

Relative Survival of Snake & Yakima River Spring Chinook: In-river and Ocean Mortality using the POST Acoustic Array

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Outline



- Delayed mortality
- Experimental Design
 - Yakima
 - Snake
- Results
 - Survival estimates
 - Survival rates
- Assumptions and caveats
- Conclusions

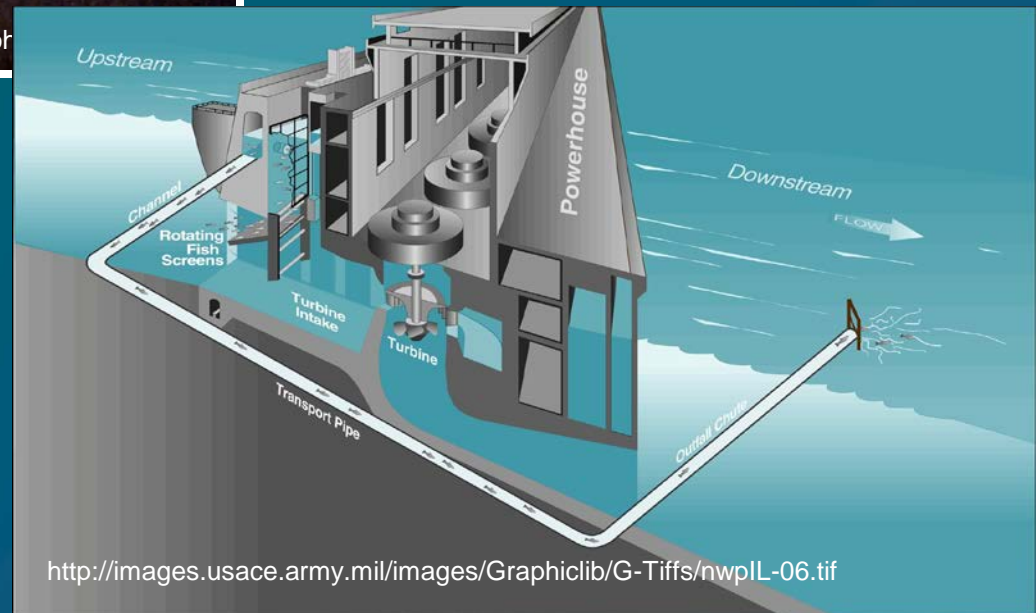
Delayed Mortality



<http://www.erdc.usace.army.mil/pls/erdcpub/docs/erdc/images/joh>

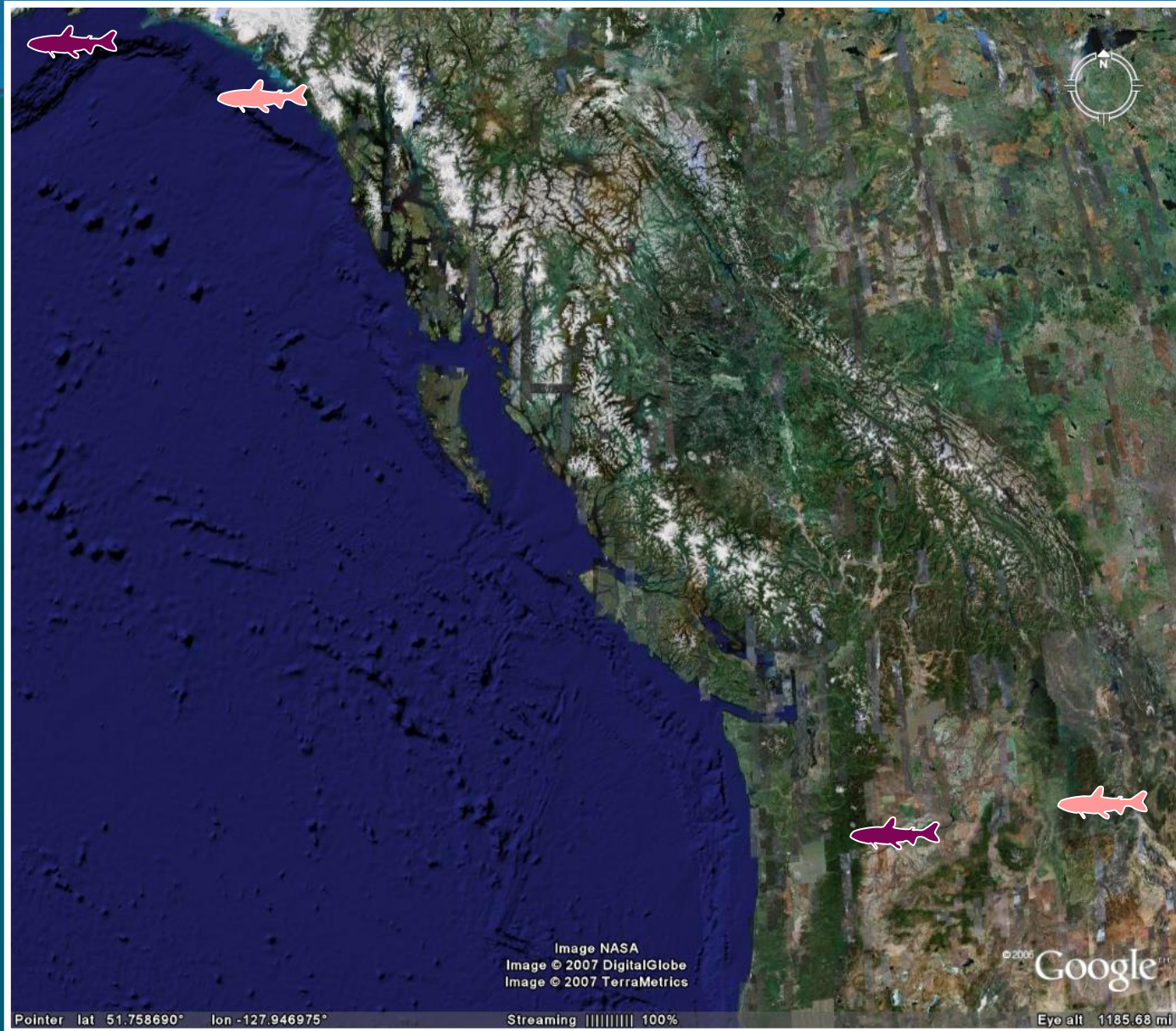
Extra mortality that occurs
After fish exit the hydrosystem:

