

MITIGATING IMPACTS TO FISH AND AQUATICS

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Presentation Overview

- ▣ ADF&G Role in Projects and Mitigation
 - Title 16 authorities
- ▣ Project Examples
 - Red Dog Mine
 - Fort Knox Mine
 - North Slope Gravel Pits
 - Placer Mines

ADF&G Role

- ▣ 1992 ADF&G Mitigation Policy
 - Avoid, minimize, rectify, reduce, compensate
- ▣ Statutory Involvement - Fish
 - Fishway Act - AS16.05.841
 - Anadromous Fish Act - AS16.05.871

Red Dog Mine



Red Dog Mine

- ▣ Pre-mining
 - Mainstem Red Dog Creek
 - ▣ High in heavy metals – most creeks around deposit high in metals
 - ▣ Fish use limited
 - ▣ Fish kills documented during summer
 - ▣ Arctic grayling migrated through the creek to access spawning habitat in North Fork Red Dog Creek



Red Dog Mine

- ▣ At Mine start-up
 - Mainstem Red Dog Creek
 - ▣ Development of pit changed hydrology and altered the flow of high metals concentration water into the creeks
 - ▣ Heavy metals impacted waters affected downstream habitats
 - ▣ Fish mortality documented in Ikalukrok Creek



Red Dog Mine

- ▣ 1992 to Present
 - Clean/Dirty water collection system constructed
 - ▣ Water high in metals is transported to the tailings facility for eventual treatment
 - ▣ Water lower in metals is bypassed to the Middle Fork of Red Dog Creek
 - System is maintained and modified as conditions change



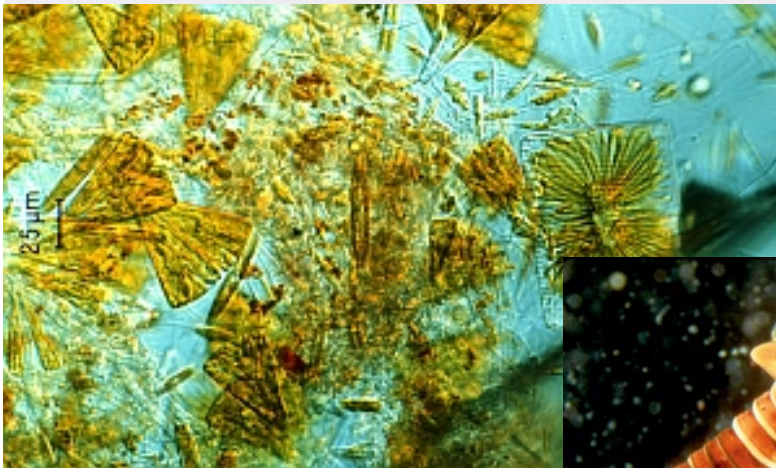


Bypass



Red Dog Mine

- ▣ Bio-monitoring in current form since mid '90s
 - Look at all levels of productivity in the systems
 - ▣ Micro algae on rocks, aquatic insects, and fish
 - ▣ Whole body metals and tissue metals concentrations

