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Science-Policy Exchange

Policy Implications from the Northwest Power and Conservation Council's Science-Policy Exchange

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Objectives for the S-P Exchange: *September 12-13, 2007; PSU*

- Inform the Upcoming FWP Amendment Process

- Science and the FWP
  - *Are the assumptions in the FWP consistent with the newest scientific findings?*
  - *Understand how science has evolved and*
  - *How will that affect our management actions*

- Roundtable Discussion: *Policy <> Science <> Management*
  - *Sharpen issues surrounding symposium topics*
  - *Reach common understanding among Council members, regional scientists, and federal, state, and Tribal managers*

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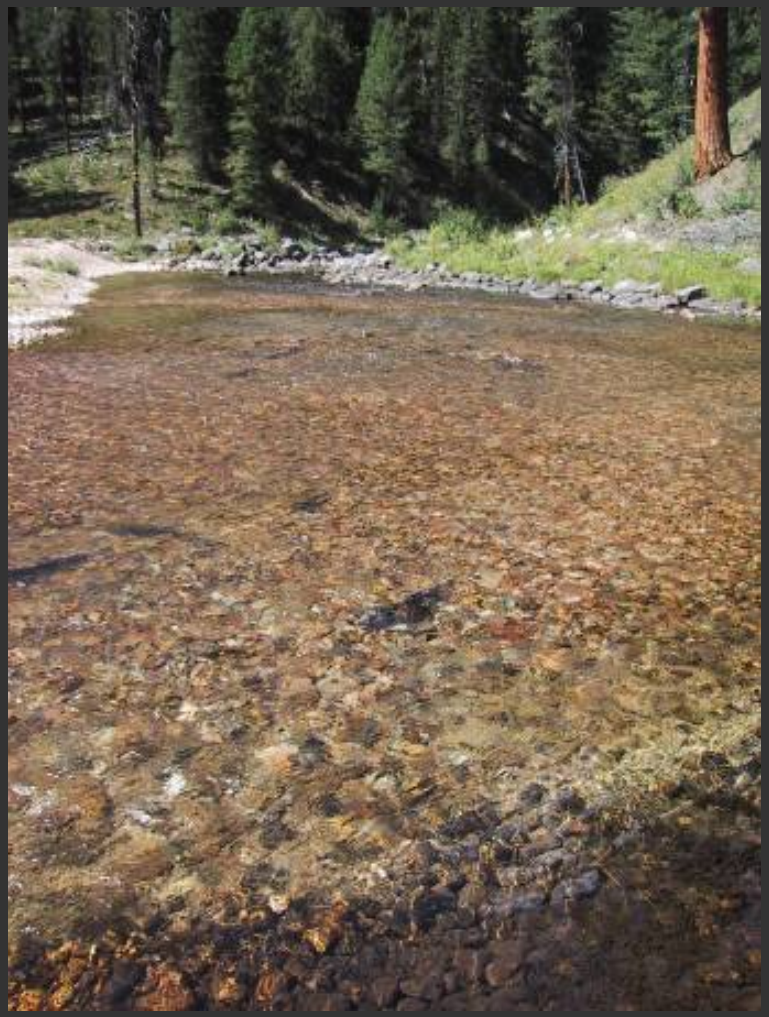

Fish and Wildlife Program Assumptions

- Habitat-based
- Incorporated in Fish and Wildlife Programs' Scientific Principles
- *Based on:*
  Independent Scientific Group's *Return to the River* and its Conceptual Foundation

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Diversity – Productivity Linkage

- Normative River Processes
  - *natural ecological processes and functions*
- Habitat Complexity and Diversity
- Biodiversity
  - *life history, population, phenotypic, genetic*
- Salmonid Productivity
  - *achieve or approach Council's rebuilding goals*

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- Format of Topic Sessions
  - Specific topic
    - *Note FWP assumptions on topic*
    - *Describe and summarize new scientific findings*
    - *Clarify with case studies, wherever possible*
  - Summary and policy implications
  - Group Discussion
    - *Exchange between Council members, managers, and scientists*
    - *Emphasis is on policy and manager's perspective*
- Final Report to Council mirrors this structure.

Asotin Creek restoration

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- **Intensively monitored watersheds**
- **Habitat strategies**
- **Nutrient enhancement**

Habitat Issues

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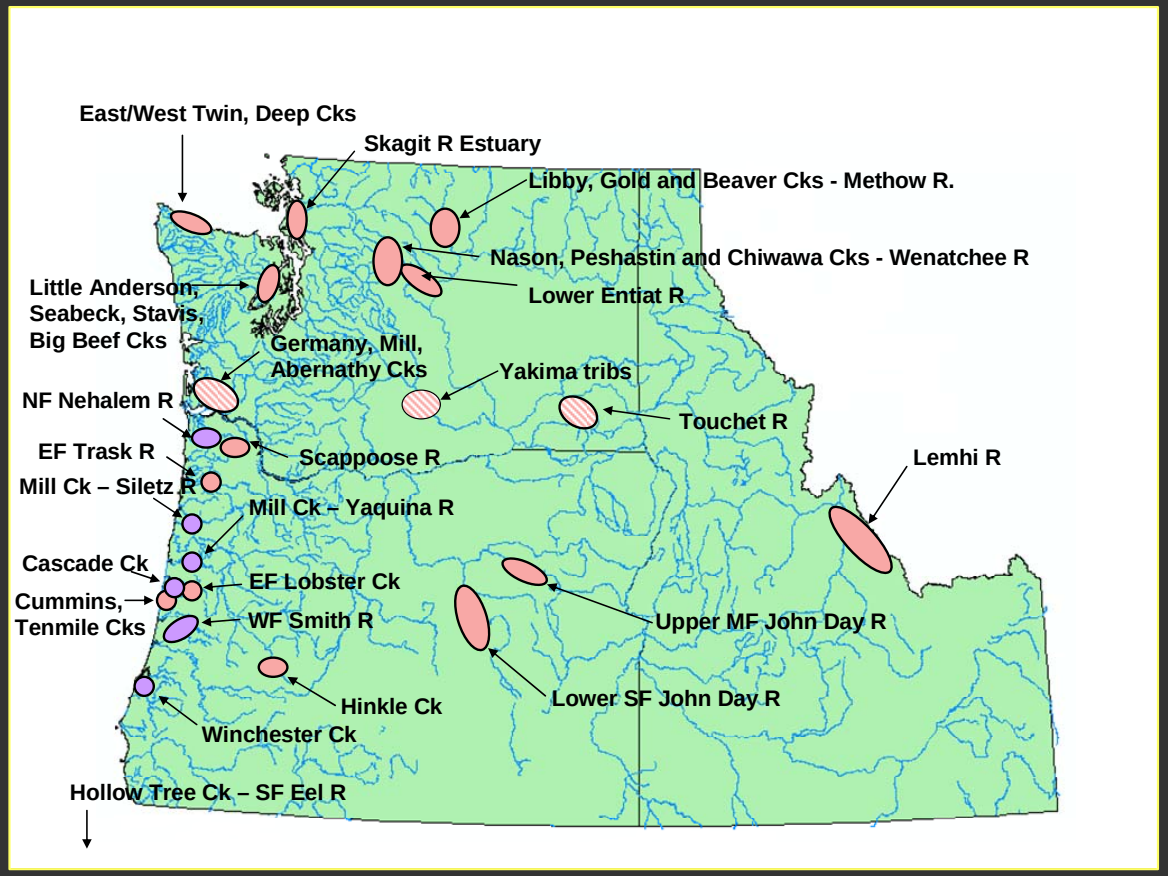
Location of Intensively Monitored Watersheds

Most IMW sites are in the coastal forests and watershed. Only a few IMWs occur in the interior Columbia; for example, only one site in Idaho on the Lemhi River.

