



SALISH SEA

MARINE SURVIVAL PROJECT



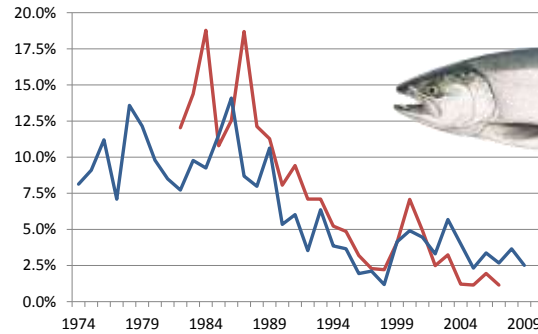
A Salish Sea-wide anomaly



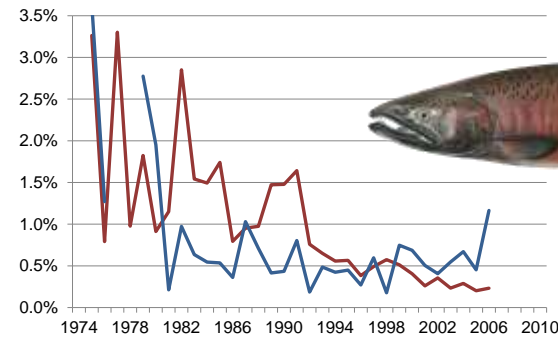
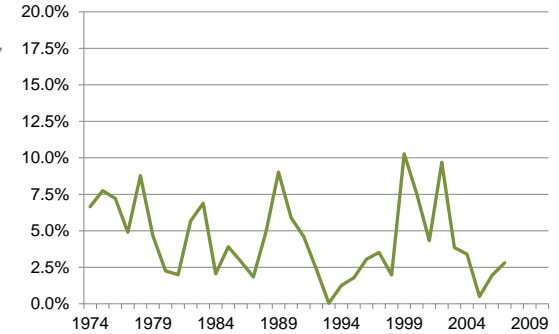
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A Salish Sea Anomaly: Decline in Marine Survival

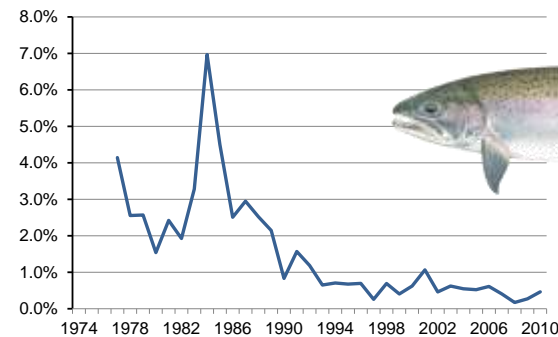
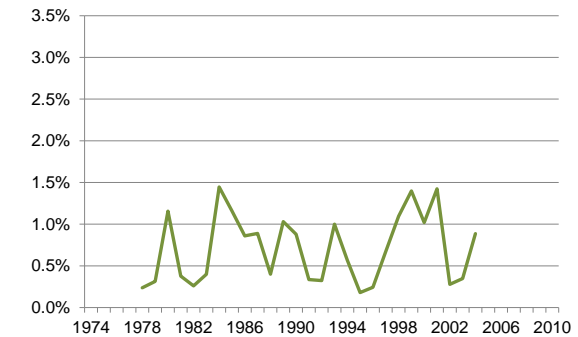
● Puget Sound
● Strait of Georgia
VS
● Washington / B.C. Coast



