



Mercury and the Kuskokwim River

- Approximately 1400 t of mercury have been produced from the region, which is ~99% of all mercury produced from Alaska.
- Red Devil Mine produced nearly 87% of all mercury produced from Alaska.
- Cinnabar is the principle ore mineral containing mercury.

Cinnabar

Methylmercury & why we are looking at fish and bugs?

The diagram illustrates the biomagnification of methylmercury in an aquatic food web. It starts with 'BUGS' (insects) at the base, which are consumed by 'SCULPIN' (forage fish). These are then eaten by 'DOLLY VARDEN' (top predator fish), which are in turn eaten by 'PIKE' (top predator fish). Yellow dots representing methylmercury are shown increasing in number and size at each successive level of the food chain, indicating that the concentration of methylmercury increases as you move up the food chain.

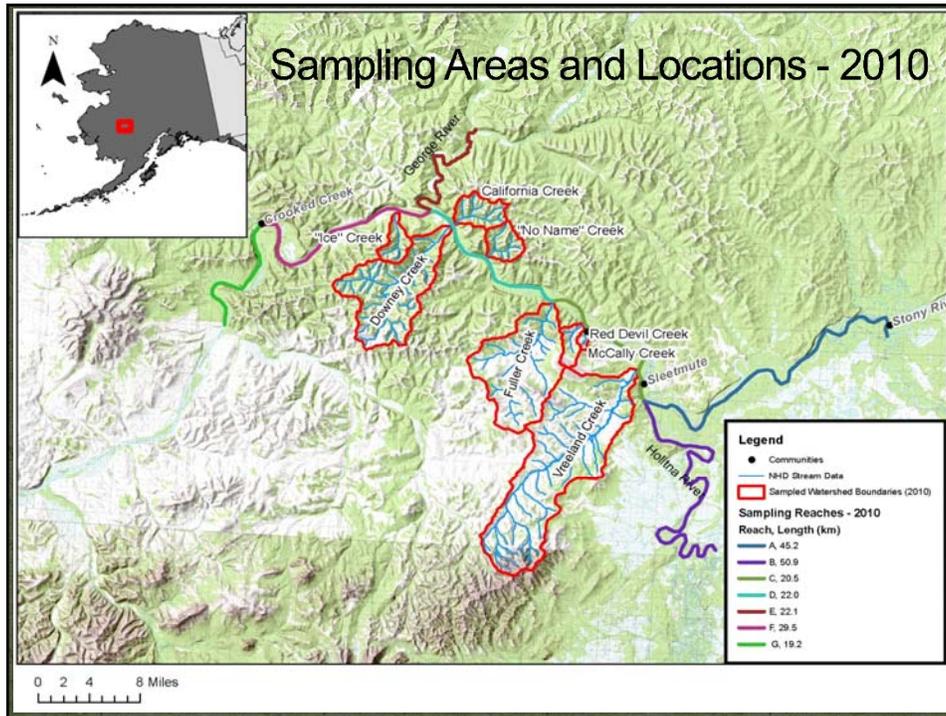
- Methylmercury most often results from bacterial activity in swampy areas.
- This form of mercury presents the greatest environmental risks to human health.
- Methylmercury is stored in fish tissue and is the only form of mercury that biomagnifies in aquatic food webs. In other words methylmercury accumulates as you move up the food chain from aquatic insects to forage fish to top predator fish and so on.

Original Study Goal

Final Operations Plan - 2010
 Quantification of potential contaminants with particular emphasis on methyl mercury in fish and aquatic macroinvertebrate tissues in the middle Kuskokwim River, Alaska.

To understand the existing levels of mercury and other contaminants in fish and insects in the middle Kuskokwim River (area between Stony River and Crooked Creek).

Field Operations Plan - 2010



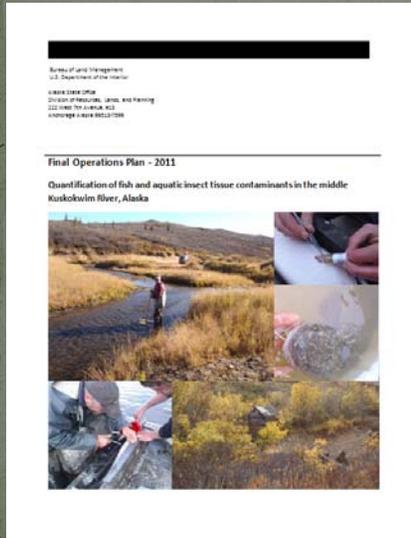
2010 Sampling Summary

Forage Fish Sampling - 227 juvenile fish collected from 8 streams. Species sampled were slimy sculpin, Dolly Varden, arctic grayling, and longnose sucker.

Predatory Fish Sampling - 140 burbot (lush), 136 northern pike, 39 sheefish, 13 arctic grayling, & 8 Dolly Varden collected from the Holitna, Kuskokwim, Tatlawiksuk, Stony, Oskawalik, and George Rivers.

