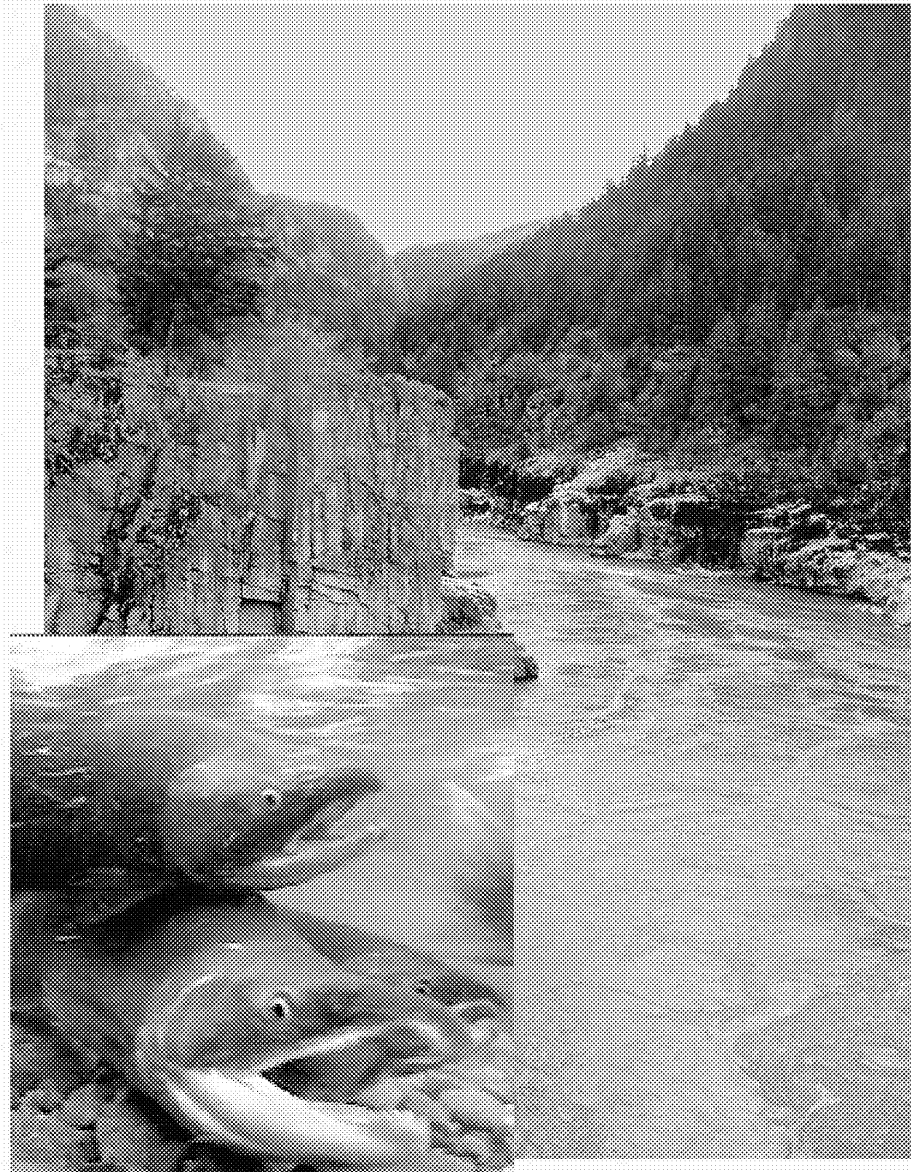
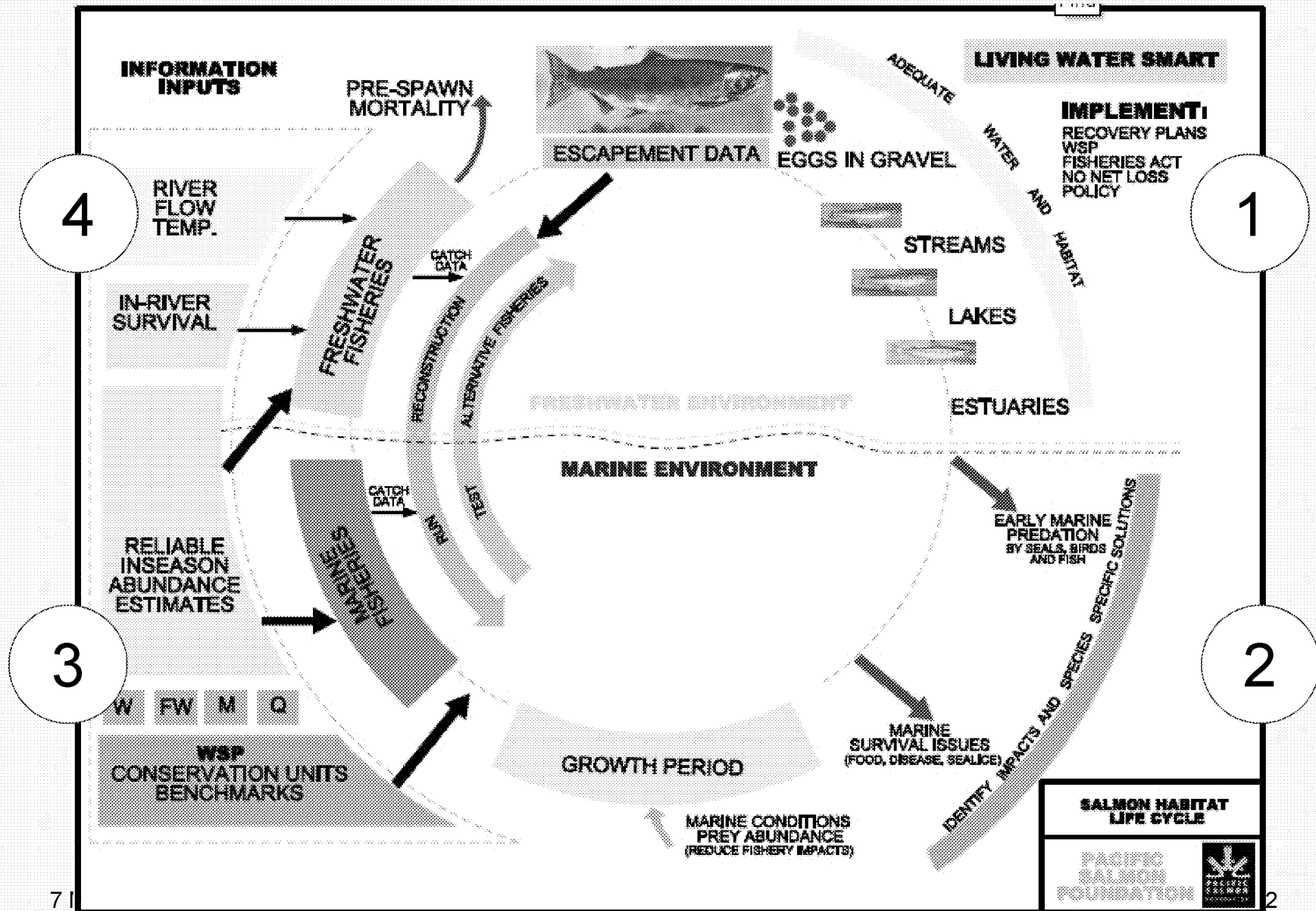