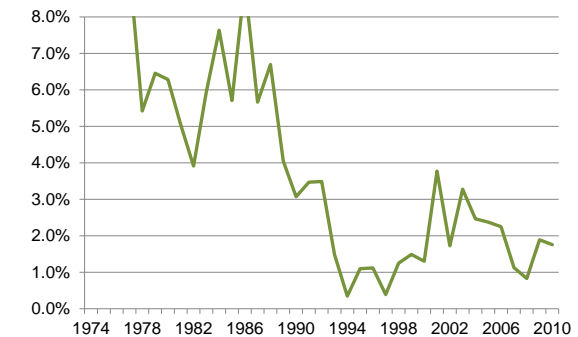
Coho



Chinook

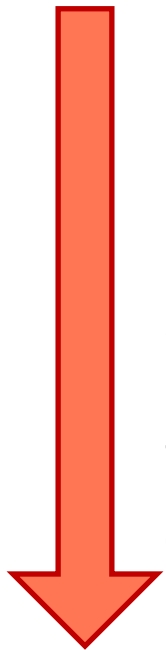


Steelhead

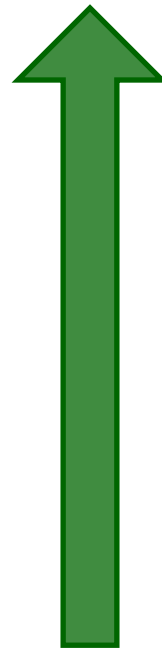




... and changes have not only been observed in Coho, Chinook & steelhead



Fraser sockeye salmon (+/-)
Herring spawning locations
Forage fishes (bait fishes);
e.g. Fraser River eulachon
Some marine fishes
Giant kelp and sea grasses



Harbour seals, white-sided
dolphin, and harbor porpoise
Fraser pink salmon (odd-year)
Strait waters, up 1°C over the
past 30 years
Human population &
developments



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SALISH SEA

MARINE SURVIVAL PROJECT

A multi-disciplinary, ecosystem-based program to determine the primary factors affecting the survival of juvenile salmon and steelhead in the Salish Sea marine environment

- >\$20 million – Combines public and private investments
- > 150 scientists and technicians
- > 40 partners and funders
- Centrally coordinated by PSF and LLTK
- 5 years for research and application to management

40+ Partners and Funders



Objectives

Advance wild salmon recovery and sustainable fisheries

- What happened since the 1980's and can we improve the situation for juvenile salmon and steelhead?
- How do we improve the accuracy of adult return forecasting with early marine survival data to better manage harvest, hatcheries and natural spawning?

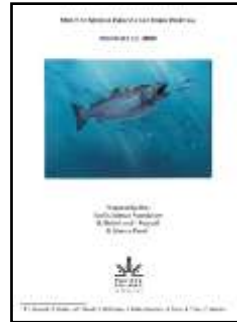


Process

Canada

US

**Comprehensive, collaborative
research planning**
(initial round through 2014)



**Coordinated, systematic
research**
(2014-2017)



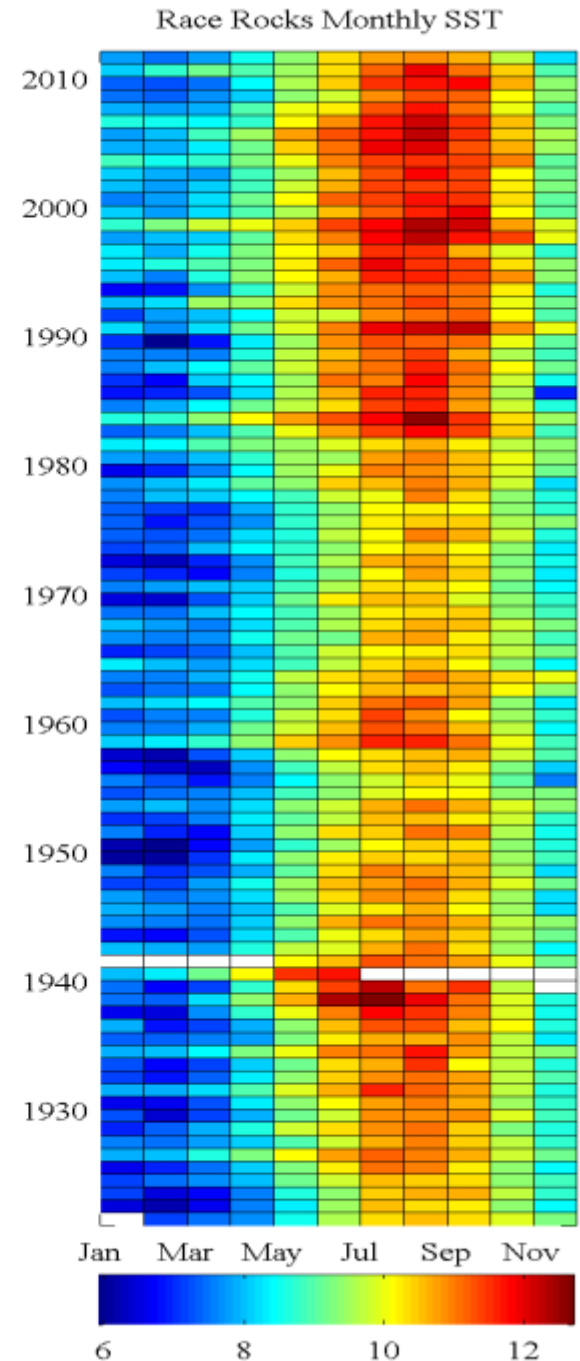
**Dissemination and
application of the research
results to management**
(2018)