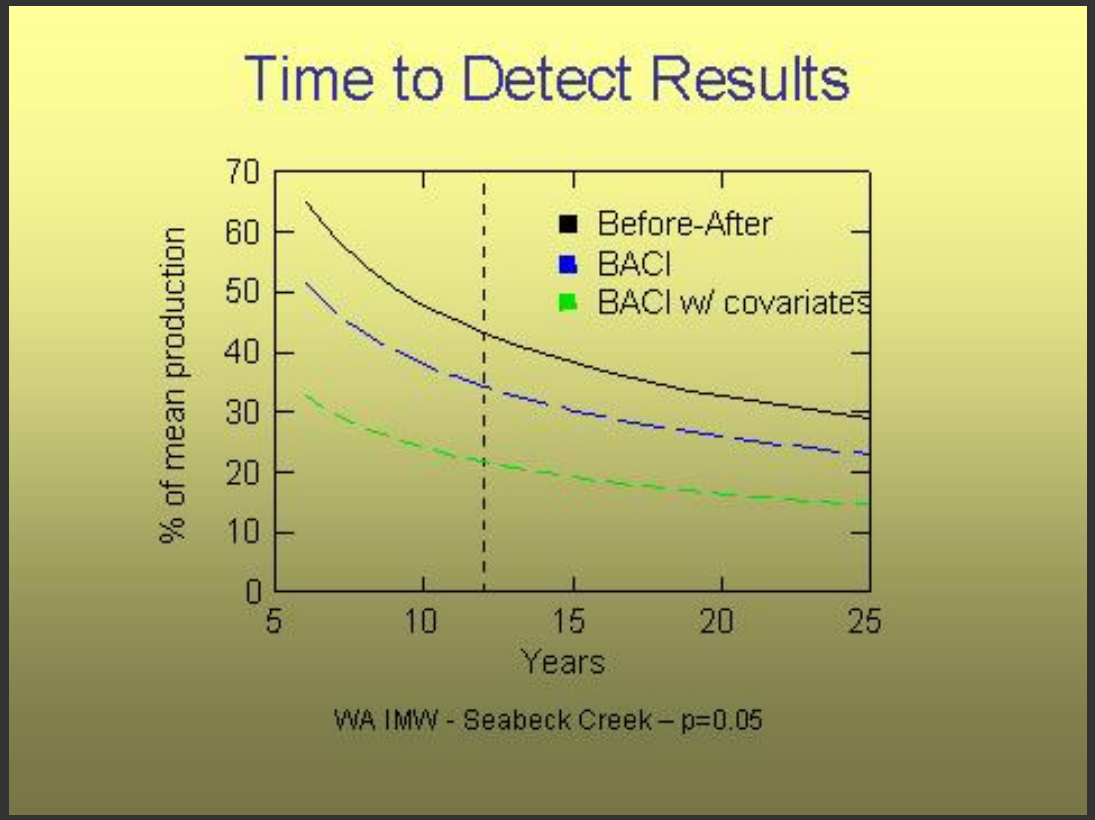
We may need more interior sites in order to be able to extrapolate from the interior IMWs to other locations in the Columbia River Basin.



IMWs - Duration of studies

Habitat response can be very fast. Monitoring needs to focus on identifying the ecological processes and the impacts of large events, such as floods or forest fires.

Monitoring for extended time periods (i.e., 15-20 years) in some selected situations is crucial to adequately assessing the impacts of restoration and recovery efforts.



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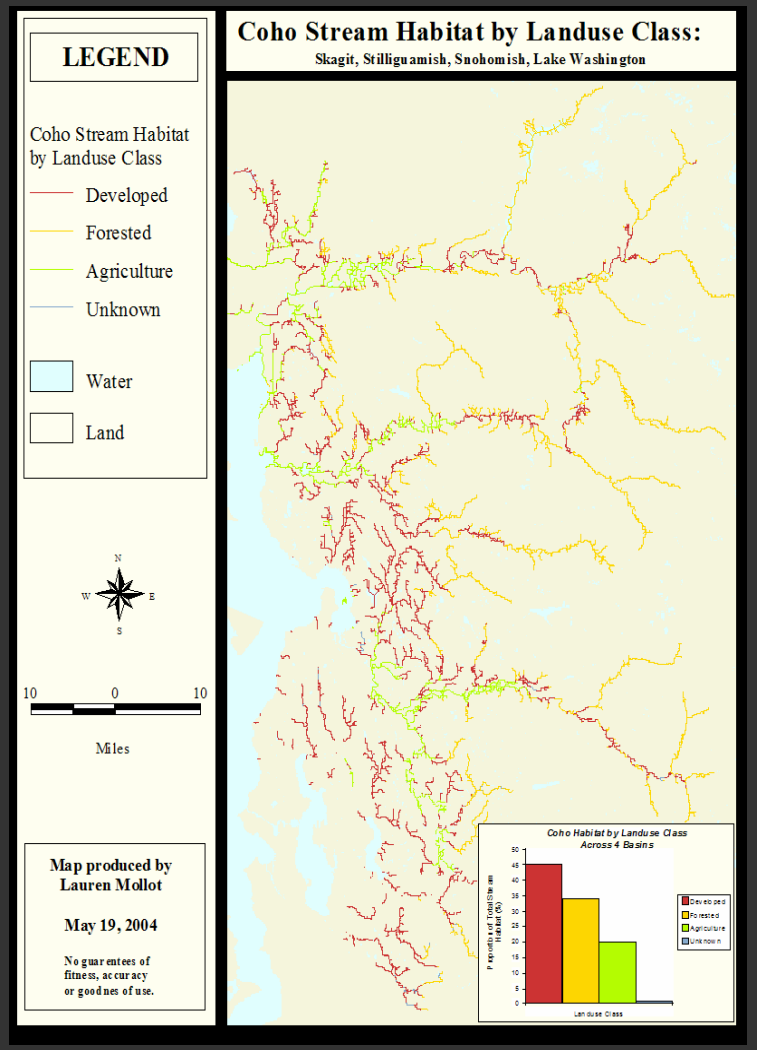
IMWs - How to define success?

What level of change and detectability are we looking for in the IMWs?

Is there a difference between biologically significant results and statistically significant results that matters to policy makers?

If additional IMWs are to be established, what criteria will be used to identify them? One approach would be to look for areas where existing datasets exist, like the Grande Ronde.



Habitat Session:
Roundtable Discussion Points

Pete Bisson (ISRP) - How long is long enough to monitor an IMW site? It's difficult after 17 years to get any statistically significant. What would it take to see a 30% change?

Gordie Reeves (USFS scientist) and Bob Bilby (ISAB) - We need to separate biological significant from statistical significance, as they don't always coincide. For example, in Fish Creek, you'd get on blip that would throw off the statistical significance. How do you define success? It needs to be defined biologically (and politically?).

Rick Williams (Facilitator) - The emerging policy question from the above discussion is "What is the level of change we are looking for; what is the time line needed to obtain it?" At present, the region has not had this discussion. It needs to do so.

Habitat Session:
Roundtable Discussion Points

Jim Kempton (Council Member, ID) - Where (geographically), given the fact that funds are limited, should watersheds be monitored intensively? Also, can the IMW approach be used on stream segments or confluences? What is the most effective way to conduct monitoring?

Gordie Reeves (USFS scientist) and Bob Bilby (ISAB) - There are a large number of IMWs going on; the coast is covered, but the interior may not be adequately represented. We need more in Idaho and the Salmon River basin in particular. It is important to have a set of IMWs across the basin to get more detailed data.

With respect to monitoring scale, the IMW design can tee-off a confluence - one control, the other treatment. Restoration strategies are applied in combination to address what the limiting factors are.