Fraser Salmon Legacy Project

... creative integration of
technology and people to
protect the greatest
salmon river in the world.



Fraser Salmon Life Cycle Diagram



The Legacy project should establish an integrated assessment process that would resolve recurring and serious Fraser salmon issues, for example:

1) “Missing Sockeye” (4 independent reviews since 1994)

- a. Inaccurate in-season assessment data (PSC)**
- b. Magnitude of in-river mortalities (from all sources)?**
- c. Accuracy of in-river catch reporting?**
- d. Loss of diversity and future salmon production.**

2) Change in Late-run Sockeye behaviour and mortalities (joint efforts of PSC/SEF, DFO-Science, UBC and NSERC).

3) Loss of confidence in DFO and PSC, heightened by increasing concerns for the impacts of climate change on salmon.

4) Inadequate delivery to First Nations’ fsc ... resulting in increased social issues including between FN’s. Do managers have the capability to deliver on present and future FN Agreements?

This project requires five inter-dependent components:

1. Fish wheels for live capture and tagging of salmon (also provides species composition) and tangle netting in early season.
2. Radio-tagging for direct tracking of individual fish and conducting mark-recapture estimates (stock of origin of tagged fish to be determined by DNA assays (DFO Science)).
3. Re-establishment of Qualark hydro-acoustics program including gillnet test fishery (DFO Science & Larocque funding).
4. In-river catch monitoring and radio-tag recovery (all fisheries), requires cooperation of all harvestors (critical in lower river).
5. Up-river monitoring of radio-tagged fishes, including tributaries (mortality location, migration rates, habitat use, etc.)

If all 5 components of the Legacy program are successfully implemented, we believe that each of these issues will be directly addressed and significantly improved.

1) “Missing Sockeye” (4 independent reviews since 1994)

a. Inaccurate in-season assessment data (PSC) 

b. Magnitude of in-river mortalities (from all sources) 

c. Accuracy of in-river catch reporting 

d. Loss of diversity and future salmon production.

*WSP + application of
new information*

2) Change in Late-run Sockeye behaviour (joint efforts of PSC/SEF, DFO-Science, UBC and NSERC). ... *contributes to larger program.*

3) Loss of confidence in DFO and PSC, heightened by increasing concerns for the impacts of climate change on salmon. 

4) Inadequate delivery to First Nations' fsc ... resulting in increased social issues including between FN's. Do managers have the capability to deliver on present and future FN Agreements? 

1. Fish Wheels: Two years of experience with wheels have successfully demonstrated the utility of wheels and has provided a critical learning period.



Fundamentally, this program is a simple Mark-Recapture study, using innovative tools and new technologies.

We estimate the total number of salmon (**N**) at the location of tagging by:

$$N = \frac{M n}{R}$$

Steps:

1. Collect salmon (fish wheel or tangle nets) and apply radio-tags (**M**).
2. Allow time for tagged fish to mix with the population migrating up-river (3 to 4 days transit to Qualark)
3. Collect salmon up-river from the tagging location, and count all salmon observed (**n**) and all tags (**R**).
4. Assuming the tags recovered per non-tagged fish in Step 3 are representative of the total population ... we can estimate **N**.