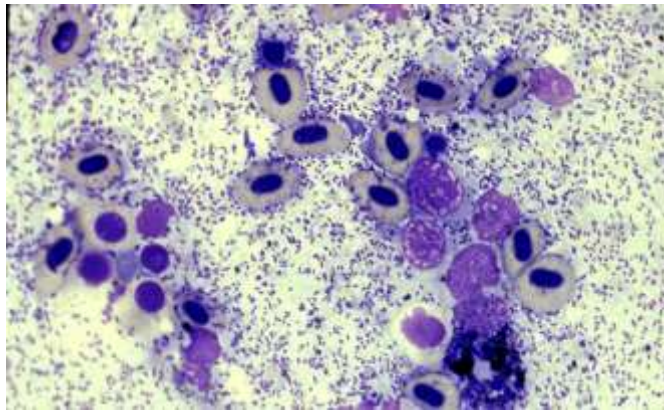
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Race Rocks Temperature

- Sustained warm periods in the 80s-2000s, late 50s- early 60s, and late 30s - early 40s











Hypotheses

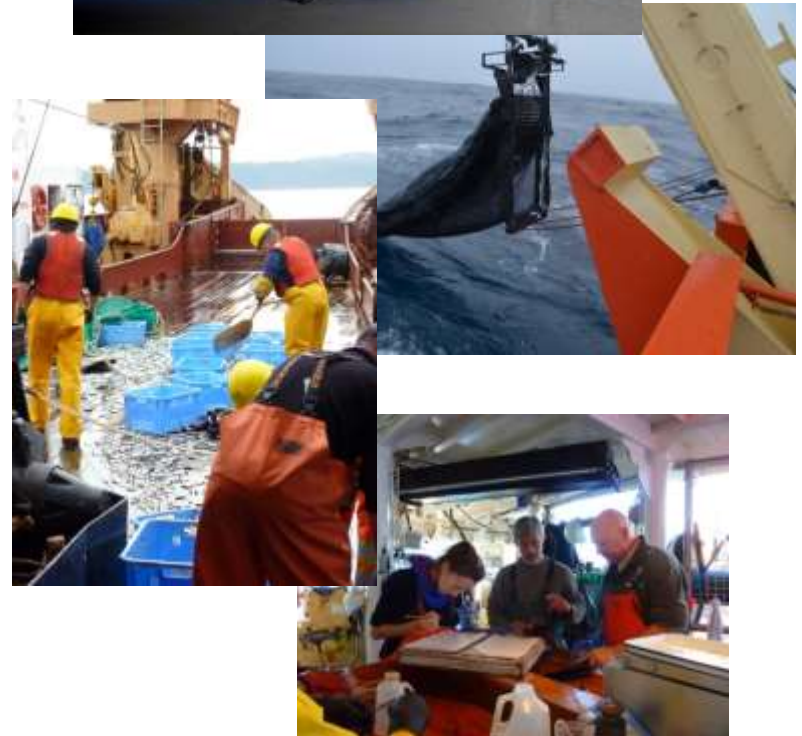
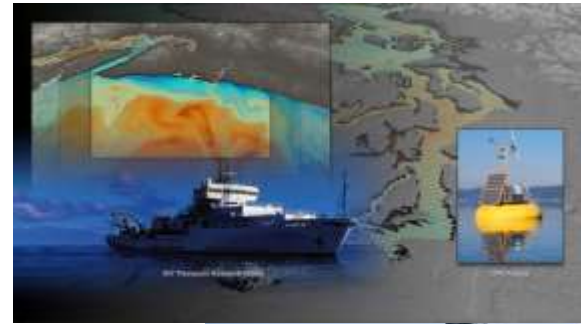
- A. Bottom-up processes** that drive Chinook, coho and forage fish prey availability have changed, and salmon aren't able to compensate - What are time and space scales of effects?
- B. Top-down processes contributing** – Primarily more predators make situation worse. Eating larger juvenile steelhead, resident salmon and baitfish. - If survival is determined in the initial few months, what are the proximate causes of mortality?
- C. Other factors may compound the problem:**
- Microbes & disease
 - Toxics
 - Habitat degradation (role of estuaries?)