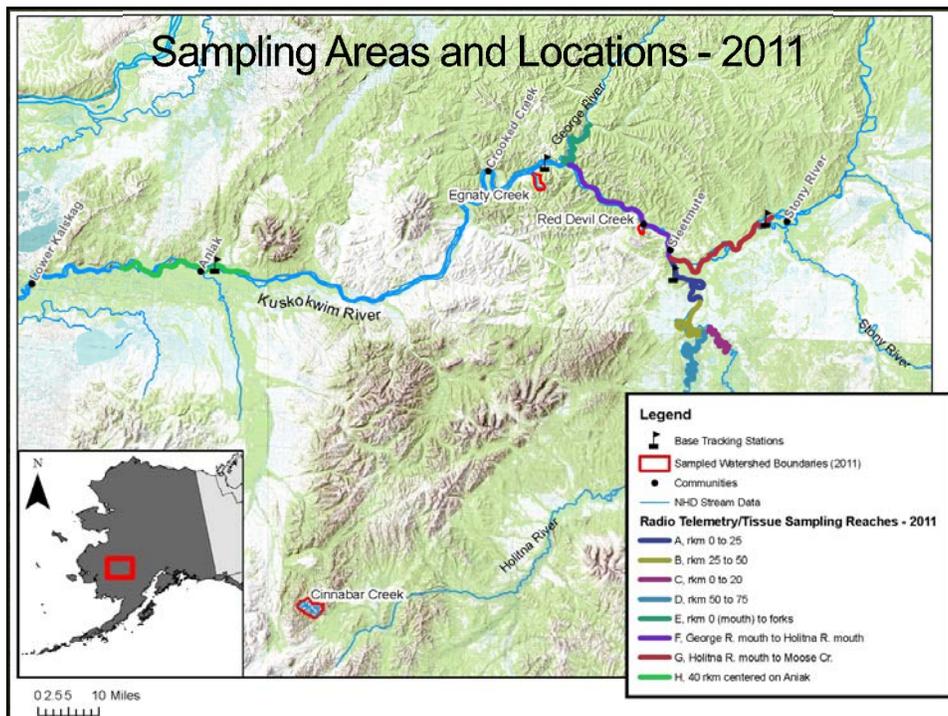
Other Sampling - 40 aquatic insect samples & 60 sediment/water samples from 8 streams.

Expanded Study Goal



To understand the existing levels of mercury and other contaminants in fish and insects in the Kuskokwim River and select tributaries (from Aniak to upriver of McGrath).

Field Operations Plan - 2011



2011 Sampling Summary

Forage Fish Sampling - 94 juvenile fish collected from 3 streams. Species sampled were slimy sculpin, Dolly Varden, & arctic grayling.

Predatory Fish Sampling - 120 burbot (lusc) & 161 northern pike collected from the Holitna, Hoholitna, Kuskokwim, and George Rivers.

Other Sampling - 8 aquatic insect samples & 8 sediment/water samples from 3 streams.

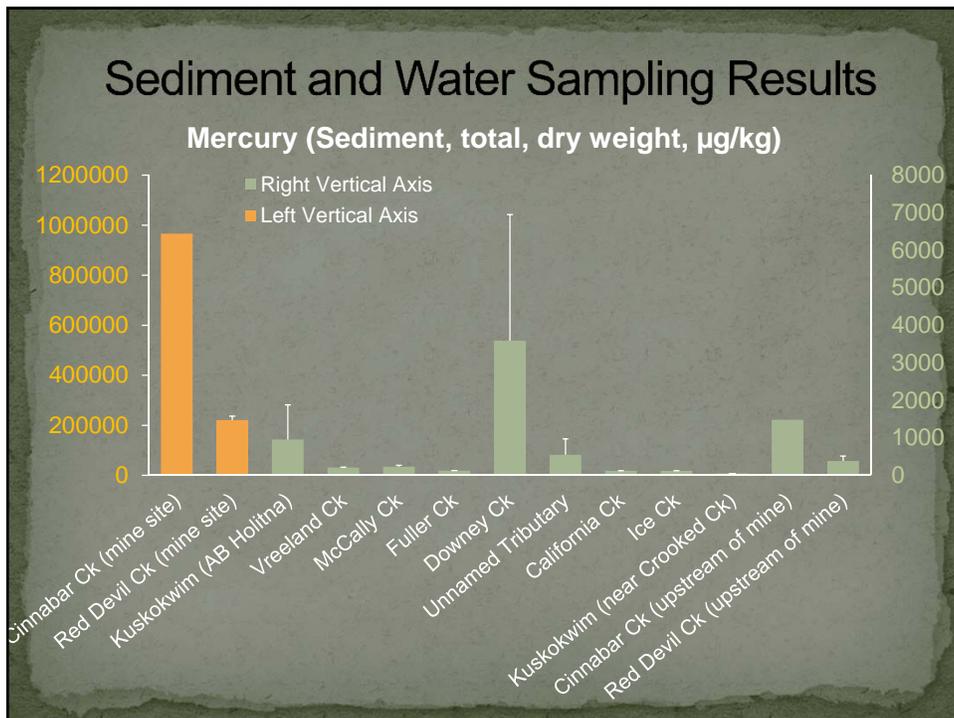
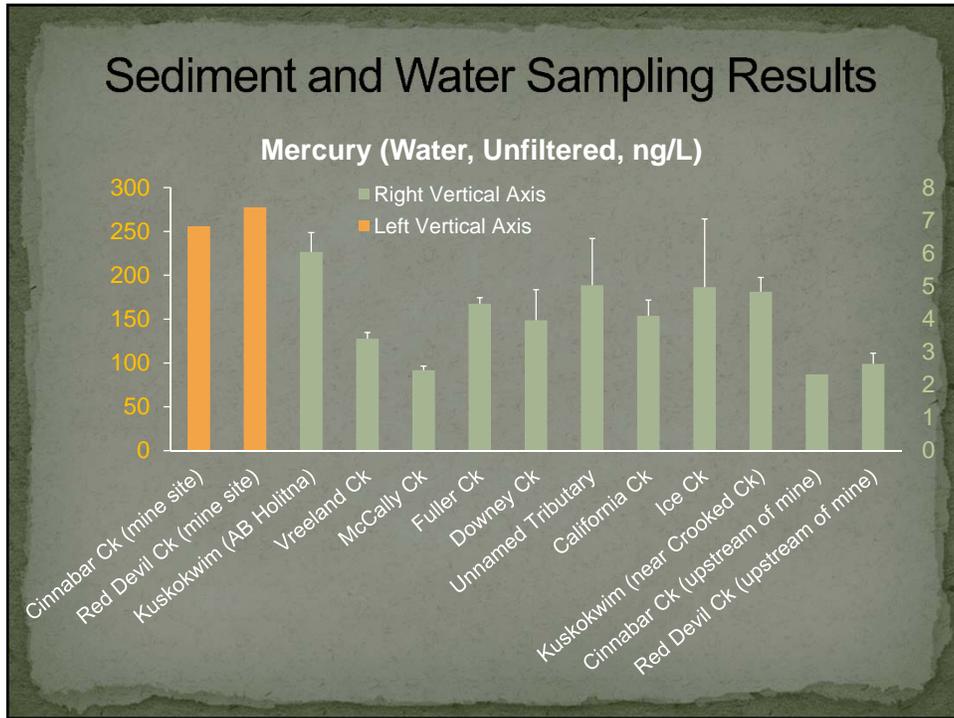
Results to Date