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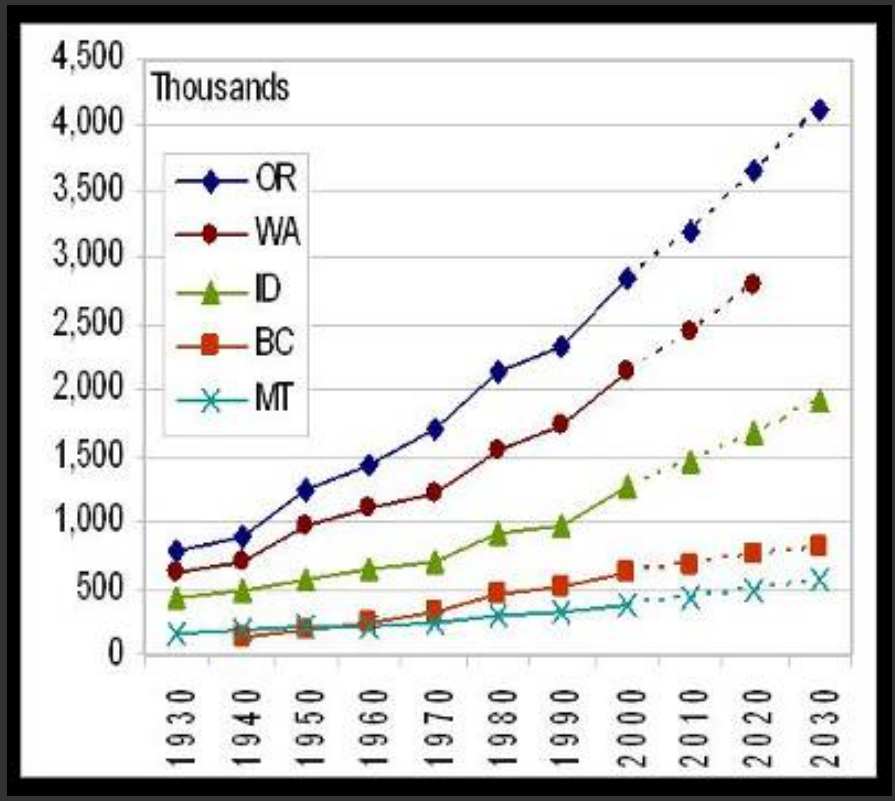
Habitat Strategies and Planning

Because climate change and human population growth may have very large impacts on water use and availability, the amendment process should explicitly address these issues, at least at the planning level, if not beyond.

Examination of the future predictions of water availability, temperature changes, habitat loss, and habitat degradation, should be included in the planning.

Prioritized strategies and actions could then arise from this planning effort.



US and Canada censuses. State and regional district projections for 2010 and 2020.

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Which habitats to protect?

Habitat protection actions should be directed at the best available habitats. Planning needs to include present and predicted future conditions taking into account climate and human population change impacts.

The best habitats today might not be the best habitats in the future.

Do we protect the current best, invest in restoration in habitats that might be better in the future, or do we attempt a balanced program of both strategies?

Wind River Canyon, WA

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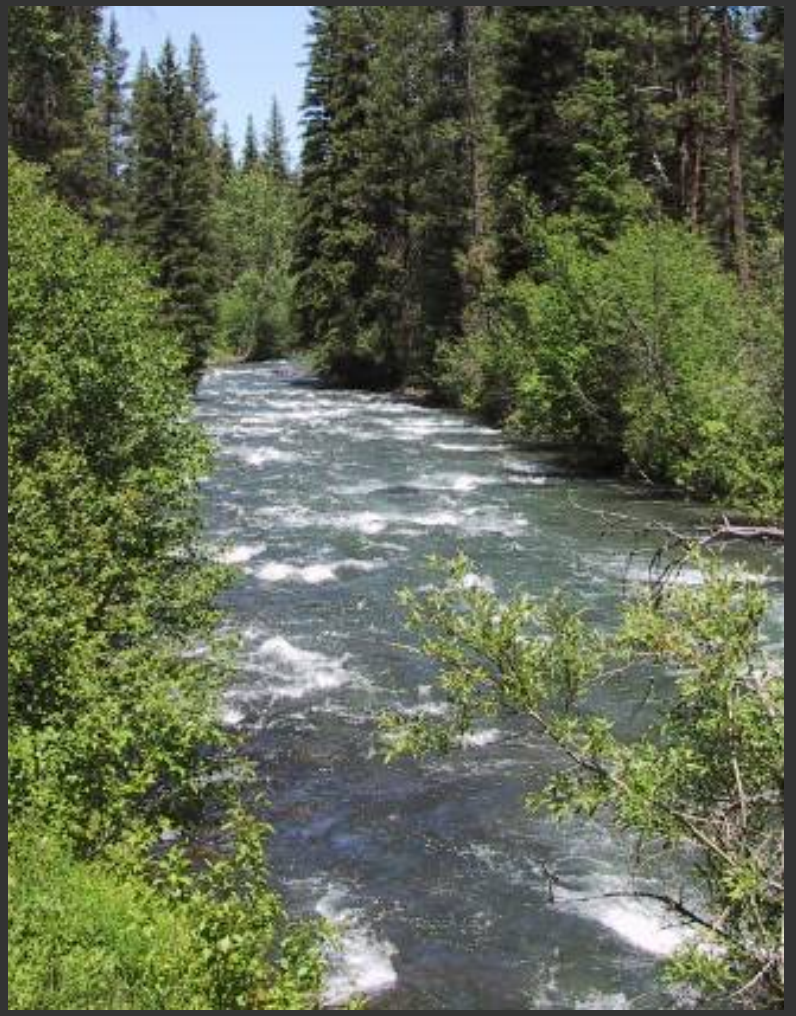
The Need for Refuges

Protection of cold-water refugia for migrating salmon and restoration of riparian habitats in headwater reaches should have high priority.

In addition to habitat refuges, consideration also should be given to wild fish / genetic refuges, as wild fish are the seed source for future salmonid genetic diversity.



Upper Imnaha River, Oregon
Spring chinook spawning habitat

Habitat Strategies:
Roundtable Discussion Points

Joan Dukes (Council member, OR) - Do we have enough information on climate change to guide specific actions?

Gary James (Scientist, Umatilla Tribe) - We don't have information that is specific enough. Temperature is always a limiting factor. One thing we can do in a western landscape where water will become more limiting is to develop broader valley natural function. This can be done by fencing riparian zones. Increasing riparian habitat will increase the system's hyporheic function.

We need to preserve the width of natural floodplain function, which allows streams to meanders and reduces temperatures in the hyporheic zone. This can lower water temperature, which varies by reach. Every flood plain provides an opportunity to lower water temperature and increase water retention.

Habitat Strategies:
Roundtable Discussion Points

Rick Williams (Facilitator) - What are our priorities for habitat restoration and protection given our limited resources? What has been the success of water banking and transfer programs? We will need more as water becomes more scarce.

Russ Kiefer (Idaho Fish and Game) - Most of the money today is applied opportunistically into habitats that are in the most trouble now. A dual strategy might be to focus short term funds to places that are currently productive and/or offer the best bang for the buck, while looking long term to invest in sites predicted to be best in future.

Susan Hanna (ISAB and presenter) - Most subbasin plans did not address human demographic change. Do we protect the best, or keep throwing money at the worst? The program needs a picture of where it wants to go. This makes it easier to make decisions along the way. Achieving goals may be difficult if money is all focused on degradation.

Linda Hardesty (ISRP) - Many subbasin plans did not get to stage of prioritizing limiting factors, strategies, or future actions, but this needs to be done.

