

Cook Inlet Aquaculture Association

Looking at Salmon Production in
the Susitna River Watershed



Cook Inlet Aquaculture Association

Mission

A non-profit regional association which exists to:

- (1) protect self-perpetuating salmon stocks and habitats upon which they depend;
- (2) rehabilitate self-perpetuating salmon stocks;
- (3) rehabilitate salmon habitat; and
- (4) maximize the value of the Cook Inlet (Area H) common property salmon resource by applying science and enhancement technology where appropriate.



Cook Inlet Aquaculture Association Funding

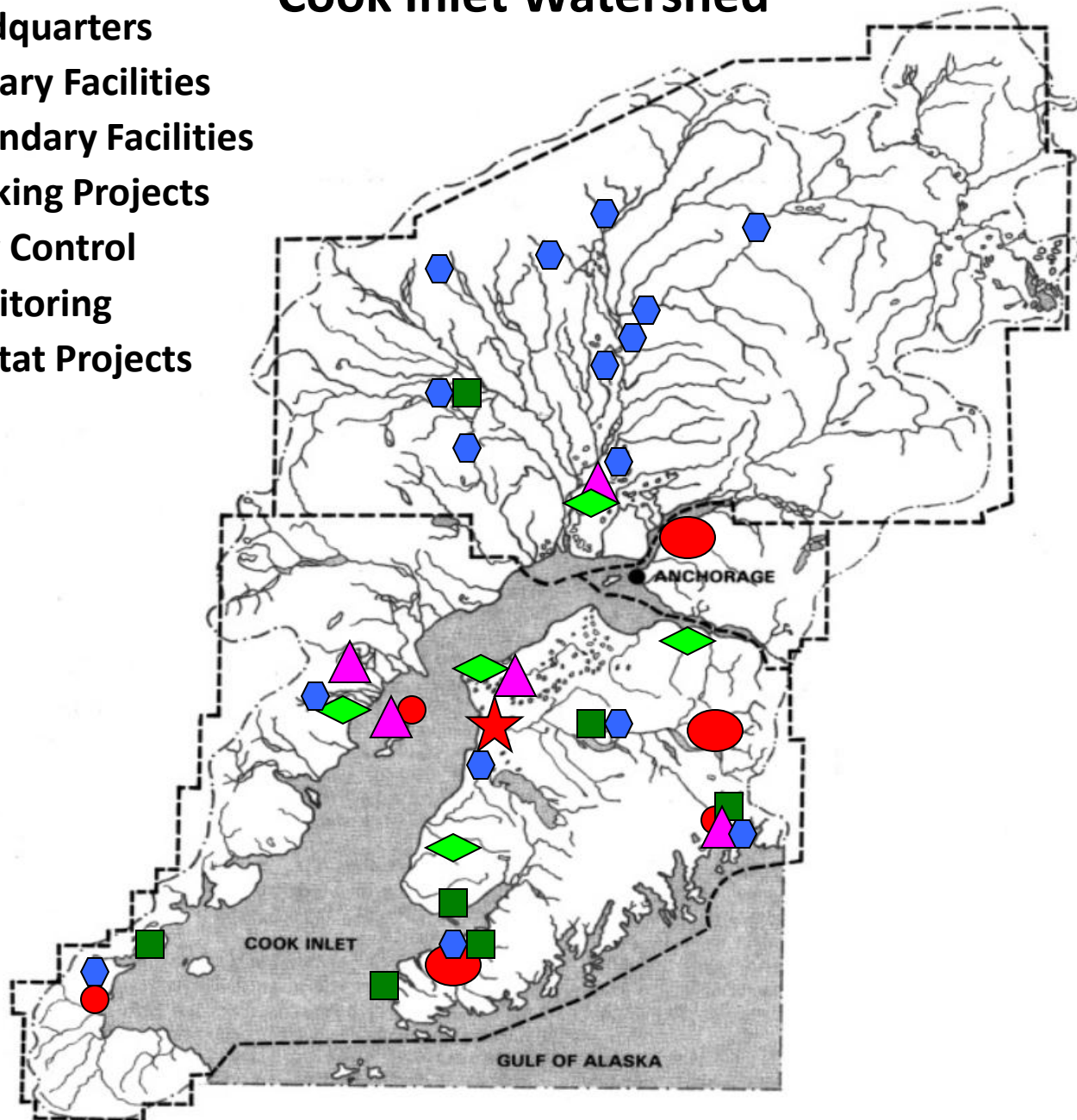
Primarily funded by:

- 2% Salmon Enhancement Tax
- Cost Recovery Licensing
- Contract Fish Production
- Grants

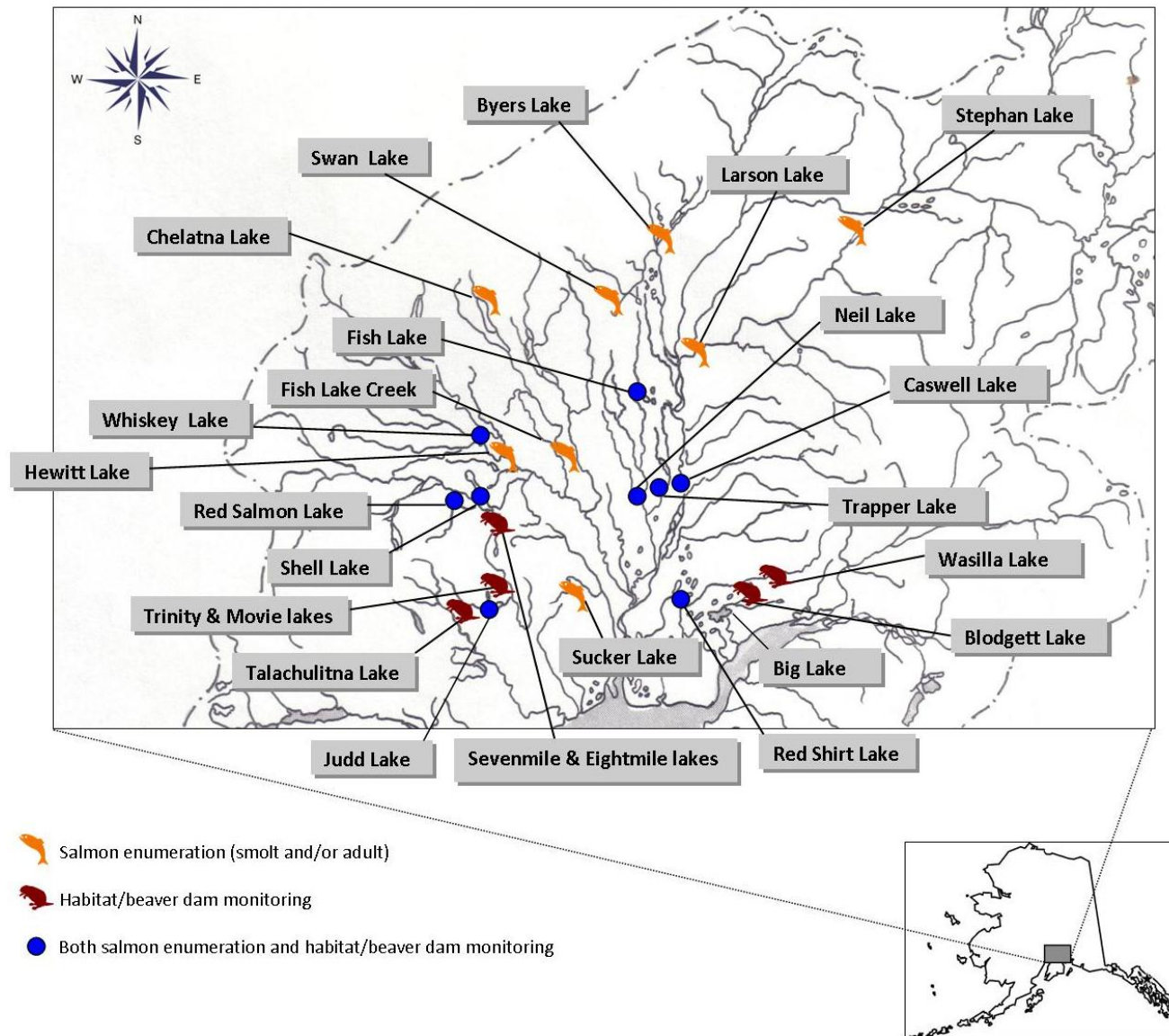


Cook Inlet Watershed

- ★ Headquarters
- Primary Facilities
- Secondary Facilities
- Stocking Projects
- ▲ Flow Control
- ⬡ Monitoring
- ◆ Habitat Projects



Working in the Susitna Basin since 1980



Improve Adult Fish Passage Through Beaver Dam Mitigation

When working at Susitna Basin lakes and streams routinely survey for the presence of beaver dams blocking adult migration



When CIAA finds beaver dams that are impeding adult migration, we notch the dam to allow adequate passage for salmon.

Some Susitna creeks and lakes have been surveyed by CIAA for beaver dams for 20 years or more.



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Shell Creek, 2003

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More Recent Susitna Studies/Projects

Susitna sockeye salmon project, started in 2006

1. Enumerate sockeye salmon (smolt and adult) in various lakes (Susitna and Yentna rivers)
 - Compare fish wheel/sonar and weir counts
 - Identify key production lakes
 - Determine salmon abundance with and without northern pike
 - Identify concerns or other issues affecting salmon returns
2. Determine population characteristics (age structure, size) of smolt and adult migrations
 - Changes over time
3. Determine possible food source limitation through regular limnology sampling



Results/Conclusions

1. Fish wheel/sonar counts alone were underestimating the total escapement
 - Led to ADF&G to consider both the weir and fish wheel/sonar counts in estimating salmon escapements and determining fishery openings
2. Identified Chelatna, Judd, and Larson lakes as key indicators for determining escapement and as primary producers for salmon
3. Discovered that some lakes historically known to have salmon present no longer had any returns (Red Shirt, Trapper)
4. Lakes known to have northern pike tended to have reduced abundance of salmon; however, the degree of impact tended to vary depending on water clarity, water flow, and vegetation type
 - The clearer the water, the slower the flow, and the greater the amount of vegetation in shallow areas = greater negative impact by northern pike on salmon abundance
5. Food availability as determined by zooplankton species and biomass were not limiting salmon production



Northern Pike Project

Overall goal is to develop a northern pike eradication strategy in the Susitna River

Watershed by assessing:

- a) The movements of northern pike within a watershed via radio telemetry**
- b) The habitat preferences of northern pike (% cover, water temperature correlations, fish behavior)**
- c) Population characteristics (size of fish, age, sex)**
- d) Determining the best method(s) to capture northern pike via CPUE analysis and assessment of barrier technology**
- e) Other means beyond physical removal of northern pike to eradicate/control populations**



Northern Pike Project:

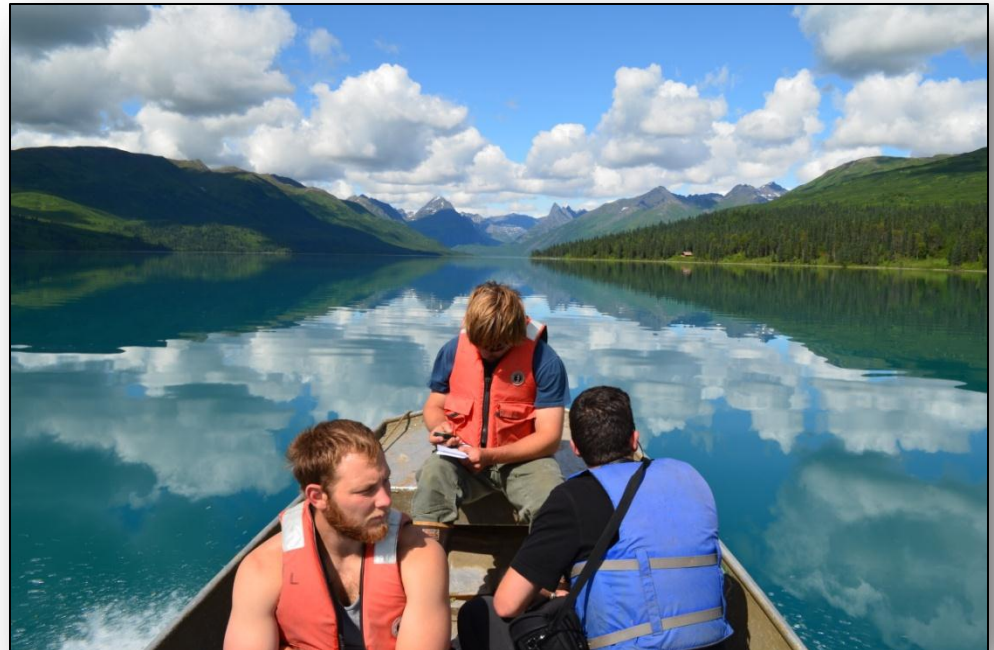
3-Year Study Performed at Three Lakes

Chelatna Lake

- Northern pike present but salmon population stable
- Determine best method to remove pike from the system
- Determine food source (stomach contents), population characteristics (recruitment, age structure)
- Harvest all northern pike caught

Preliminary results:

- 511 pike harvested in 2012
- 412 pike harvested in 2013
- Stomach analysis indicated pike are preying heavily on salmon fry/smolt



Northern Pike Project, continued

Whiskey and Hewitt lakes

- Northern pike present but salmon population unstable
- Track the movements of northern pike throughout the year to determine habitat preferences, seasonality preferences, and migrations between the two lake systems
- Determine populations recruitment
- Evaluate the use of an electrical barrier (Neptun) to deter/limit the movement of northern pike while still allowing the migration of smolt and adult salmon



Testing NEPTUN, 2013

Northern Pike Project

Whiskey and Hewitt lakes, continued

Preliminary results:

○ 2012:

