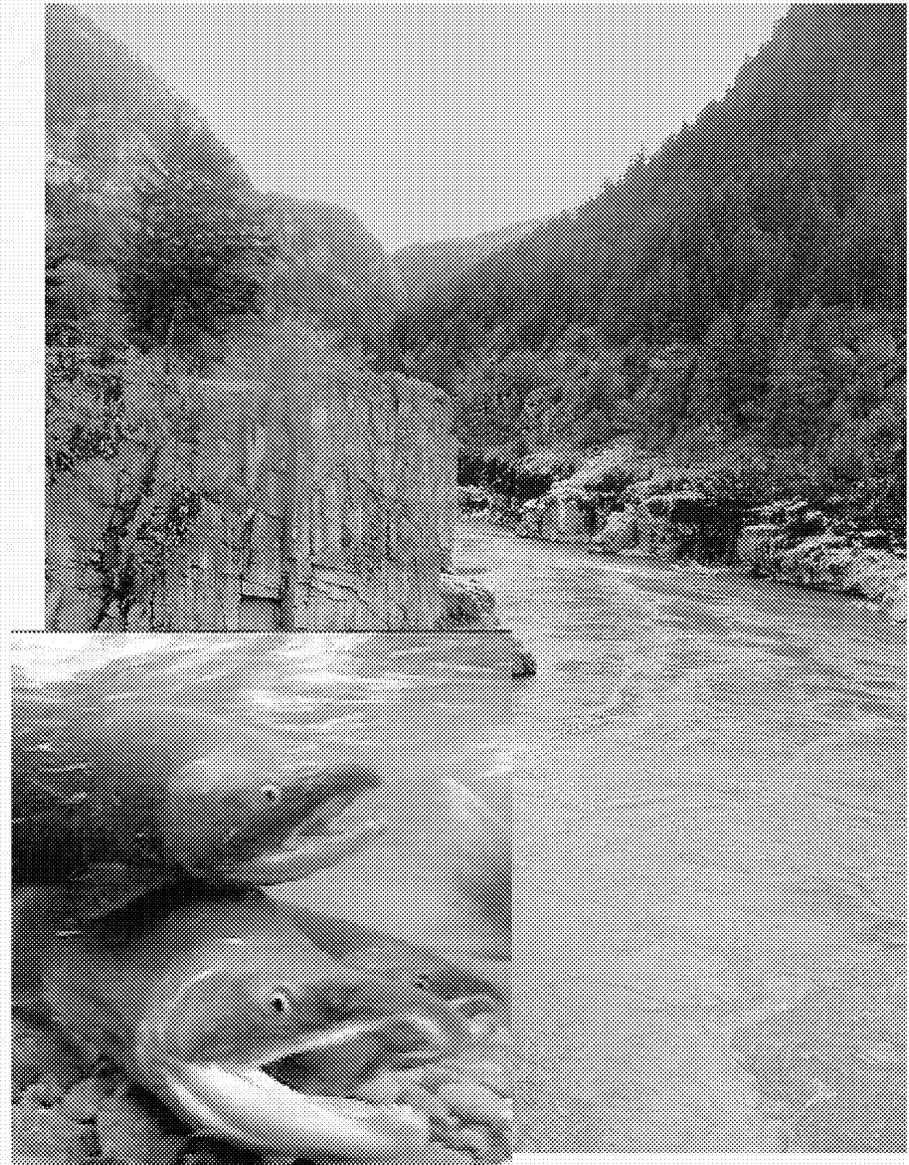