Nutrient Enhancement

Questions remain about whether short term increases in fish growth due to nutrient enhancement, actually translate into increased overwinter survival, more productive smolt outmigrations and, ultimately, increased adult returns.

Consider whether additional nutrient enhancement experiments are needed and how they might be coordinated with the IMW research efforts.

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The Efficacy of Nutrient Enhancement as a Rebuilding Tool

While popular with the public, and while some fertilizing projects in the Columbia River Basin have produced impressive gains in fish growth, the scientists recommended that fertilization should not be widely implemented until the impacts, such as potential water contamination, and benefits for fish, insects, and water quality are better understood.

Carefully monitored field trials are warranted before the technique is implemented widely.

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Nutrient Enhancement:
Roundtable Discussion Points

Tom Karier (Council Member, WA) - The region is looking for strategies that are cheaper, faster, and better. Nutrient enhancement seems to deliver in only 4 years what may take other habitat restoration techniques 15 years. Considering uncertainty, at what scale do we implement now? How fast can we expand this? Can we get information faster? Should we worry about water quality implications?

Pete Bisson (ISRP and presenter) - The studies suggest that we ought to move cautiously. We need more studies. For example, when you replace carcasses with carcass analogs, studies suggest this truncates benefits to the larger ecosystem. We don't know if it (nutrient enhancement) does really aid in overwinter survival and contributes to adult returns. We need to be aware of the limitations of each study.

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Nutrient Enhancement:
Roundtable Discussion Points

Gary James (Scientist, Umatilla Tribe) - These enhancement measures seem like life support. Isn't it better to get natural systems functioning? What would a natural distribution of dead fish carcasses look like in a watershed?

Matt Mesa (US Geological Survey and presenter) - An underlying aspect of nutrient enhancement work is that it is supposed to be temporary fix, not a long term solution. There have not been a lot of studies on carcass enhancement.

Pete Bisson (ISRP and presenter) - Similarly, it is not as effective as habitat improvement, because of short term fix. Effects are immediate and short term and do not stay in the system. Consequently, there are a lot of reasons to not implement program widely; variation in conditions could have big effect. It could change entire system dynamics.

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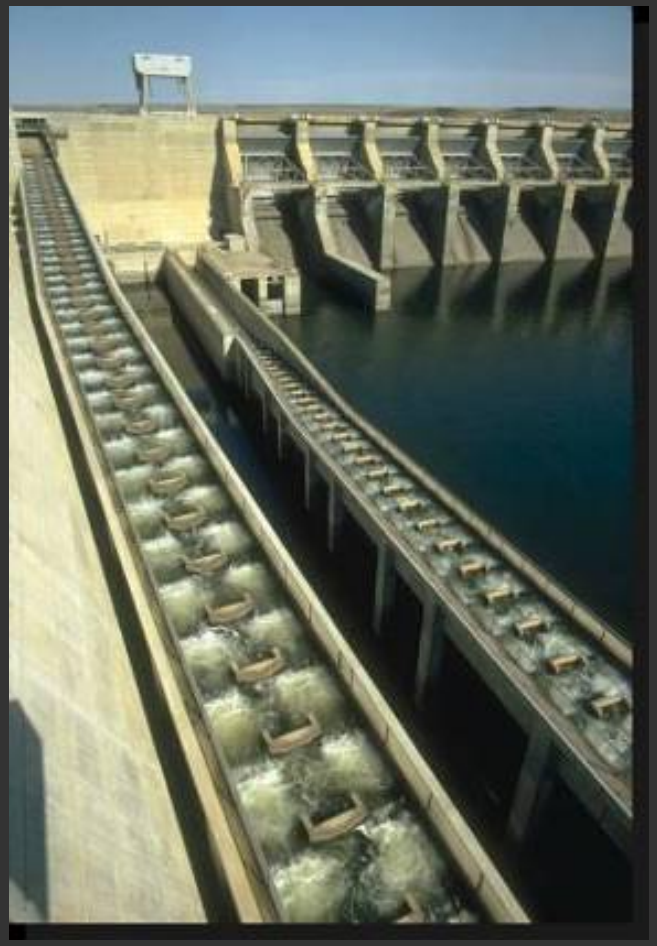
Mainstem Issues

- **Mainstem passage survival**
- **Snake River Fall Chinook life history diversity**

Mainstem Passage

Because fish survival varies with river and ocean conditions, and with whether juvenile fish are transported downriver in barges or migrate on their own, it will be difficult to meet specific survival targets established in policies.

Consider policies that fine-tune spill levels, flow, and fish bypass structures at each dam, as the research suggests that a one-size-fits-all approach won't work.



Ice Harbor Dam
North Fish Ladder

Mainstem Passage

Warm water and slow flows in the summer reduce survival of juvenile fish, so consider policies that address those problems.

Study in-river migration conditions that maximize survival in light of river travel time and annual conditions in the river, estuary, and ocean.

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Juvenile Fish Transportation

Address the future of juvenile fish transportation, which has a measurable effect on fish survival.

Examine the survival benefit of barge transportation for subyearling fall Chinook salmon from the Snake River in comparison to the survival benefit of summer spills at the Snake River dams to aid the downstream migration of these fish.

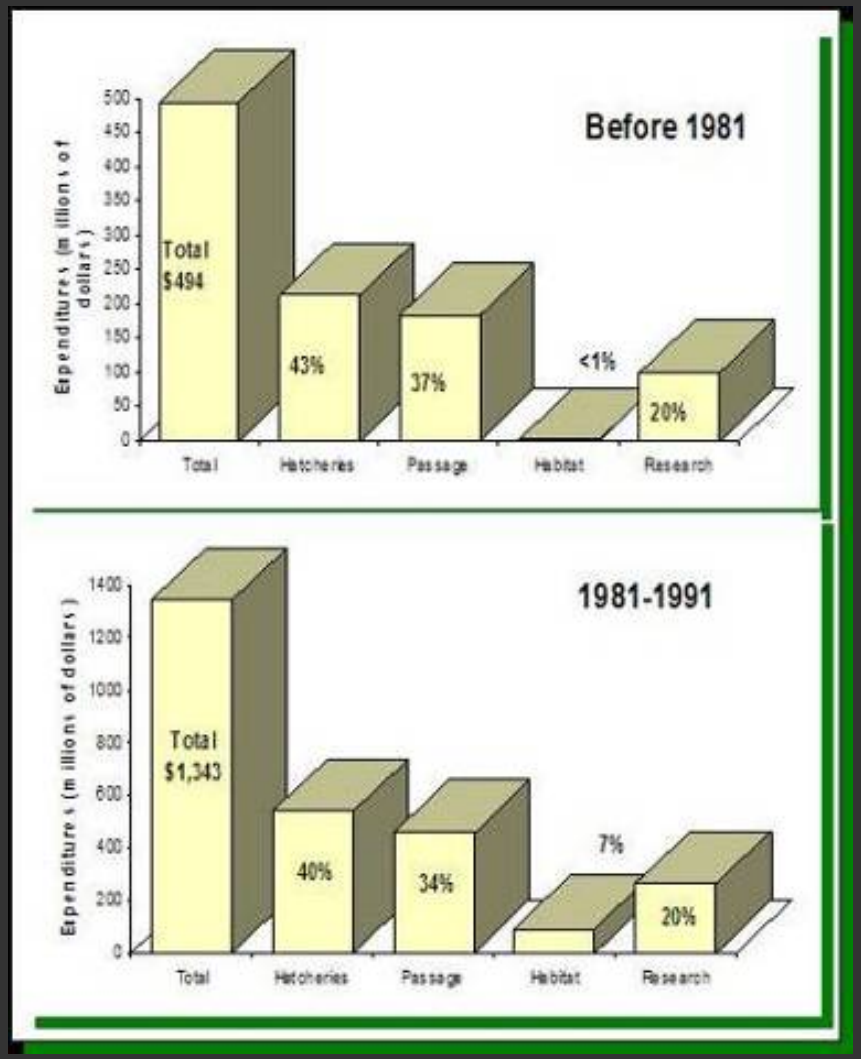
Cost Effective Investments?

