Agenda Item C.1
Situation Summary
June 2012

CURRENT HABITAT ISSUES

The Habitat Committee (HC) will meet on Tuesday, June 12, 2012, in Portland, Oregon to discuss Columbia River salmonid survival, the Lower Columbia Salmon and Steelhead Recovery Plan, Fishery Ecosystem Plan development, forage species, the NOAA Habitat Blueprint, and other topics.

At the April Council meeting, the Council elected to send two letters developed by the Habitat Committee concerning levee vegetation and Klamath water management. The letters have been sent and copies are attached (Attachments 1 and 2).

Council Action:

1. **Consider comments and recommendations developed by the HC at its June 2012 meeting.**

Reference Materials:

1. Agenda Item C.1.a, Attachment 1: Letter on Levee Vegetation.
2. Agenda Item C.1.a, Attachment 2: Letter on Klamath Water Management.
3. Agenda Item C.1.b, Supplemental HC Report.

Agenda Order:

a.	Agenda Item Overview	John Coon
b.	Report of the Habitat Committee	Tim Roth
c.	Reports and Comments of Advisory Bodies and Management Entities	
d.	Public Comment	
e.	**Council Action:** Consider Habitat Committee Recommendations	

PFMC
05/31/12

Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101, Portland, OR 97220-1384
Phone 503-820-2280 | Toll free 866-806-7204 | Fax 503-820-2299 | www.pcouncil.org
Dan Wolford, Chairman | Donald O. McIsaac, Executive Director

April 16, 2012

U.S. Army Corps of Engineers
Attn: CECW-CE, Tammy Conforti
441 G Street, N.W.
Washington, D.C. 20314-1000

Re: Docket number COE-2010-0007

Dear Ms. Conforti:

The Pacific Fishery Management Council (Council) has followed, with concern, the proposal by the U.S. Army Corps of Engineers (Corps) to reduce vegetation tolerance on levees adjacent to thousands of miles of salmon essential fish habitat (EFH) in Washington, Oregon, Idaho, and California. As you are aware, many salmon populations are also listed under the Endangered Species Act (ESA) in these streams. Both EFH and critical habitat designations call for the conservation of riparian vegetation due to the vital role it plays for salmon in maintaining productive habitat, including moderating water temperatures, reducing fine sediment, and providing cover and food resources.

The Council commented on a previous draft of the Policy Guidance Letter on levee vegetation (PGL)[1], and appreciates the opportunity to provide comments on the most recent draft of the PGL[2]. The Council was established by the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and has jurisdiction over fisheries in Federal waters off Washington, Oregon and California. The MSA includes provisions to identify, conserve, and enhance EFH for species regulated under Council fisheries management plans. The MSA requires Federal agencies to consult with the National Marine Fisheries Service (NMFS) on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH,[3] and requires the Council to comment on those activities that are likely to have a substantial impact on the habitat, including EFH, of salmon under its authority.

[1] 75 FR 6364 (2/09/10)

[2] 77 FR 9637 (2/17/12)

[3] MSA §305(b)(2)

The Council is concerned that the policies outlined in the Draft PGL will further impair salmon populations and their habitats due to the strong restrictions contained in the Engineer Technical Letter (ETL) 1110–2–571 - *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*.

The draft PGL will seriously limit levee vegetation under the ETL umbrella. Where vegetation is permitted, restrictions on the size, root characteristics, and density greatly diminish its potential to shade streams or form and maintain in-stream salmon habitat. While the primary goal of the PGL and ETL is to ensure public safety, the Corp's own Engineer Research and Development Center researchers have noted that neither document is supported with robust science and engineering principles, especially with regard to streams and rivers of the West Coast where levee and riverine characteristics differ significantly from Mid-west and East Coast systems (see Dunbar et al. 2011 and Corcoran et al. 2010). As identified in these Engineer Research and Development Center reports, significant research gaps remain in characterizing vegetation risks and benefits. In many situations, vegetation has been observed to benefit levee stability (Dunbar et al. 2011 and Corcoran et al. 2010). Clearly, more research is needed in order to develop appropriate standards for West Coast levees. Such standards may provide more opportunity to maintain salmon habitat and safety.

Additionally, under the MSA, actions taken by the Corps in adopting the ETL and subsequent PGL require EFH consultation with NMFS. Moreover, ESA consultations are required with NMFS and the US Fish and Wildlife Service. Therefore, because the Corps is implementing these nationwide policies, the Council believes that it is the Corps' responsibility, rather than the individual levee owners, to conduct an EFH consultation to avoid violating the MSA. The Council formally requests a response from the Corps on why consultation under MSA has not yet occurred.

The Council reiterates its previous comments (attached for reference) to develop and authorize acceptable levee standards and variances at the Corp's District or Division level, rather than in Washington D.C., as currently proposed. It is unclear that variances to the ETL will conserve and maintain salmon EFH or avoid jeopardy for listed species without such an approach. While the scientific literature suggests that long-term salmon protection will improve by moving levees further away from rivers and streams, there has been progress in recent years in developing safe levees with vegetation benefits to salmon in the Sacramento and Seattle Districts. The Council believes the continuing work in these districts can provide a model for developing both safe levees and future habitat for salmon.

To reiterate, although we note some improvements from previous versions, the Council is concerned that adoption of the PGL fails to adequately protect Council-managed species under MSA. We strongly encourage the Corps to consult with the Federal Services (NMFS and US Fish and Wildlife Service prior to administering the levee vegetation management program. The Council looks forward to your response regarding meeting EFH obligations and consulting with NMFS.

Thank you for the opportunity to provide comment on the revised PGL.

Sincerely,

D. O. McIsaac, Ph.D.
Executive Director

JDG:kam

References:

Corcoran, M.K., J. F. Peters, J.B. Dunbar, J. L. Llopis, F.T. Tracy, J.L. Wibowo, J.E. Simms, C.E. Kees, S.K. McKay, M.E. Glynn, B.A. Robbins, R.C. Strange, M.T. Schultz, T.E. Berry, C.D. Little, L.T. Lee, J.U. Clarke, and J.C. Fischenich. 2010. *Effects of Woody Vegetation on Levees Volume IV of IV: Summary of Results and Conclusions*. Final Report – DRAFT. US Army Corps of Engineers, Engineer Research and Development Center. 23pp.

Dunbar, J.B., E.R. Gore, and M.K. Corcoran. 2011. *Trip Report: Site Visit to Examine Woody Vegetation on Levees in the U.S. Army Corps of Engineers, Walla Walla District.* US Army Corps of Engineers, Engineer Research and Development Center. 42pp.

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Dan Wolford, Chairman | Donald O. McIsaac, Executive Director

May 15, 2012

The Honorable Ken Salazar, Secretary
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

RE: Action Requested to Prevent Klamath River Fish Kill

Dear Secretary Salazar:

The Pacific Fishery Management Council (Council) is concerned that potential low flows in the Klamath River will substantially affect salmon essential fish habitat (EFH) and potentially create conditions leading to a fish kill in the Klamath River during the fall Chinook migration in 2012, such as occurred in 2002. The purpose of this letter is to recommend advance planning for stored water releases this fall so as to prevent such an occurrence.

As you know, the Council is one of eight regional fishery management councils established by the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA), and recommends management actions for Federal fisheries off Washington, Oregon and California. The MSA includes provisions to identify, conserve, and enhance EFH for species regulated under a Council fisheries management plan. Each Council is authorized under MSA to comment on any Federal or state activity that may affect the habitat, including EFH, of a fishery resource under its authority. Furthermore, for activities that the Council believes are likely to substantially affect the habitat of an anadromous fishery resource under its authority, the Council is obligated to provide comments and recommendations (MSA §305(b)(3)).

Forecasted Flows

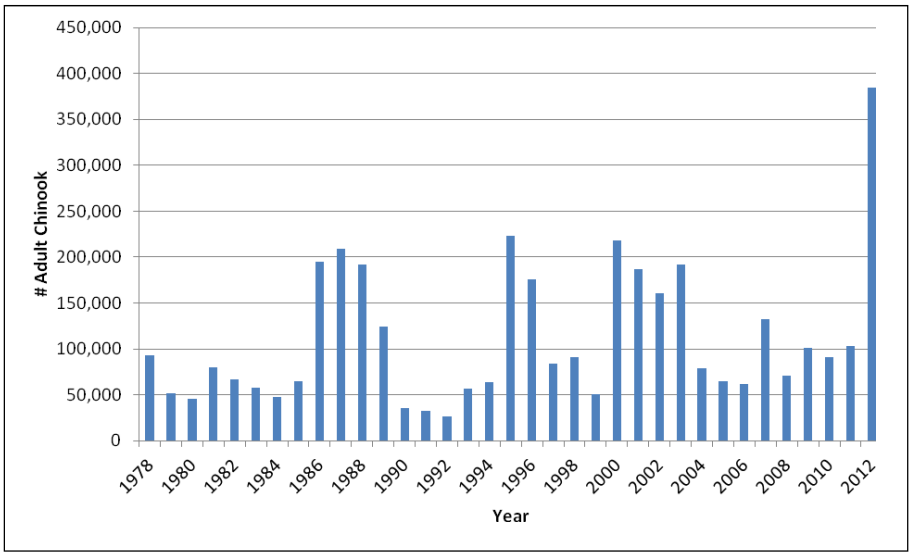
Precipitation during the past several weeks has substantially improved hydrologic conditions for the Klamath Basin; forecasted summer flows have gone from extremely dry in early March to nearly normal in mid-April. However, given that the projection for the fall Chinook run is much larger than any time since comprehensive records were first taken in 1978, and there are water management decisions to be made between this point and September, we remain concerned that sufficient flow be provided in the lower river to minimize conditions similar to those that led to the September 2002 fish kill, when more than 33,000 adult salmon died in the Lower Klamath River.

We recommend you pursue all necessary measures to ensure an adequate amount of additional water will be available for release from the Trinity and/or Upper Klamath basins during the peak migration and holding timeframe for the fall Chinook return. Such flow augmentation should be designed to maintain the quality of salmon EFH and minimize the likelihood of another fish kill, taking into consideration the river flow patterns and salmon abundance that resulted in the 2002 fish kill. Therefore, we recommend that the Department of Interior work with the Klamath Basin's biologists and scientists, such as the Trinity River Restoration Program's Flow Group, to determine the best manner for using this water to minimize the potential for another fish kill.

Forecasted Run Size

The 2012 fall Chinook escapement is projected to be much larger than any other year since 1978. Ocean fishery modeling, including projections of the number of fish returning to the Klamath Basin, will continue through April, but the Council's Salmon Technical Team's preliminary Klamath Ocean Harvest Model estimate indicates that over 380,000 adult fish will return to the Klamath River, nearly 2.4 times the 2002 adult run size associated with the 2002 fish kill. Several analyses, including one produced by the U.S. Fish and Wildlife Service[1], concluded that low river flow and high densities of fish contributed to the outbreak of two diseases (Ich and columnaris) that caused the 2002 fish kill.

The figure below contains the post-season estimated Klamath River adult fall Chinook run sizes for 1978 – 2011 and the projected abundance for 2012.