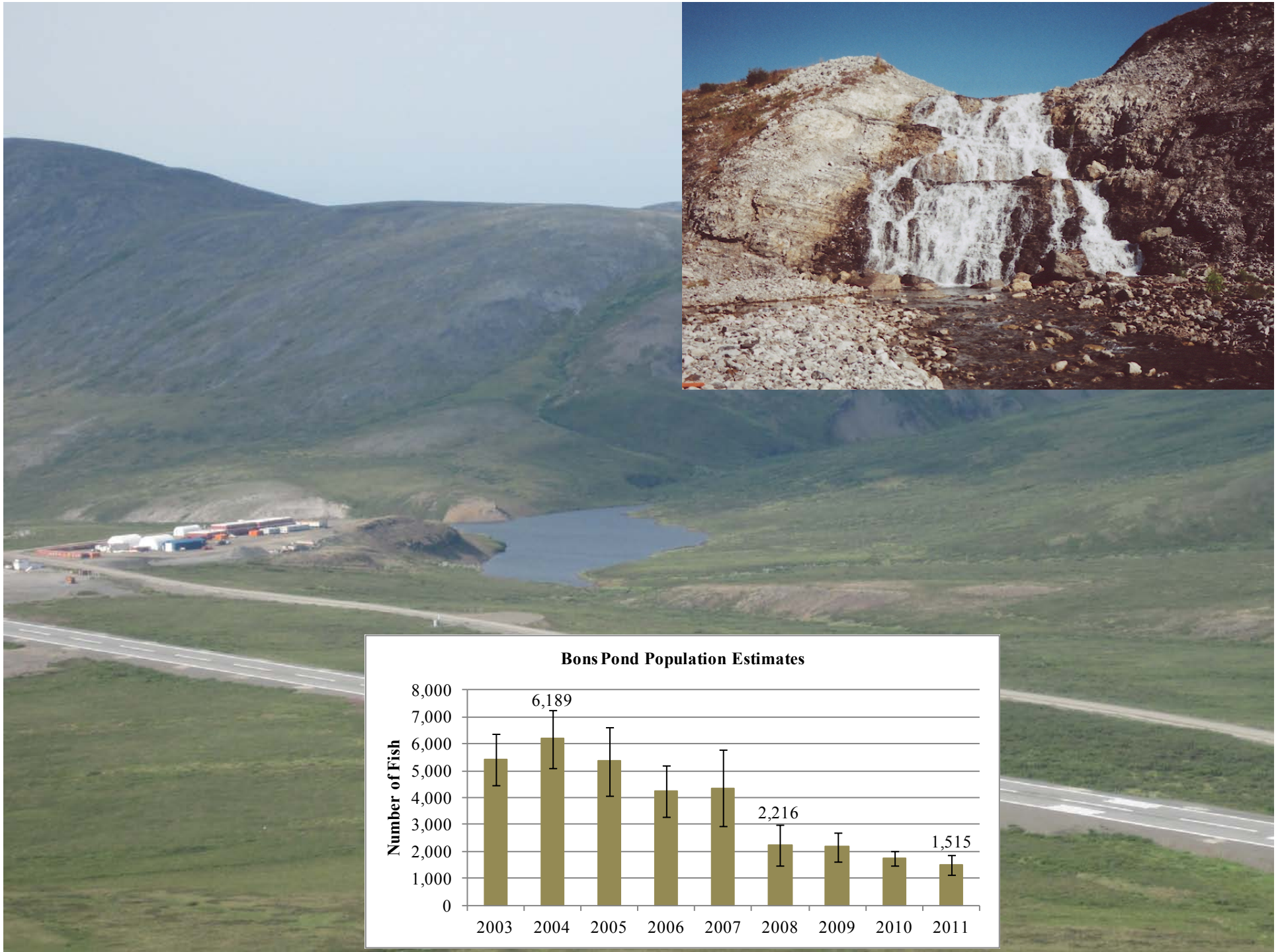


Red Dog Mine

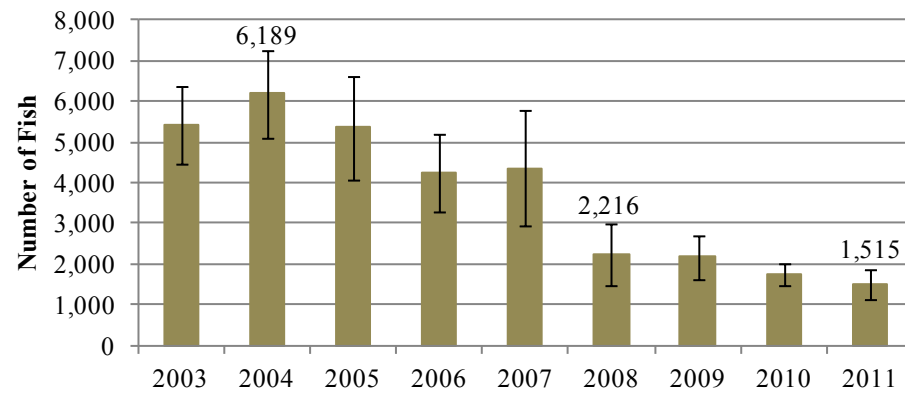
- ▣ Current Conditions in Mainstem Red Dog Creek are Improved
 - Still mineralized waterbody
 - ▣ No more fish kills
 - ▣ Arctic grayling actually spawn in parts of the creek as opposed to just moving through it to better habitats
- ▣ Variations in metals concentrations in water and fish, as well as productivity is largely related to natural seeps and background metals concentrations in the creeks.