Consider the cost-effectiveness of fish and wildlife program expenditures for hydrosystem passage improvements and artificial production.

~80 % of the annual program budget.

Have these expenditures reached the point of diminishing returns?

Might some of that funding be directed more effectively to other parts of the program such as habitat improvements upriver or in the estuary?



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Fall Chinook Migration Conditions

Warm water and low flows in the summer reduce survival of juvenile fish, while spill aids juvenile fish passage.

Study in-river migration conditions that maximize survival in light of river travel time and conditions in the estuary and ocean.

Need to balance flow and temperature releases from Dworshak and Hells Canyon complex.

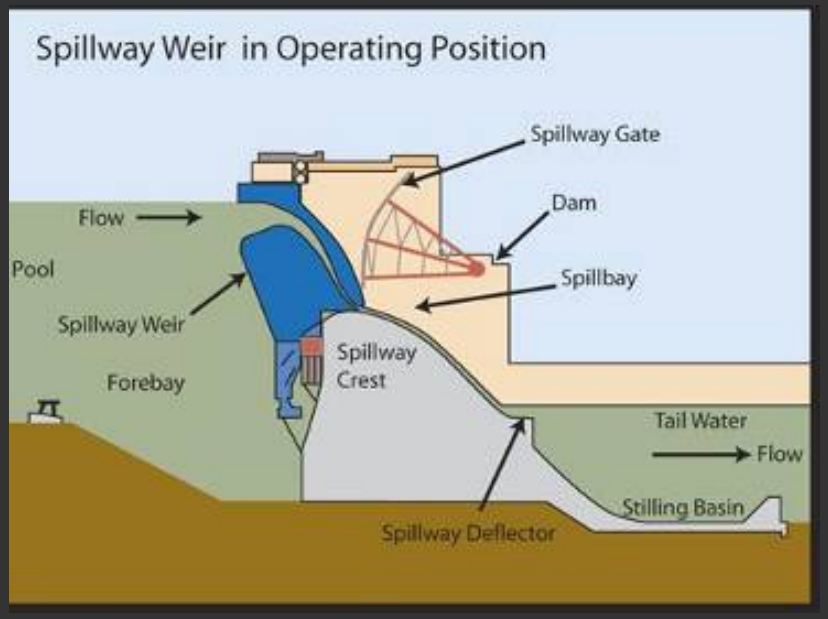
Removable Spillway Weirs

Surface-flow structures improved fish survival while reducing the volume of water released over dam spillways.

RSWs spill water and juvenile fish, from the top 10 feet of the water column; passage through spill gates typically occurs 50-60 feet below.

Most fish migrate in the top 10 feet, so RSWs pass fish more efficiently in terms of water volume, particularly for steelhead but also for Chinook.

Fish survival through the flow structures was the same as or higher than passage through spill gates.



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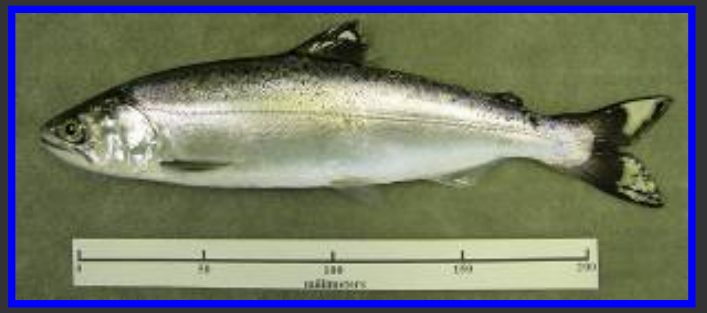
Fall Chinook Transportation

Study the survival benefit of barge transportation for subyearling fall Chinook salmon from the Snake River in comparison to the survival benefit of summer flows and spills at the Snake River dams to aid the downstream migration.

Juvenile fall Chinook have not been available from Snake River hatcheries in recent years.



These “test fish” were not available in 2006 or in 2007, unless there is a policy change that would give the research higher priority.

Mainstem Passage:
Roundtable Discussion Points

Gordon Axel (NOAA Fisheries and presenter) - The take home message from the Ice Harbor research is that you need to fine-tune spill operations at each dam. This was done by finding the optimal amount of water spilled for fish passage guidance and efficiency.

Howard Schaller (US Fish and Wildlife Service) - The take home message is to take a more holistic approach. What types of in-river conditions lead to higher survival considering direct and indirect effects, and near-shore and ocean conditions?

Russ Kiefer (Idaho Fish and Game) - In 2001, when we had a Power Emergency, in-river survival declined. Also in 2001, we saw that the typical relationship of in-river fish surviving better than transported fish once below Bonneville Dam was reversed. RSWs should be operated in concert with spill as a potential means to reduce latent mortality.

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Fall Chinook:
Roundtable Discussion Points

Nancy Huntly (ISAB) – Snake River fall Chinook increased without meeting number of hatchery fish releases. If natural numbers are doing well, do you risk that success by trying to push artificial production?

Jay Hesse (Scientist and presenter, Nez Perce Tribe) - The dip in production shown in our graph was a result of low returns and a decision to not include strays in the broodstock. A very significant policy question is the mitigation responsibility for Lyons Ferry Hatchery. So you have a difference of goals at play between ESA vs. hydro mitigation.

Bob Heinith (CRITFC) - The FWP is supposed to protect all fish and wildlife. Lamprey are disappearing; the amendment process should maintain a multi-species focus. Lamprey recently exhibited the lowest counts ever seen at Bonneville; only 20-30 above Bonneville.

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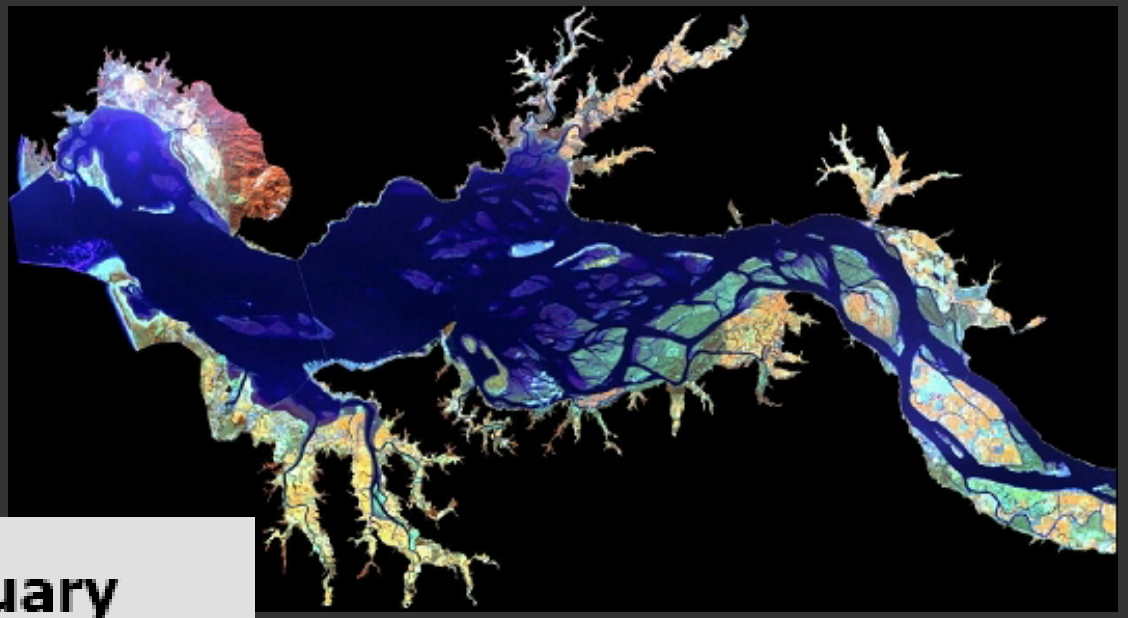
Estuary and Plume Issues



- **Survival through the Estuary**
- **Salmon life histories, habitats, and food webs in the Columbia River Estuary**
- **Current restoration activities**

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Estuary Habitat

Fish from throughout the Columbia River Basin use estuary habitat for varying amounts of time before ocean entry.

