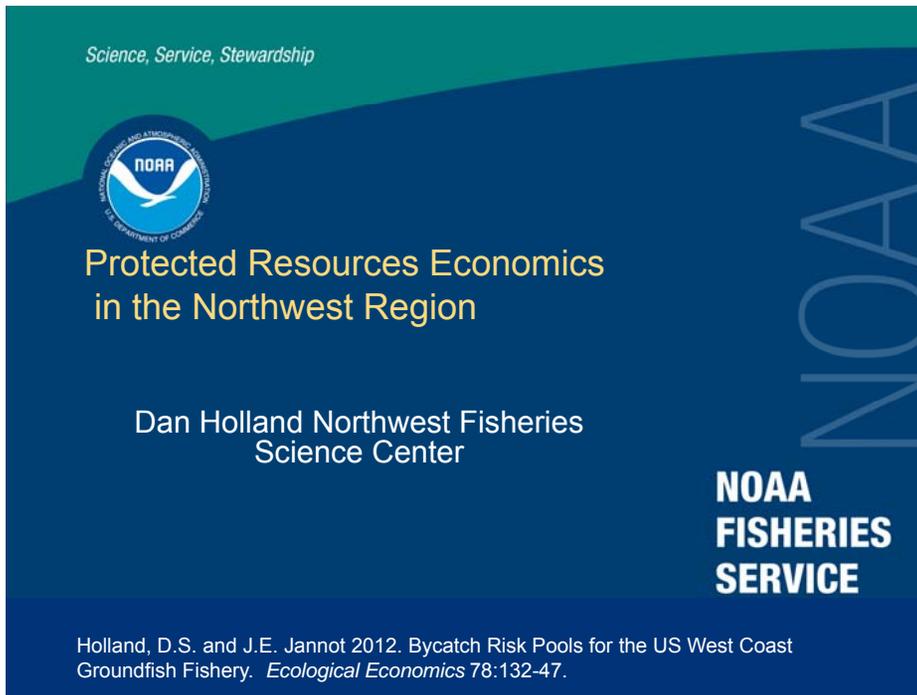


**Appendix C5: Protected Resource Economics in the Northwest Region**



## Species of Interest

- West Coast Salmon and Steelhead (multiple species and ESUs)
- Southern Resident Killer Whales
- Puget Sound Rockfish (three species)
- Green Sturgeon
- Eulachon
- Black Abalone

2

## Primary Management Tools

- Habitat Conservation and Restoration
- Fish Passage
- Bycatch
- Prey Availability
- Rules to limit disturbance

3

## Analyses

- **Critical Habitat Designations** - evaluation of costs or economic impacts of designations
- **Regulatory Flexibility Act** – economic impacts on small entities
- **Regulatory Impact Review** – costs of regulations such as vessel speed and approach distance
- Cost-effectiveness analysis of different methods of promoting salmon recovery in Wenatchee River watershed
- Non-market valuation of a set of closures to help conserve Puget Sound rockfish species
- Recreational Value of Wild and Hatchery Salmon.

4

## Cost and Benefits of Critical Habitat Designations

- Section 4(b)(2) of the ESA -consider the economic, national security, and other impacts of designating a particular area as critical habitat
- Conceptually, the “benefits of exclusion,” which is essentially the language used in section 4(b)(2) of the ESA, are identical to the “costs of inclusion,”
  - Define the geographic study area and identify the units of analysis.
  - Estimate the economic impacts associated with this change in management – both administrative and use modification.
  - Contracted out to Consulting Firms
  - Done for Salmon/steelhead, Killer Whales, Euchalon, Abalone, Sturgeon, Puget Sound rockfish

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## Activity types affected by critical habitat designation for the economic analysis for salmon:

- Hydropower dams
- Non-hydropower dams and other water supply structures
- Federal lands management, including grazing (considered separately)
- Transportation projects
- Utility line projects
- Instream activities, including dredging (considered separately)
- EPA NPDES-permitted activities

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## Regulatory Flexibility Act (RFA)

- Determine the number of small entities affected by critical habitat designations and estimate the economic impacts on these entities.
- Done for several protected species

## Regulatory Impact Review (RIR)

- RIR on vessel traffic regulations for Killer Whale rules
- Key focus on economic impacts on the Whale Watching Industry Found insufficient data to quantify costs of proposed rules

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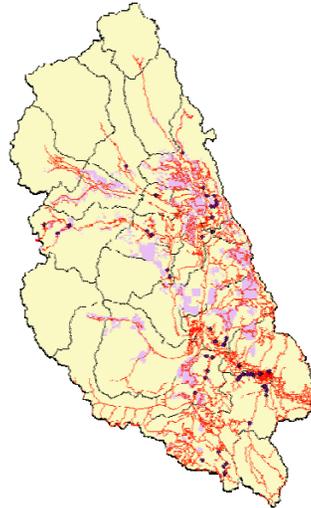
## Conservation Banking and Mitigation Banking