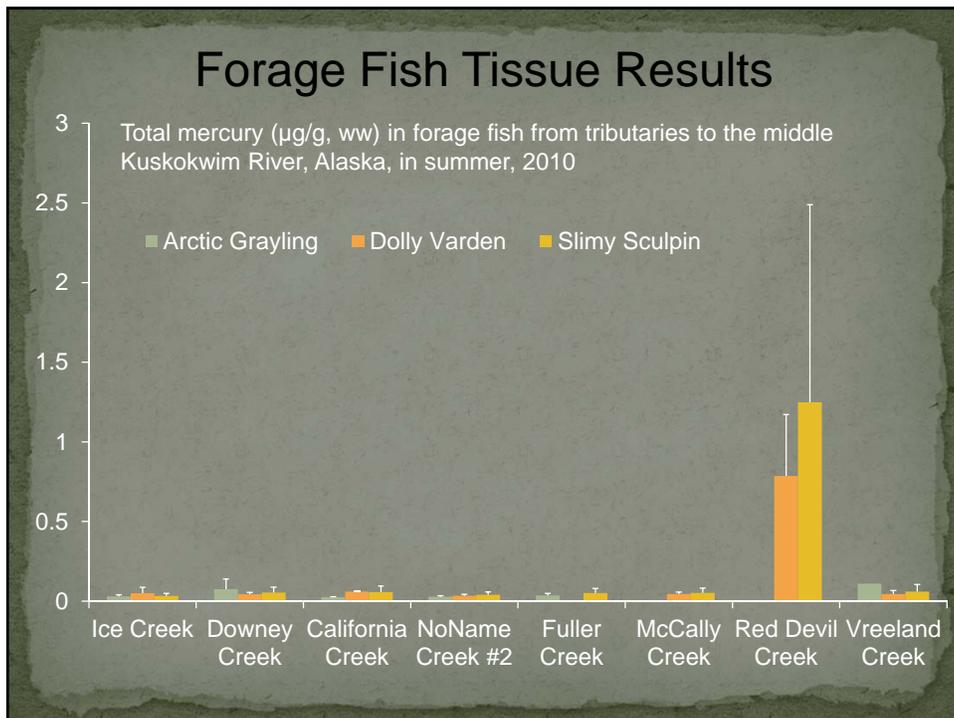
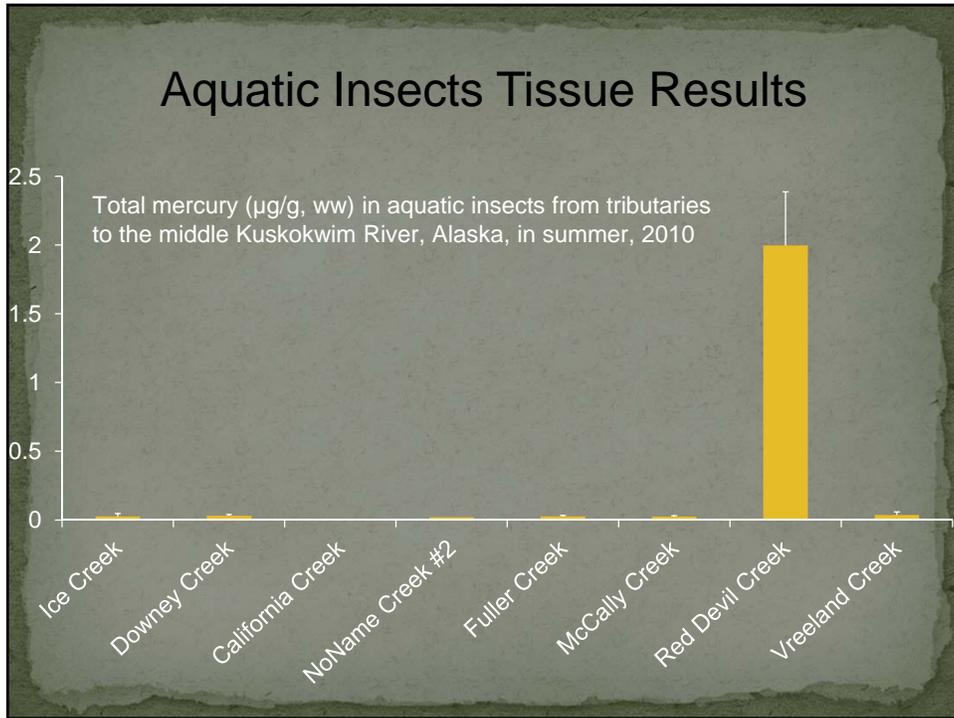
Anadromous Waters Catalogue (AWC) Nominations Accepted