Red Dog Mine

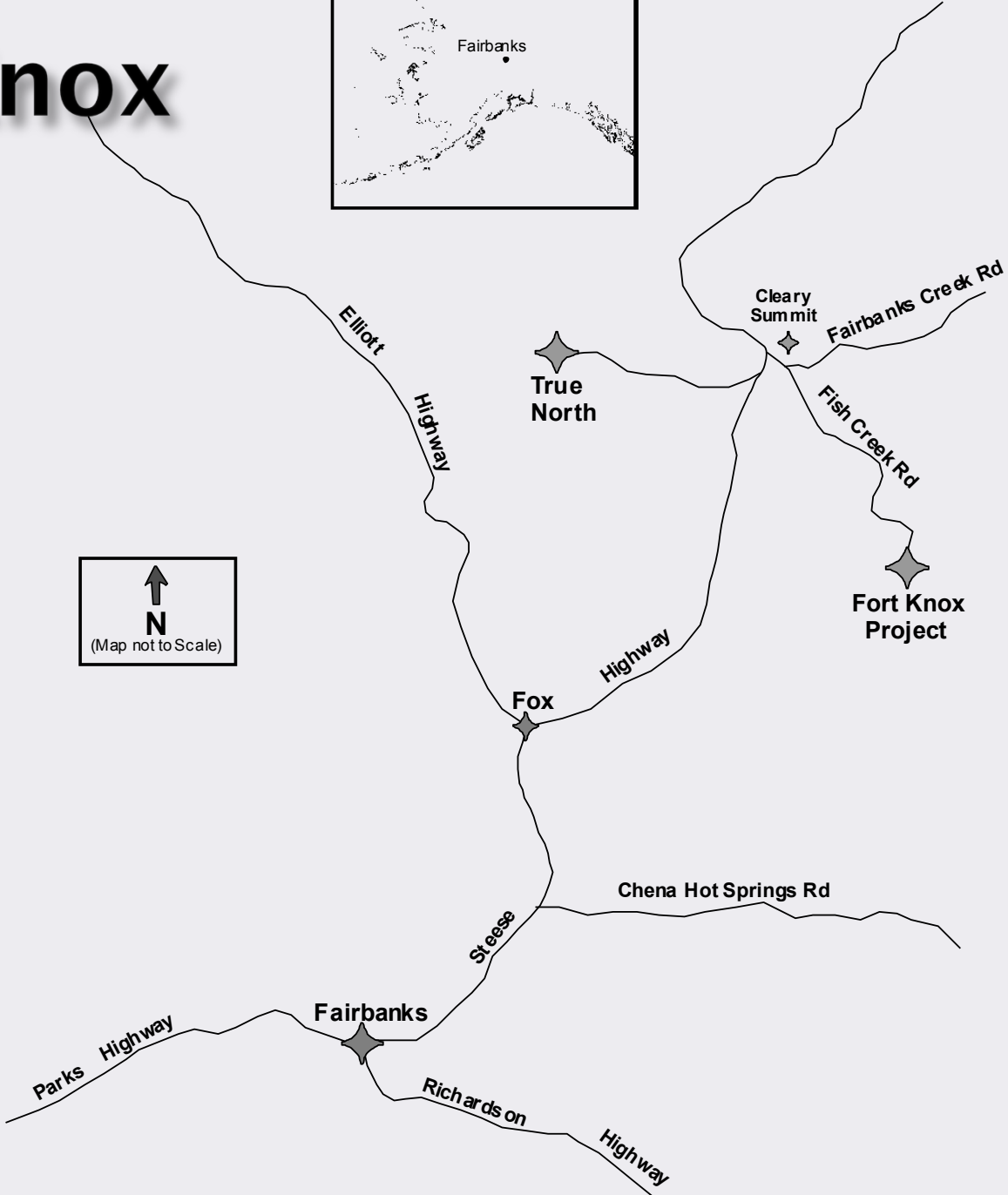
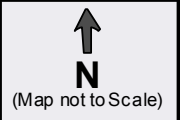
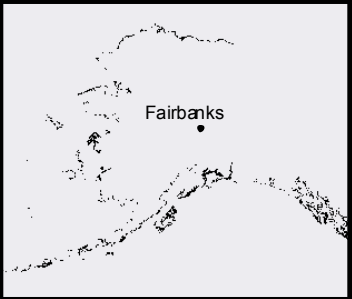
- ▣ Population Enhancement
- ▣ Freshwater reservoir stocked with Arctic grayling in 1995
 - Fishable population now exists
 - Recreation for miners
 - Source population for local Arctic grayling population