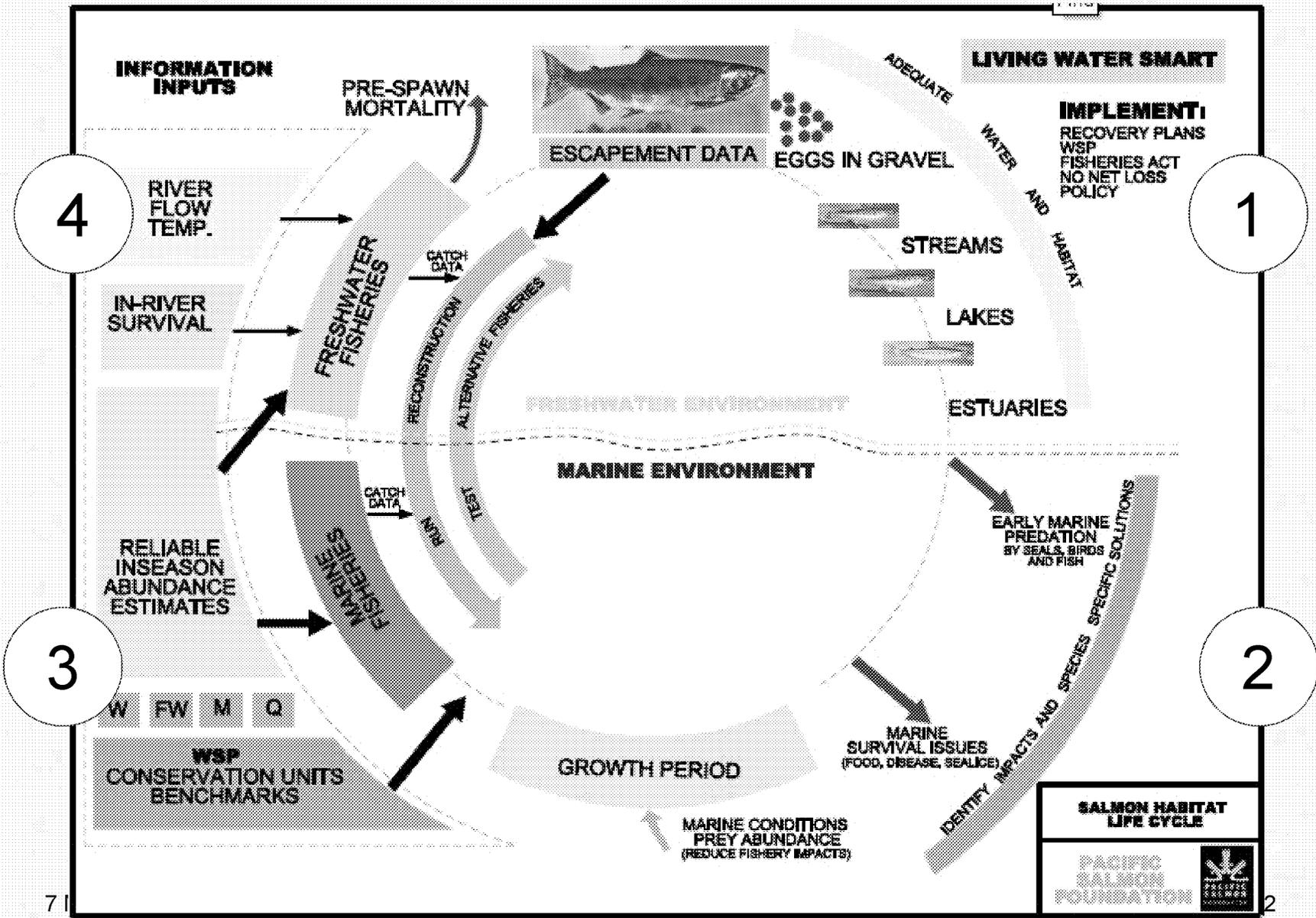


