Kitwanga Sockeye Salmon Rebuilding

Lakeshore Spawning Ground Restoration

Date: November 8, 2006

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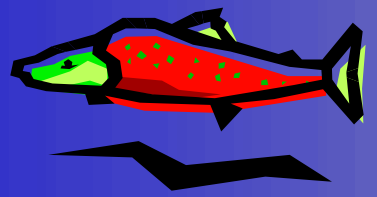
Kitwanga Watershed

- Tributary of the Skeena River.
- Located 250 km inland ocean.
- Main stem length of 61 km, catchment area 833 km².
- Fisheries values considered "Very High".
- Important spawning river for all six species of Pacific salmon.
- **Sockeye particularly importance to the Aboriginals who inhabit the watershed.**

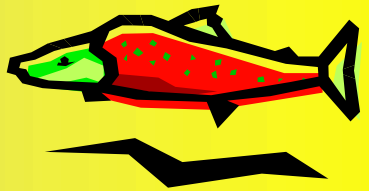
Gitanyow Lake

- Kitwanga sockeye originate from Gitanyow Lake, 1 of the 10 major wild sockeye producing lakes in the Skeena Watershed.
- Kitwanga sockeye are genetically unique and spatially separated from other sockeye populations.
- Gitanyow Lake rated as one of the most productive lake in BC based on macrozooplankton biomass (mostly composed of Daphnia Sp.).
- Historically, sockeye escapement to lake numbered in the 10,000's
- Today, only a fraction of these historical sockeye escapement numbers persist.

Daphnia Sp.



Kitwanga Sockeye



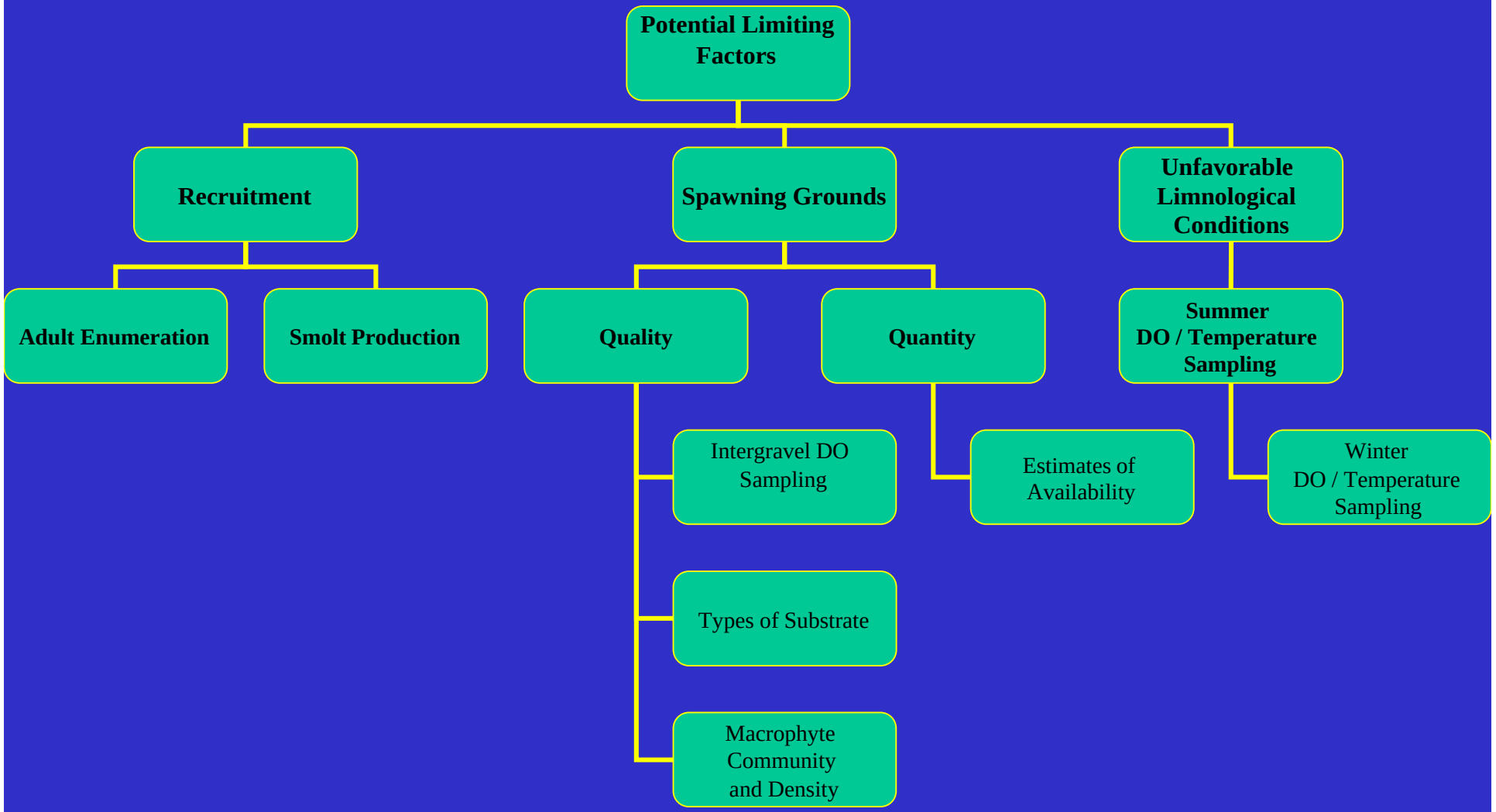
- Stock assessment patterns for Kitwanga sockeye over the last 50 years show low but stable escapement trends (only few 1000 / year).
- Presently the stock is producing < 5% of the lakes potential.
- Based on the trophic status alone, Gitanyow Lake could produce ~ 1 million sockeye smolts /year,
- Optimum adult escapement > 18,000.