Bons Pond Population Estimates



Fort Knox



History





Concurrent Reclamation



WLD 874 UAC-5
NO. 1121 8/18

MLA FT. KNOX

5-16-07

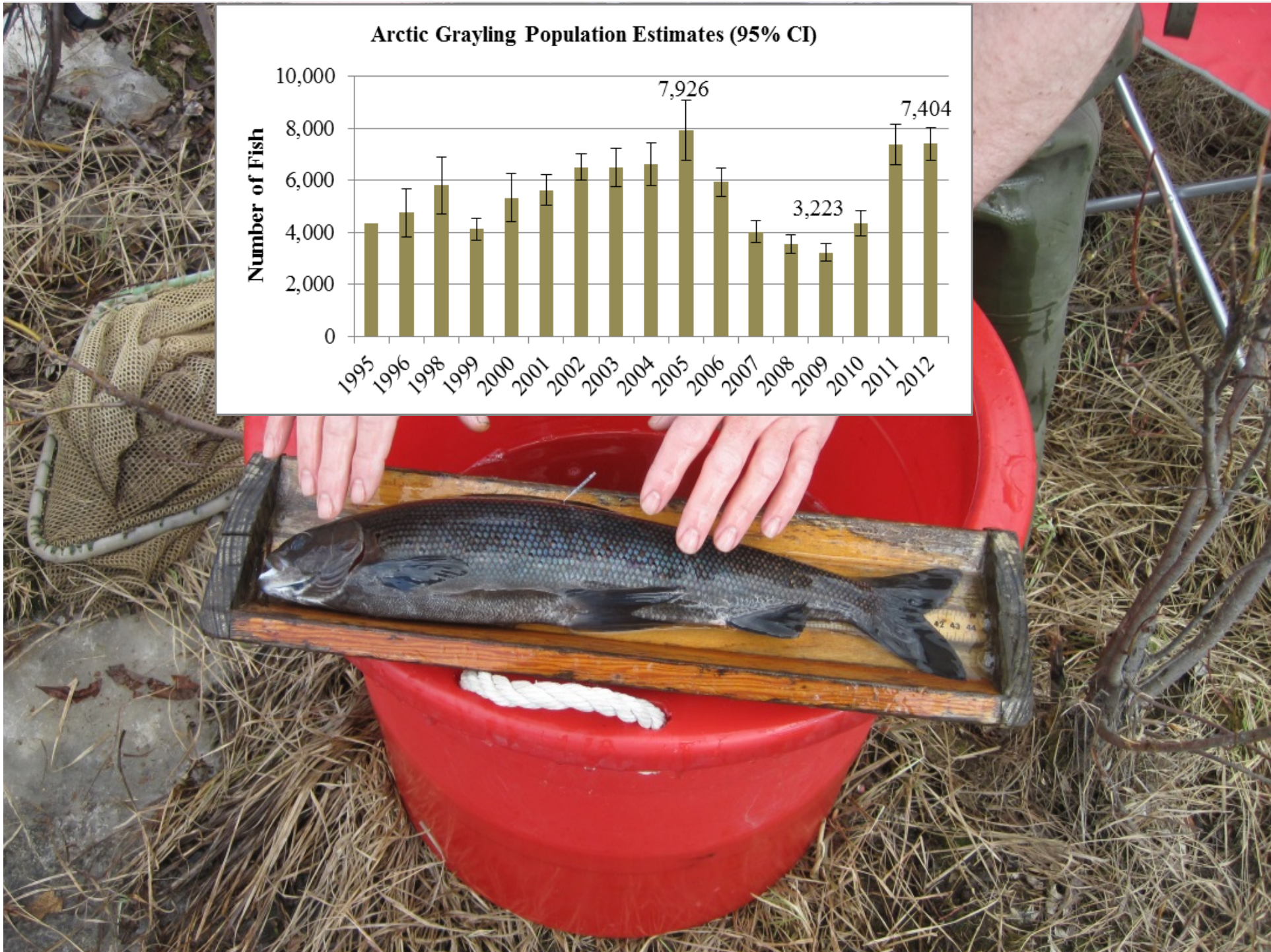
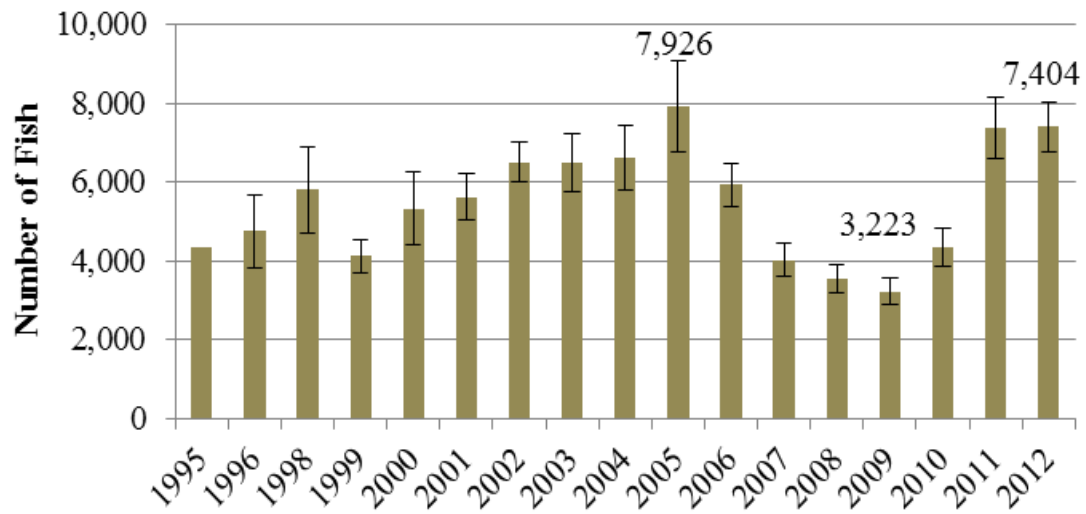
Successful Concurrent Reclamation
FGMI and ADF&G Recipients of Multiple Reclamation Awards
Most recent – 2009 Tileston Award

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Arctic Grayling Population Estimates (95% CI)



North Slope Gravel Pits

- ▣ Gravel = significant component of past and current oil field development
- ▣ Early 70's – in-river scrapes