In closing, the Council recommends that the Department of the Interior initiate planning how to take all necessary steps in the coming months to ensure sufficient water is available to minimize the potential for another fish kill if conditions in the Klamath River are predicted to become, or become, dangerous to migrating Chinook salmon in the late summer and fall of 2012. We would appreciate hearing about such planning, and offer our assistance in any way possible.

Thank you for your attention to this important matter.

Sincerely,

D. O. McIsaac, Ph.D.
Executive Director

JDG:kam

C: Council Members
Mr. Samuel Rauch
Mr. Alan Reisenhoover
Mr. Will Stelle
Mr. Rod McInnis
Habitat Committee
Salmon Advisory Subpanel
Salmon Technical Team

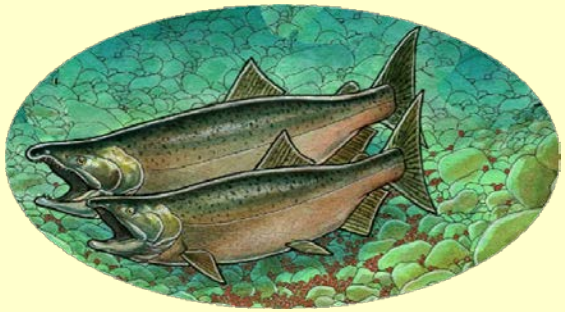
[1] Guillen, G.J. 2003. Klamath River Fish Die-off: September 2002: Report on Causative Factors. AFWO 03-03. USFWS. Arcata, California

Comparative Survival Study

Habitat Committee meeting

Pacific Fishery Management Council

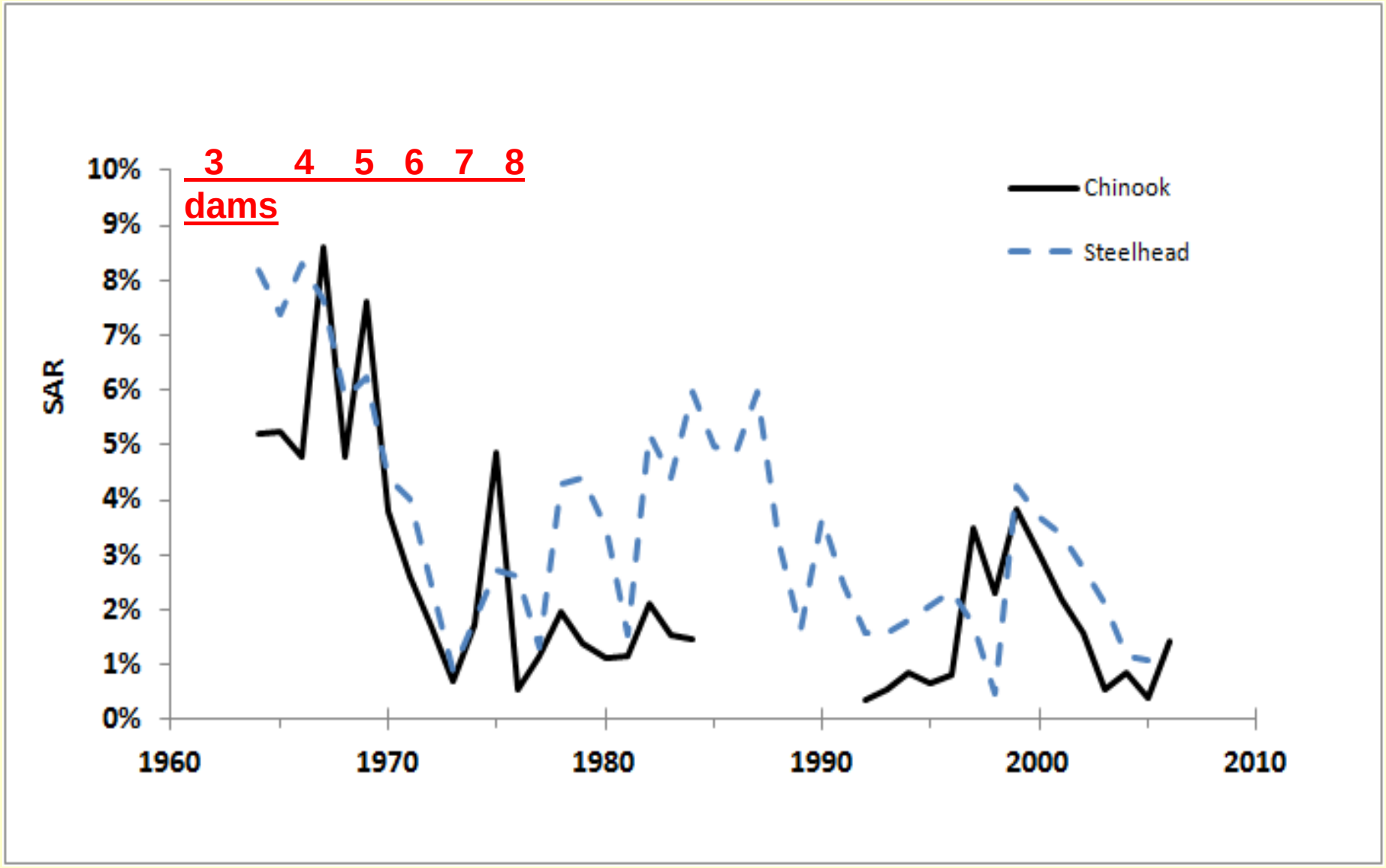
June 12, 2012



Comparative Survival Study

- Initiated in 1996 by states, tribes & USFWS to estimate survival rates at various life stages
  - Assess effects of hydrosystem operations on wild and hatchery salmon & steelhead in Snake & Columbia rivers
  - PATH – "can transportation … compensate for effects of the FCRPS?"
  - NPCC – need to collect annual migration characteristics, including survival
  - NOAA biological opinions require research, monitoring and evaluation
- Management-oriented large-scale monitoring
  - Observational study
  - Aligned with basin-wide monitoring needs (RME)

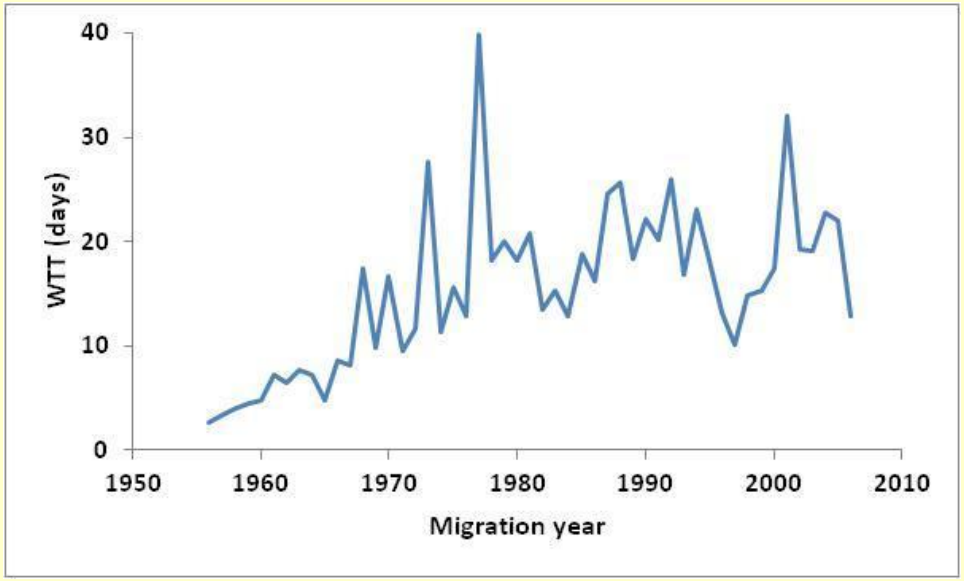
Decline in Snake R. Chinook & steelhead associated with dams…

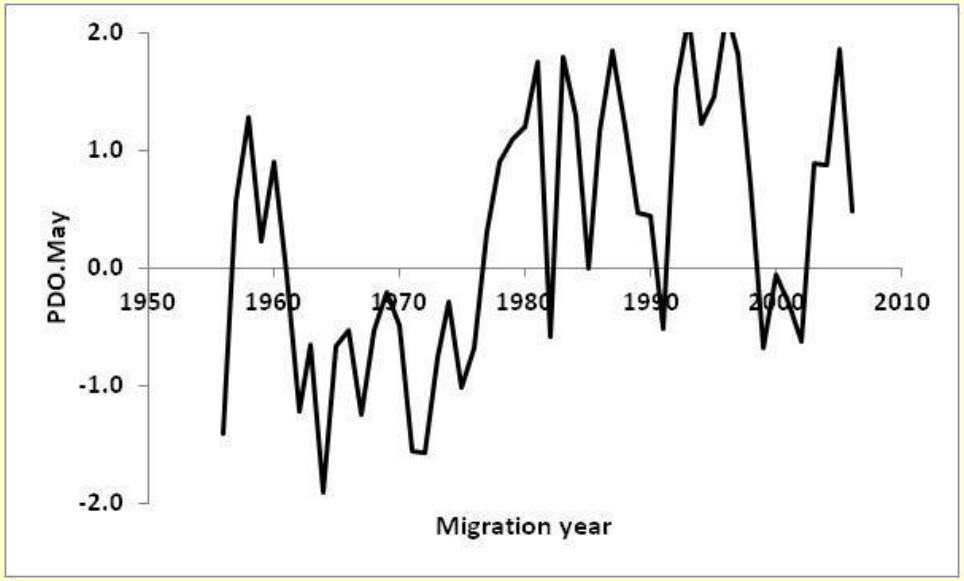


Dramatic changes in outmigration conditions with dams…

marine conditions were not static…

Need to account for both





Linking SARs and Life Cycle Survival Rates…

- SARs to meet NMFS (interim) survival and recovery criteria (2000 BiOp)*
  - 2% SAR - meets long-term (100 yr) survival
  - 4% SAR - meets (48 yr) recovery
  - 6% SAR - meets short-term (24 yr) survival
- 2-6% SAR objectives (ave. 4% SAR; NPCC 2009)
  - Evaluate SARs in face of varying ocean conditions
  - Adapt freshwater management actions (tributaries & FCRPS)
- Other goals: population viability, broad-scale recovery, sustainable fisheries, etc.