Reasons for the Decline:

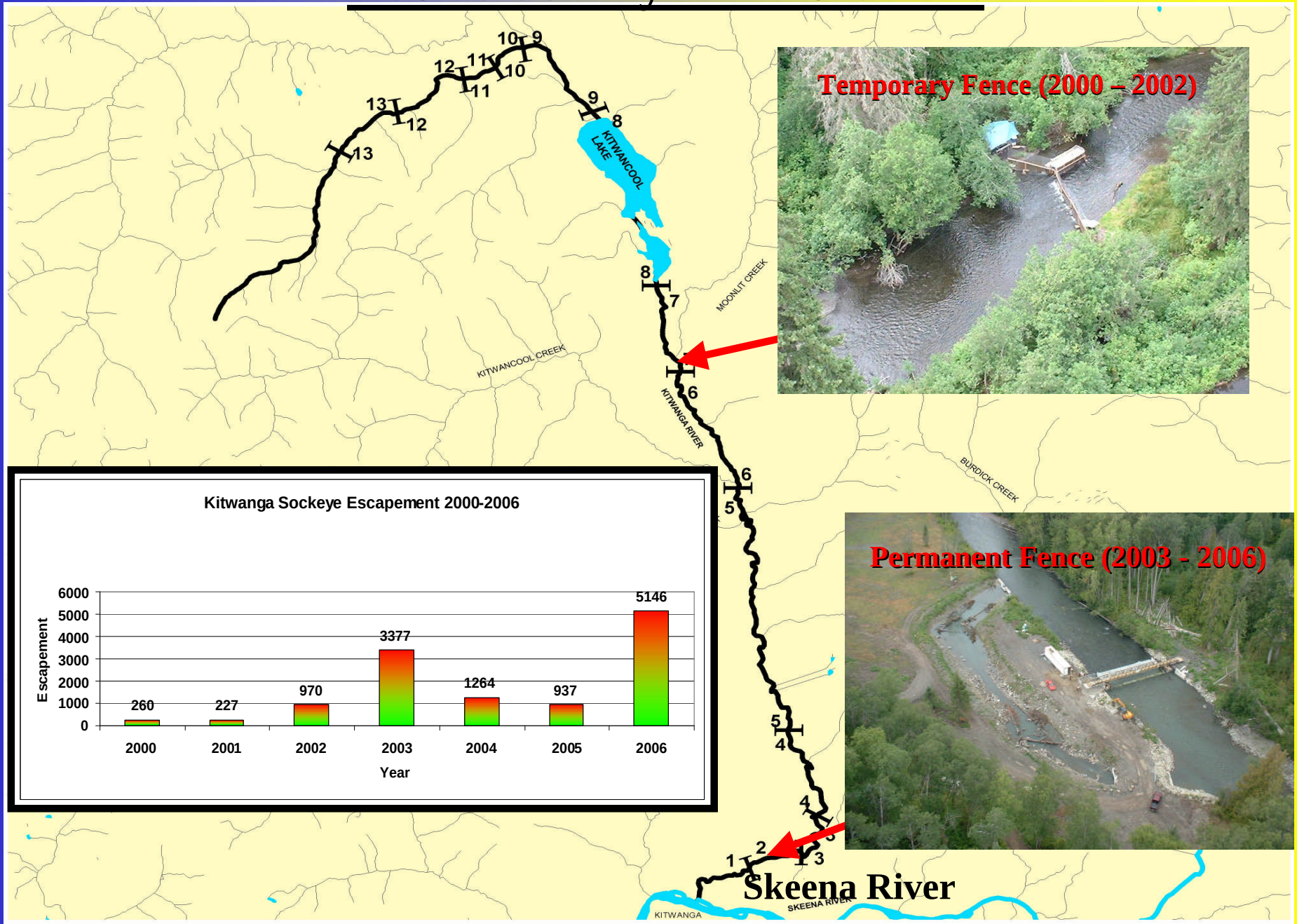
1. High exploitation rates since the inception of commercial fishing at the mouth of the Skeena River in 1877 (>50% in most years, as high as 74% in some years).
2. Over the last 45 years logging has impacted watershed. Spawning and rearing areas have been adversely affected by changed water flow patterns, sedimentation of spawning grounds and increased macrophyte growth.