- 1) Dam passage
 - spill
 - turbines
 - bypass



<http://images.usace.army.mil/images/Graphiclib/G-Tiffs/nwpIL-06.tif>

Ocean Distribution



2006 POST Array (Pacific Ocean Shelf Tracking Project)



POST in the Columbia River Basin

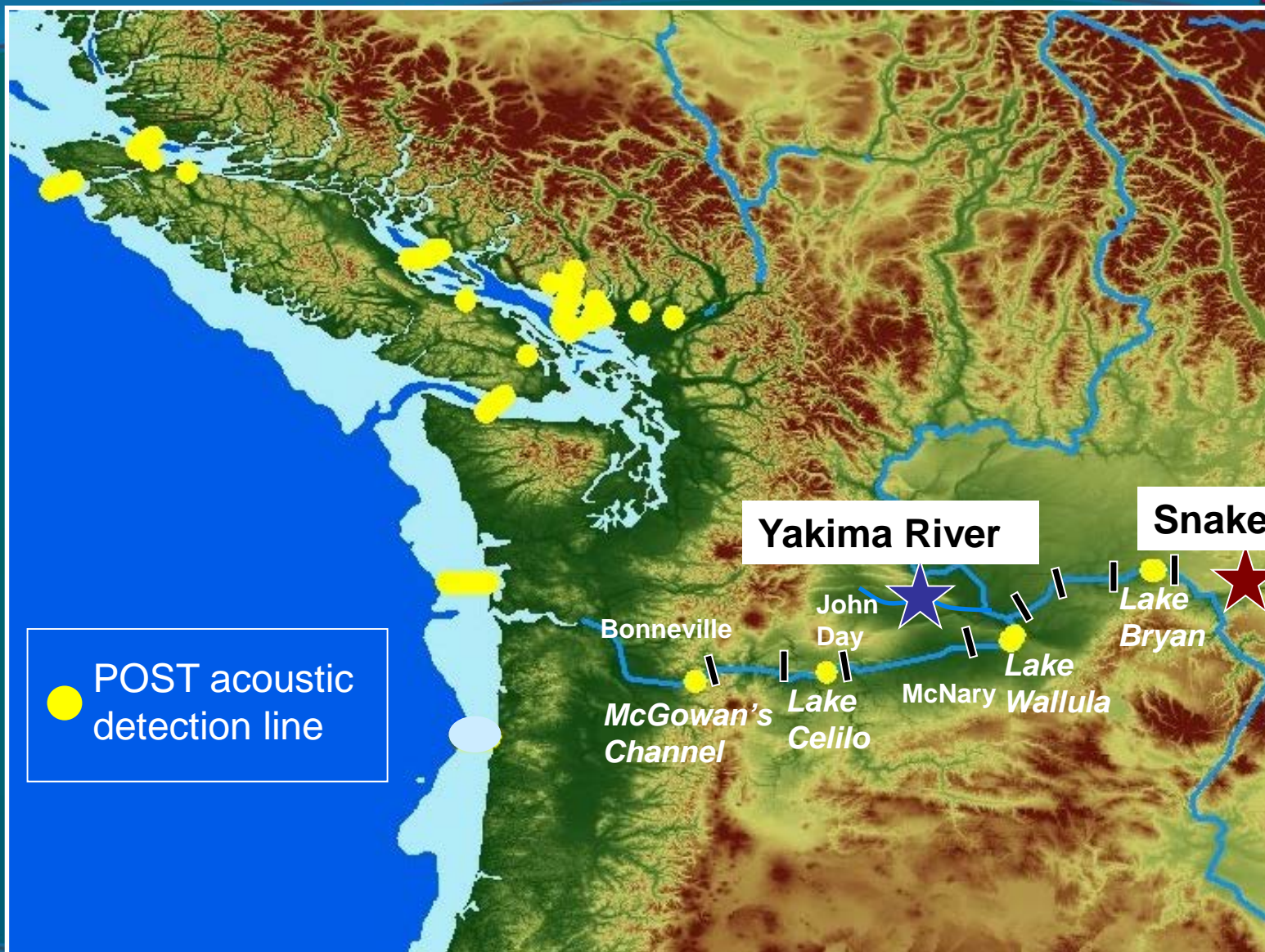


Spring Chinook Populations tracked in 2006



- Snake River- Dworshak Hatchery
- Yakima River- Cle Elum Hatchery (CESRF)

POST in the Columbia River



Spring Chinook Populations tracked in 2006



- Snake River- Dworshak Hatchery

- Low adult return rate
 - 0.61%*
 - 8 yr average
- 8 dams
- 870 km to Columbia River mouth

- * Comparative Survival Study 2006 Annual Report

- Yakima River- Cle Elum Hatchery (CESRF)

- Higher adult return rate
 - 2.8%*
 - 6 year average
- 4 dams
- 615 km to Columbia River mouth