*Marmorek et al. 1998 - PATH FY98 Final Report

Linking survival rates and hydrosystem conditions…

Spawners & recruits

- Long time series (start before full FCRPS impacts)
- 18 Snake River & 3 John Day River Chinook populations
- Contrast in river & ocean conditions

SARs

- Long time series, Snake River wild Chinook & steelhead

Comparative Survival Study

- PIT tag SARs (↓ precision):
  - Snake River wild & hatchery Chinook & steelhead
  - John Day River wild Chinook and steelhead
- In-river survival rates
- Transport to in-river SAR ratios (TIRs)
- Differential delayed mortality of transported smolts (*D*)
- Increased detection sites
- Court-ordered spill program (2006+ contrast in river conditions)

Assessing hydrosystem mortality

Recent CSS analyses:

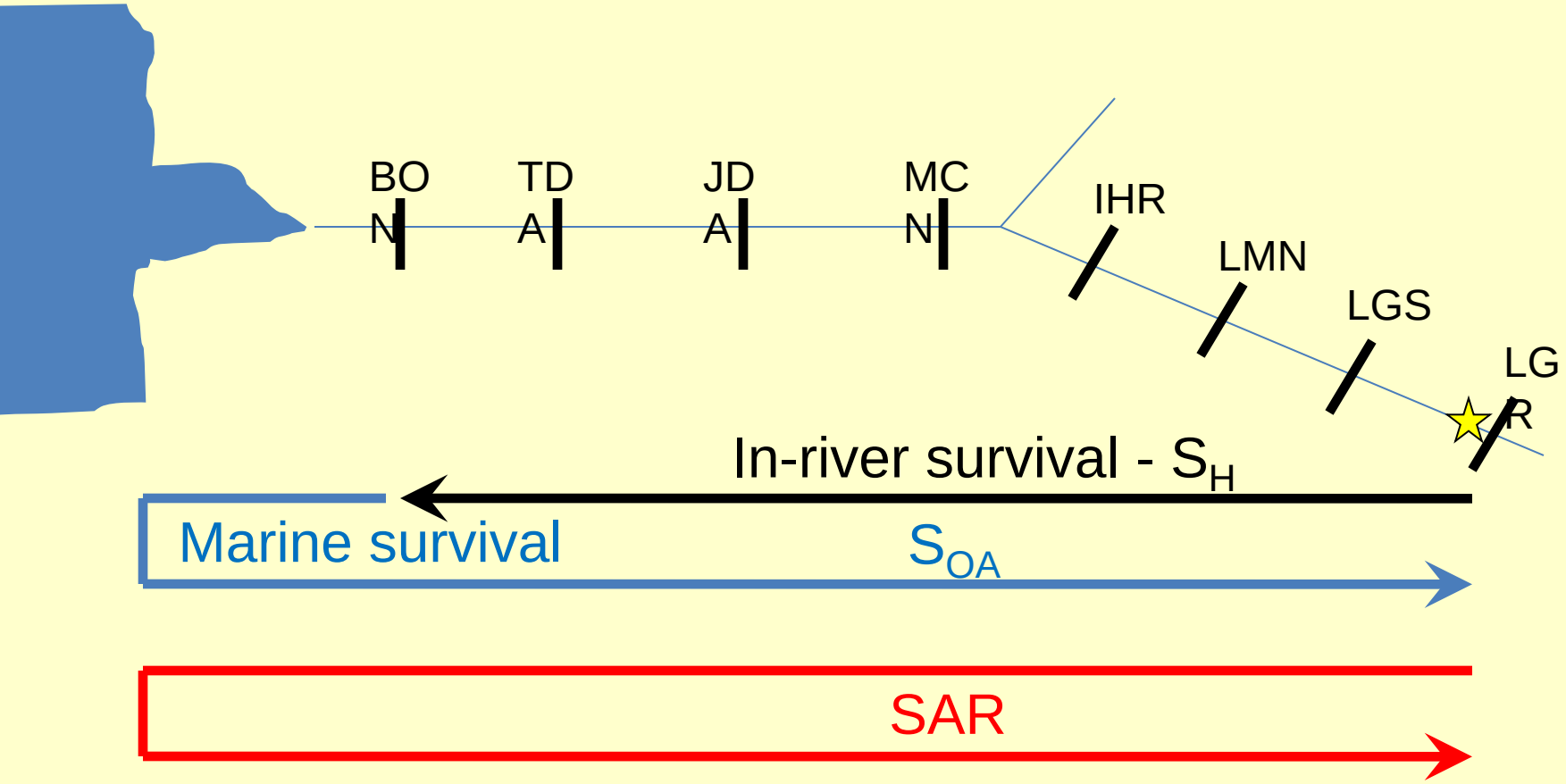
- Estimate hydrosystem effects with & without using reference populations
  - Differential mortality (8 vs. 3 dam)
  - Hydro-related delayed mortality (in ocean)

- CSS PIT tag data – increased precision, overall SARs & by passage route, isolate mechanisms

- Examine multiple lines of evidence – consistent results?
  - Long-term (1950s or 60s) & recent (PIT tag) data sets
  - Spawner-recruit, SAR, marine survival rate data sets
  - Analyze with & without reference populations

Data

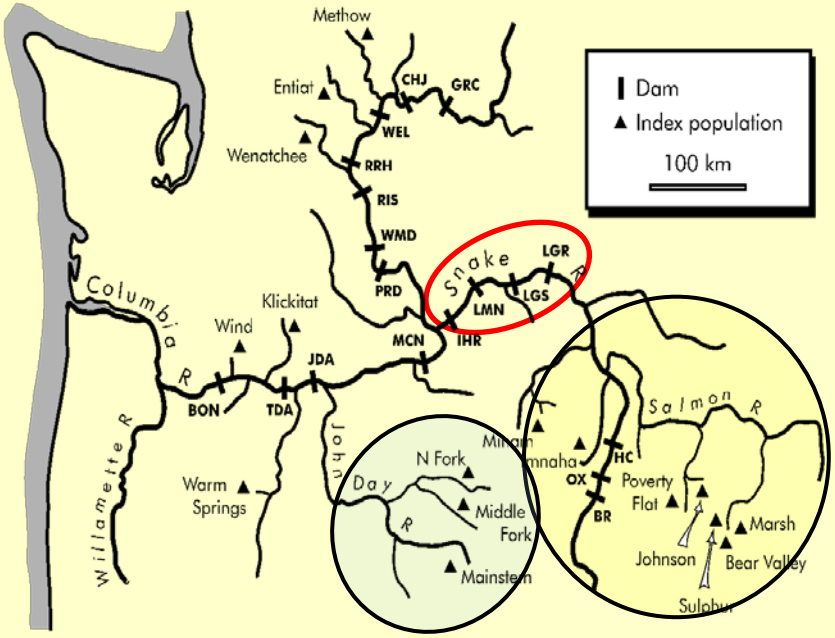
- Long time series of annual Spawner/Recruit and SARs
- CSS PIT-tag SARS for multiple cohorts per year
  - Partitioned into life-stage survival rates



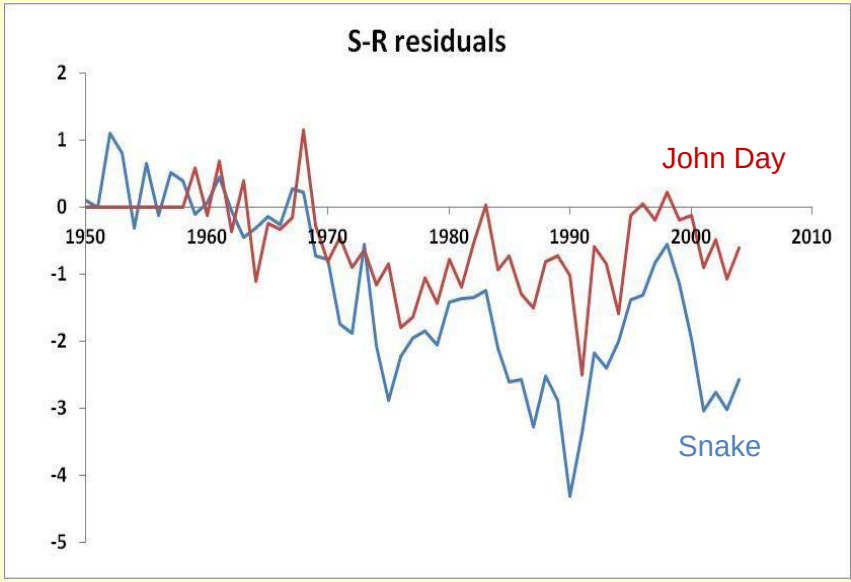
Spawner-recruit spatial contrast

Treatment = Snake populations
- (3 dams → 8 dams)

Reference = John Day populations
- (2 dams → 3 dams)



Snake R. Chinook populations survived ¼ to 1/3 as well as reference populations since FCRPS completion (differential mortality)



e.g., Schaller et al. 1999; Deriso et al. 2001; Schaller & Petrosky 2007

SAR spatial contrast

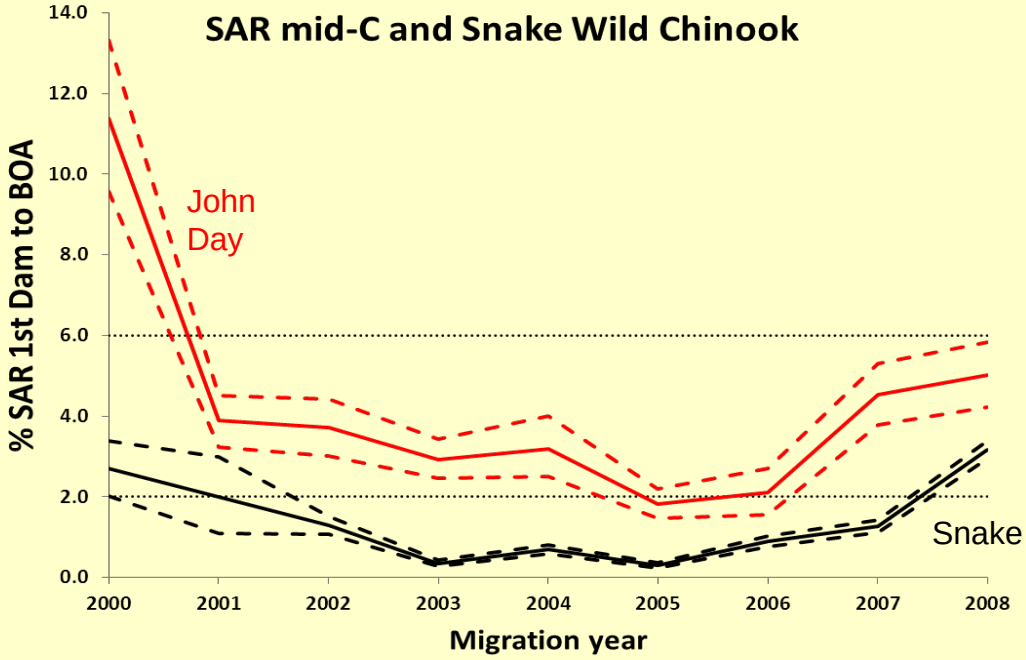
(↑ Precision-PIT tags)

Treatment = Snake aggregate
- (8 dams)

Reference = John Day aggregate
- (3 dams)