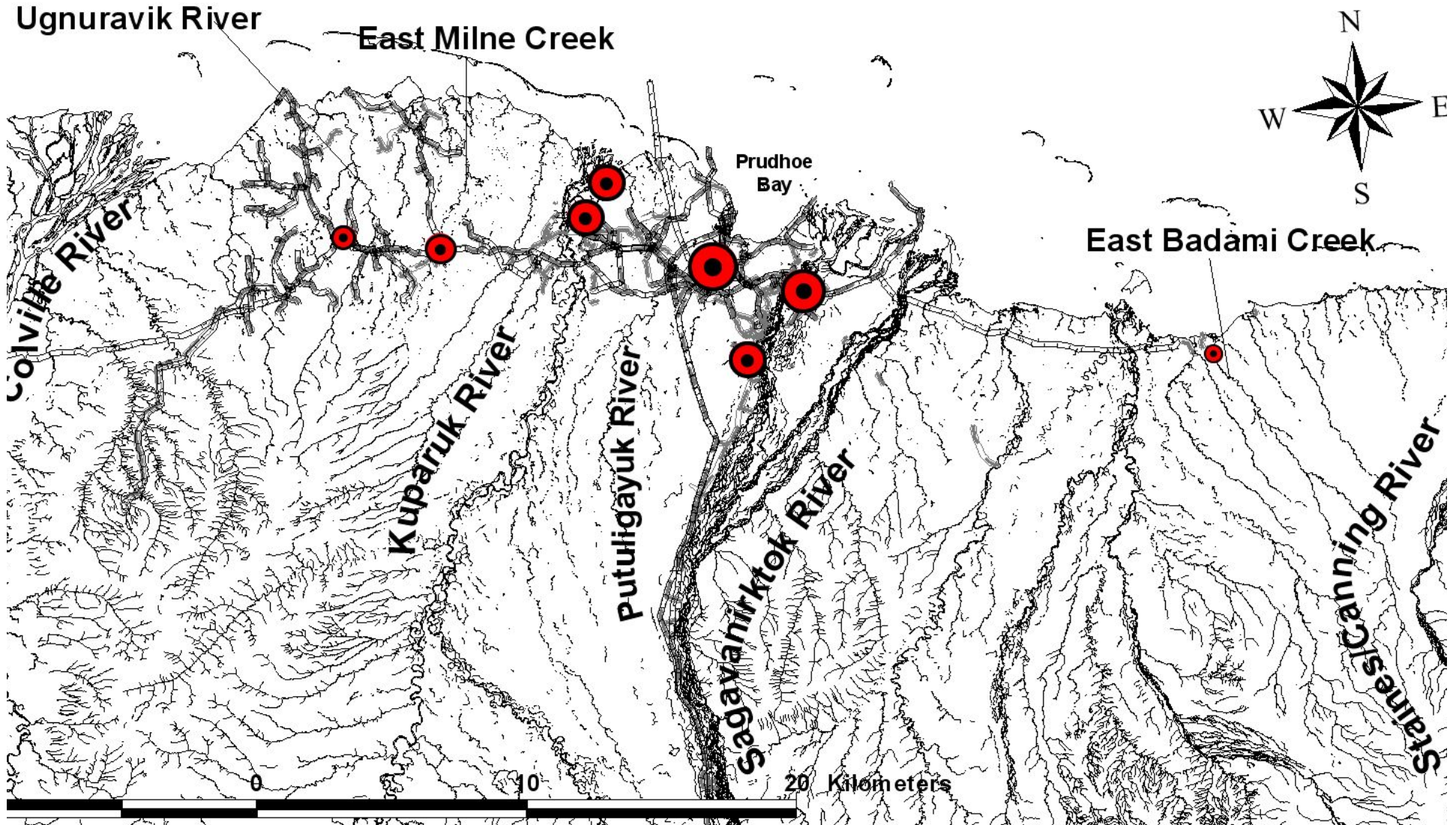


North Slope Gravel Pits

- ▣ Mid to late 70's – moved to large, upland gravel sites
 - Large open pits throughout oil field
 - Huge volumes of water and fish habitat
- ▣ Mid 80's to present
 - Fish overwintering habitat is likely the limiting factor determining fish population size and distribution
 - ▣ Reclaim/design pits to enhance fish habitat