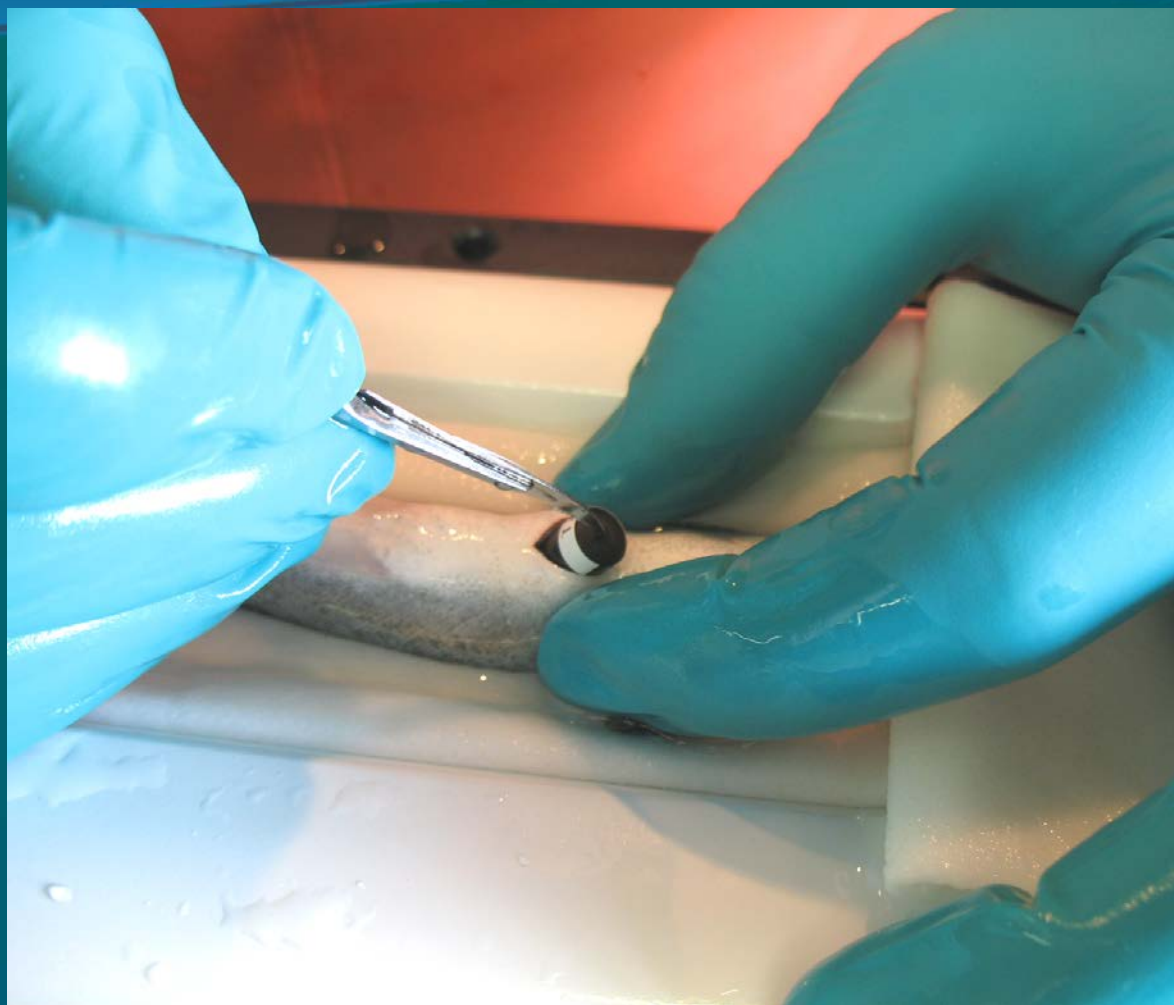
*Yakima/Klickitat Fisheries Project Monitoring and Evaluation
2006 Annual Report