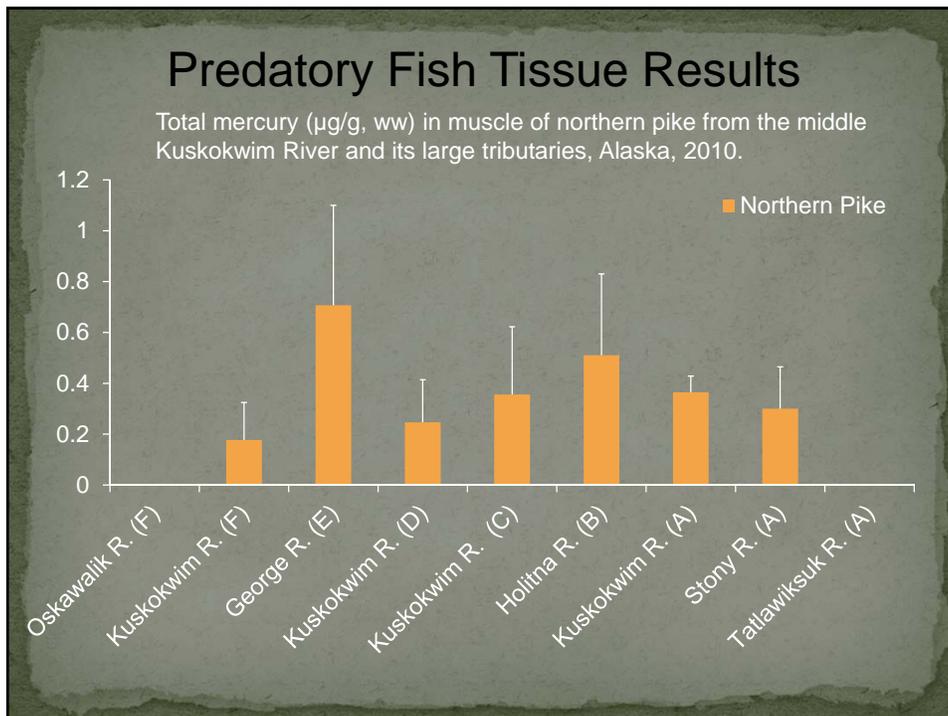
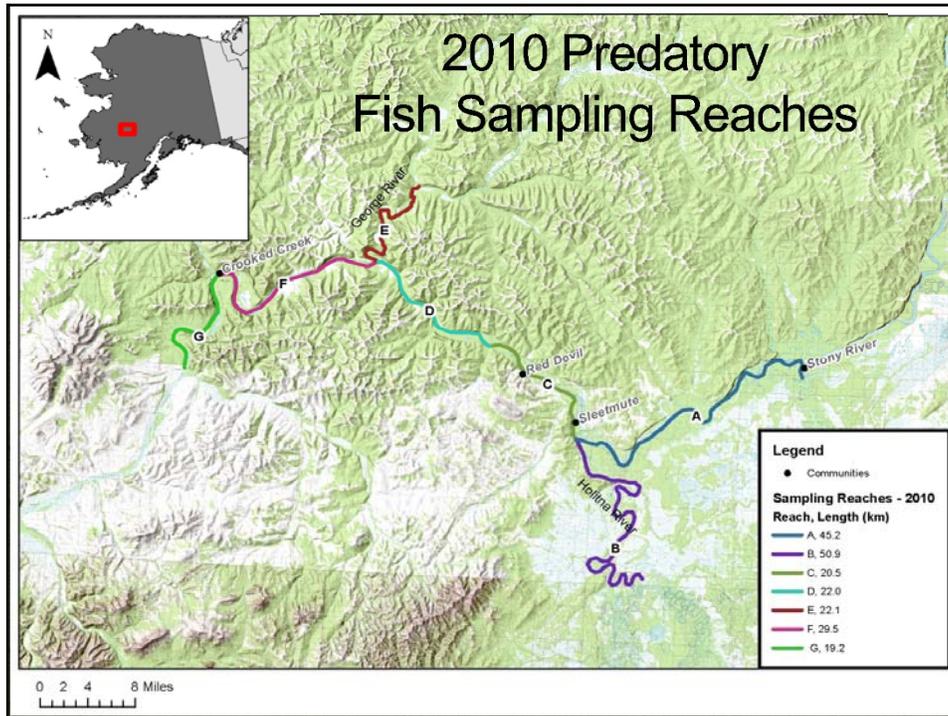
- Red Devil Ck = coho & Chinook (rearing)
 - [5 coho and 4 Chinook captured]
- Downey Ck = Chinook (rearing)
 - [8 Chinook captured]