Investigating Freshwater Environment

Studies initiated in 1999 to determine limiting factors to production based on the following assessment framework.



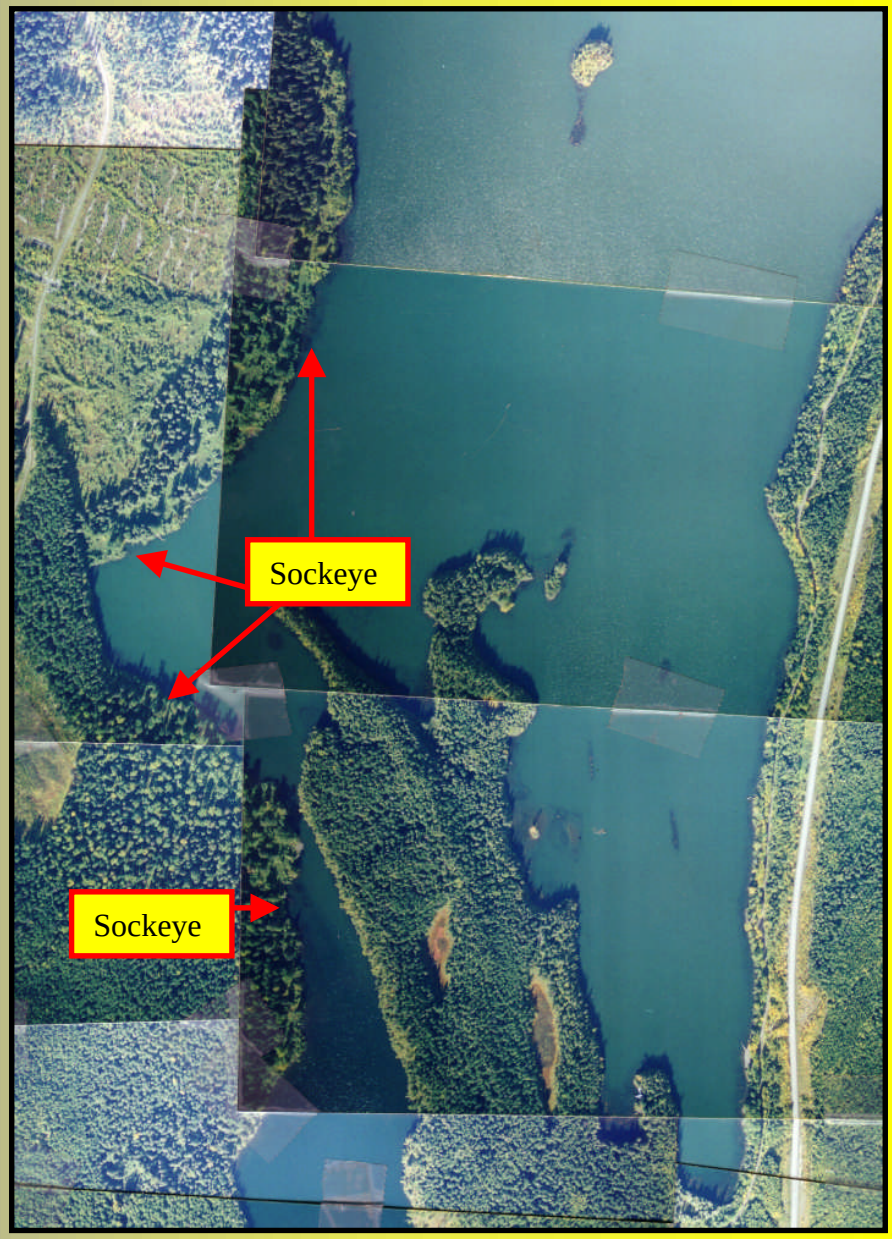
Adults Sockeye Recruitment



Spawning Ground Identification

- Radio tracking & diver surveys.

  Results: Spawners found to actively use 4 sites, no river spawners found.