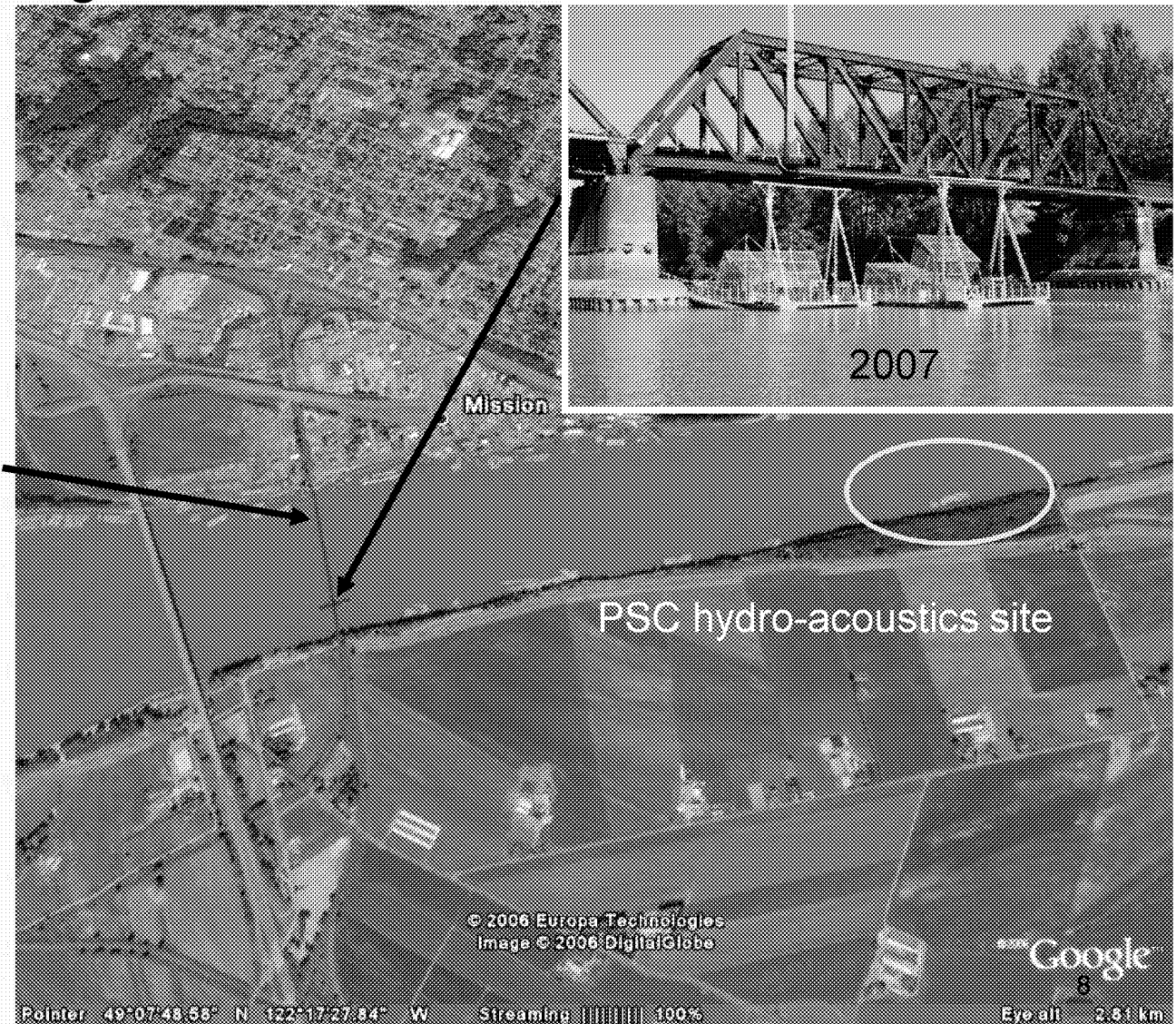
2. Radio Tagging: micro-radio tags will be inserted at fish wheels operating near Mission, B.C. (Crescent Island). Individual fish can now be tracked through out the Fraser basin.