River and estuary management should emphasize diversity and assume there is an optimum time of residence in the estuary.

- *One size will not fit all.*

Policies should connect the upriver hydropower system to the lower river estuary, synthesizing available scientific knowledge in order to direct future research and policy-making.

- *For example, some Snake River fall Chinook are spending up to a year in the estuary*

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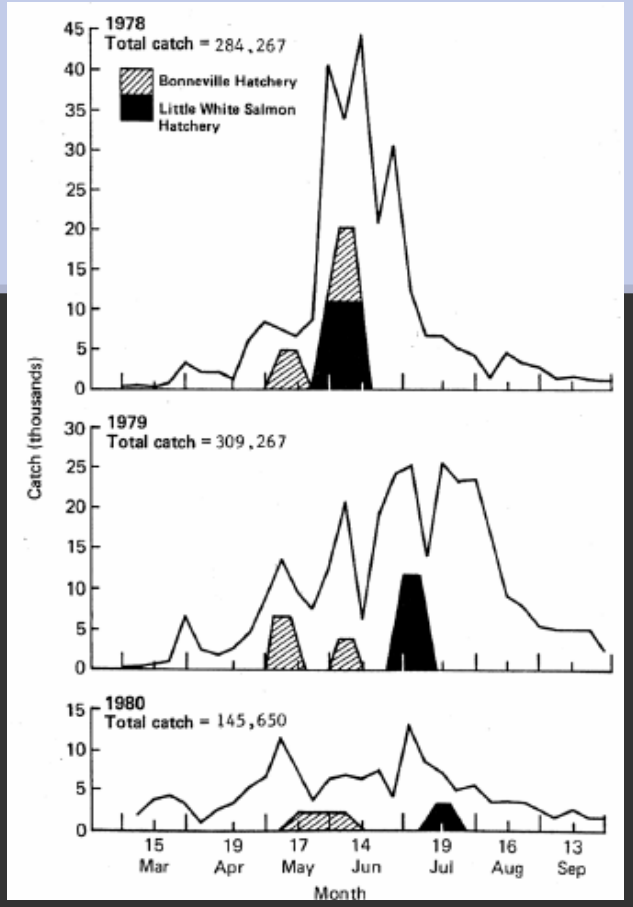
Estuary Research Priorities

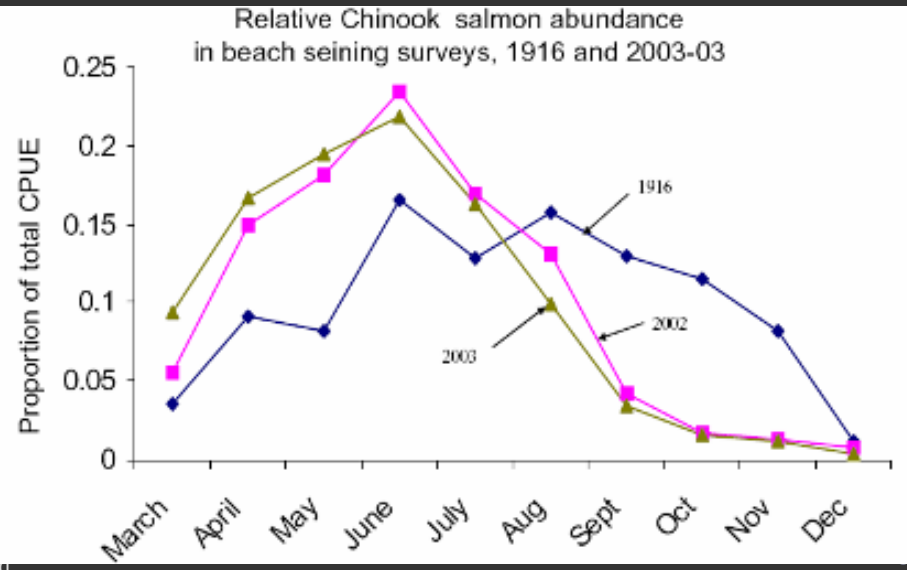
Survival of wild fish should drive management decisions.

The freshwater tidal reach is an unknown and an obvious research priority.

Quantitative goals should be considered for habitat restoration.

Intensively monitored watersheds might include estuary sites to better understand how fish use these habitats.

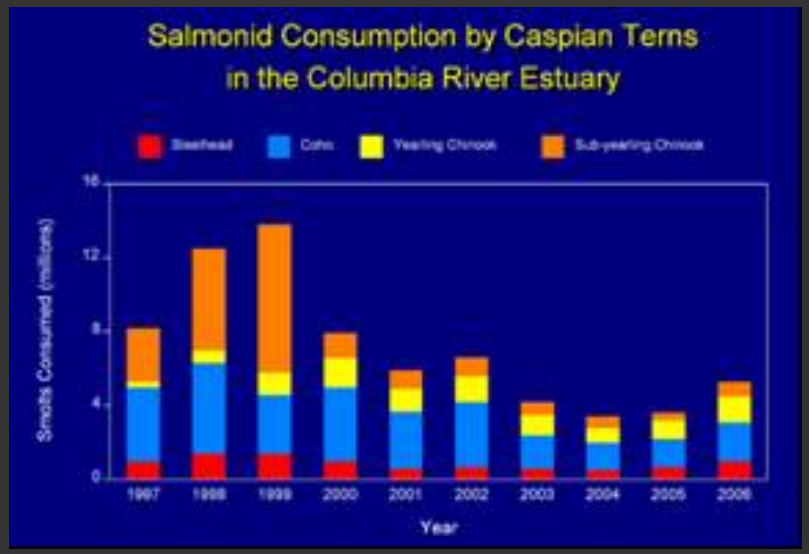


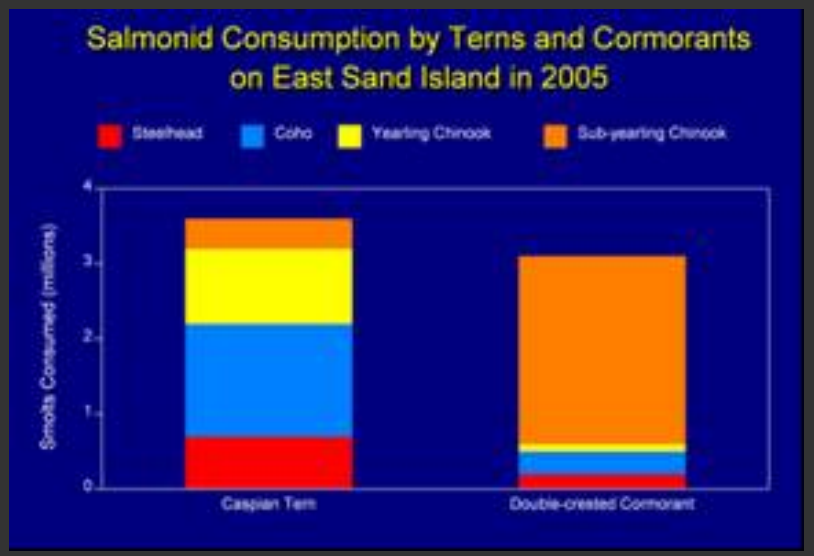


Bird Predation

Survival in the estuary is lower than previously believed, and not much different than survival through the hydropower system.