- Snake Chinook populations survived ¼ to 1/3 as well as reference populations

- "Same "result as spawner & recruit analysis

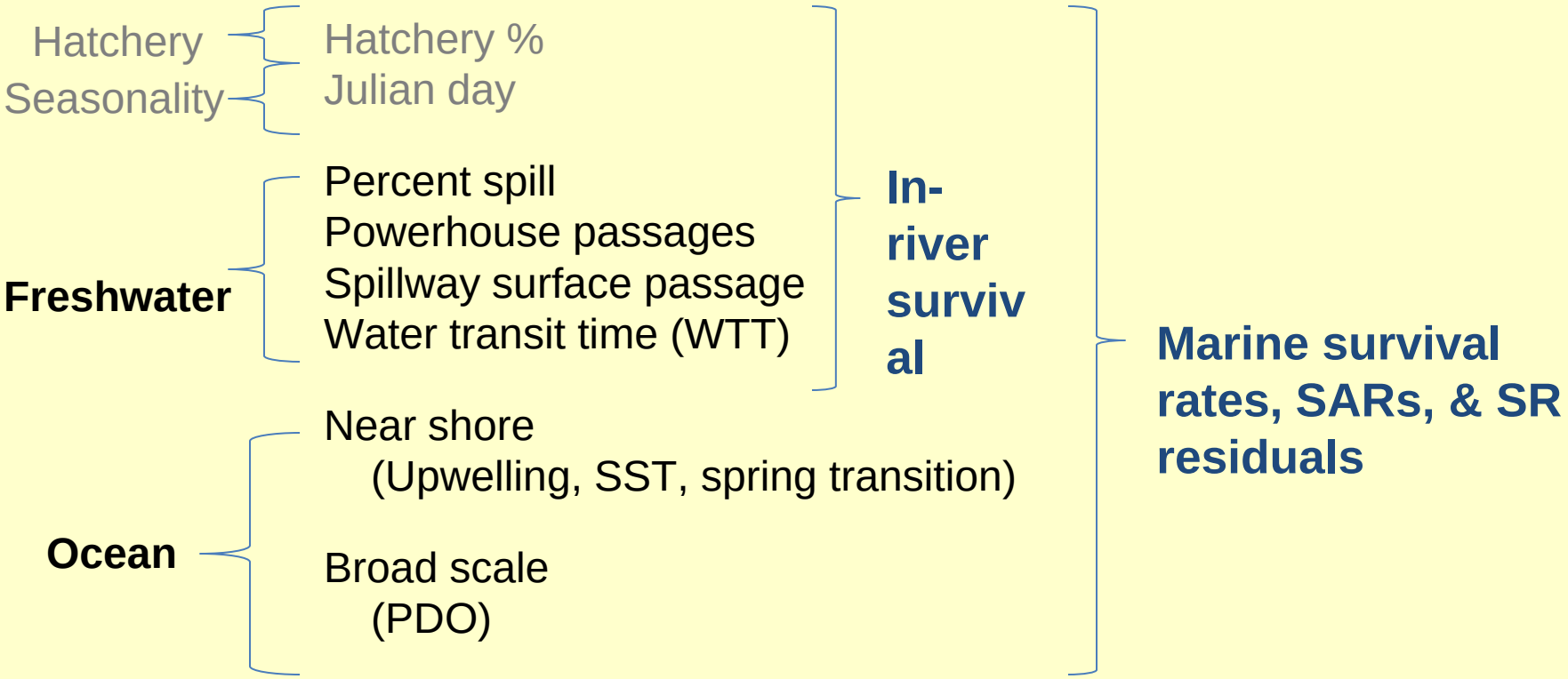


e.g., Schaller & Petrosky 2007; CSS 2011 annual

Temporal Analyses

- Influence of river & ocean conditions on survival rates
  - Long time series:
    - Pre & post Snake River dam completion
    - Survival rates for different life stages
      - (SR residuals, SARs, marine survival)
    - Variables for ocean conditions & river conditions during seaward migration
  - CSS PIT tags
    - Survival rates for different life stages (increased precision)
    - Variables for ocean & river conditions
- For different life stages & species - evaluate ocean & river conditions that explain variation in survival rates (temporal)
- Temporal contrasts to estimate FCRPS impacts - differential and delayed hydrosystem mortality

Factors examined – temporal analysis



Conducted multiple linear regressions between environmental factors and survival rates using multimodel inference tools

Candidate River Variables

Water travel time (Lewiston – BON Dam):

- 2 days pre-dam
- 10-40 days (19 day ave.) post-dam

In-river migrants now pass through:

- up to 8 powerhouses
- up to 4 turbines
- depending on spill

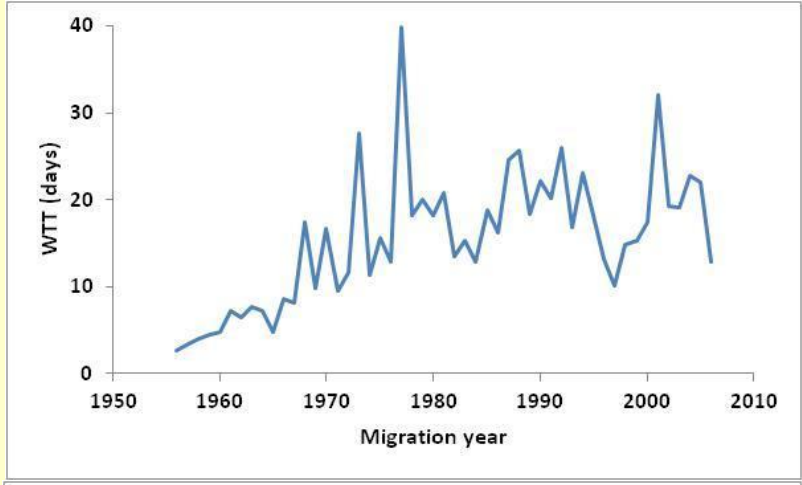
Collection and transport:

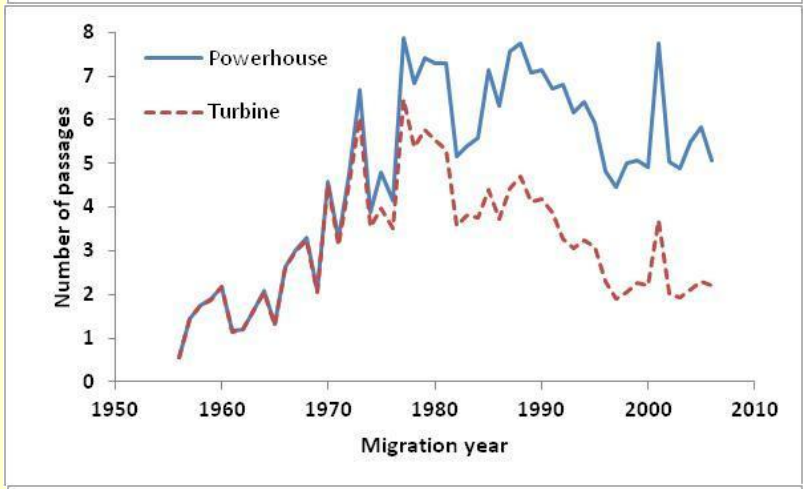
- 25% - 99% of smolts transported (1977-2006)

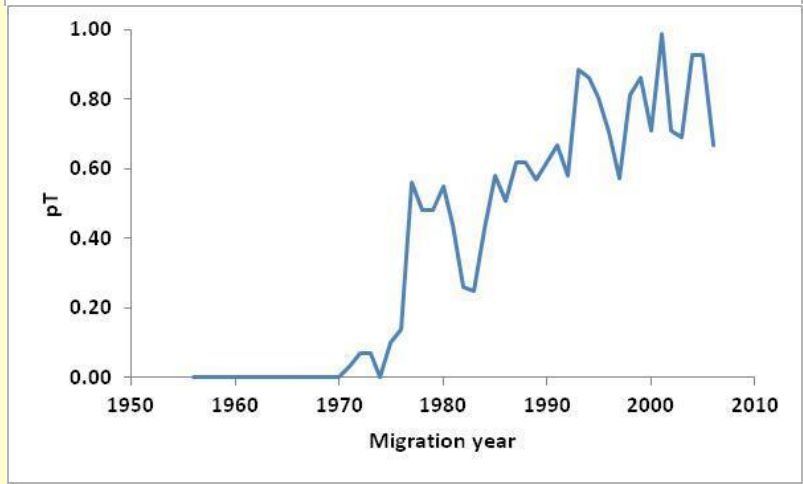
Mean daily maximum temperature

- Snake River mean maximum temperature at Lewiston 9.9 to 13.2C

Petrosky & Schaller 2010







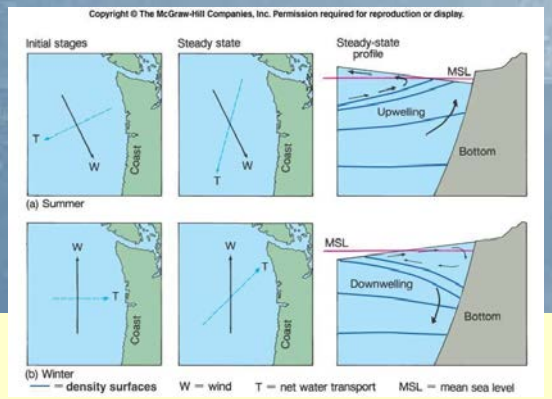
Candidate Ocean Variables

Broad scale:

- Pacific Decadal Oscillation

Near shore:

- Coastal Upwelling
- Spring Transition
- Near shore Temp.



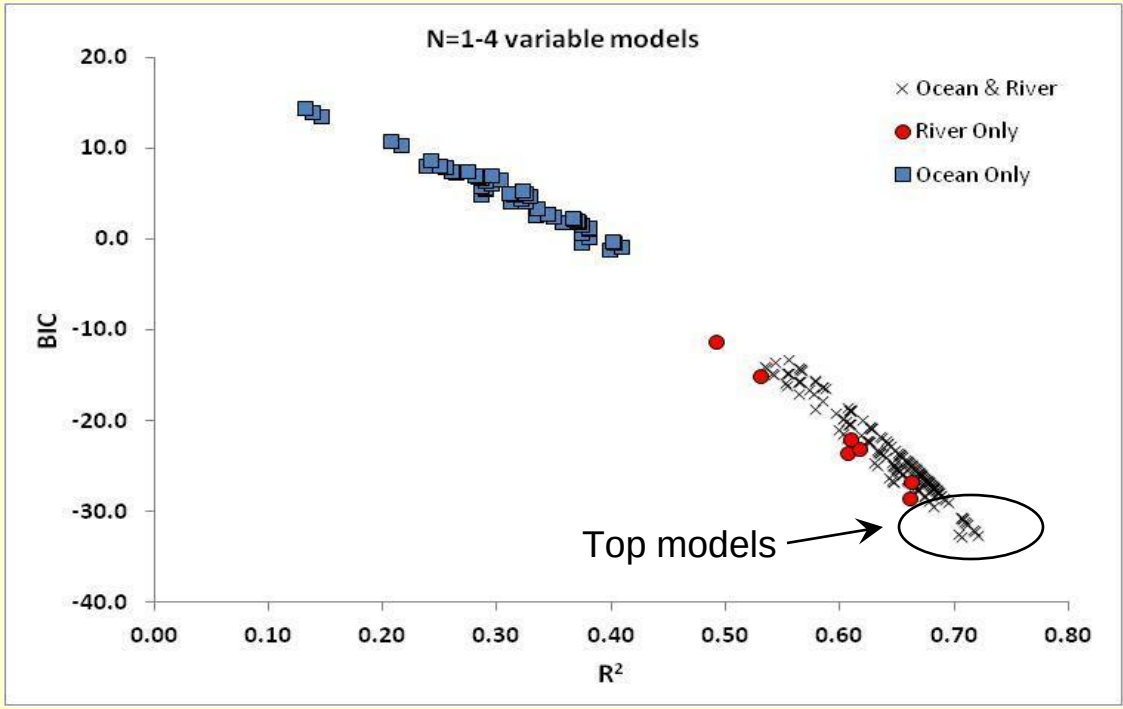
Multiple Regression – Chinook spawner-recruit