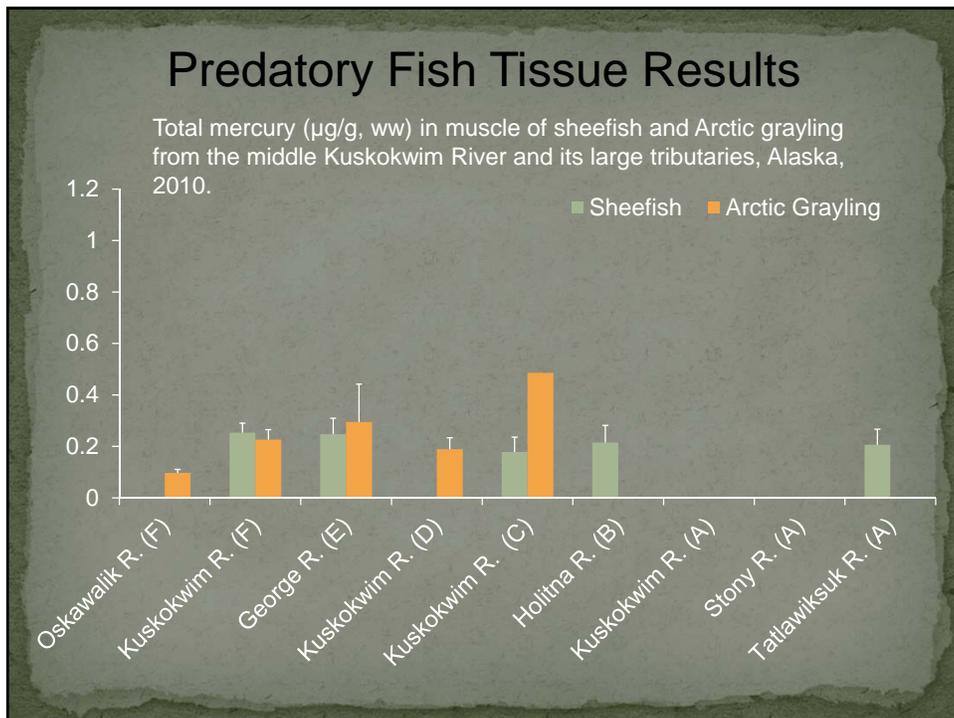
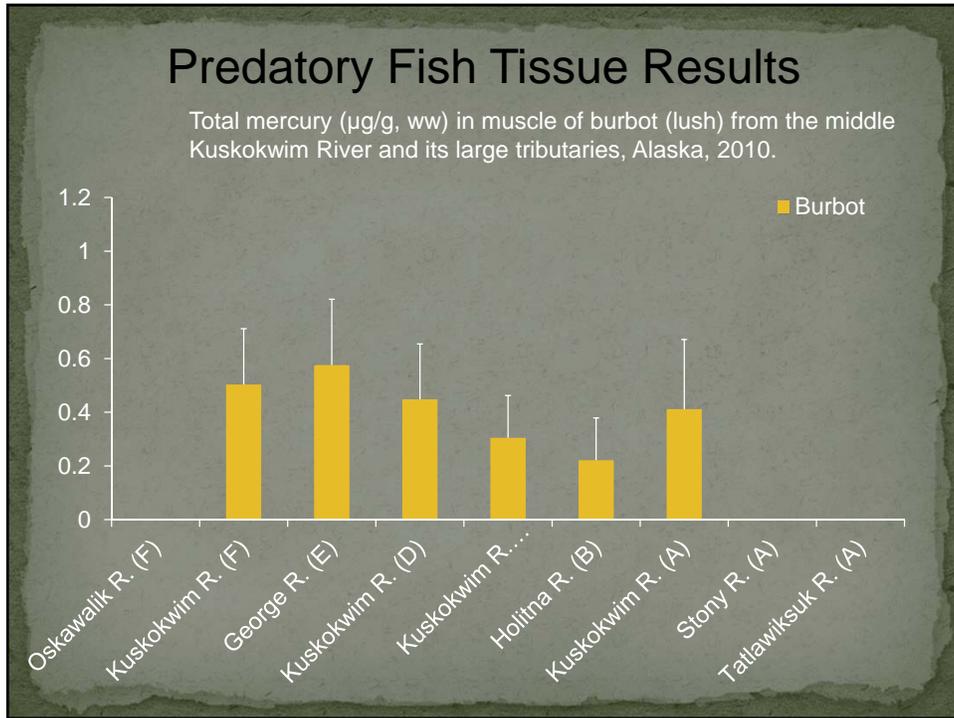


