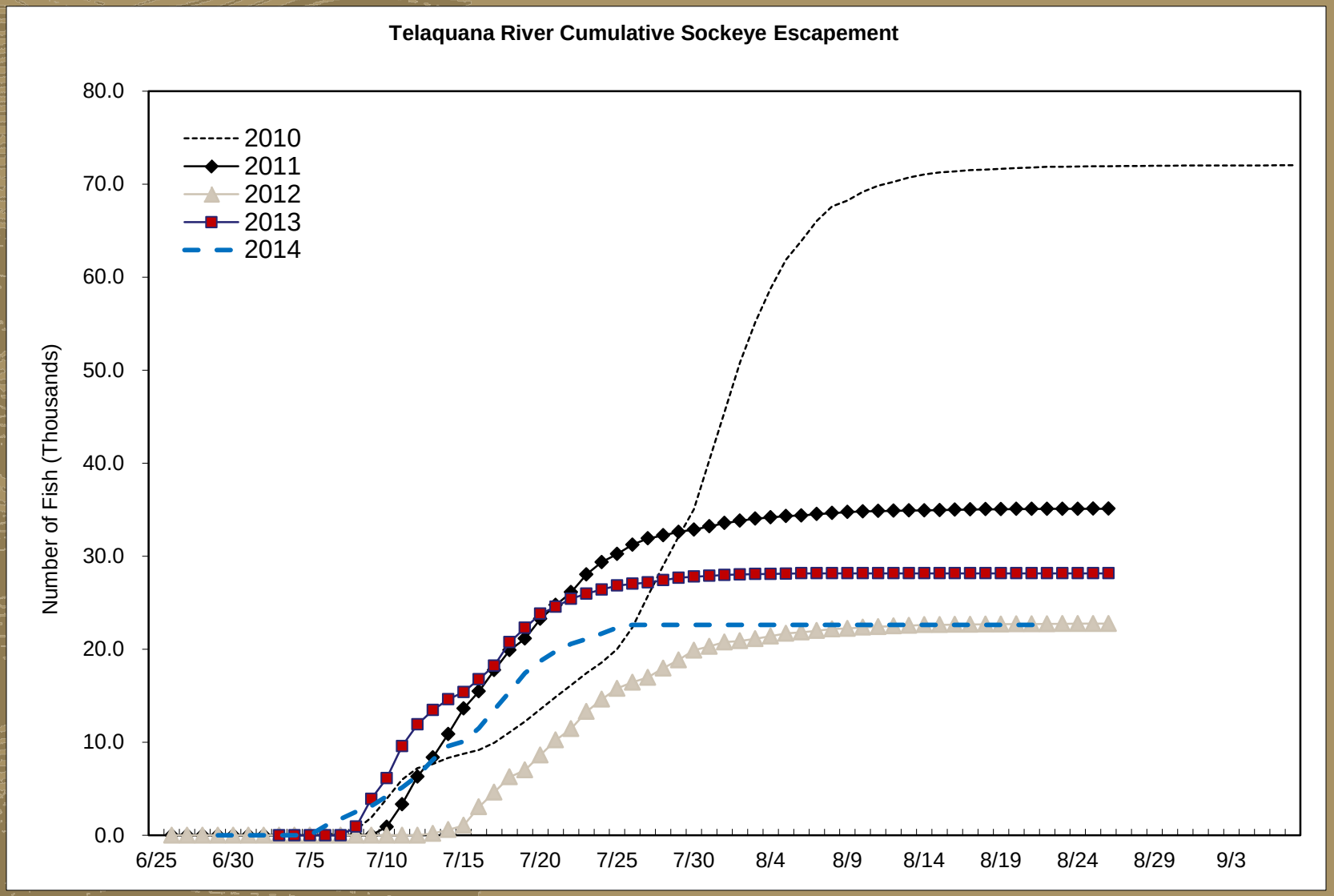
Newhalen River Escapement Project

Fixing nets, measuring fish, counting in towers, and communicating with the Natives are all tasks that occur at River Mile 22

Telaquana Weir

- Telaquana river is much smaller, less distance across
- Instead of counting towers, they have a weir
  - The weir is a long fence the goes across the river.
  - It prevents any fish from going up or down stream except where there is an opening.
- The weir has been in existence only a few years, so there isn't as much data
  - We are noticing, as the project continues, some of the same trends

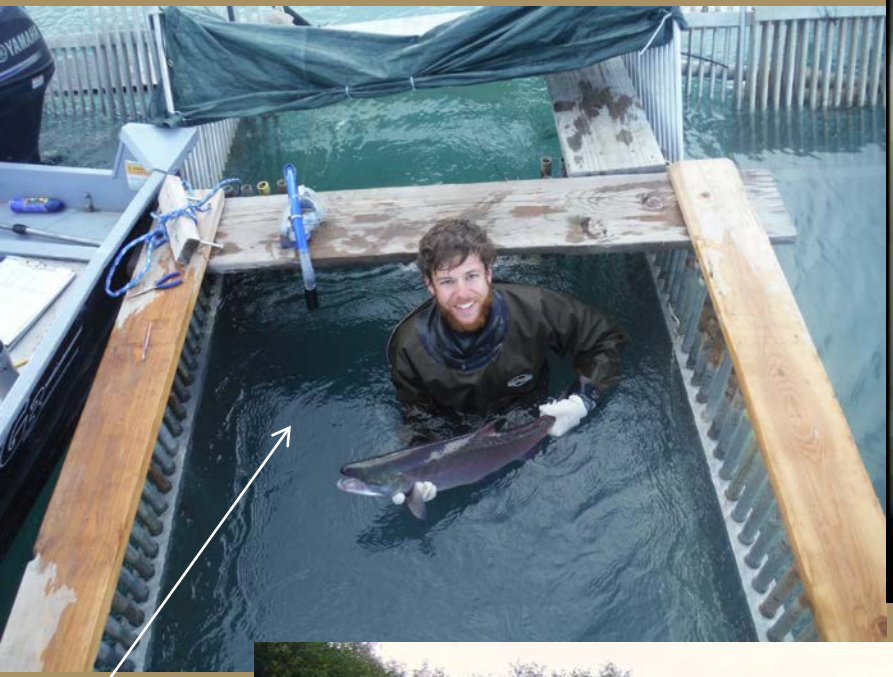
Telaquana Weir



Telaquana Weir

- The weir is monitored by one of two ways
  - They have people who sit on the weir and count fish for one hour every 4 hours (that's 6 hours a day) at all other times the weir is closed off and fish wait to pass
  - There is a camera mounted in the weir that captures footage every hour. The footage is then analyzed by Fish Crew every day for salmon counts, gender, etc.

Telaquana Weir



Fish Crew member James monitoring salmon at the weir

The weir set up at Telaquana