Predation by birds in the estuary might be reduced if barged smolts were released downstream from Astoria, although this might also affect their survival, if rearing and physiological transition time in the mixed saltwater and freshwater environment of the estuary is needed for their maturation and survival.





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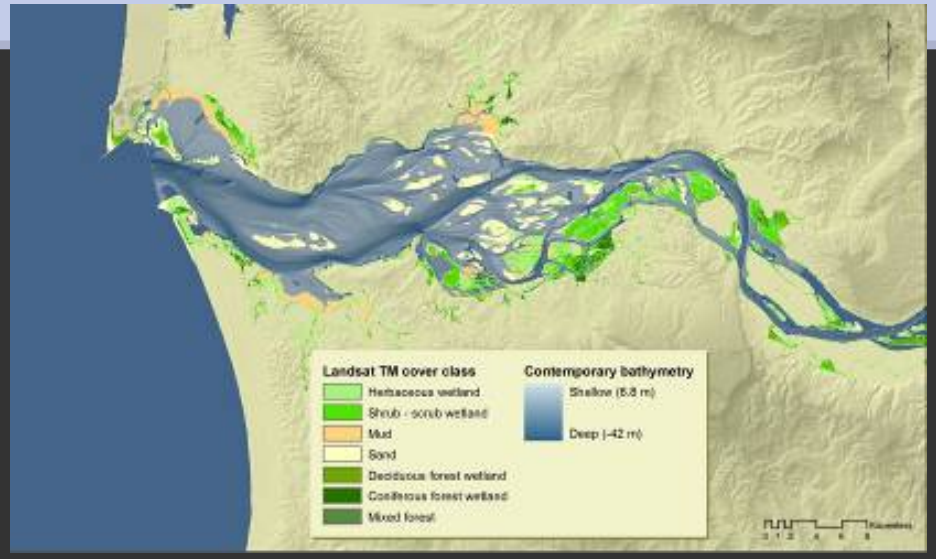
Linking Upriver to Estuary

Policies should connect the (upriver) hydropower system to the (lower river) estuary, synthesizing scientific knowledge in order to direct future research and policy-making.

For example, some Snake River fall Chinook are spending up to a year in the estuary, but it is not known where.

This knowledge could inform policy decisions on hydropower operations that influence salmon travel time and habitat conditions in the estuary.



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The Estuary and Salmon Life History

Policies need to focus on creating more of what the fish need – more acres of salt marsh, rather than on quantifying increases and decreases in fish mortality.

We need to look at the estuary as a critical part of the salmon life cycle.

The estuary is an important rearing environment that salmon have adapted to use, and we need to preserve it as part of the continuum.

Estuary Session:
Roundtable Discussion Points

Tom Karier (Council member, WA) - How do we know when we get to salmon recovery and how far along the path are we? Ocean and estuary have come into their own in the program over the past decade. The assumption is that all the anadromous fish go through the estuary, so this is an important area for improvement of fish survival.

Dan Bottom (NOAA Fisheries and presenter) - Columbia River estuary research has been consistent with research in other West coast estuaries. Defining how much salt marsh we need might not be a fruitful exercise. Survival estimates aren't the approach they are taking; they are trying to find what salmon need and provide that.

Rick Williams (Facilitator) - We need to look at the upper two thirds of estuary in more detail and improve our understanding of stock specific use of habitat including tributary deltas. Greater efforts need to be made to link management of the estuary to the operation of the hydroelectric system.

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Ocean and Marine Survival Issues

- **Coastal and ocean ecosystem – entry timing, and plume research**
- **Northeast Pacific Basin — tagging data**

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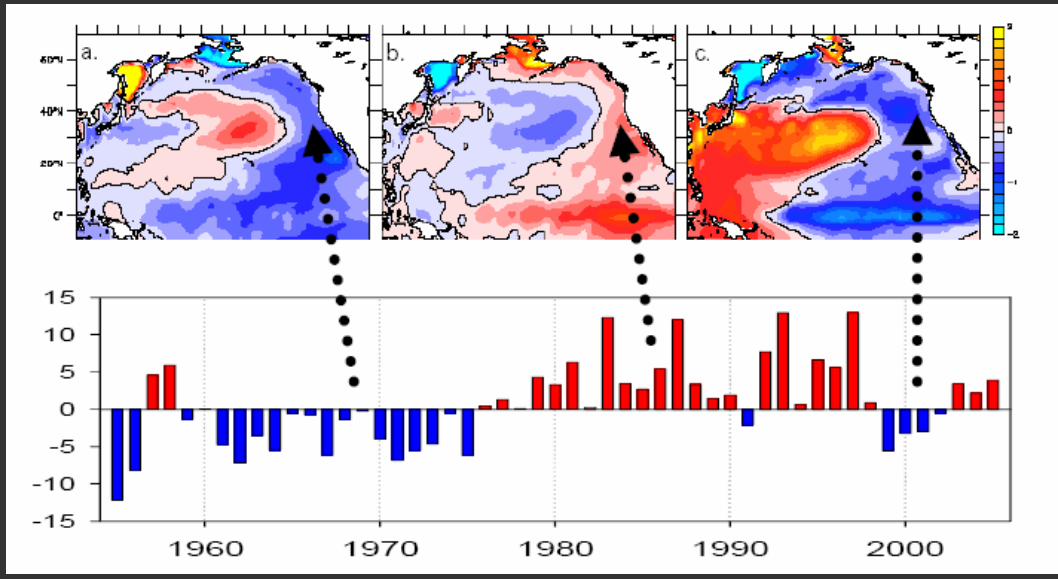
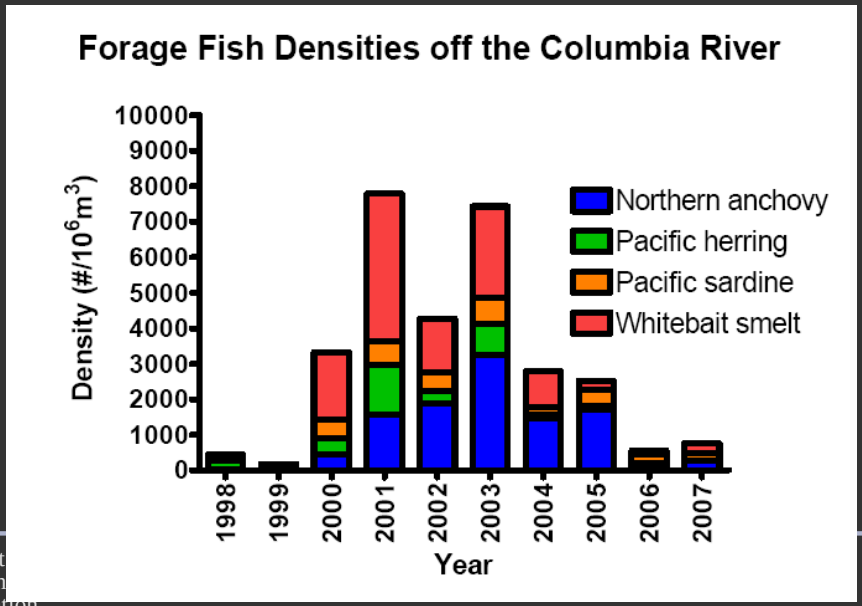
The Ocean as a Variable Environment

New insights from research demonstrate that variations in salmon abundance are linked to variation at spatial and temporal scales in the entire North Pacific Basin that biologists and managers have not previously taken into account.