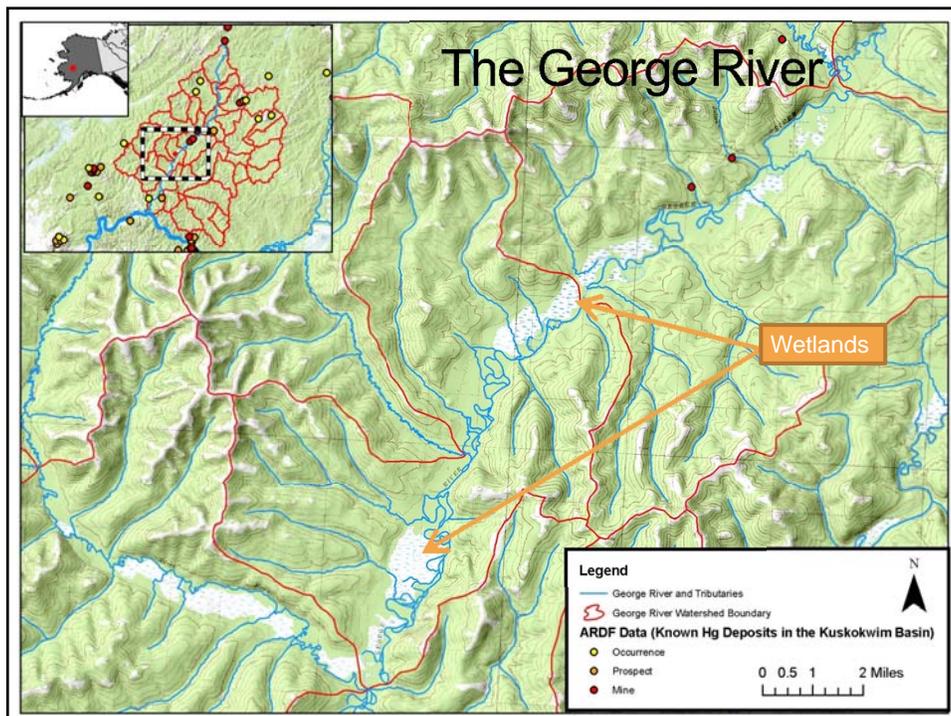
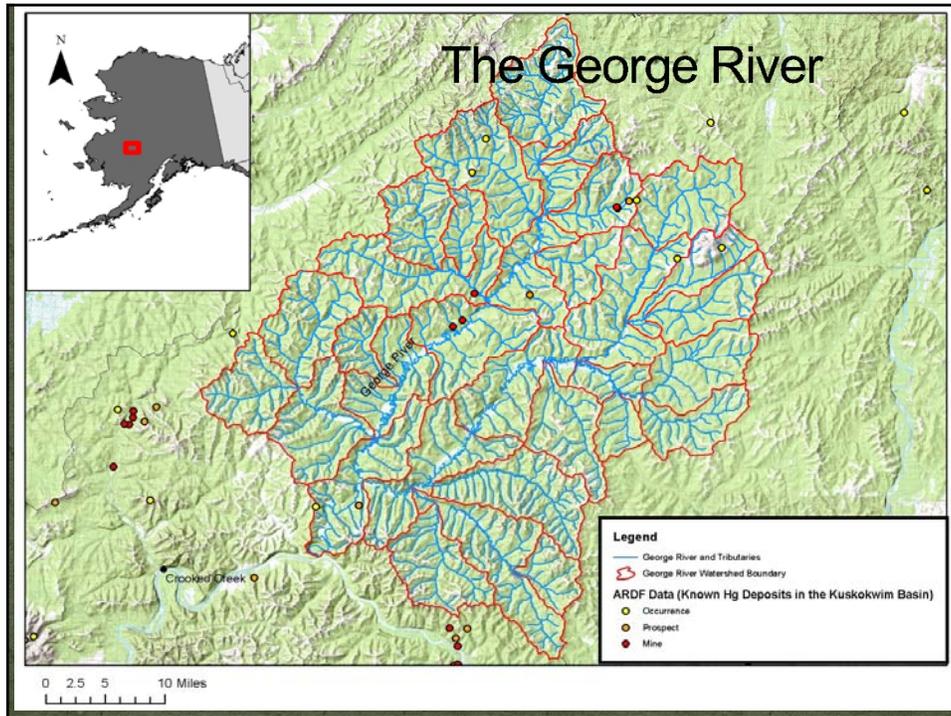
AWC streams receive protections that are provided by Alaska Statute 16.05.871 (Anadromous Fish Act).