2007 and 2008

Mission Railway Bridge

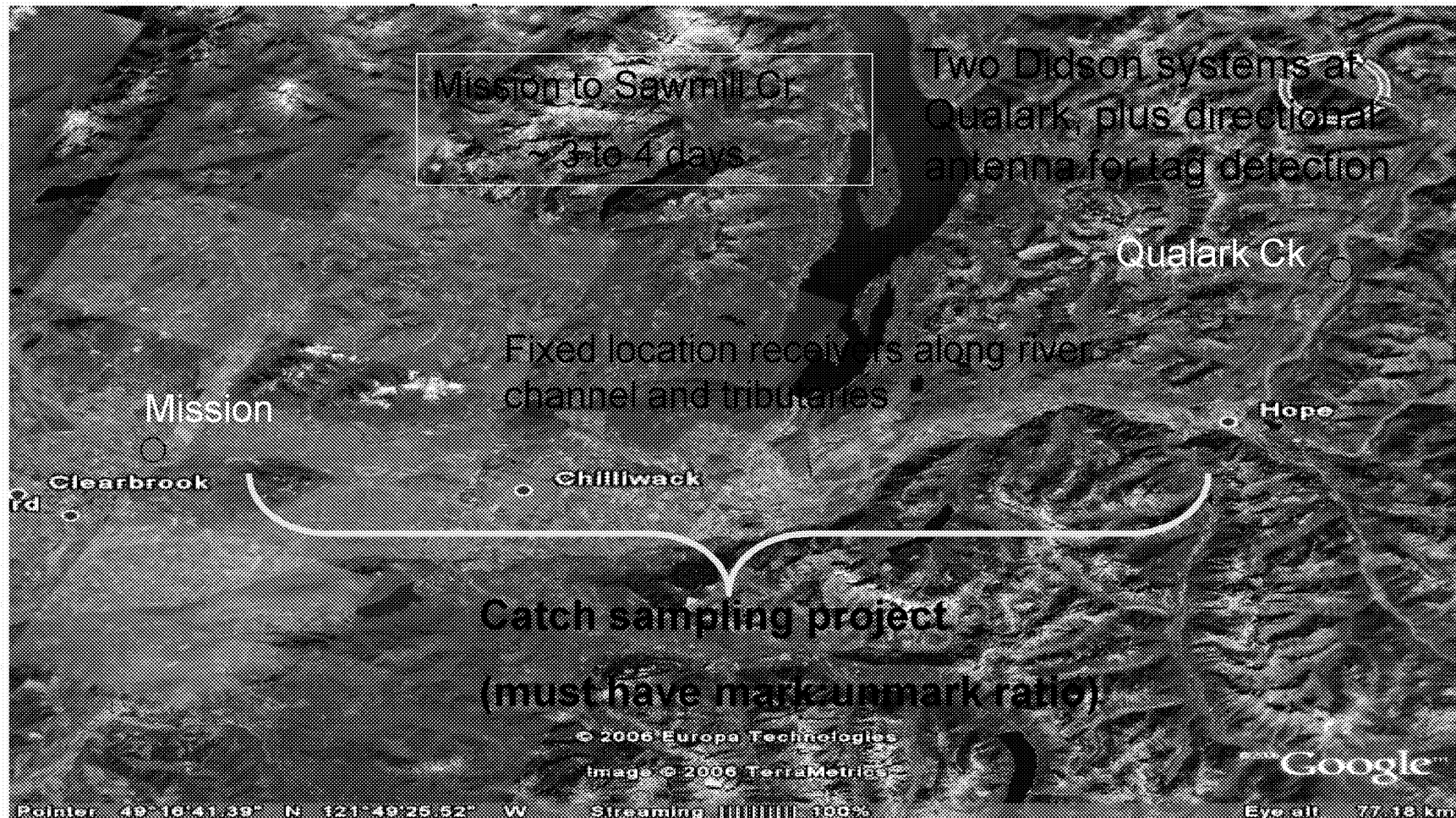
2008 Crescent Island

approx. 10 km downstream

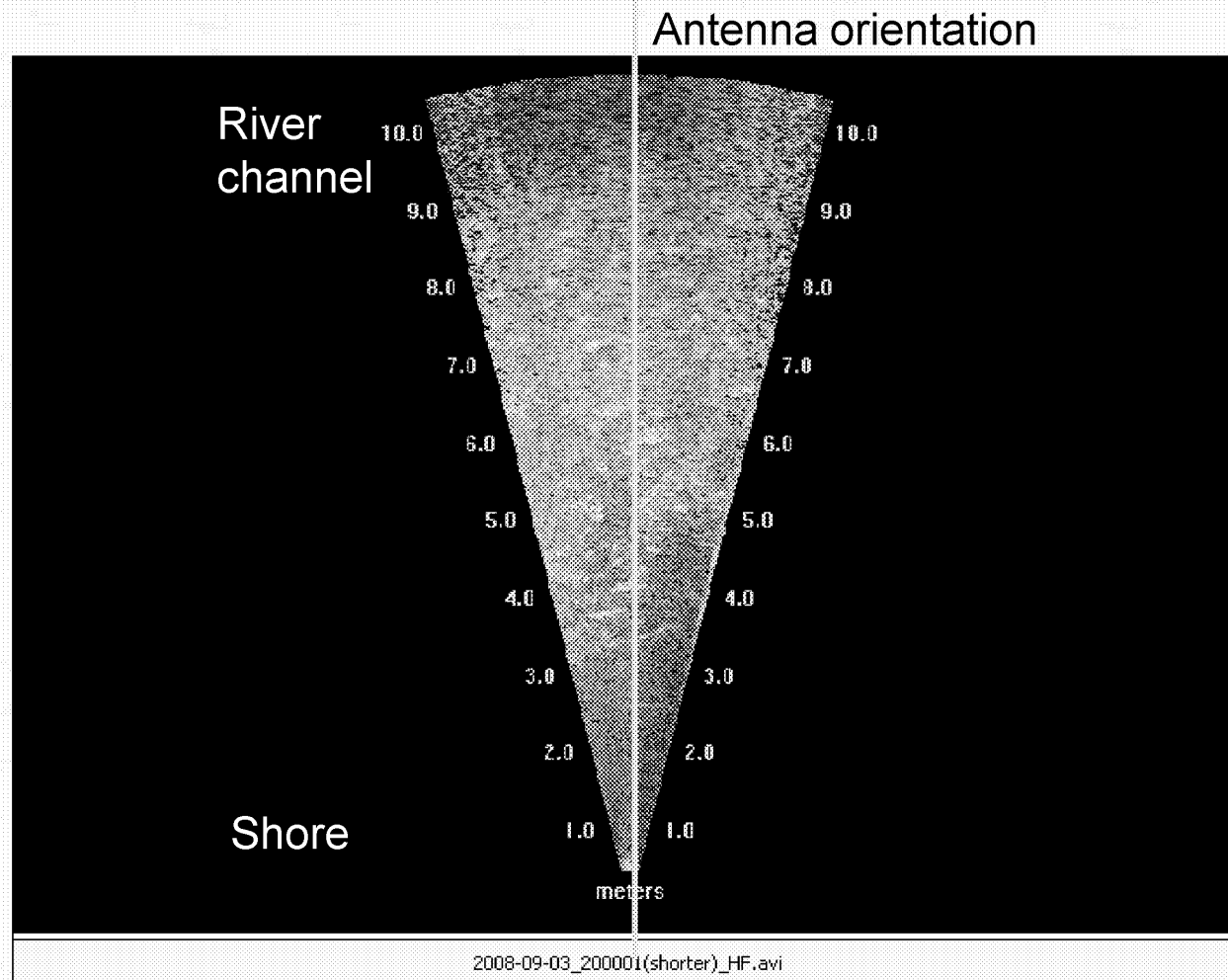