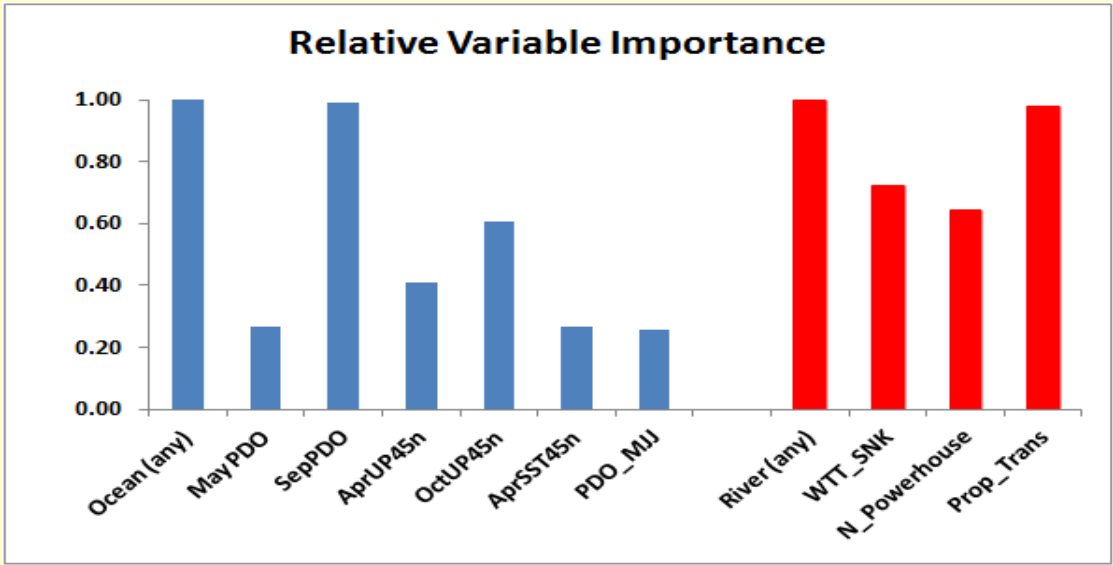
Ocean & River important

Best fit, simplest models - low survival associated with:

- Warm PDO
- Reduced upwelling
- Increased powerhouse passages
- Slow WTT
- Increased proportion transported

SARs & marine survival showed similar results as SR resids Chinook & steelhead (1964-2006)





CSS PIT tags – in-river survival

Steelhead

Observed
Predicted

Relative Variable Importance

S_H

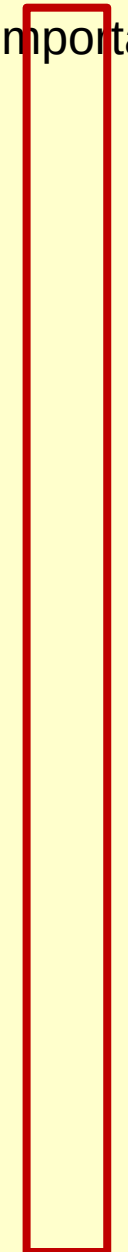
Chinook

S_H

CSS PIT tags – marine survival

Steelhead

Relative Variable Importance

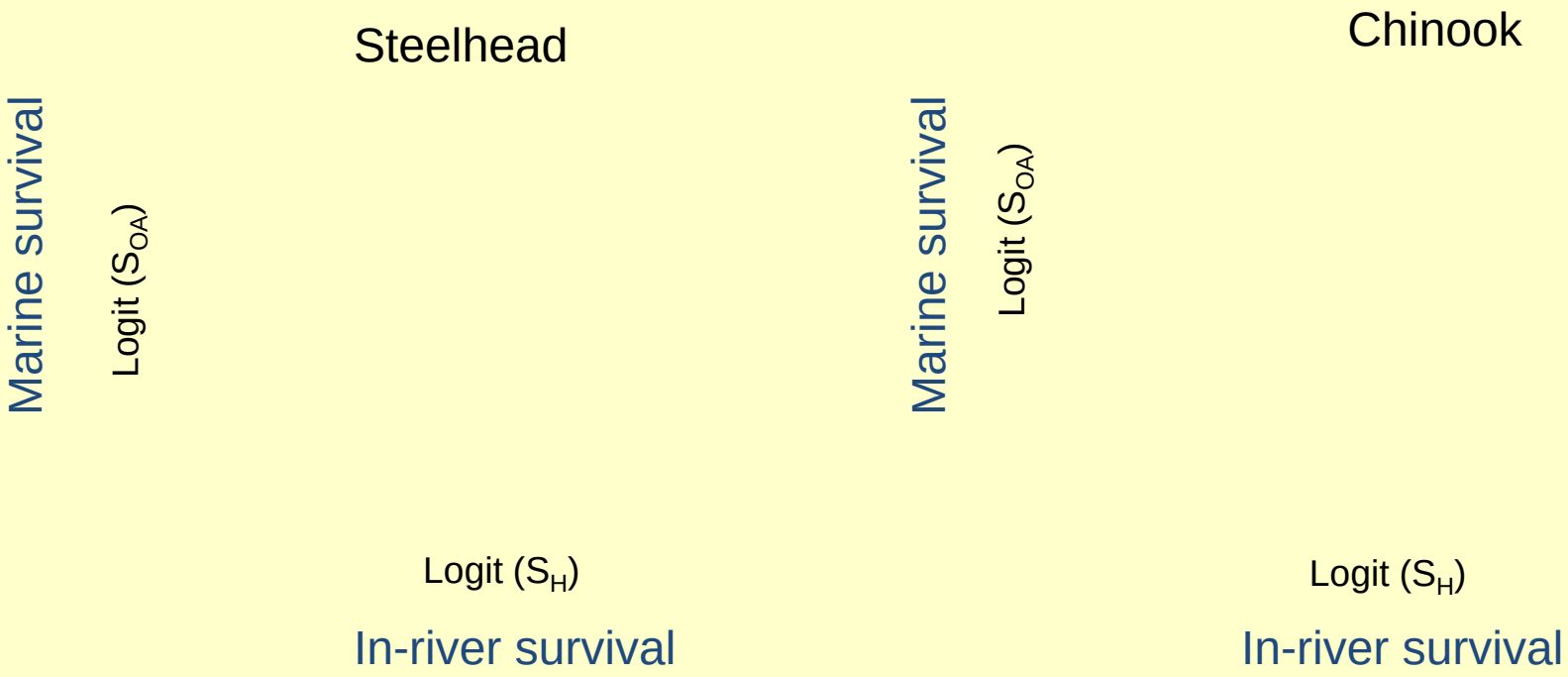


S_{OA}

Chinook

S_{OA}

Marine survival is not independent of freshwater survival through FCRPS
(CSS PIT tags)

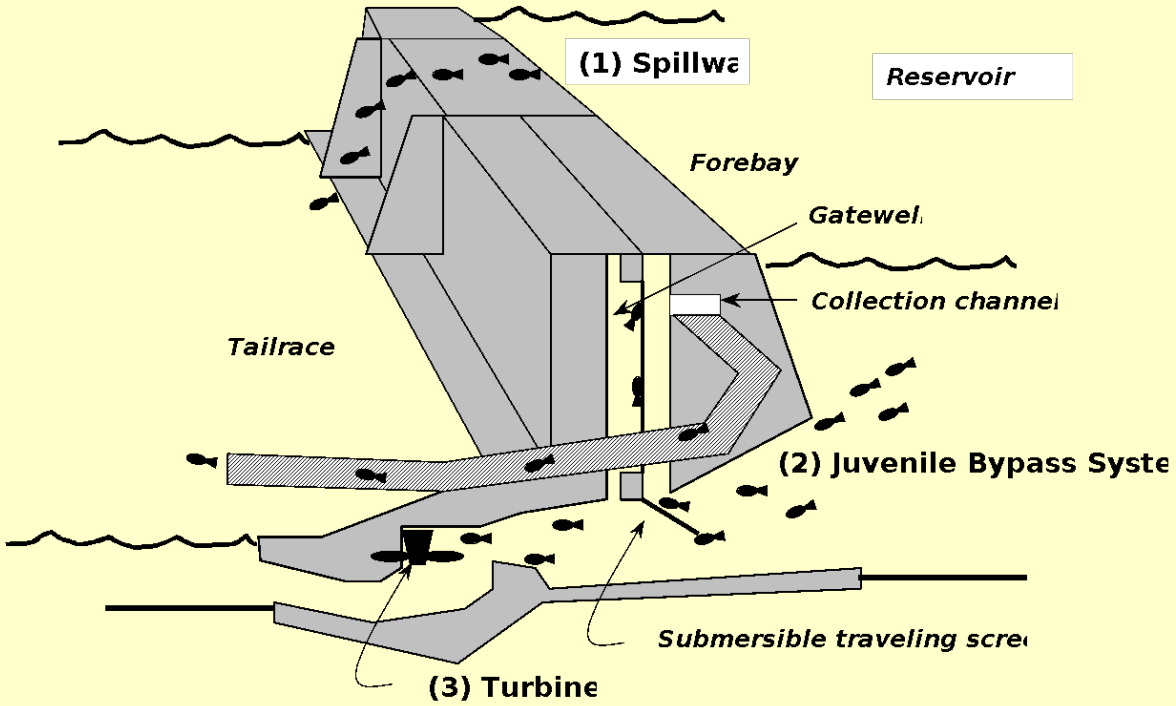


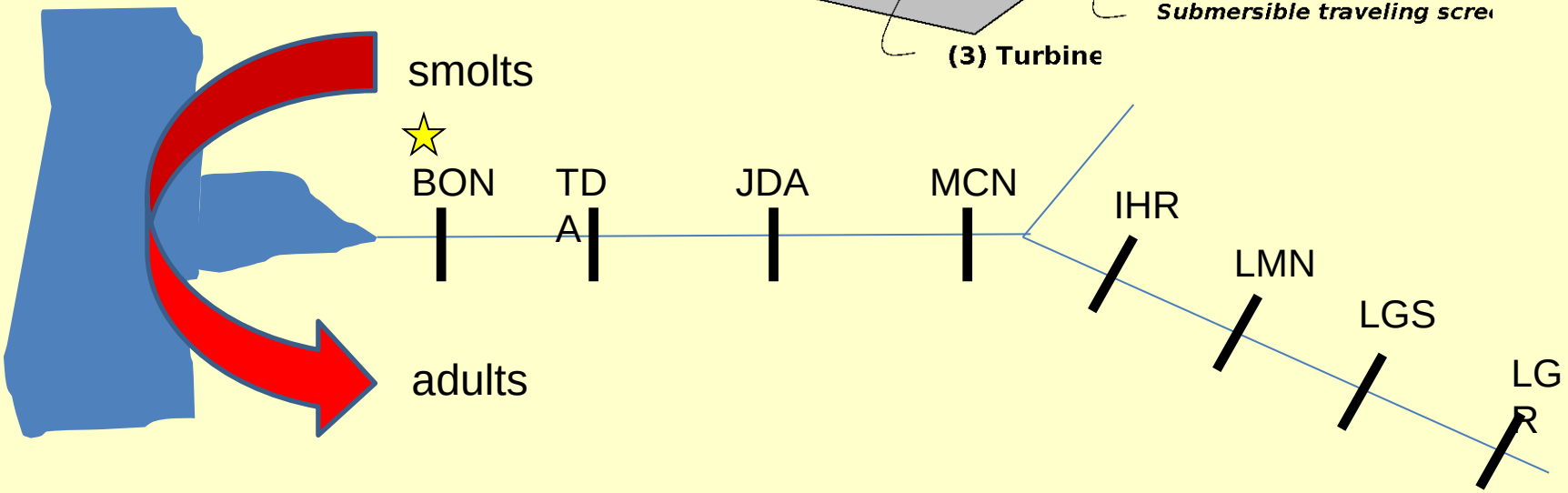
Haeseker et al. 2012

Hydro-related Delayed Mortality

- Defined as mortality that occurs in marine environment as result of FCRPS experience
- Effect of increased Hydrosystem Development
  - > 5 fold decline in Chinook recruitment success (SR resids.)
  - > 3 fold decline in Chinook marine survival rate
  - > 2 fold decline in steelhead marine survival rate
- Evidence of Hydro-related Delayed Mortality
  - Consistency in estimates of delayed mortality from multiple data sets and analytical approaches
    - Long-term & recent data sets
    - spawner/recruit, SAR, marine survival, w/ or w/o reference populations