- 1,038 pike harvested
- 118 pike tagged

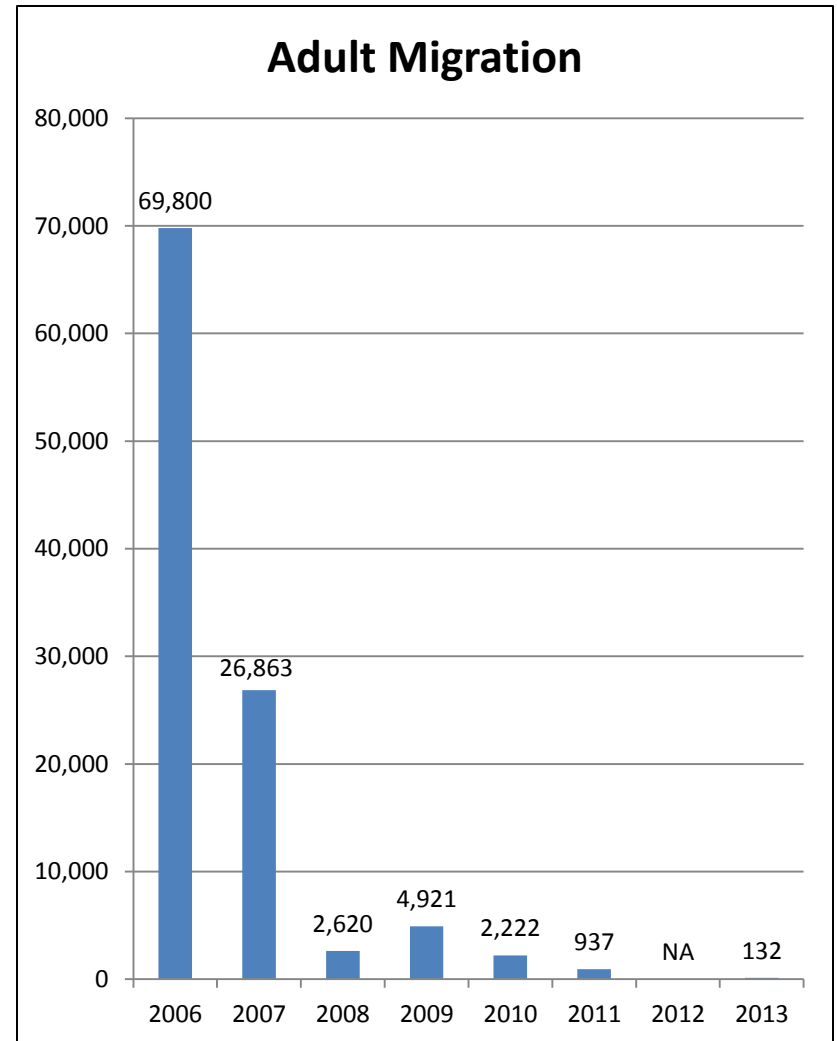
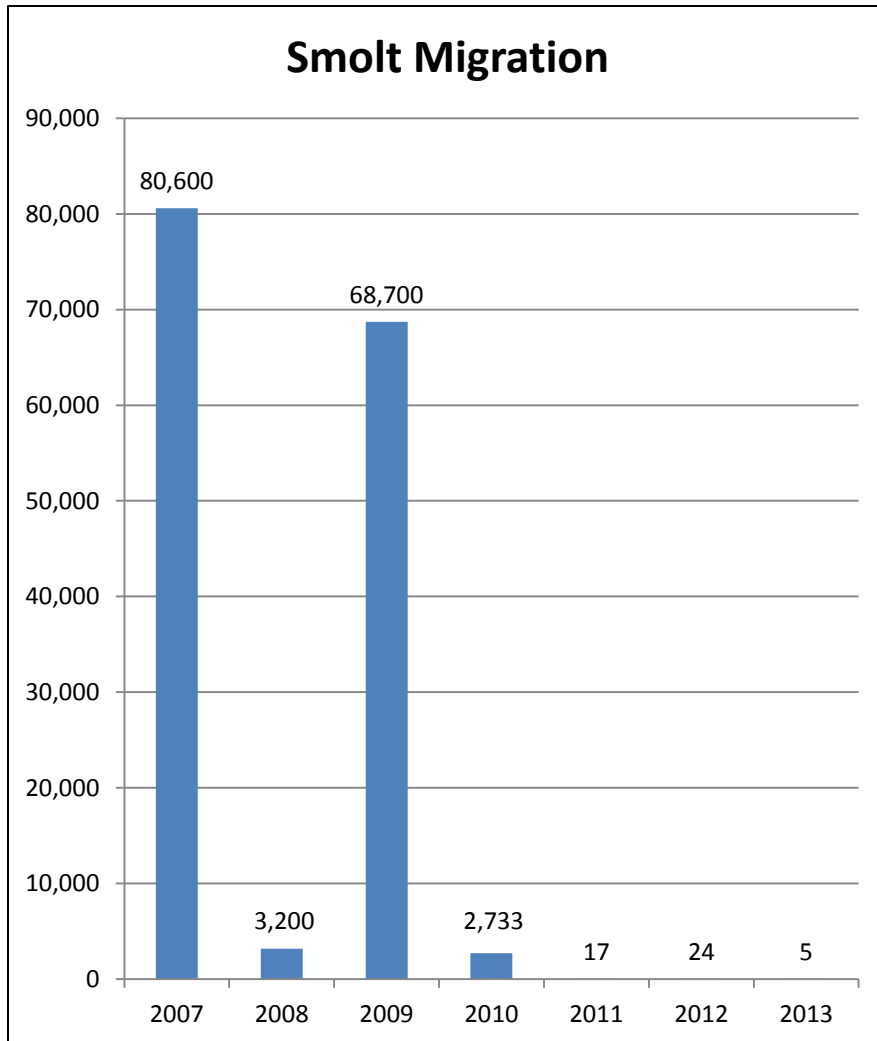
○ 2013:

- 31 pike harvested
- 474 pike tagged
- 25 trials were run in the field with Neptun; analysis of those data underway
- Tracking data analysis is underway



Shell Lake Project

Monitoring has indicated some alarming declines in sockeye populations



Shell Lake Project, continued



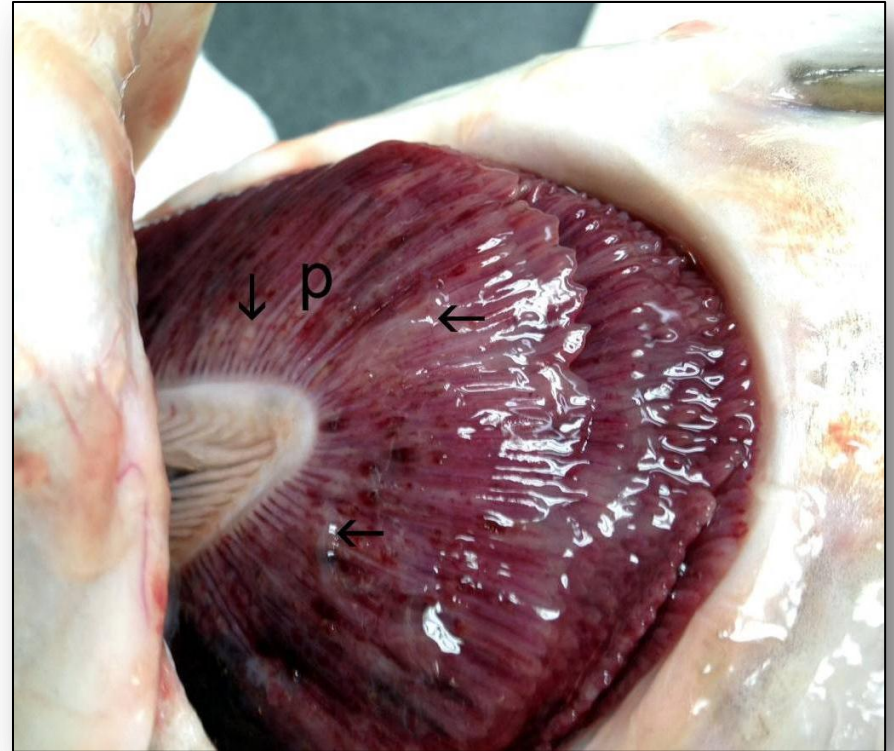
Originally believed that the decline in salmon populations may be due to predation by northern pike

- CIAA started a project in 2012 to eradicate/control northern pike
 - Nearly 1,000 pike have been harvested through 2013
- In order to preserve the genetic lineage, CIAA collected gametes from 34 sockeye females and males in 2012 (approximately 91,000 eggs)
- Gametes were shipped to Trail Lakes Hatchery for fertilization, incubation, and rearing
 - approximately 70,000 sockeye smolt will be re-introduced to the lake in 2014



Shell Lake Project, continued

- Prior to and during the collection of gametes, tissues samples were sent to AD&G for disease screening
- Returning adult salmon were diagnosed to be infected with two different parasite infections
 - *Loma*: primarily affects the gills causing them to swell and inhibit the ability of fish to exchange oxygen across its gill
 - PKD or Proliferative Kidney Disease: as the name implies affects the kidney causing anemia in the fish
 - Both parasites can result in death of the fish



Future Susitna Projects

- Continuing with Shell Lake sockeye salmon rehabilitation
- Continuing with northern pike project into 2014
- Further assessment of disease incidence/prevalence in other water bodies that have shown declines in salmon production
- Reintroduction of salmon to lake systems in which monitoring has indicated that there are no salmon returns (Red Shirt and Trapper lakes) or where populations may be threatened for extinction (such as Shell Lake)



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