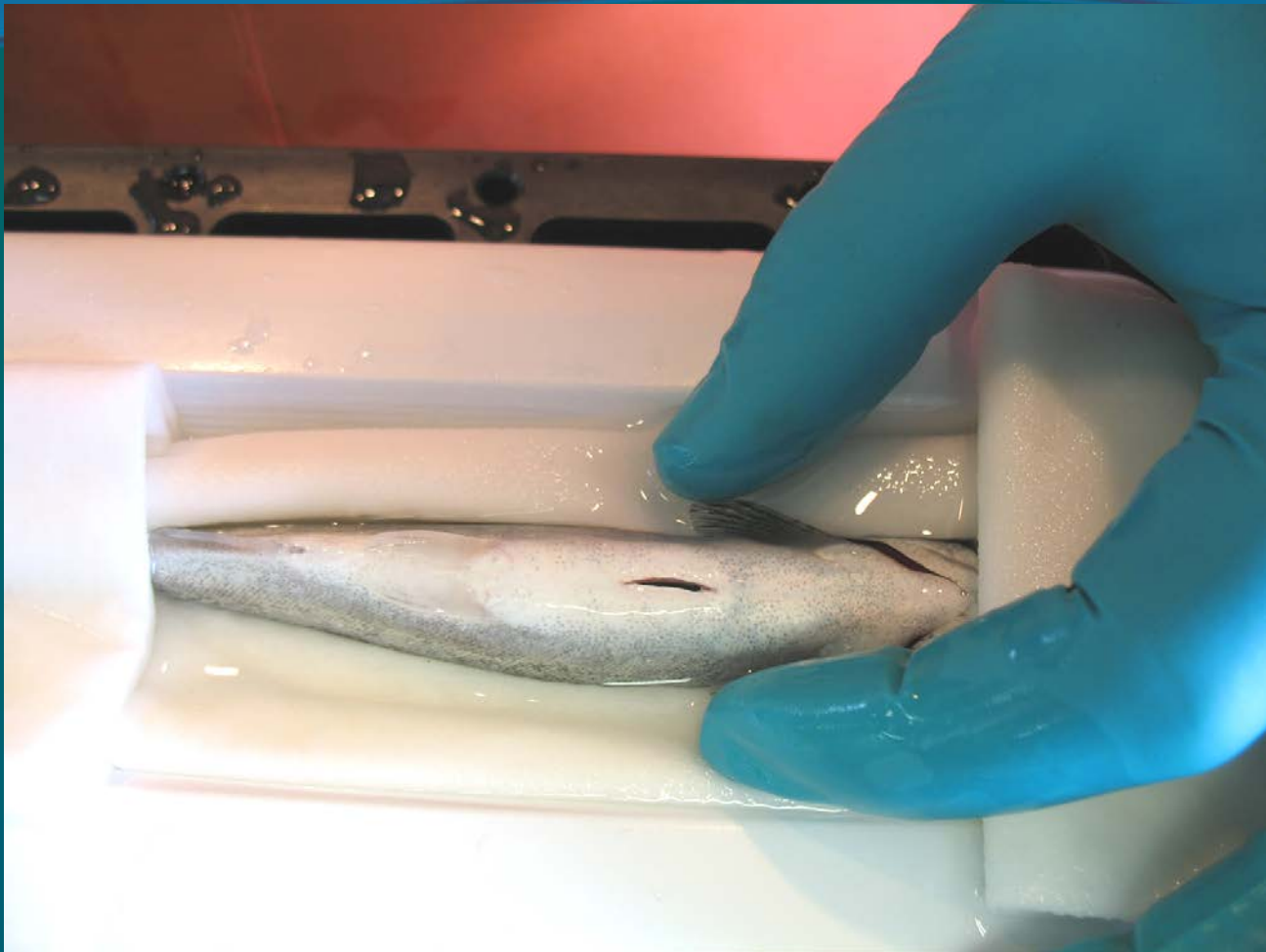
Tagging

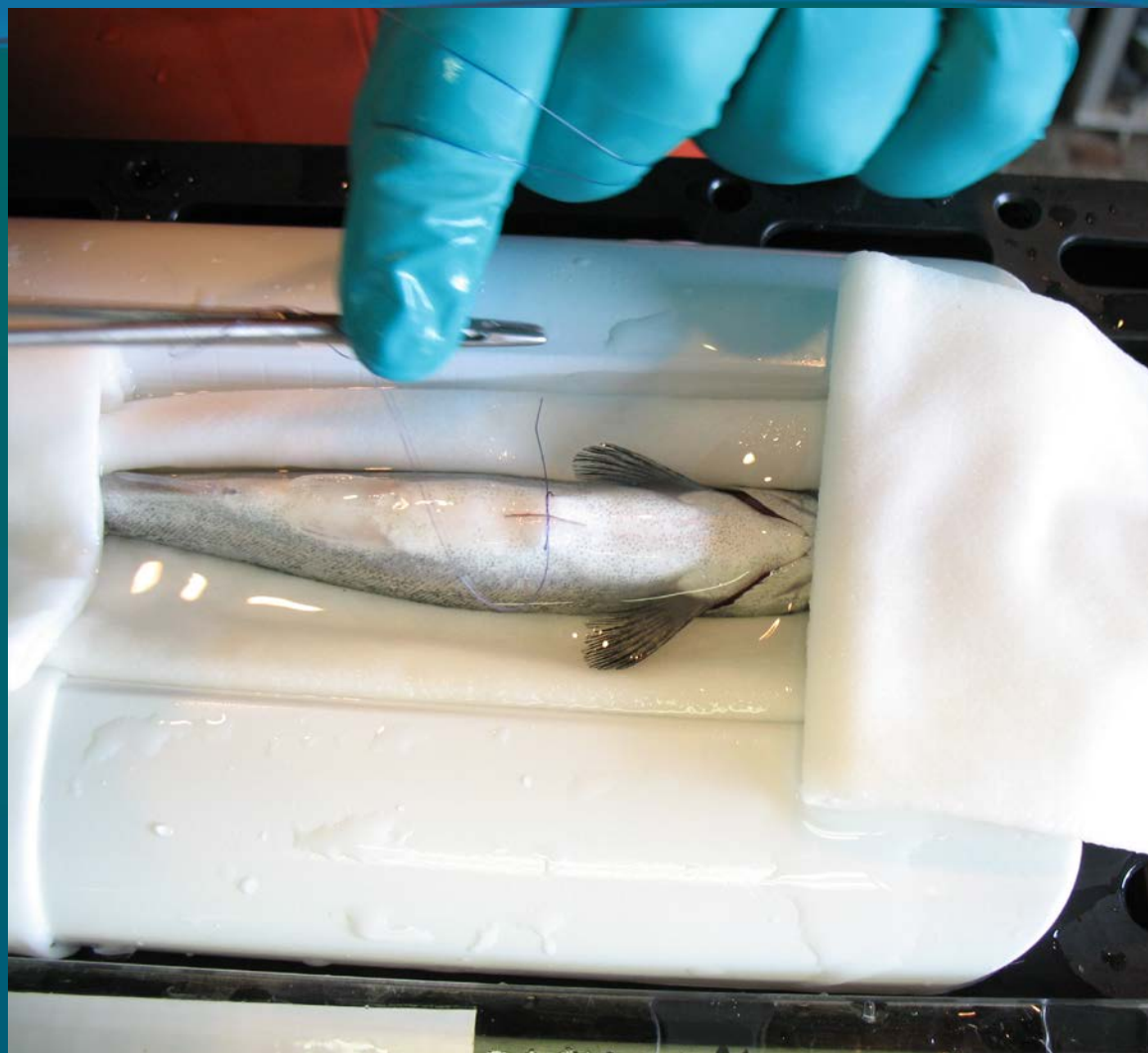


VEMCO
 V9-6L coded
 69 kHz
 + PIT tag

Hatchery	Release Date	# Tagged	Mean size at tagging (mm FL; range)	Release Site
Dworshak	May 1	198	146.9 (140-208)	Kooskia NFH
Dworshak	May 8	198	145.6 (140-192)	Kooskia NFH
Cle Elum	May 30	199	154.5 (140-173)	Chandler
Cle Elum	June 6	199	154.5 (140-168)	Chandler