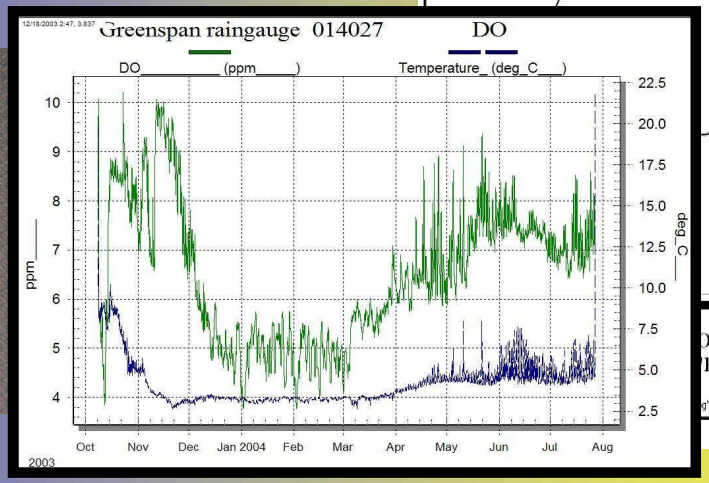


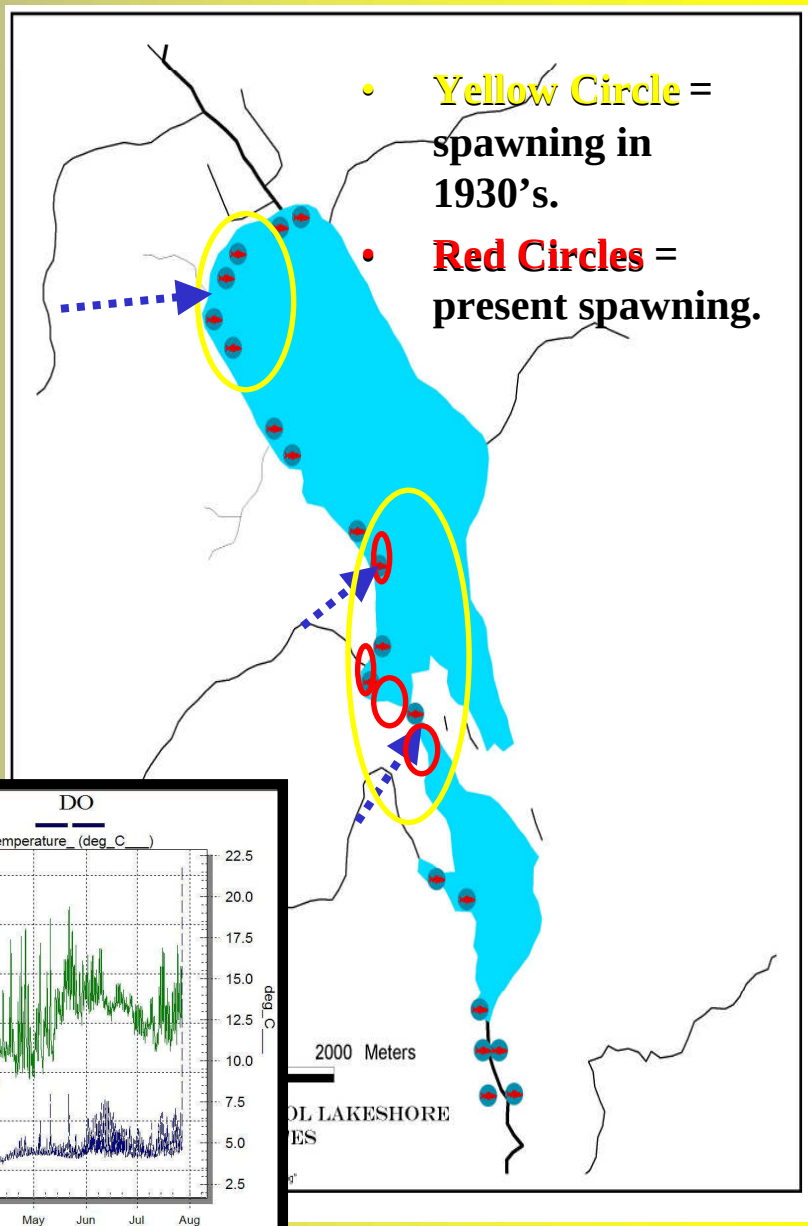
Habitat Assessments

Spawning Area Assessment **(Quality / Quantity).**

Results:

- Fraction of historical spawning areas presently available.
- Spawning areas appeared to be severely impacted by sedimentation and *Elodea canadensis* encroachment.
- Aquatic vegetation presently covers ~50% of the littoral zone, compares to ~18% in 1945.
- Intergravel D.O. levels appear to be limiting egg to fry survival (~4-7ppm)