# Fraser Salmon Legacy Project

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



# Fraser Salmon Life Cycle Diagram



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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.



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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:

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

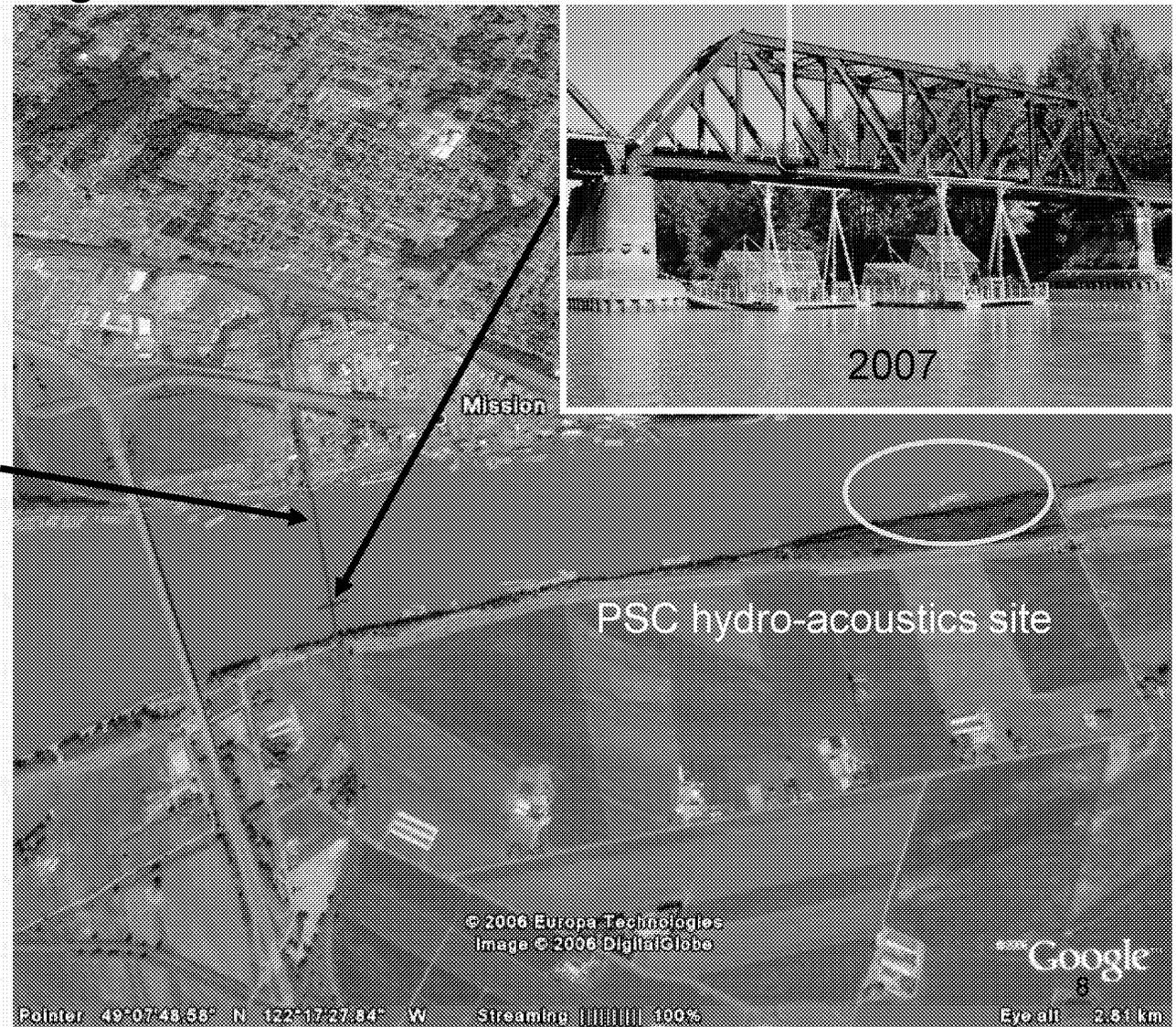
Steps:

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.