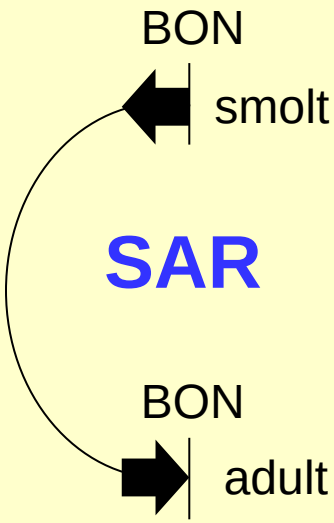
Bypass events influence ocean survival?





Bypass events influence ocean survival?

- Logistic regression
- Yearling Chinook and steelhead, MYs 2000-2009
- Individual passage histories - # bypasses and where bypassed



	JDA	MCN	IHR	LMN	LGS	LGR
Smolt 1	0	0	0	0	0	0
Smolt 2	1	0	0	0	0	0
Smolt 3	0	1	0	0	1	1

Spring/summer Chinook salmon

- Each bypass event reduced post-BON SARs by 10%

Steelhead

- Each Snake bypass event reduced post-BON SARs by 9%
- Each McNary or John Day bypass event reduced post-BON SARs by 20%

Management implications

- Direct and route-specific juvenile survival estimates unlikely to reflect full impacts of passage routes
- Actions that reduce powerhouse passage (bypass + turbine) expected to increase SARs

Conclusions – retrospective analyses

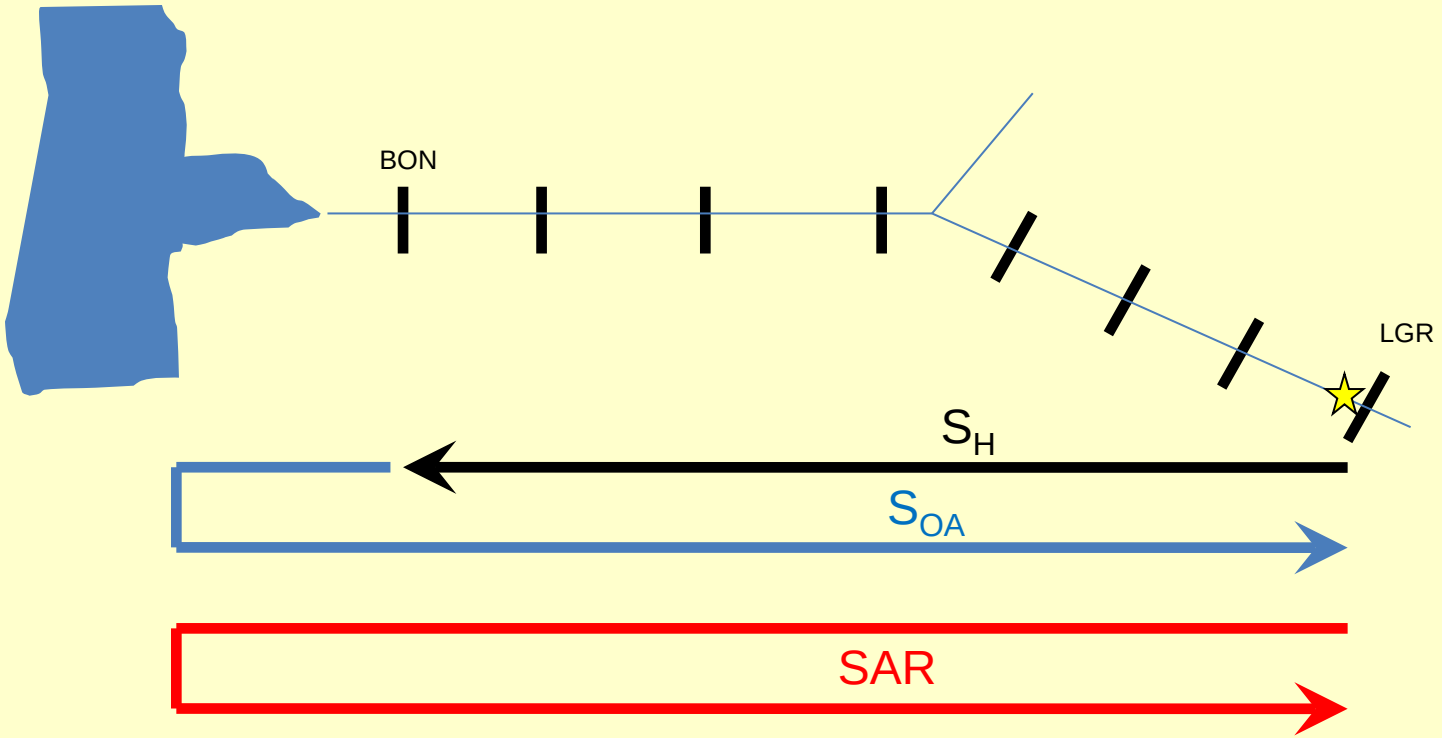
- River conditions during seaward migration have strong influence on survival rates at later life stages
- Hydrosystem is a key factor influencing delayed mortality
  - multiple methods, independent data – consistent results
- NPCC 2%-6% SAR goal – extremely difficult to achieve without major changes to seaward migration conditions in the mainstem
  - Especially in face of climate change (e.g. warming & increased variability in ocean conditions)
- CSS 2011 Workshop retrospective conclusions
  - *"The evidence presented for … delayed mortality arising from earlier experience in the hydrosystem is strong and convincing."*
  - *" It is difficult to imagine how [other factors] would align so well both in time and space with the establishment of the*

Prospective analyses

- CSS 2011 Workshop –
  - Prospective analyses synthesize the retrospective work in a manner that may be useful in a variety of applications in the region.
- Workshop Question
  - *How can we use recent analyses to build tools that evaluate and optimize FCRPS operations … to meet established NPCC objectives for listed Snake and upper Columbia River salmon and steelhead SARs?*
- What conditions would achieve SAR objectives?
- Testable hypotheses
- Management experiments

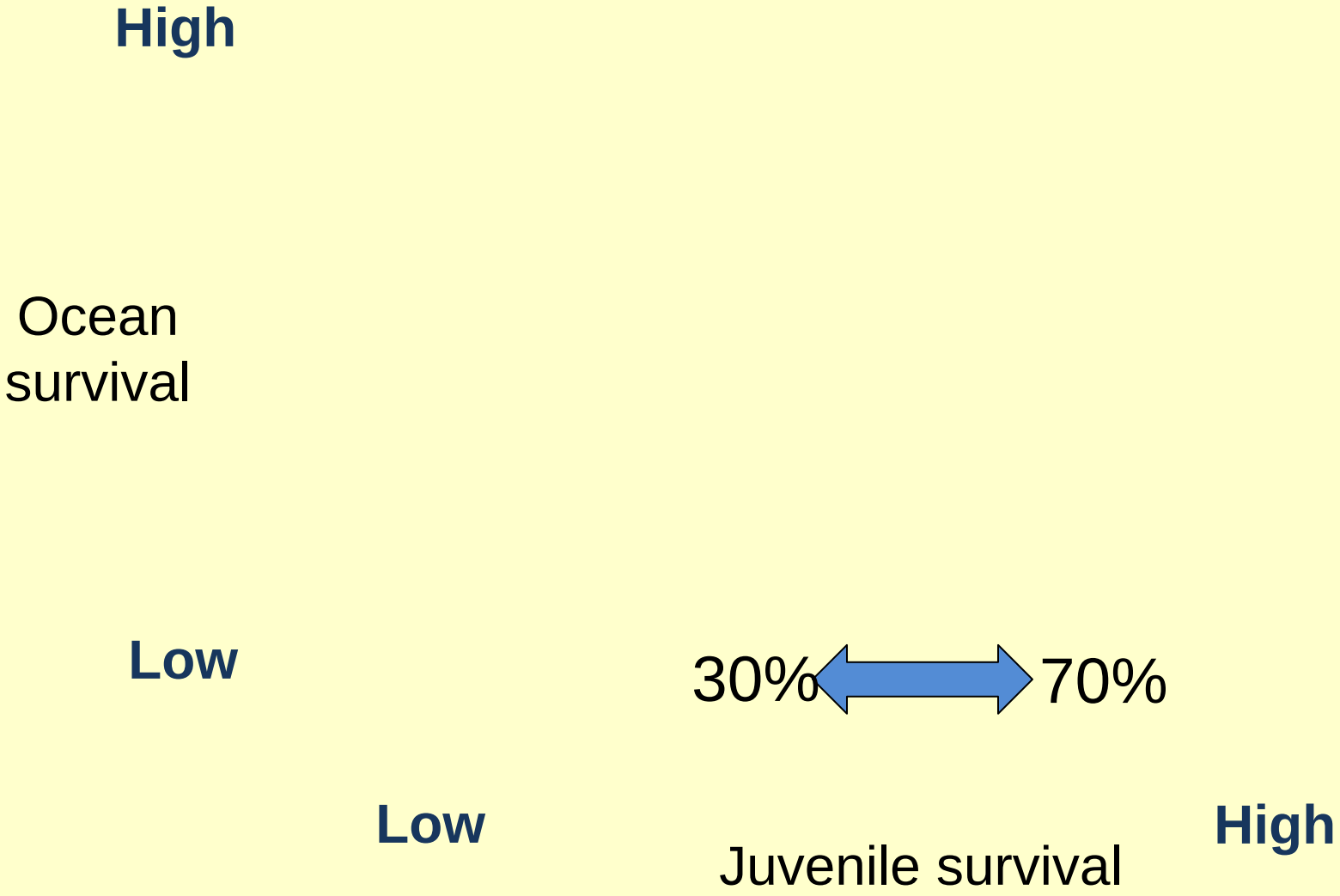
1) How do changes in juvenile and ocean survival rates influence SARs?