Ultimately, is this caused by local, human influence or regional or global impacts (climate change, natural ocean and temperature cycles)?

Research Approach

- Track salmon.
- Identify critical growth periods and drivers of growth.
- Analyze predators, disease, toxic chemicals, etc.
- Models and trends analyses to pull pieces together and tell the story.



Status

- Planning for first two years of research complete (Puget Sound Chinook & coho plan to be released this fall)
- To date, 35 activities proposed, 19 implemented
- Very successful year of field work



Collaborative Puget Sound Sampling

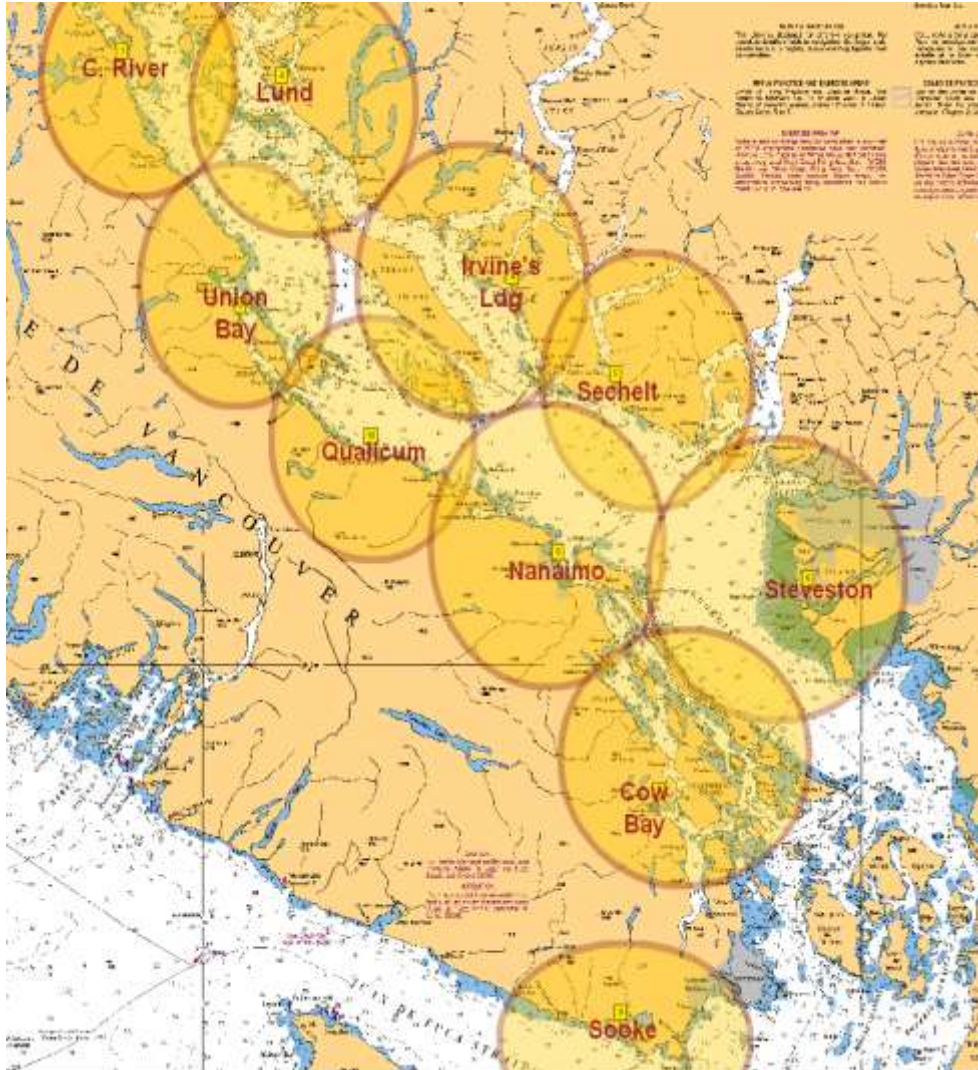
- Over 80 biologists in the field and labs
- 18 entities involved
- Federal, state, tribal, nonprofit and academic participants