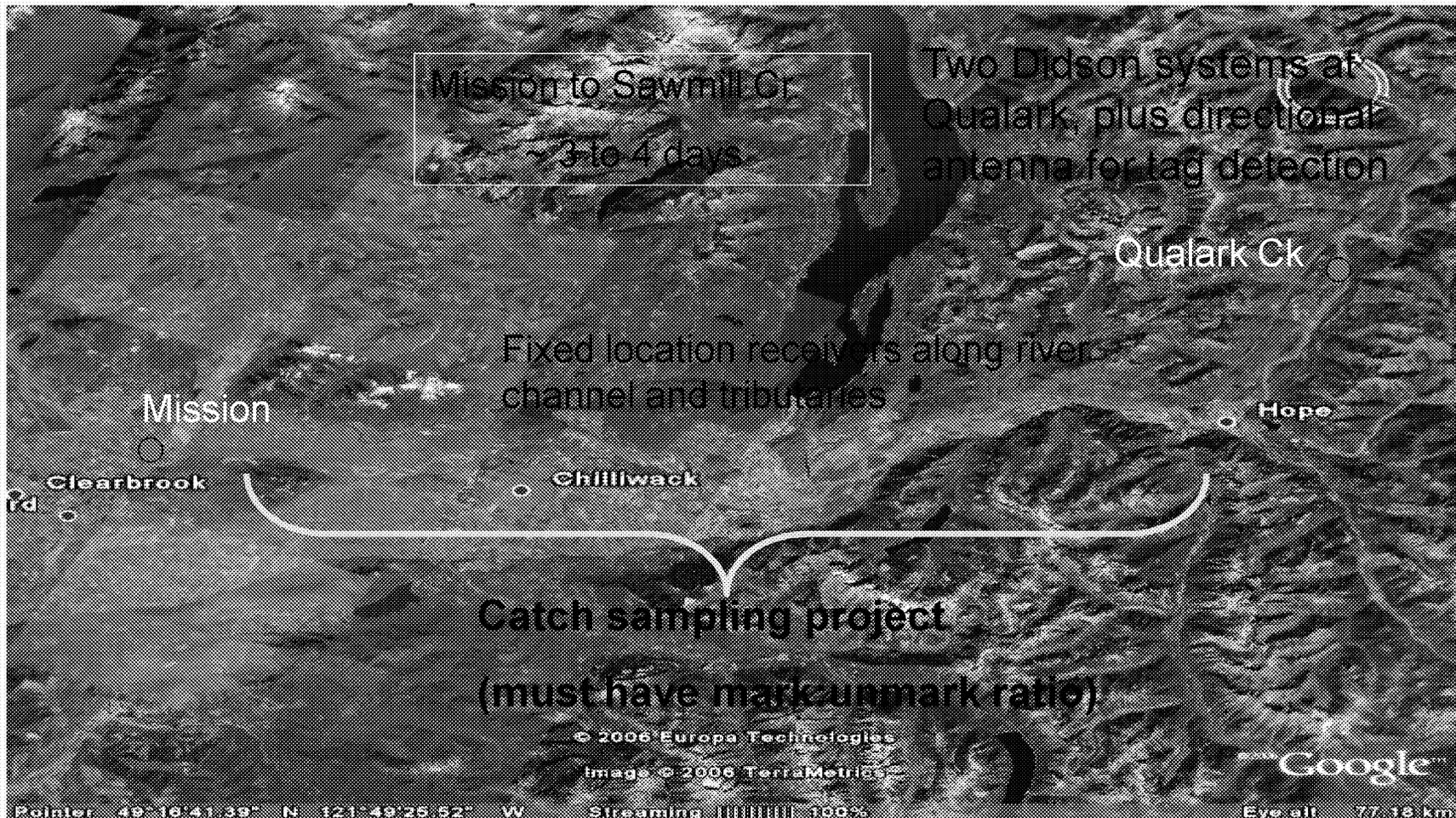
**2007 and 2008  
Mission Railway  
Bridge**