Which juvenile survival values (if any) achieve 4% average SARs?



Positive correlations between juvenile & ocean survival rates

Chinook salmon



Haeseker et al. 2012

Approach

Allow juvenile survival to vary between 5% and 95%

Simulate ocean survival rate using regression with observed variability

Calculate mean SAR associated with each juvenile survival rate

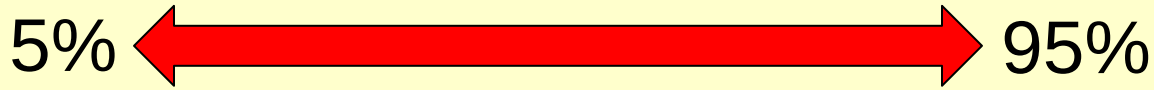
Hypothesized response

Chinook salmon

High

Ocean survival

Low

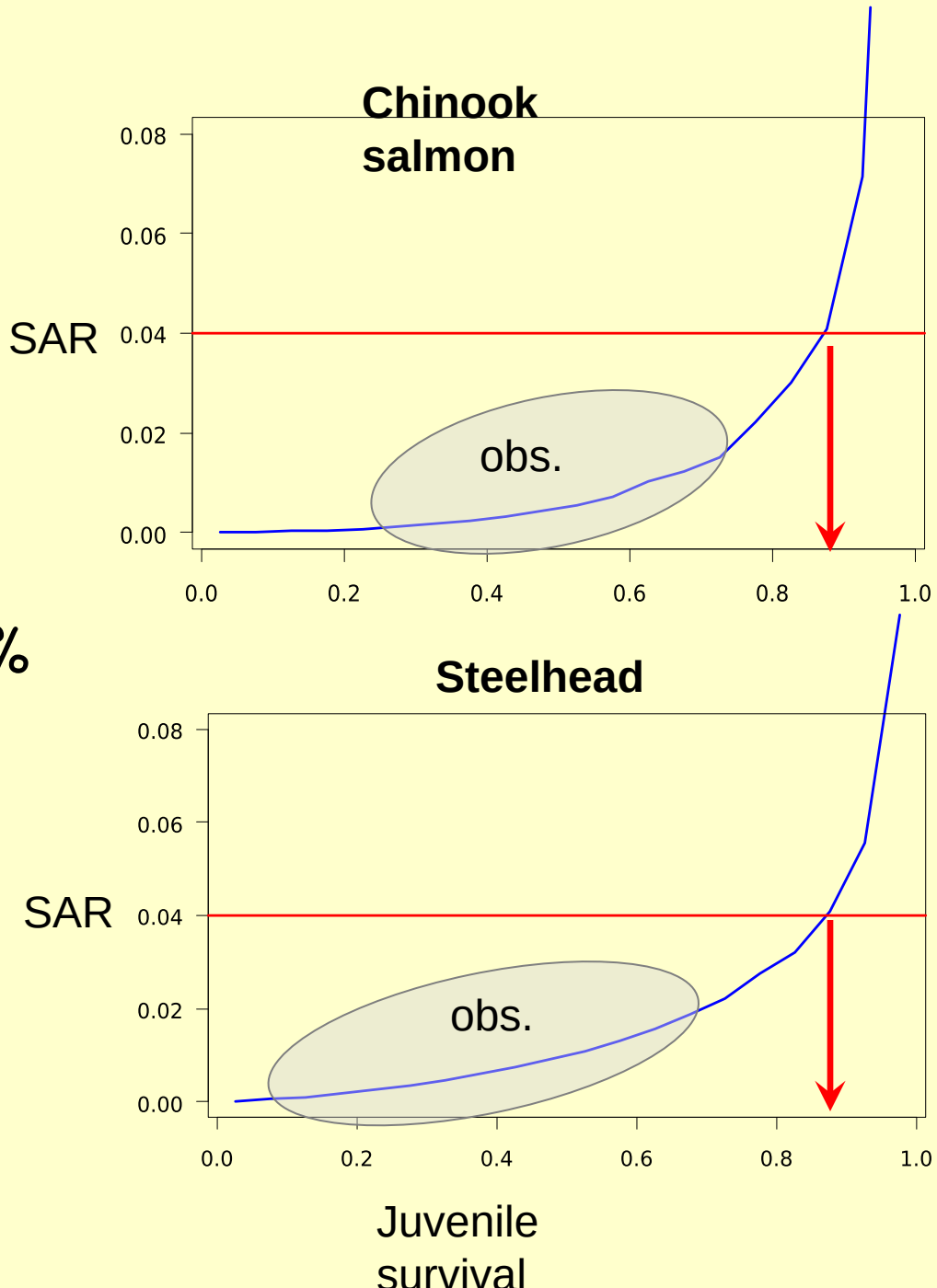


Low **High**

Juvenile survival

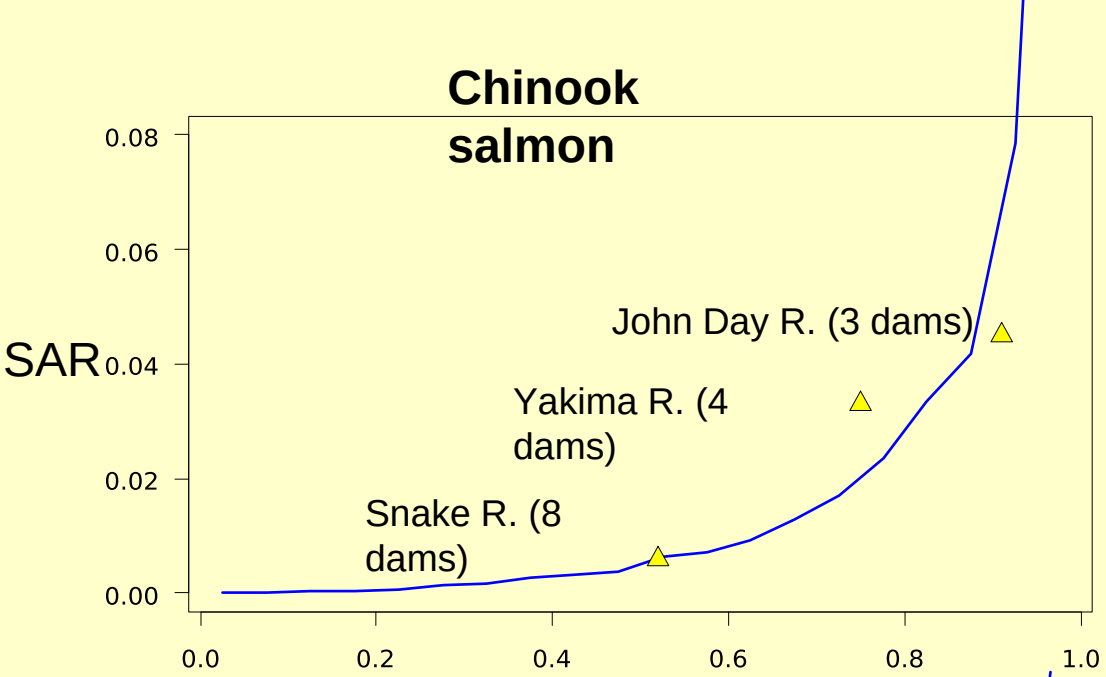
Simulations:

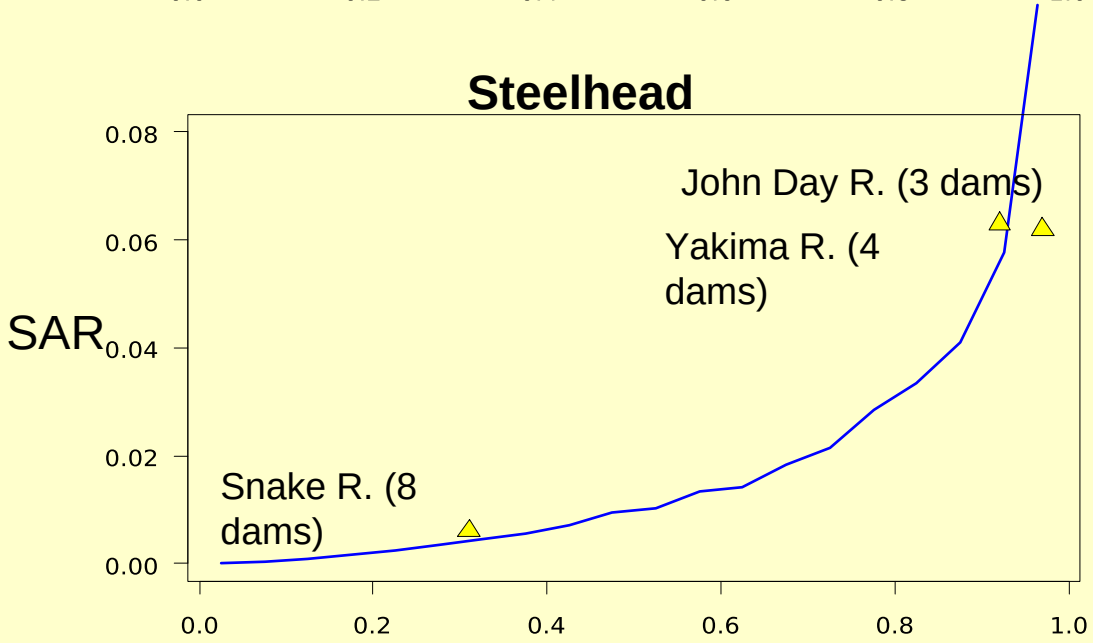
Chinook & steelhead:
predicted SARs ~ 4%
at juvenile survival > 85%



Reasonable predictions?

Supported by data from other populations above fewer dams





Juvenile survival

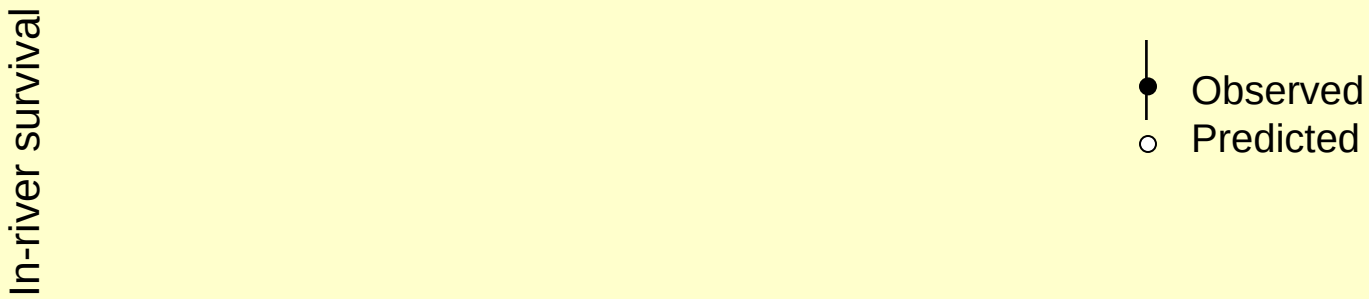
2) What operations might achieve 85% juvenile survival rates?