North Slope Gravel Pits

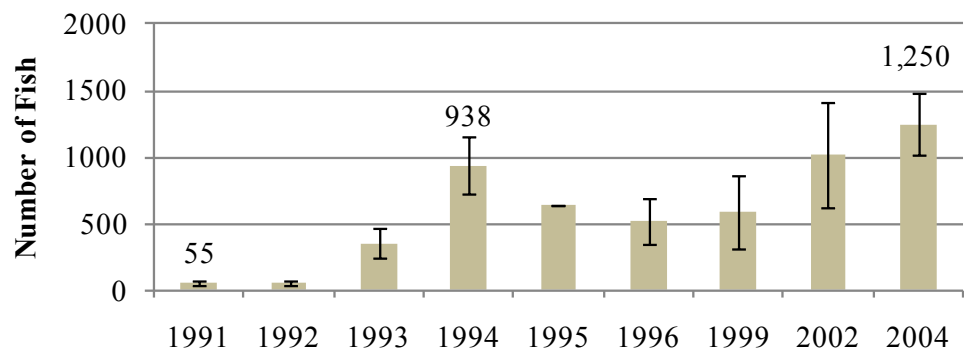
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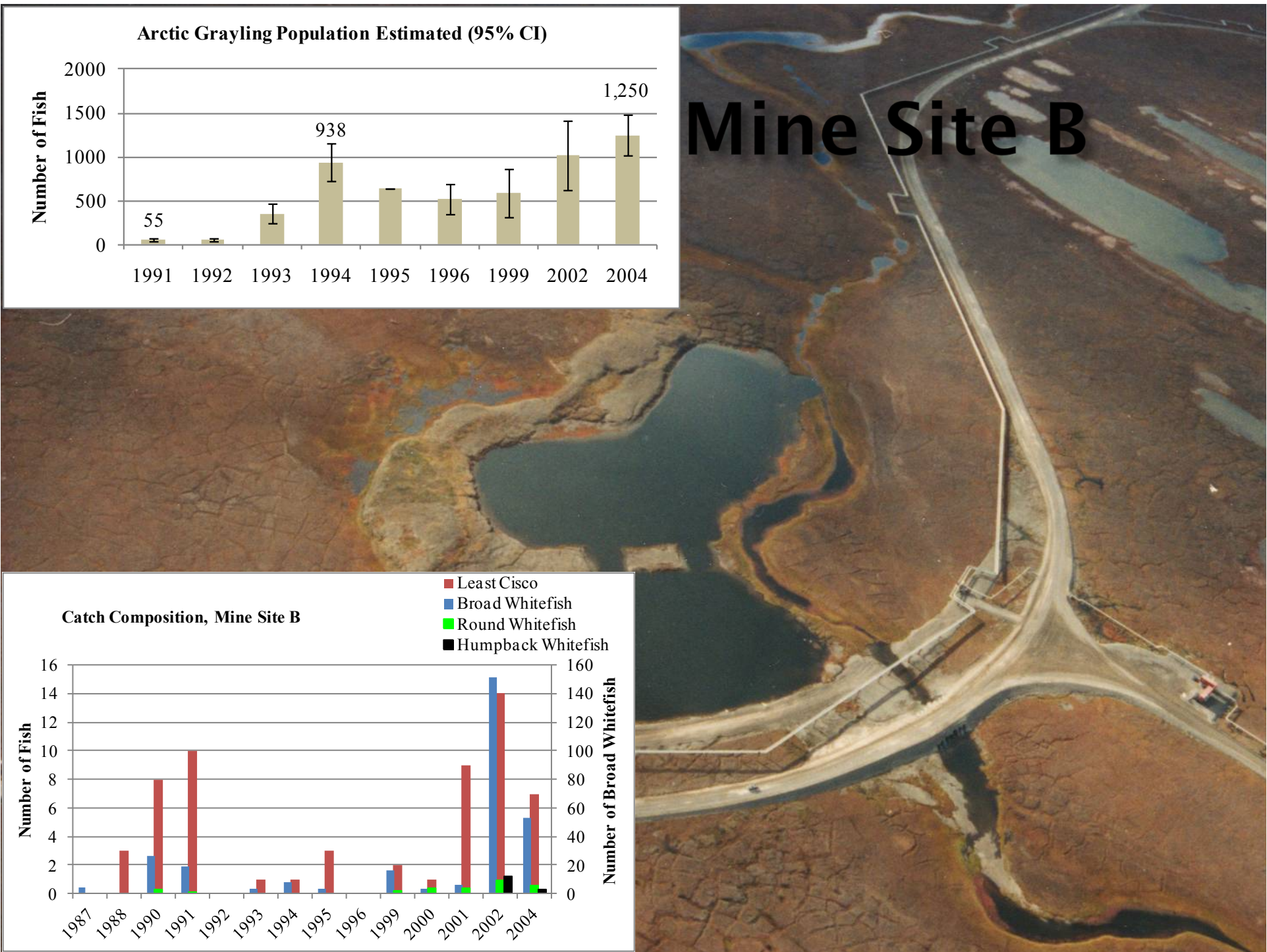
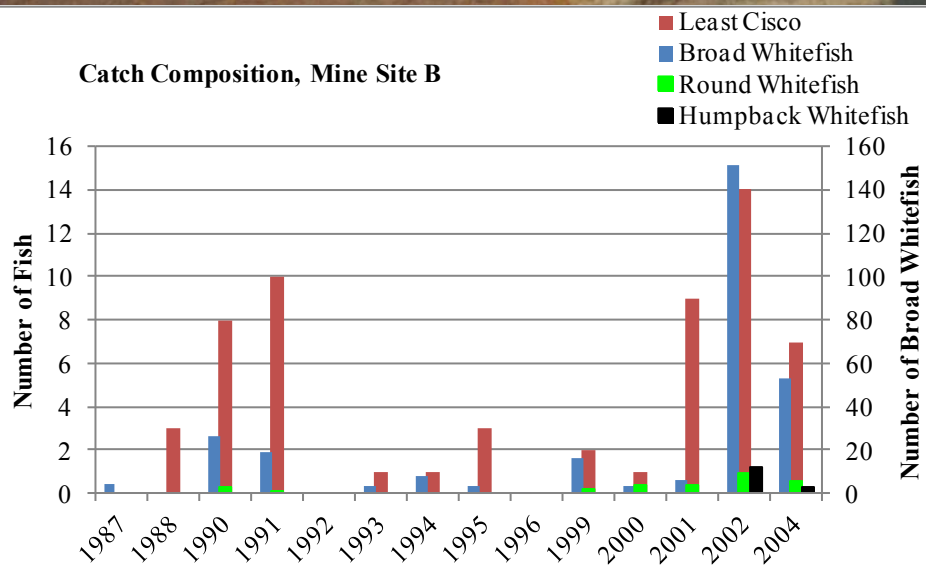


Mine Site B

Arctic Grayling Population Estimated (95% CI)