The distribution, abundance, condition, and survival of juvenile Columbia River salmon vary synchronously with ocean conditions.



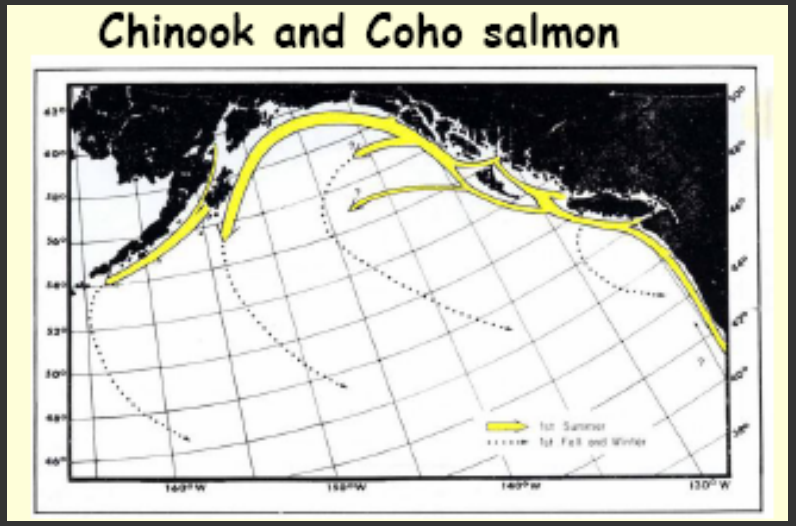


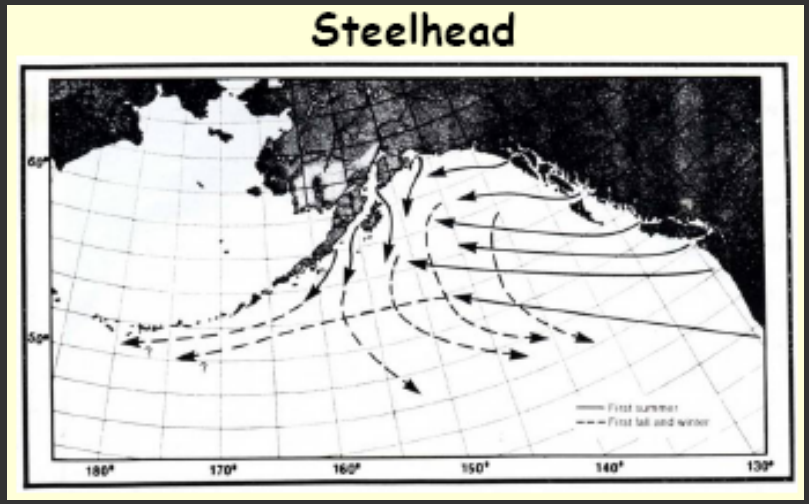
Understanding the Ocean

While the future cannot be predicted, salmon management strategies that ignore the effects of changing ocean conditions on Columbia River salmon are likely to fail.

Critical ocean habitats could be identified in order to plan for the future effects of climate change.

Strategies could be planned to meet escapement goals using stock-specific estimates of early ocean survival and abundance.





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Planning and Ocean Variability

Fish transportation and spill operations could be improved to maximize early ocean survival of salmon.

Under certain conditions, the ocean appears to have limited capacity to support salmon and steelhead.

It may be possible to overwhelm wild fish in the ocean with hatchery fish when ocean feeding conditions are poor.

Can we adjust hatchery releases to account for ocean conditions?

- *This would require information about ocean conditions more than two years in advance to adjust hatchery production schedules.*

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Harvest and Ocean Conditions

Harvest rates could be adjusted in response to ocean conditions to take fewer fish when conditions are poor and it is likely that fewer fish are available.

Strategies could be planned to meet escapement goals using stock-specific estimates of early ocean survival and abundance.

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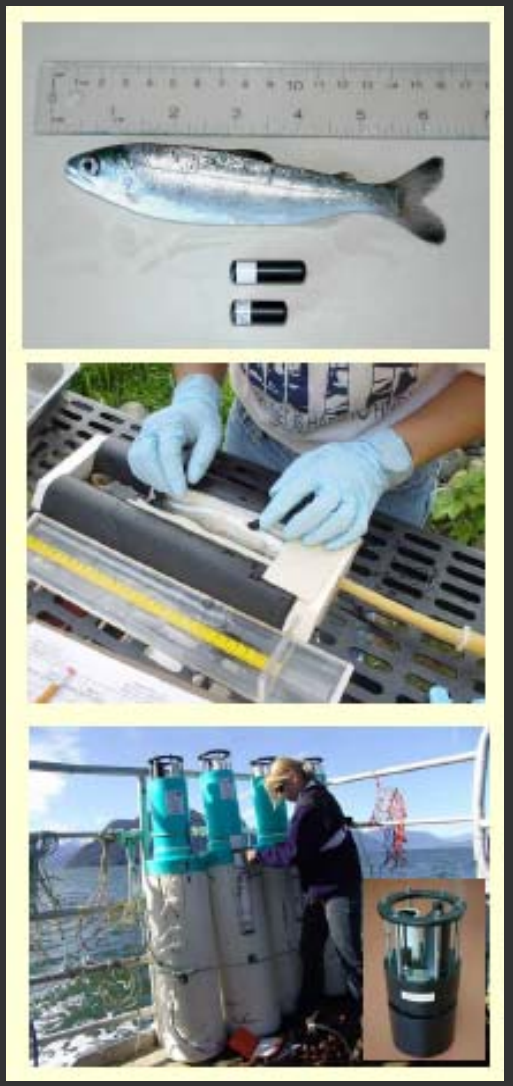
Ocean Session:
Policy Points from Kate Myers talk

Scientific knowledge from comprehensive research programs in combination with new and improved technologies and management tools can lead to sustainable fisheries and salmon returns to the Columbia River.

Use of informed “what if?” scenarios for future ocean conditions, climate, habitat, harvest, and hatchery production offers a means for testing different long-term planning strategies for resilience in the face of uncertainty.

Seek new innovative & comprehensive approaches.



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Ocean Roundtable Points

Bill Pearcy (ISAB and presenter) - Nate Mantua (UW scientist) would say forget about predictions; with climate change, think about diversity of stocks. The best thing we can do for the future is to think about the diversity of stocks.

Bill Tweit (WDFW) - Harvest managers are working on Bill Pearcy's comment on harvest rates, thinking of relative abundance of hatchery and wild fish. They are also looking as selective harvest. They've heard the message to maximize diversity. This pertains primarily to wild fish, but they are also attempting to manage hatcheries for diversity.

David Welch (Scientist) - A lot of what is inferred as freshwater impacts is confounded by ocean impacts. This can lead to major policy mistakes. In the Columbia, there is so much research going on that simultaneous collapse of other fisheries is not being considered together. For example, lamprey have collapsed up and down the coast at a consistent time with the salmon decrease. There would be benefits to bring the results together.

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Final Ocean Roundtable Points

Rick Williams (Facilitator)

It is interesting to see how the myths we had three decades ago about the ocean now look naïve. One is forced to wonder what current assumptions or myths will look naïve decades from now.

Failing to question our assumptions can lead to mismanagement (without knowing it!) and can lead to catastrophic collapses, as seen in the Atlantic cod fishery off the Grand Banks.

For decades, scientists, including the SRG, ISG, ISAB, and ISRP have recommended that all hatchery fish be marked. Without a method of unequivocally identifying hatchery fish (and wild fish), it is impossible adequately manage wild fish and assess fisheries, harvest, hatchery, and habitat management actions.

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Questions?

Snake River below Hells Canyon Dam