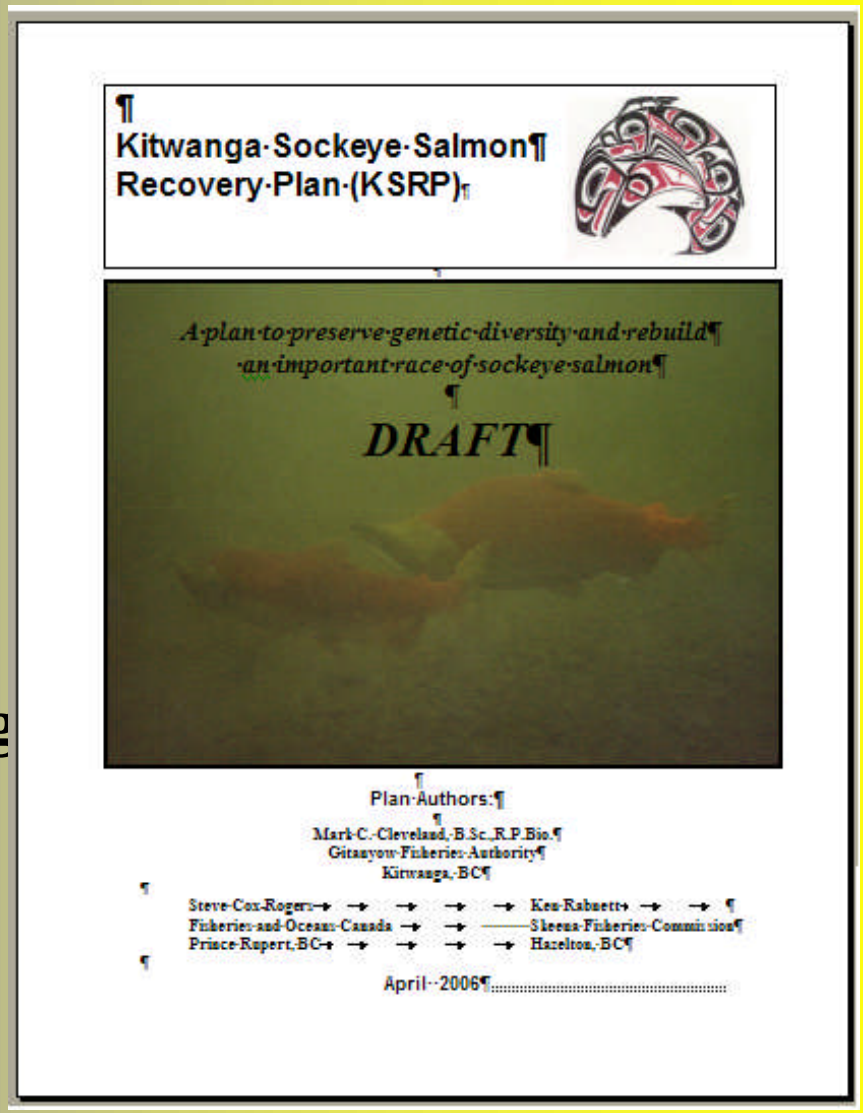




Kitwanga SockeyeRecovery Plan

- After 6 years of studies, Kitwanga Sockeye Recovery Plan was developed to help guide rebuilding priorities.

- One of the highest priorities of the recovery plan included the **restoration of lakeshore spawning areas** and the **enhancement of the stock through culture**.


Kitwanga Sockeye Salmon
Recovery Plan (KSRP)

A plan to preserve genetic diversity and rebuild an important race of sockeye salmon

DRAFT

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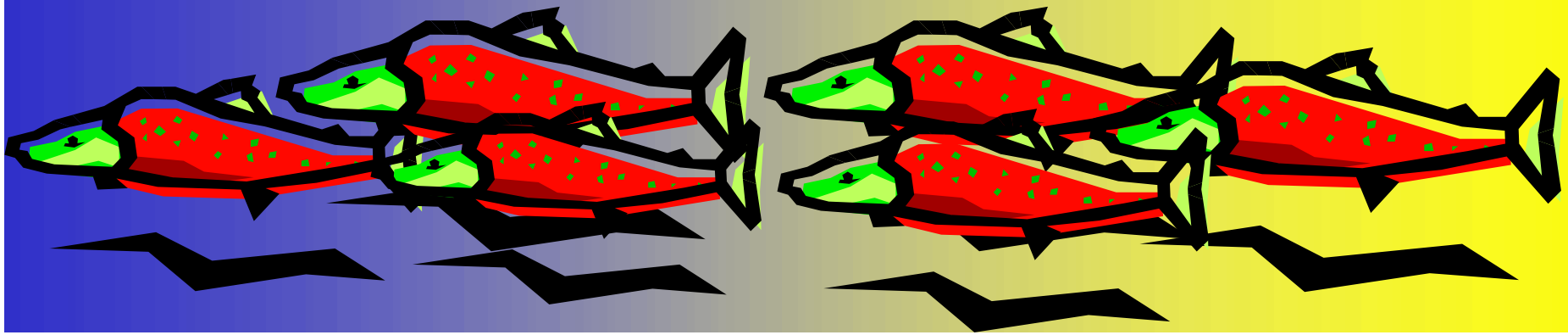
April 2006

SpawningGround Restoration - 2006

Applied 3 types of experimental pilot treatments.

1. Cleaning = sediment extraction (100 m^2).
   - Use of modified hydrolic sampler to lift fine sediment into the water column, 4” pump (11hp motor) capable of pumping 2,000 L / min., move sediment to forest floor.
2. Graveling = addition of superior spawning substrate (100 m^2).
   - Gravel Specs: 10% ½”, 20% ¾’, 20% 1”, 25% 1 ½”, 10% 2”, 15% 3”.
3. Cleaning / Graveling (100 m^2).

1 years goals to improve spawning substrate to accommodate ~600 spawners in 2006.



SpawningGround Restoration - Cleaning

SpawningGround Restoration - Graveling

SpawningGround Restoration - Assessment

Questionsto beanswered:

- Willsockeye spawners keyin andutilize treatedareas?
- Aretreated (cleaned)areas significantly differentfrom non-treatedareas?
- Havetreated sitesachieved ourgoals of increasingegg tofry survival?

SpawningGround Restoration - Assessment

Will sockeye spawners key in and utilize treated areas?

Determined by: Visual observations of treated and untreated spawning areas.