**2008 Crescent  
Island  
approx. 10 km  
downstream**

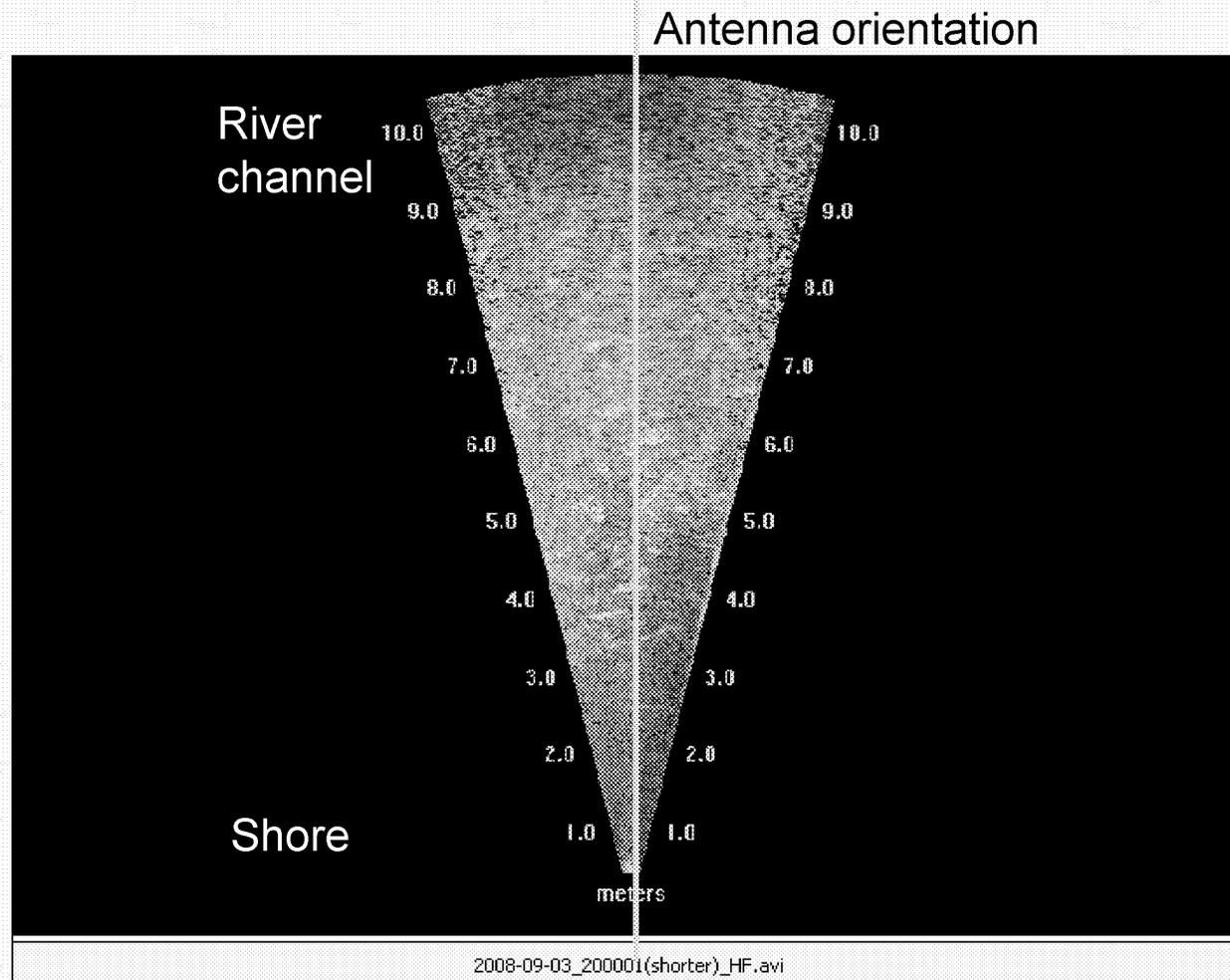


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### 3. In-river catch monitoring program throughout the basin.