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3. In-river catch monitoring program throughout the basin.



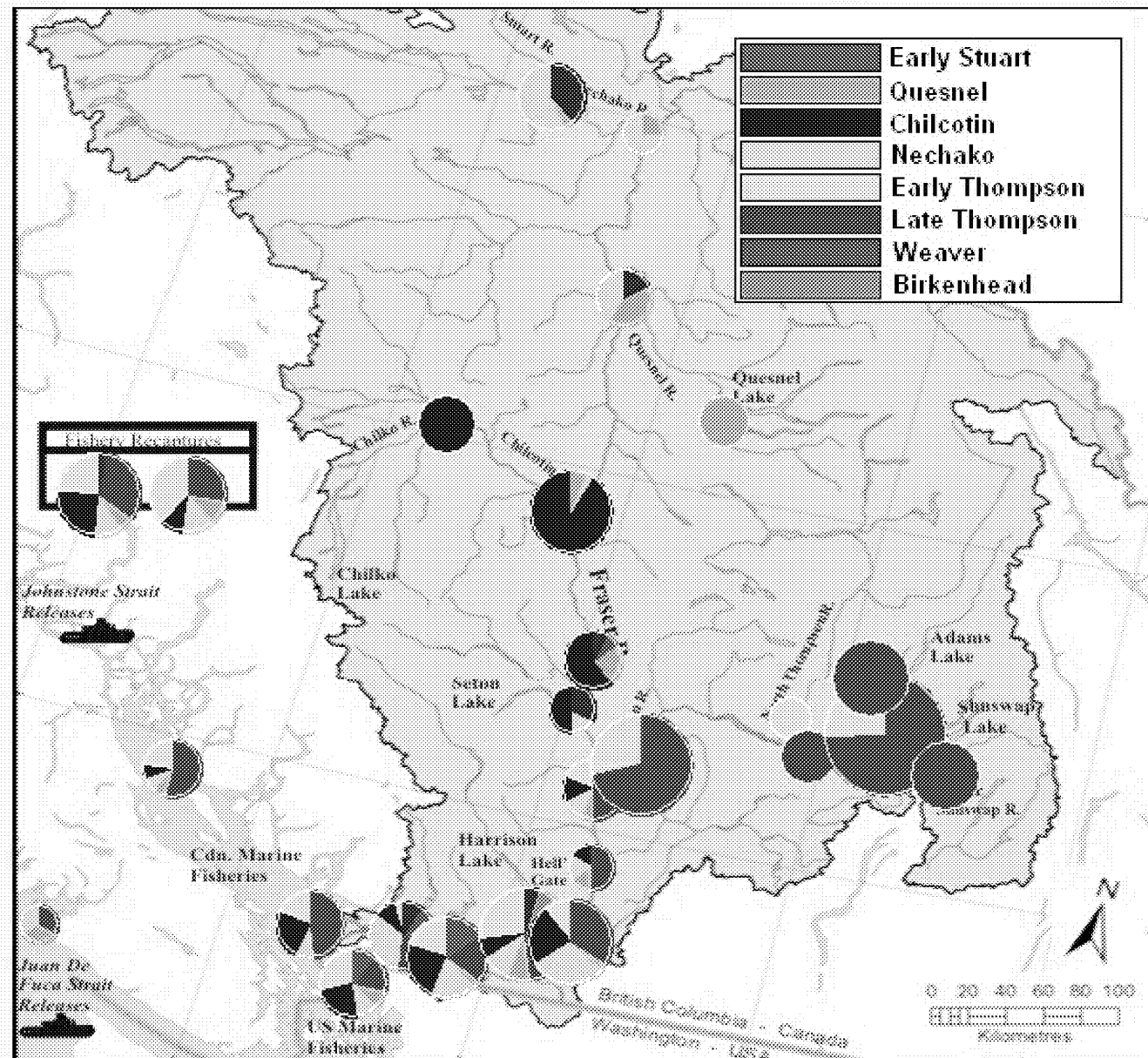
4. Innovation of Didson hydroacoustic “cameras” and directional radio-tag detection at Qualark, 2008 (successful). Real time detection of tags and counts of passing salmon.