Puget Sound

- Buoys
- Zooplankton
- Juv. Salmon and Steelhead



Citizen Science in the Strait of Georgia

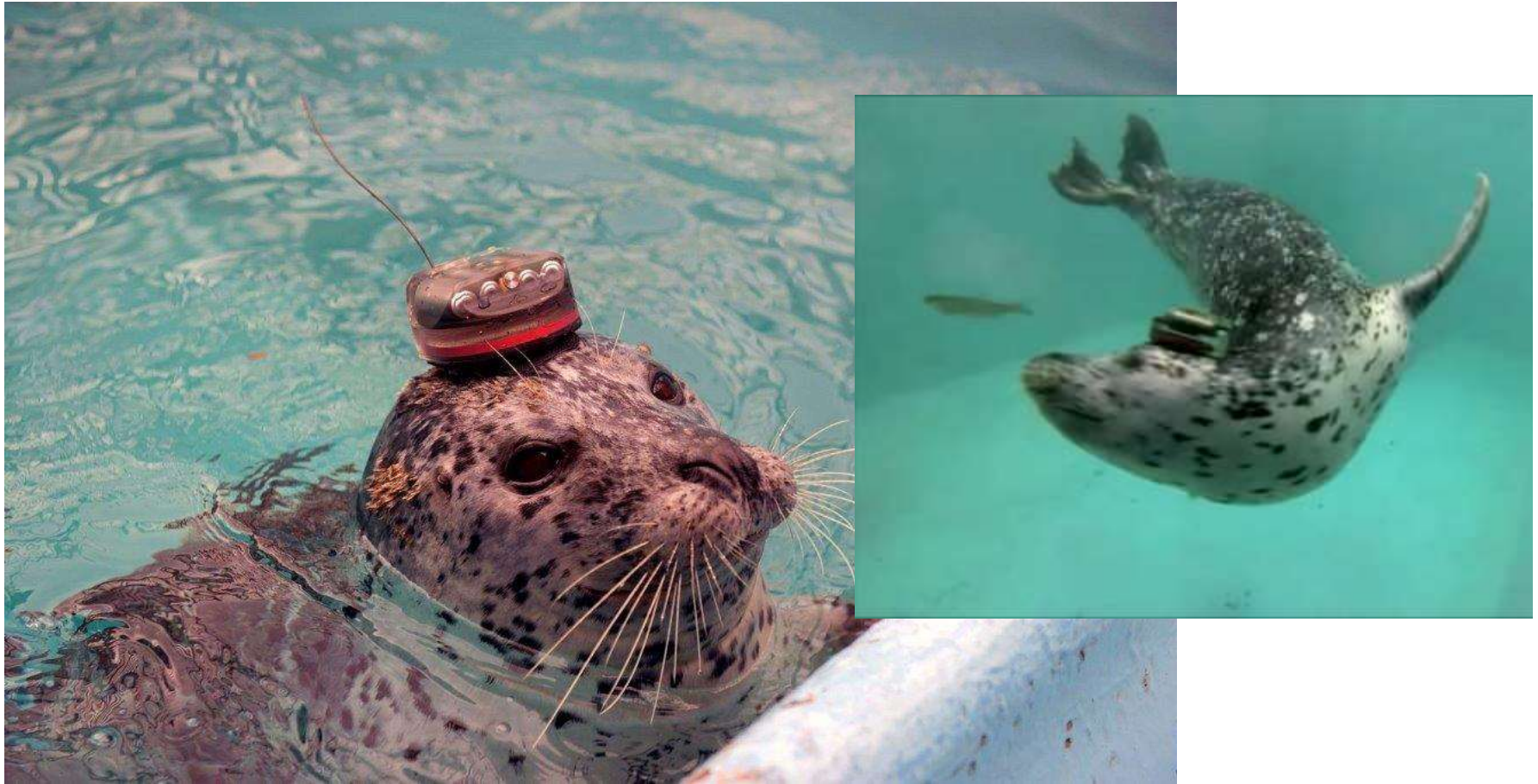


- 2014 development: Cowichan Bay, & Campbell River, Victoria, Deep Bay.
- Define time/space scales for sampling
- Involves Ocean Networks Canada, DFO Institute of Ocean Sciences staff, SSMSP technicians

Telemetry Arrays to Track the Fish



Innovative Research Techniques



Austin Thomas UBC

Funding Status

- \$20 million dollars (new money) over 5 years: \$10 million U.S / \$10 million Canada
- Raised approximately \$12 million to date: \$4.25 million U.S. / \$7.25 million Canada
- Anchored by \$5 million/ 5 year grant from the Pacific Salmon Commission, Southern Endowment Fund





“I’ve been waiting 30 years for this type of effort to occur.”

- Kip Killebrew, Senior Fisheries Biologist,
Stillaguamish Tribe



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www.marinesurvivalproject.com