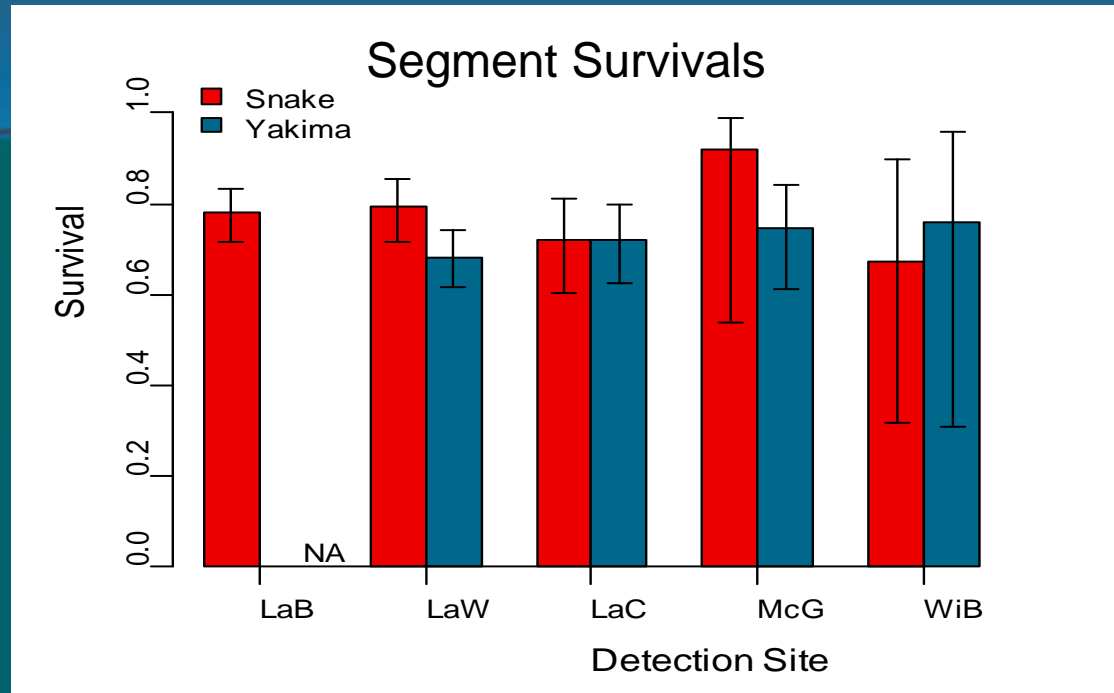


Data Analyses



- Survival and detection probabilities estimated with Cormack-Jolly-Seber (CJS) in Program MARK
 - Estimates possible to Willapa Bay (coastal WA)
- Minimum Survival to North western Vancouver Island
- Survivorship curves use cumulative survival probabilities
 - CI's - Delta method
- Monte Carlo simulations of survival rate (S/km)

Results

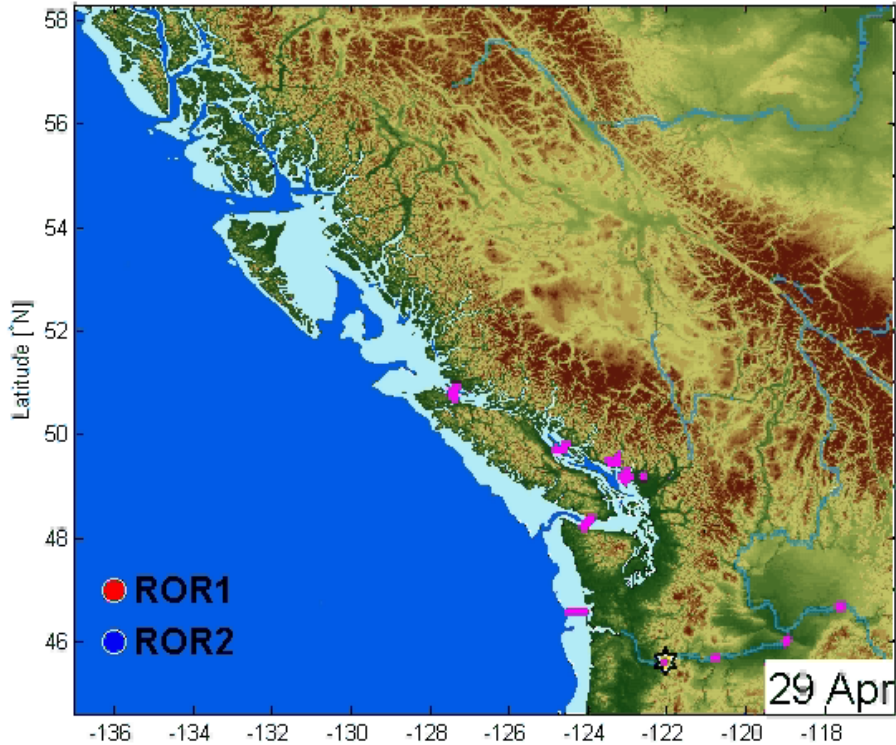


Detection Site	Reference Point	Snake Survival	Yakima Survival
Lake Bryan (LaB)	Below LGR	0.78	NA
Lake Wallula (LaW)	Below confluence	0.79	0.68
Lake Celilo (LaC)	Below JDA	0.72	0.72
McGowan's Channel (McC)	Below BON	0.92	0.74
Willapa Bay (WiB)	Coastal WA	0.67	0.76