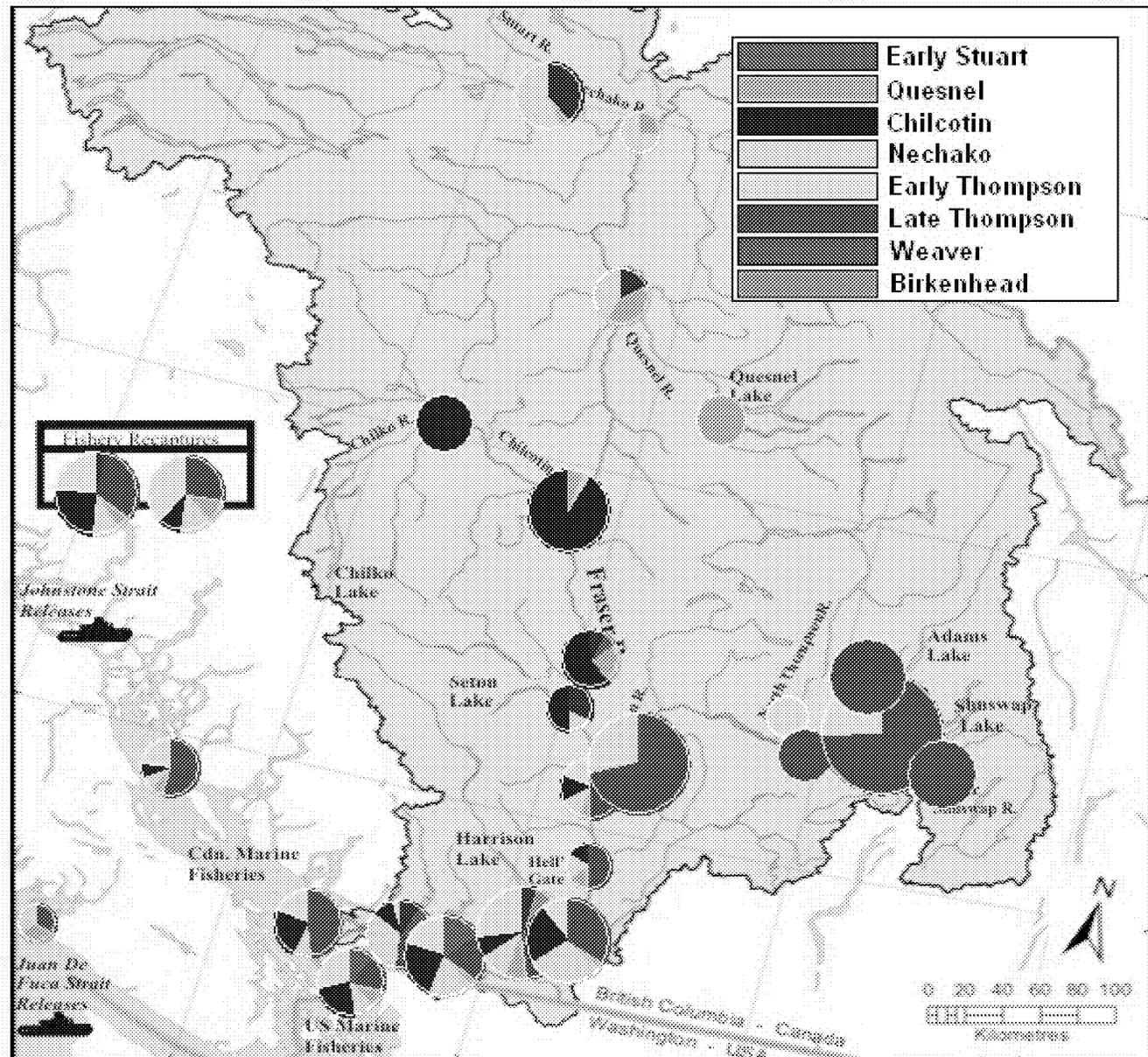


**4. Innovation of Didson hydroacoustic “cameras” and directional radio-tag detection at Qualark, 2008 (successful). Real time detection of tags and counts of passing salmon.**



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

<b>2009 Project Costs</b>	<b>\$1.255M</b>
<b>Source of Funds</b>	
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
<b>Total</b>	<b>\$1.255M</b>