Catch Composition, Mine Site B





South Net

Dalton Highway

Southeast Corner Net

AUG 3 2007

Gwydyr Bay

Northstar Island

East Net

South Net

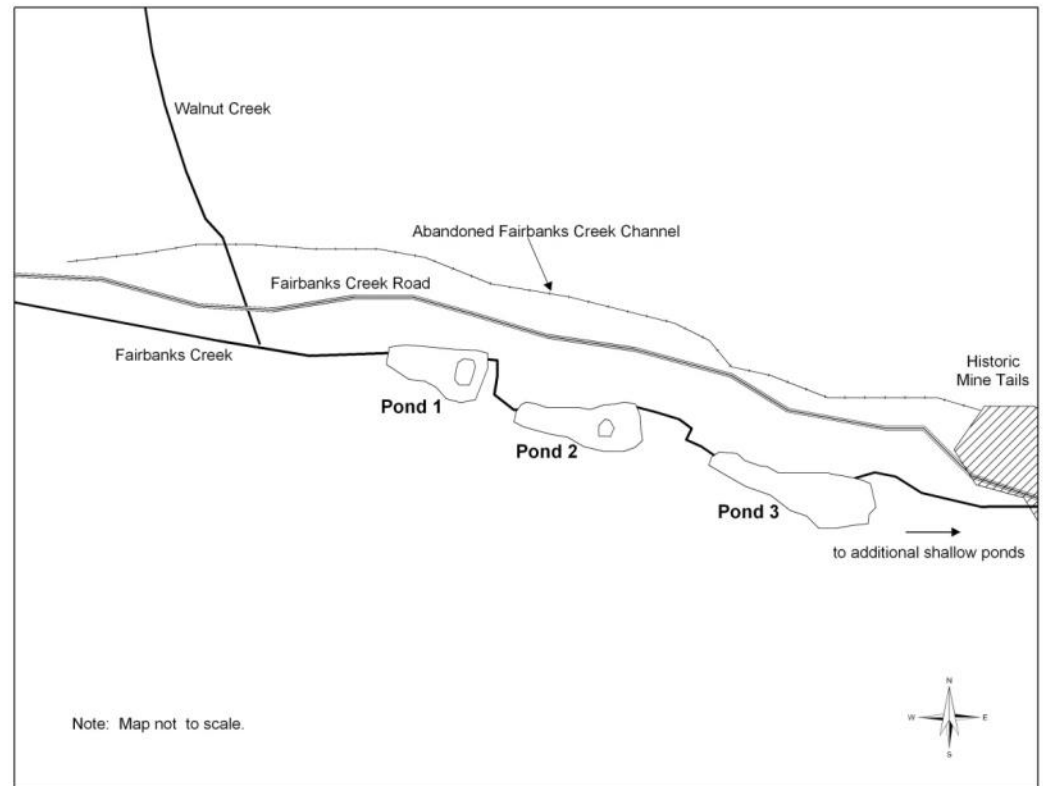
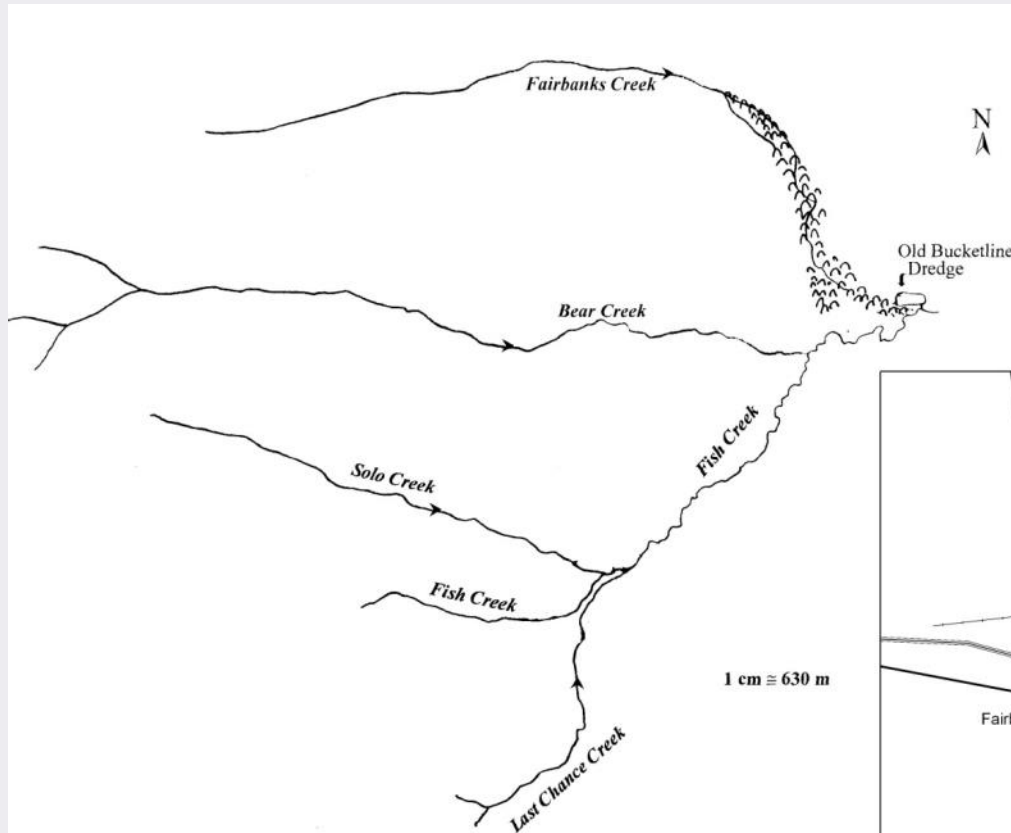
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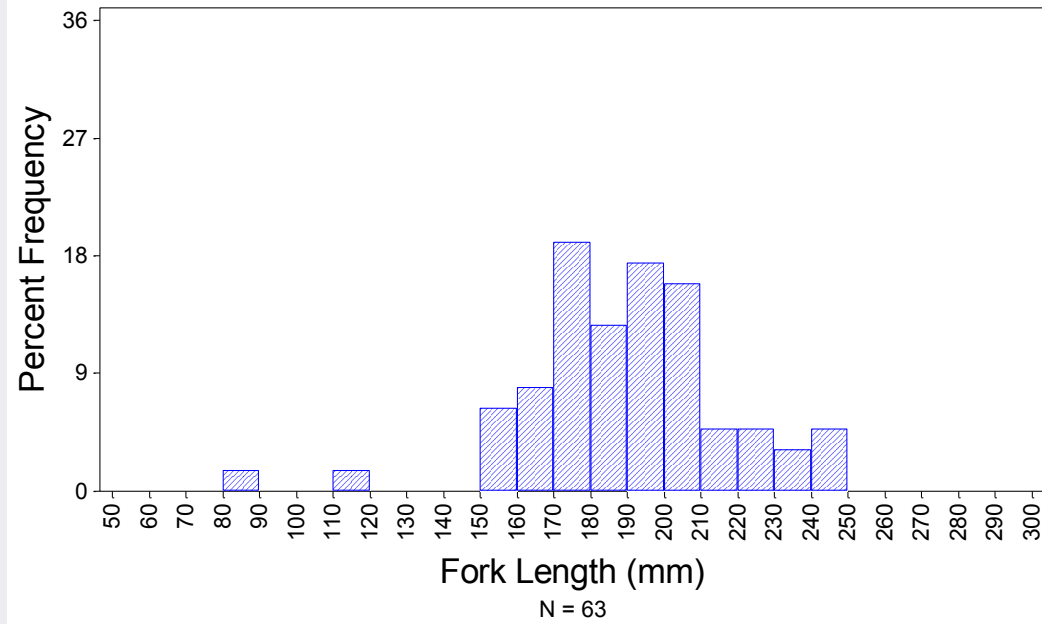
North Slope Gravel Pits