Results- Migration Rate

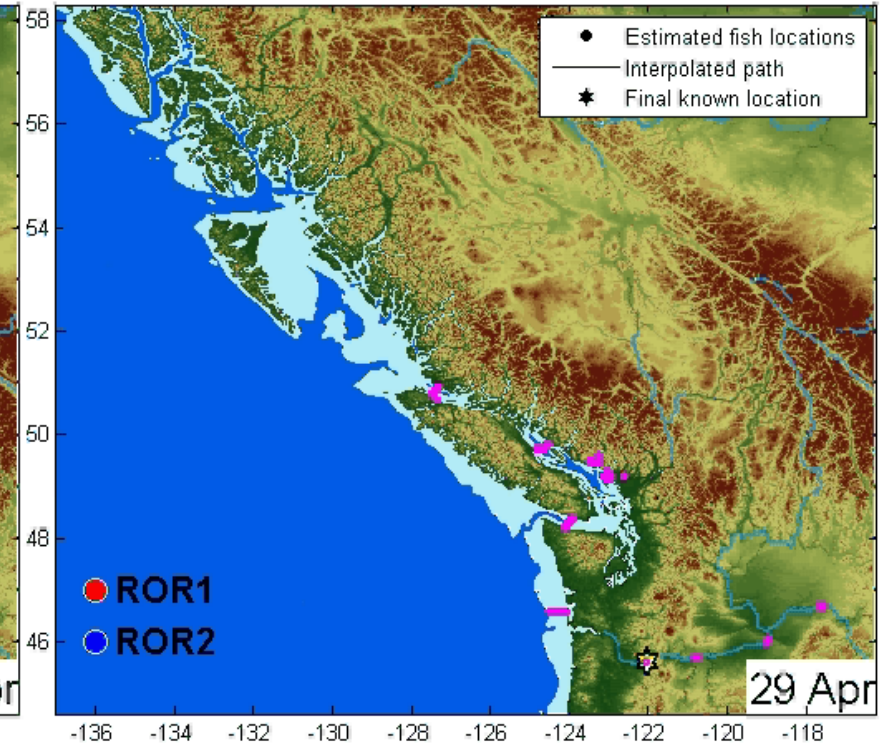
Snake

POST 2006: Snake River

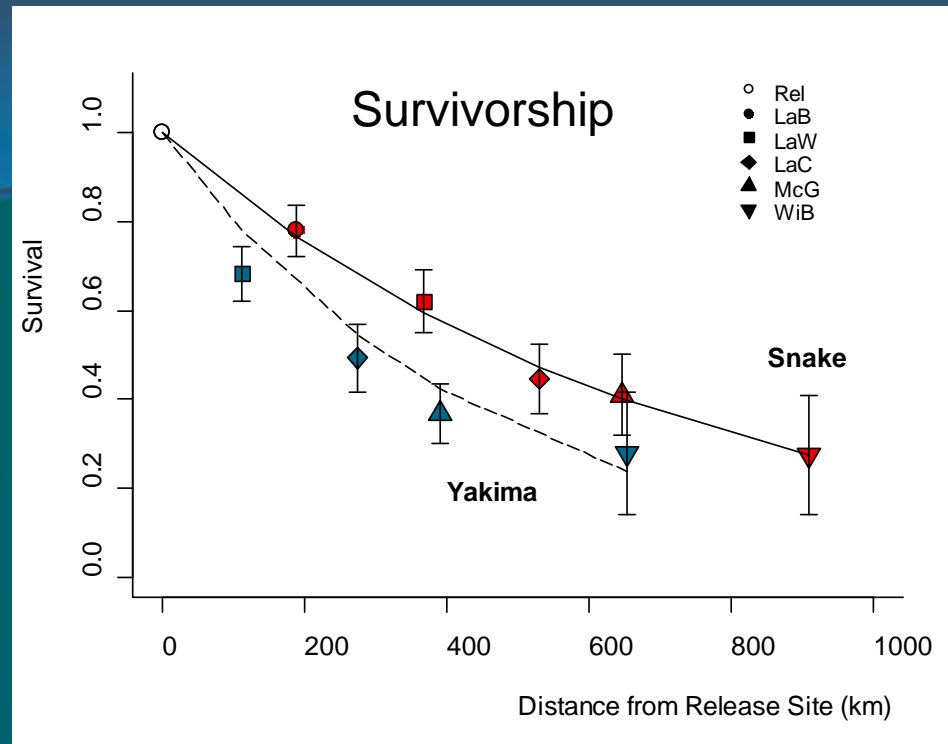


Yakima

POST 2006: Yakima River



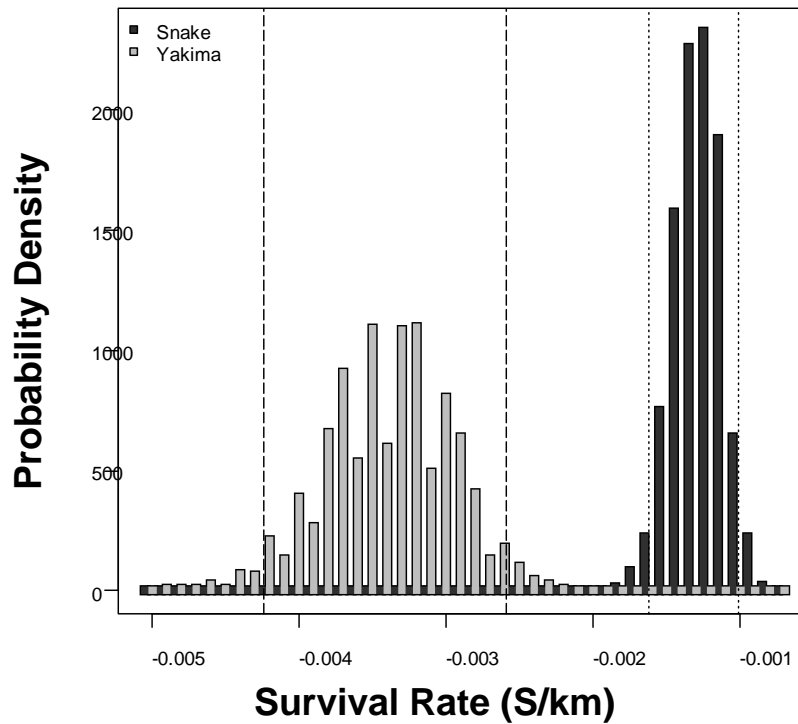
Results



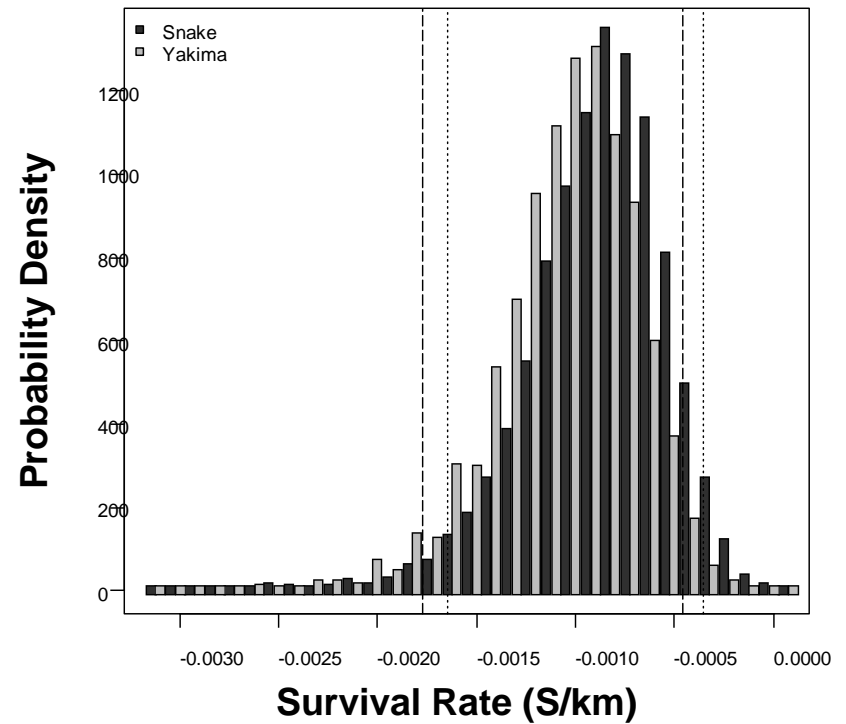
Detection Site	Reference Point	Snake Survival	Yakima Survival
Lake Bryan (LaB)	Below LGR	0.78	NA
Lake Wallula (LaW)	Below confluence	0.62	0.68
Lake Celilo (LaC)	Below JDA	0.45	0.49
McGowan's Channel (McC)	Below BON	0.41	0.37
Willapa Bay (WiB)	Coastal WA	<u>0.28</u>	<u>0.28</u>