Summary

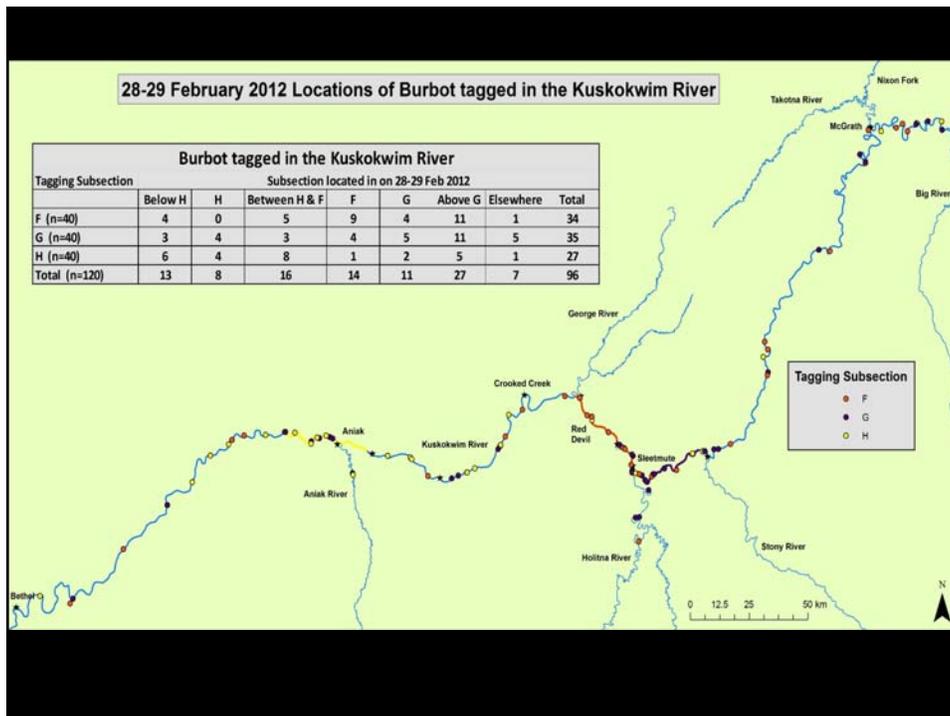
In general, mercury data from sampled predatory fish, such as pike and burbot (lush), from the mainstem Kuskokwim and its tributaries showed no clear patterns with the exception of samples from the George River.

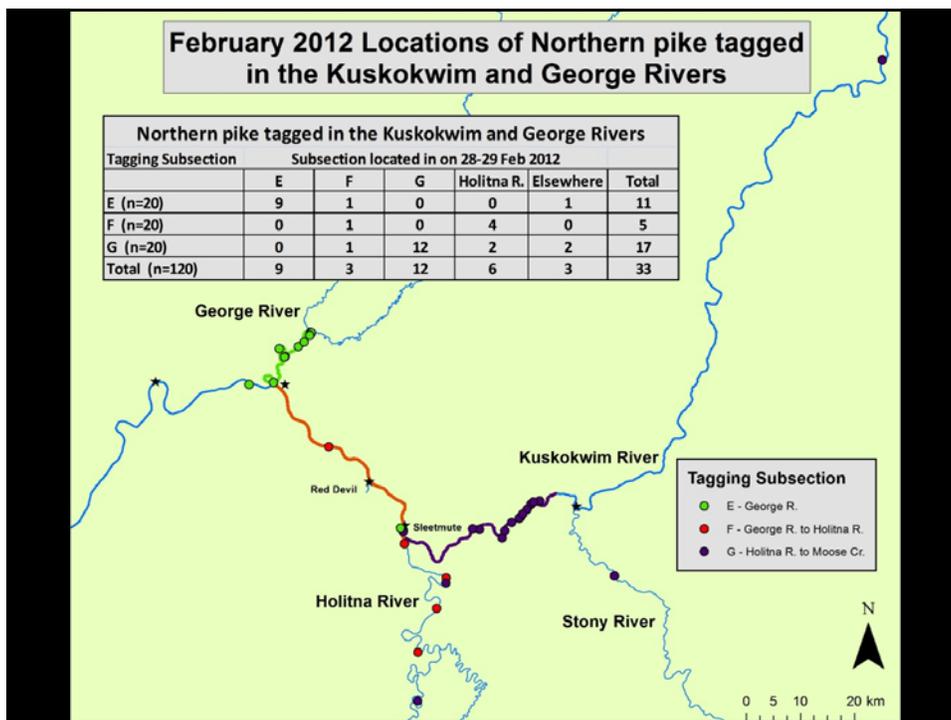
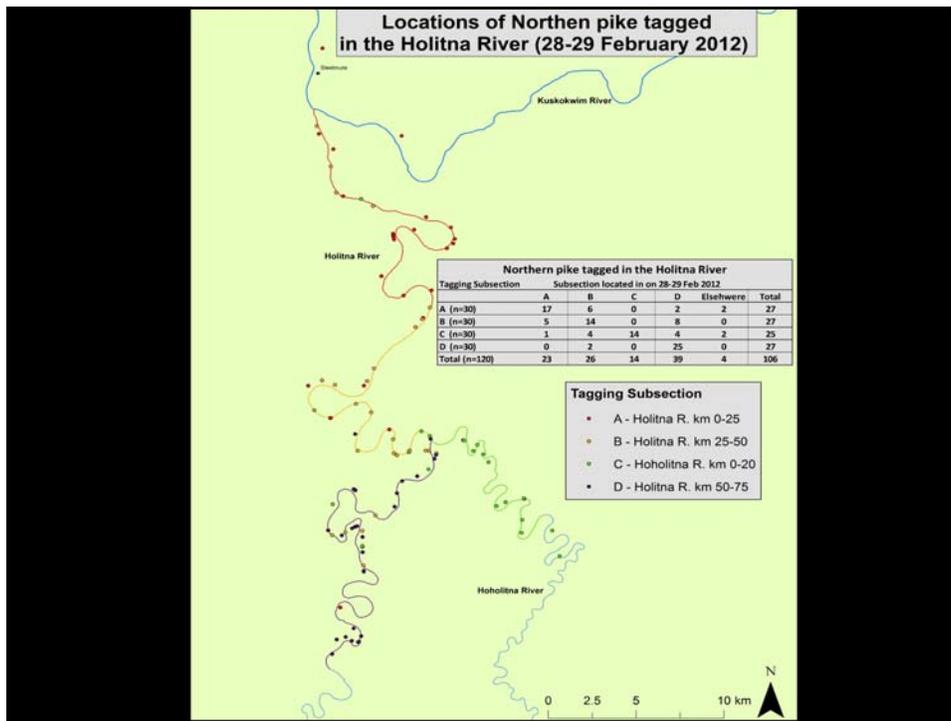