10

5. Radio tag
monitoring
throughout the
Fraser basin.

e.g. Fraser
Sockeye
tracking from
2006



What are the outcomes of a successful implementation?

- Fully integrated assessment program, initially for sockeye. Greatly improved accuracy of in-season assessment for conduct of fisheries and accountability. Provides critical information basis for in-river management model.
- All sources of mortality can be monitored directly via radio tags & with estimable accuracy and precision.
- Provides a means to directly assess impacts of climate change on Fraser R salmon over time (i.e., improved understandings of pressures within Fraser Basin).
- Significant benefits in public accountability in resource management and restoration of public confidence.
- Means to achieve Sustainability, with improved cooperation, communication and engagement of all communities.

Conclusions from 2007 & 2008

- Large wheel and Crescent Island site improved catch rates in 2008 and relative to the smaller wheels.
- Mark-recapture program with conventional tags (i.e., not radio tags) is not viable for lower Fraser River.
- Radio-telemetry with Qualark array is a viable method for in-season evaluation of Mission abundance estimates.
- Fish wheel data suggests that DIDSON systems could be used to distinguish between Chinook jacks and adult sockeye/Chinook. (more verification required)
- A combination of Whonnock test fishery and fish-wheel data may be best solution to the Mission species composition problem
- Sockeye drop back rates were substantial from areas with major gillnet fisheries
- Increased attention to catch monitoring required.

2009 project

- Apply 350-400 radio-tags to summer-run sockeye below Mission using fish wheels and tangle nets to assess migration rates, in-river survival rates and fishery impacts (tangle nets were successfully used in 2006 study).
- Apply radio-tags to 100-150 spring-run Chinook between Hope and Yale to assess migration rates and in-river survival.
- Operate Crescent Island fish-wheels from July-Sept. for near-shore species composition data (pink salmon feasibility year)
- Co-operate with DFO on Qualark enumeration site.
- Design a lower Fraser River catch monitoring and tag recovery system in collaboration with DFO and FN's
- Provide a full network of shore-based radio-tag receivers.
- Provide full post-season report.

Fraser Salmon Legacy Program

2009 Project Costs	\$1.255M
Source of Funds	
DFO In-kind, Qualark, Catch Monitoring and Stock ID	\$ 480K
Fraser Salmon and Watersheds Program	\$ 350K
Metro Port Vancouver	\$ 50K
Bob Hagar	\$ 25K
PSEFS Contribution request	\$ 350K
Total	\$1.255M