Results

Release to Lake Wallula



Lake Wallula to Willapa Bay



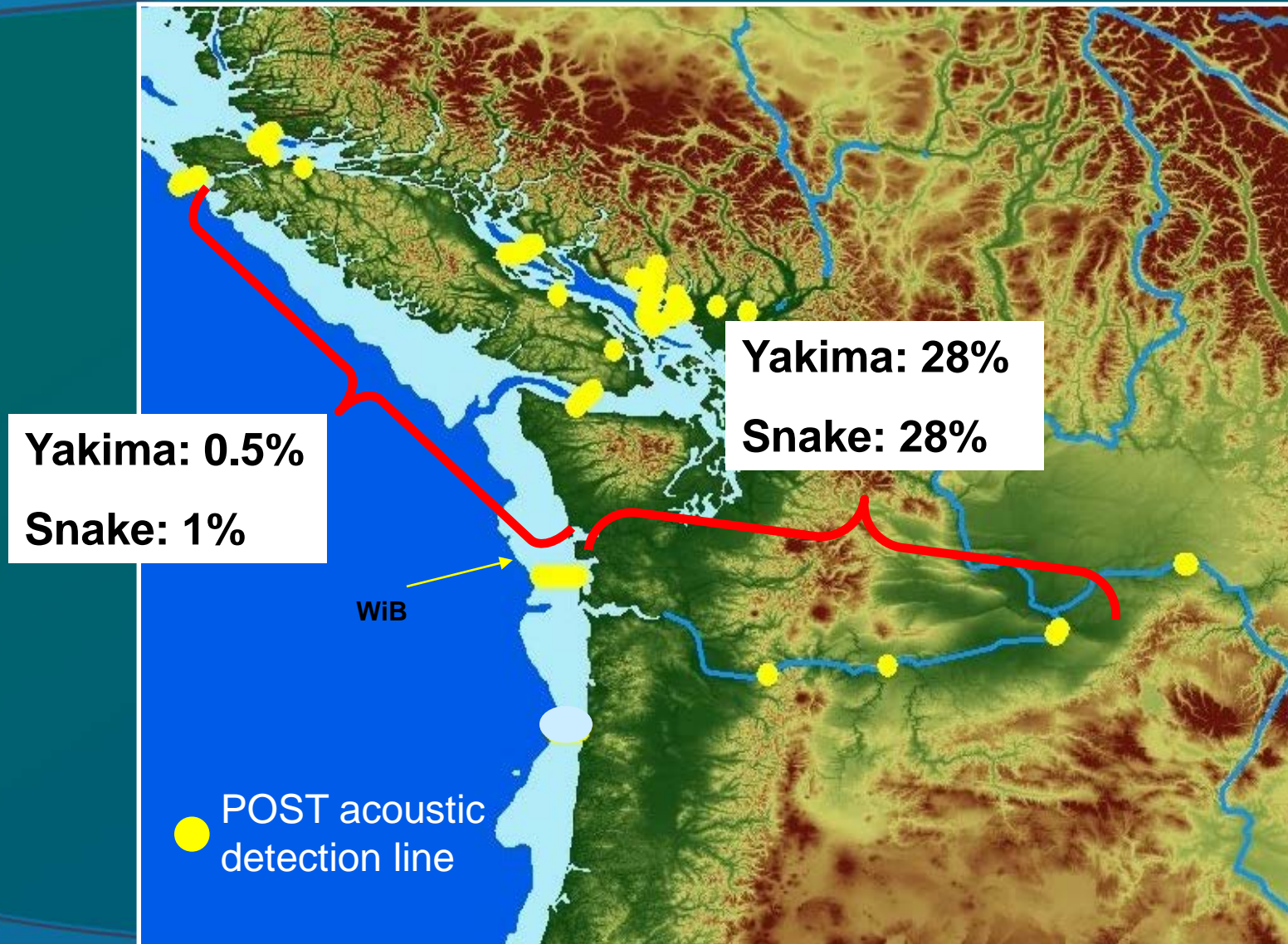
Avian predation?

-Prosser

-Crescent Island



Results



Assumptions and Caveats



- Assumptions
 - Fish swim north
 - Remain on continental shelf
- Timing of ocean entry
- Minimum size requirements
 - Minijacks?
- Tag effects
 - High tag retention