Sampled fish from the George River routinely had mercury concentrations greater than fish from other sites.



The seasonal mobility of these species made some analysis of the data difficult, however the data collected from radio tagged fish (2011) should greatly enhance our understanding of fish movement in relation to known mercury sources in the Kuskokwim basin.





Fish Consumption Guidelines

Mercury data for pike and burbot muscle and liver collected during the 2010 sampling season were given to the State of Alaska to develop preliminary fish consumption guidelines for the Middle Kuskokwim River area.

In June 2011, the State of Alaska issued a fact sheet with these preliminary consumption guidelines, available at: <http://www.epi.alaska.gov/eh/fish/default.htm>.

STATE OF ALASKA
Alaska Department of Health and Social Services
Division of Public Health - Section of Epidemiology

Fact Sheet: Mercury in Burbot (Lush) and Pike from the Middle Kuskokwim River Area – June 2, 2011

Fish and other traditional foods are very nutritious and are usually an excellent choice for a healthy diet. However, some fish may not be safe for women of child-bearing age and young children to eat in large amounts because they contain mercury.

Why are we concerned about mercury?
Mercury is a toxin that, at high levels, can damage the brain and other organs. Because they are still developing, young children and fetuses (unborn babies) are more sensitive to mercury than adults. Mercury in the mother's body can pass to the fetus.

Where does mercury in Alaska come from?

- **Natural sources** – these include breakdown of local bedrock into streams, forest fires and volcanoes.
- **Human-caused sources** – these include global air pollution from burning fuels and garbage, and mining runoff.
- **Mercury deposited in wetlands** is transformed by bacteria into methylmercury, which accumulates (builds up) in fish and other animals up the food chain.

How do I find out how much and which Alaska fish are safe to eat?
Various agencies, including the Alaska Department of Environmental Conservation, U.S. Fish and Wildlife Service, and the Bureau of Land Management have measured mercury in different marine and freshwater fish species in Alaska. The Alaska Division of Public Health has developed consumption guidelines for women and children on how much of each fish they can safely eat, based on the amount of mercury in a variety of fish species. These guidelines:

- Reflect what we have learned from other states and national agencies.
- Include what we know from studying mercury in food and the effects of mercury on children.
- Include a large margin of safety so you can be safe even if you do not follow the guidelines strictly.
- Recommend that women who are or can become pregnant (generally those aged 15 to 45 years), nursing mothers, and children aged 12 years and under adjust their Alaska fish consumption by choosing to eat fish that are low in mercury, like salmon. Men, elders, teenage boys, and women past child-bearing age can safely eat unlimited amounts of most Alaska fish, including pike and burbot (or lush, as it is often called).
- Are available at: www.epi.bhs.state.ak.us/eh/fish/FishConsumptionGuidelines.pdf

Measure mercury in people
Although mercury concentrations in fish can be used to help approximate mercury exposure in people who eat fish, Alaska has a program that tests for actual mercury levels in people through hair samples. If you are a woman of child-bearing age, you can get your hair tested and find out your own mercury levels – for free! Hair collection is done by a health care provider, and samples are sent to the Alaska State Public Health Laboratory. Results are sent back to the woman and her health care provider within 2 months. If you are one

What to expect next...

Draft Report Schedule

2010-2011 Arsenic/Antimony/Mercury	April 27, 2012
2010-2011 Comprehensive Report	June 8, 2012
Comprehensive Report + Tracking Data	Annually 2012-13

2012 Field Operations Plan	May 2012
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Preliminary Field Schedule

Tracking Flights	Seasonally thru 2014
Tissue Sampling/Radio Tagging	Summer/Fall 2012

Project updates and reports can be found at:
http://www.blm.gov/ak/st/en/prog/fisheries/rdm_fish.html