Approach

Used model-averaged coefficients for in-river survival regressions

Held WTT and spill percentages at fixed levels

Calculated expected mean juvenile survival rates



Haeseker et al.

Projected in-river survival

Chinook salmon

Spring flow levels

Spill (%)	Low	Average	High
0	0.19	0.19	0.19
10	0.27	0.27	0.27
20	0.38	0.38	0.38
30	0.50	0.50	0.50
40	0.62	0.62	0.62
50	0.73	0.73	0.73
55	0.77	0.78	0.78
60	0.81	0.81	0.81

Steelhead

Spring flow levels

Spill (%)	Low	Average	High
0	0.04	0.09	0.17
10	0.08	0.17	0.30
20	0.15	0.29	0.45
30	0.26	0.44	0.62
40	0.41	0.61	0.76
50	0.58	0.75	0.86
55	0.66	0.82	0.90
60	0.73	0.86	0.93

3) What operations might achieve SARs averaging 4%?

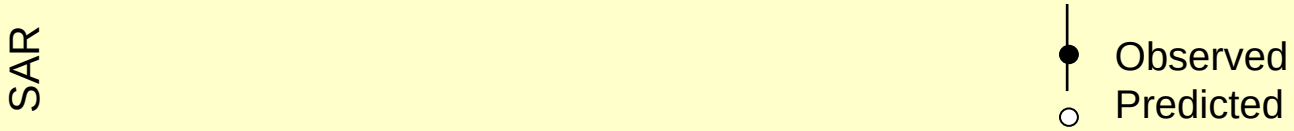
Approach

Used model-averaged coefficients for SAR regressions

Maintained historical patterns in ocean conditions (1998-2009)

Held WTT and spill percentages at fixed levels

Calculated expected mean SAR



Haeseker et al.

Projected SAR

Chinook salmon

Spring flow levels

Spill (%)	Low	Average	High
0	0.0	0.0	0.0
10	0.0	0.0	0.1
20	0.1	0.1	0.2
30	0.2	0.3	0.4
40	0.6	0.8	1.0
50	1.5	2.0	2.6
55	2.4	3.2	4.1
60	3.9	5.0	6.3

Steelhead

Spring flow levels

Spill (%)	Low	Average	High
0	0.0	0.0	0.1
10	0.1	0.1	0.1
20	0.2	0.2	0.3
30	0.4	0.6	0.9
40	1.0	1.5	2.1
50	2.4	3.6	5.0
55	3.8	5.5	7.6
60	5.8	8.3	11.3

Conclusions – Prospective Analyses

Snake River simulations and data from other stocks both indicate that juvenile survival rates need to be > 85% to achieve 4% SAR goals.

Juvenile models indicate that spill levels of 55-60% may achieve 85% juvenile survival across a range of flow conditions.

SAR models indicate that spill levels of 55-60% may achieve the 4% SAR goal under a similar series of ocean conditions.

Analyses highlight need for active Adaptive Management experiments. Existing/enhanced PIT releases provide monitoring framework for testing predictions.

Comparative Survival Study

Bonneville Power Administration Project 19960200

Reports & presentations are posted on
Fish Passage Center website:

www.fpc.org

HABITAT COMMITTEE REPORT

Fish Passage Center Comparative Survival Study

The Habitat Committee (HC) was briefed by Dr. Charlie Petrosky, Endangered Species Act Program Coordinator for Idaho Department of Fish and Game and Council Scientific and Statistical Committee member, on the Comparative Survival Study, a two decade (1996-2000) time series study that monitors the life cycles of salmon and steelhead on the Columbia River (see attachment 1). The Comparative Survival Study provides salmonid life stage survival and passage estimates relative to riverine and marine environmental and hydrosystem variables. The information gathered from this study is a requirement of NOAA's 2010 Biological Opinion on Columbia River hydropower operation. The Comparative Survival Study develops smolt-to-adult return rates, juvenile survival rates, and travel times for specific routes of passage throughout the Columbia River hydropower system. Since 2006, the Comparative Survival Study has incorporated information from the court-ordered spill program affecting the Federal dams of the Columbia River.

A few key findings from this review are as follows:

- There are ever stronger indications that spill is positively related to ocean survival (in addition to in-river survival). The multi-year Comparative Survival Study builds on existing lines of evidence demonstrating the benefits of spill as a potential tool for recovery, and shows that spill benefits salmon regardless of ocean conditions.
- In-river environmental variables such as flow and spill, along with ocean variables, explained most of the variation in smolt-to-adult return rates and marine survival rates.
- Increased spill has resulted in faster juvenile fish travel time, higher survival rates between dams, higher ocean survival, and higher smolt-to-adult return rates. For Chinook salmon in particular, increased spill was by far the primary driver that increased in-river survival.
- Passage of salmon through dam powerhouses was related to lower ocean survival and lower smolt-to-adult return rates, which suggests that significant delayed mortality is occurring with powerhouse passage routes.

The Northwest Power and Conservation Council program established a goal of a 2-6% smolt-to-adult return rate to ensure recovery of Snake River spring/summer Chinook and steelhead. However, this goal is not being met under the current spill schedule. To achieve an average 4% smolt-to-adult return rate, the study suggests that 85% juvenile survival rates through the hydro system are necessary, given current ocean survival rates. In turn, spill levels of 55-60% at all projects are projected to meet these juvenile survival rate goals. The current Court order requires about 40% spill, and this has been shown to increase survival, but more is needed to achieve recovery goals. Using the Corps of Engineers dissolved gas model, it appears that the 55% spill level may be achievable within existing gas cap constraints.

These preliminary conclusions are based on an extrapolation of existing data; there is limited empirical data at the higher spill levels. An adaptive management experiment that monitors the

effects of higher spill regimes is necessary to determine if these predictions are realistic. Given that current measures are not meeting the smolt-to-adult return rates necessary for recovery, the next logical step is to determine whether spilling at these higher levels within current gas cap constraints meets the goal. If recovery level smolt-to-adult return rates are not achievable with a maximum spill program, dam breaching remains a final option.

In summary, the HC feels that an experiment to test the effect of increased spill levels on smolt-to-adult return rates is promising, especially as an effective alternative to dam breaching. Achieving the Northwest Power and Conservation Council's targeted smolt-to-adult return rate goal of 2-6% (average 4%) is projected to more than double adult returns of Snake River salmon to the mouth of the Columbia River, and presumably would benefit other Council-managed stocks that originate in the Columbia Basin.

Lower Columbia Salmon and Steelhead Recovery Plan

The HC understands that the Council has asked for an extension to provide comments on the draft Lower Columbia Salmon and Steelhead Recovery Plan. This plan includes information arranged into three management unit plans, including the Oregon Lower Columbia Conservation and Recovery Plan, the Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, and the Endangered Species Act Salmon Recovery Plan for the White Salmon River Subbasin. National Marine Fisheries Service (NMFS) has indicated that a comment deadline extension is possible.

NOAA Habitat Blueprint

The HC received a presentation from Mary Yoklavich (NMFS, Southwest Fisheries Science Center) with Korie Schaeffer (NMFS Southwest Region) on NOAA's Habitat Blueprint. The purpose of the Blueprint is to provide a framework for NOAA to act strategically across programs and with partner organizations to improve coastal and marine habitat.

NOAA's Conservation Vision for this effort is to ensure "healthy habitats that sustain resilient and thriving marine resources, communities and economies." The Blueprint's key components are to establish long-term habitat focus areas, approach habitat science systematically and strategically, and strengthen policy and legislation.

The Blueprint will be used to prioritize habitat activities and interests across NOAA. The first short-term objective was to develop Regional Habitat Initiatives, which are already underway in each NOAA region. One goal of the Regional Habitat Initiatives is to find immediate opportunities to apply place-based science to management. The two Pacific coast initiatives are the Southern California Bight Habitat Assessment and the Puget Sound Habitat Initiative.
For the Southern California Bight, NMFS and partners will assess deep-water demersal species and habitats, particularly rockfishes and corals, in and out of areas that have been closed to bottom-contact fishing gear. The initiative began in January 2012.

For Puget Sound, the Initiative objectives are designed to address the loss of estuarine wetlands, riparian habitat, and impacts on threatened Chinook salmon and steelhead. NMFS will work with partners to develop new strategies to conserve salmon habitat, as well as to integrate scientific modeling and monitoring with regulatory and restoration programs. While efforts will focus on

habitat restoration in the near-term, NMFS will provide a critical scientific framework for long-term recovery.

While no new funding is provided to launch and sustain these Initiatives, these efforts may help leverage new funds in the future. Further information on these Initiatives and the Blueprint are available at http://www.habitat.noaa.gov/blueprint

Fukushima/Tsunami/Invasive Species/Earthquake Testing

The HC heard updates about consequences to the West Coast from last year's Japanese tsunami. Increasing volumes of tsunami debris have been appearing on the West Coast, and at a faster rate than originally expected. Tsunami debris poses a safety risk to fishing vessels, wildlife, and potentially to human health, and contributes to the threat of aquatic invasive species. In early June a 66-foot, 165-ton dock washed up on the beach near Newport, Oregon after a 5000-mile journey from Japan; and on June 16, a Japanese fishing boat, suspected to be tsunami debris, washed ashore near Ilwaco. The dock was heavily colonized by mussels, barnacles, crabs, oysters, seastars, seaweed and many other species, some of which are known invasive species for the eastern Pacific.

On a somewhat related topic, California legislation passed in 2006 (AB 1632), requires seismic surveys of earthquake faults near operating nuclear power plants. The need for such surveys has intensified as a result of the Fukushima nuclear disaster. In California, seismic surveys are planned around the Diablo Canyon Nuclear Power Plant in San Luis Obispo County. These surveys will use high intensity airguns, hydrophones towed by a vessel, and bottom-placed geophones. Because of the loud noises generated by these tests, there are concerns over barotrauma impacts to fish eggs, larvae, and adults, as well as invertebrates and marine mammals, such as whales. California Department of Fish and Game is in consultation with Pacific Gas and Electric, project proponent, to develop a monitoring program and address potential impacts to marine resources and marine protected areas.

Invasive Species Impacts on Mud Shrimp

New information indicates that a serious invasive species issue has developed that threatens the ecological integrity of a keystone estuarine shrimp. Blue mud shrimp (*Upogebia pugettensis*) occur in intertidal tideflats throughout the Pacific northwest, where they excavate burrows in the soft sediment. The shrimp provide an important food source for juvenile salmon in West Coast estuaries. However, large numbers of the shrimp have recently been parasitized by an Asian invasive copepod that castrates the adult shrimp and makes them unable to reproduce. Blue mud shrimp are now thought to be extinct in many estuaries. Initial efforts are underway to create a "hatchery" program for Blue mud shrimp to conserve the remaining populations, and to reintroduce them to the estuaries after the parasite has died out. However, debris from the Japanese tsunami could complicate this effort and worsen the situation (for more information, see "An introduced Asian parasite threatens northeastern Pacific estuarine ecosystems" (John W. Chapman, et al., 2011, http://tinyurl.com/cwwp7w2).