- ▣ Rehabilitated mine sites can be beneficial
 - Increase fish and wildlife habitat
 - Increase domestic/construction water availability w/o impacting wintering fish
- ▣ Gravel extraction site selection is important
- ▣ Rehabilitation concurrent with excavation allows features desirable for fish and wildlife to be built into the site

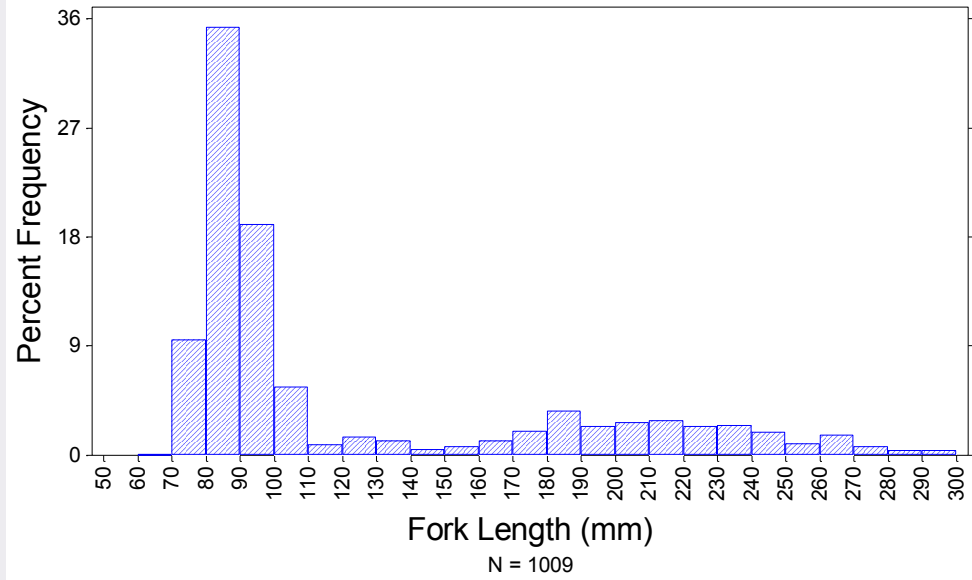
Smaller Scale Mitigation



2006



2007



Conclusion

- ▣ Mitigation
 - Must recognize that with development there WILL be impacts
 - Must be creative to find opportunities for mitigation
 - Must be adaptive – no two operations are alike, and techniques that work in one place may not work in another
 - ▣ try and fail, try again!
- ▣ Long term monitoring and record keeping is critical.