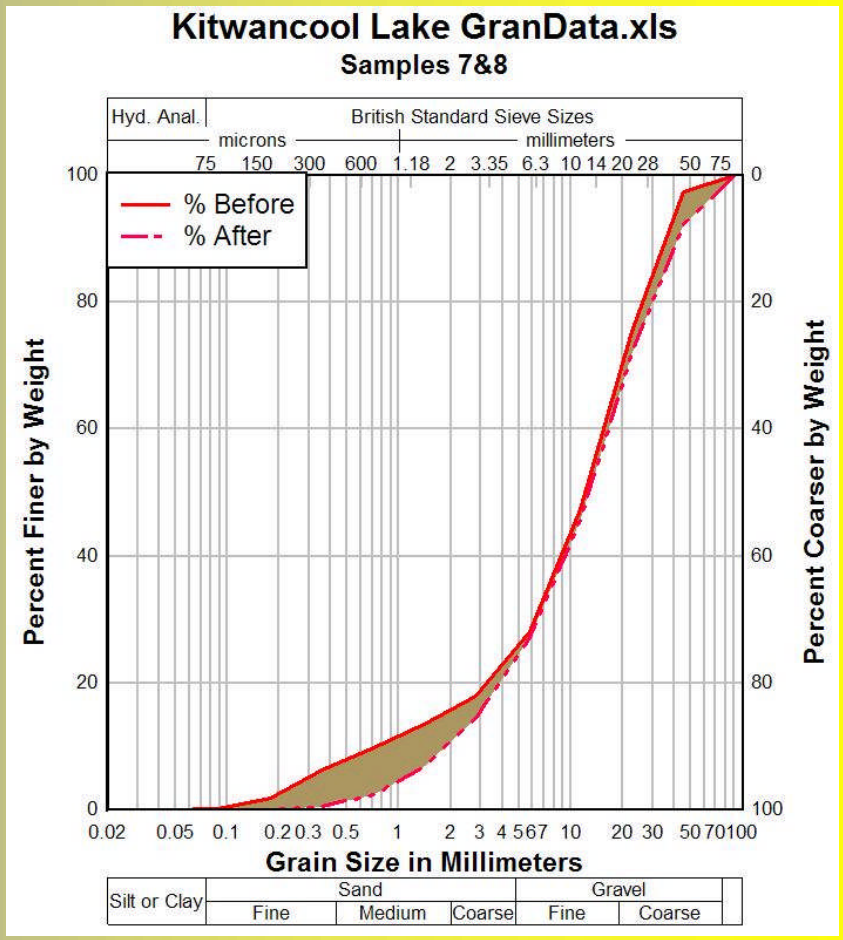
Results from fall 2006:

- Sockeye spawners appear to be selectively using **treated graveled sites** over non-treated sites.
- Sockeye do not appear to be selectively using cleaned sites.

SpawningGround Restoration - Assessment

Are treated (cleaned) areas significantly different from non-treated areas?

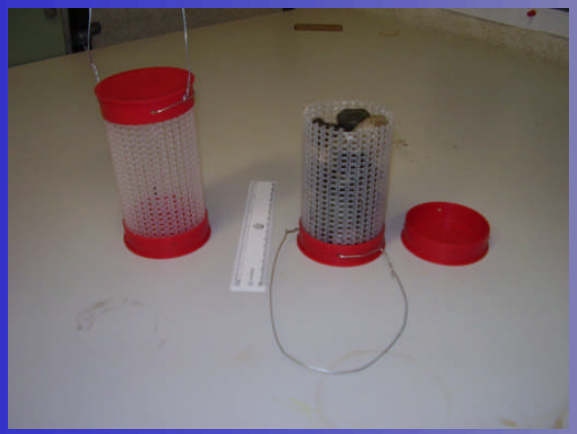
Results: noticeable reduction in fine sediment smaller than 3 mm.



SpawningGround Restoration - Assessment

Have treated sites achieved our goals of increasing egg to fry survival?

Results: Available in the spring 2007.



Kitwanga SockeyeEnhancement - 2006

Pilot hatchery program to raise 100,000 fry for release in spring of 2007.

- Alaskan sockeye culture techniques.
- Experimental holding adult sockeye.

Adultholding 2006

Experimental holding of green sockeye in lake net pens and in hatchery raceway.

Netpen Results: Held for 2 months, spawned successfully, 89 % survival rate (25/28).

Hatchery Results: Sockeye still being held (2.5 months), predicted to be ripe within 2 weeks, survival rates to date 95% (19/20).