Conclusions

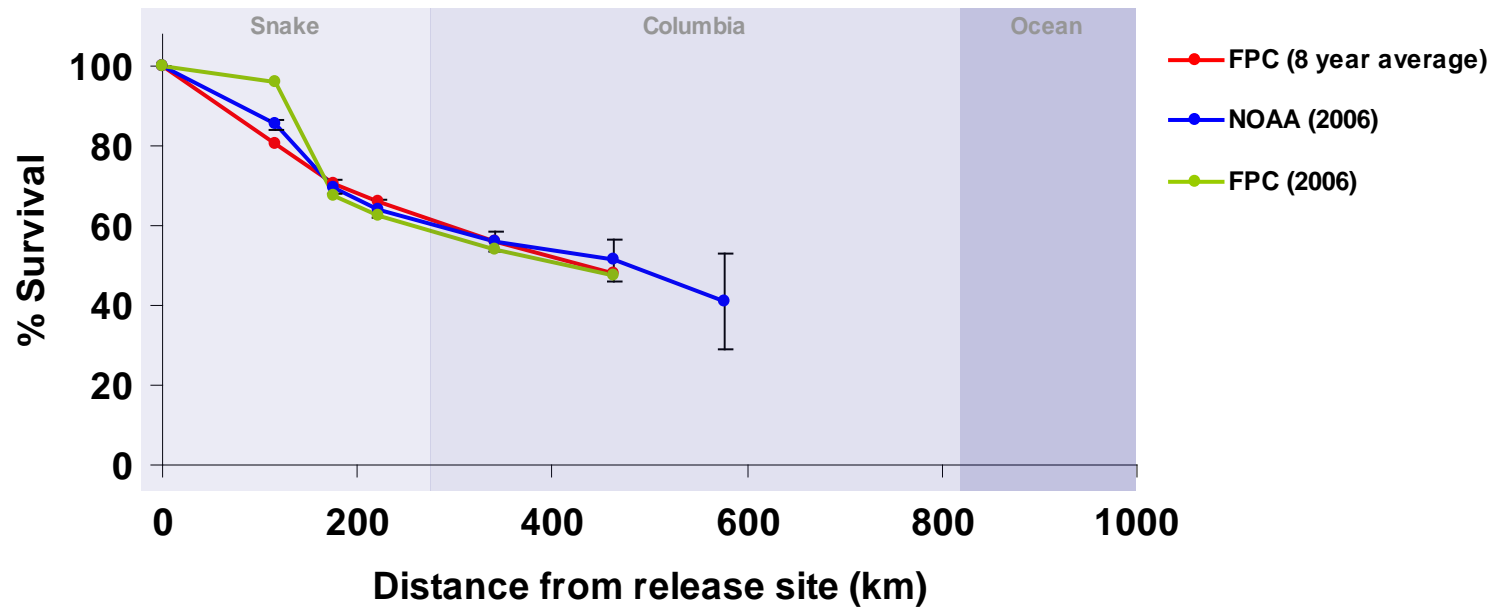


- Within the size range tested we found no difference in survival below Bonneville Dam and into the ocean in 2006
 - '07, '08, '09
- Delayed mortality hypothesis is directly testable beyond the hydrosystem to
 - Coastal Washington (264 km)
 - Northwestern Vancouver Island (788 km)
 - Southeast Alaska (1885 km)

2006 PIT Tag Survivals for Dworshak



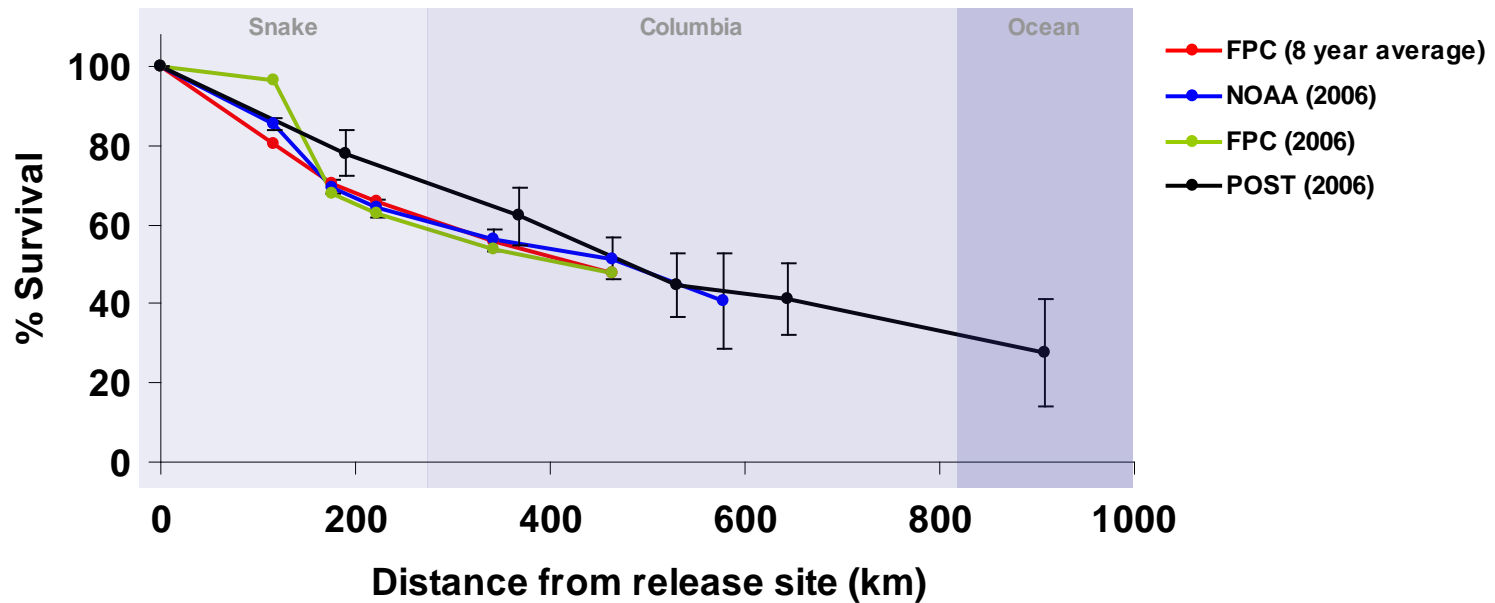
Relative Survival of Dworshak Spring Chinook



2006 PIT Tag Survivals for Dworshak

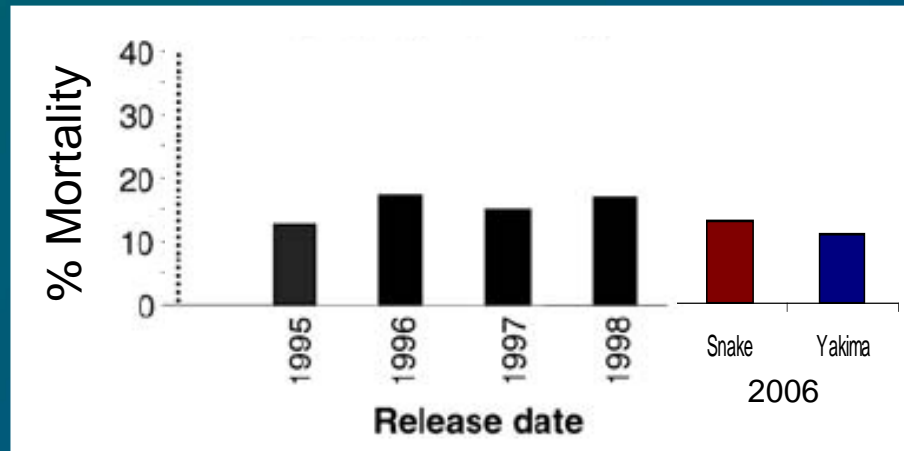


Relative Survival of Dworshak Spring Chinook



Radio Tag Study

- Schreck et al. 2006
 - Mortality from below Bonneville Dam through the estuary: 15-19% (1995-98)
- POST 2006
 - 13% Snake
 - 11% Yakima



Ocean Detections