- Conservation banking programs and mitigation banks that offset wetland conversion exit.
- No economic research on these programs

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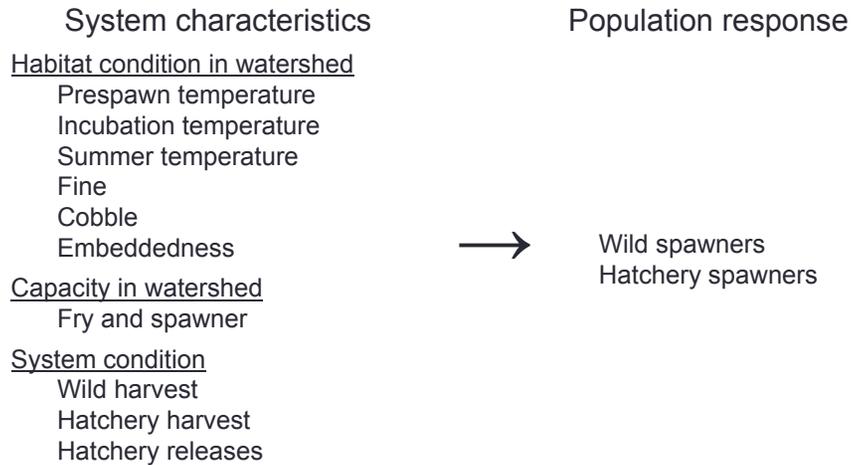
## Cost-Effective Recovery Actions for Endangered Spring Chinook in the Wenatchee River Basin

- “Biggest Bang for the Buck” analysis – Mark Plummer, Jeff Jorgensen, Jon Honea
- Combines biological models/data with economic data to assess cost-effectiveness of a suite of possible recovery actions for spring Chinook in the Wenatchee river basin



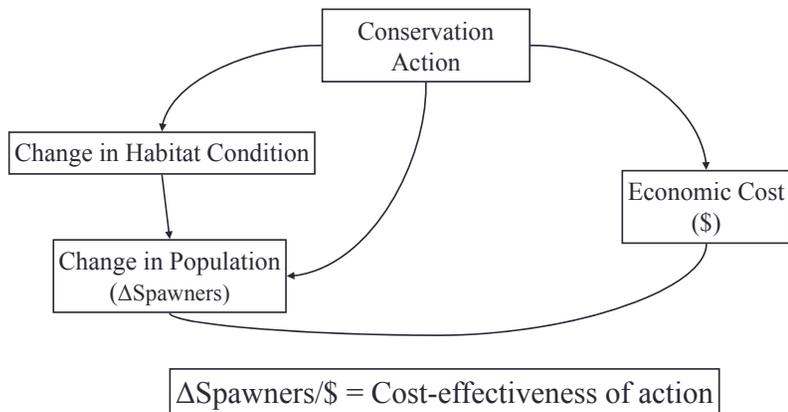
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## Honea *et al.* model: Habitat and other conditions to population response



10

## Cost-Effectiveness Analysis: Wenatchee river spring Chinook



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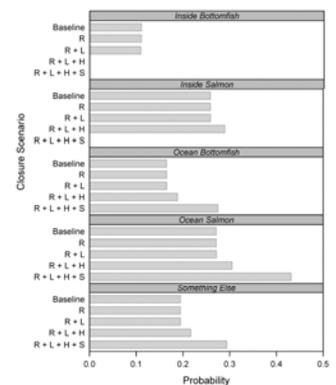
**Anderson, L. E., S. T. Lee, P. S. Levin. 2013.** Costs of Delaying Conservation: Regulations and the Recreational Values of Rockfish and Co-occurring Species. *Land Economics*, 89(2):371-385.

Researchers used non-market valuation to estimate the changes in economic value from a set of closures that may be implemented in order to help conserve Puget Sound rockfish species

Four closures were examined incrementally: a rockfish closure; a rockfish and lingcod closure; a rockfish, lingcod, and halibut closure; and a rockfish, lingcod, halibut, and salmon closure

In addition to economic values, the study examined the amount of substitution that would occur to related fisheries

Participation Rates in Fisheries by Closure Scenario



WTP for a Fishing Day by Closure Scenario

Closure Scenario	Mean	5th Percentile	Median	95th Percentile
R	\$0.17	\$0.08	\$0.17	\$0.30
R + L	\$0.78	\$0.36	\$0.75	\$1.34
R + L + H	\$48.47	\$29.34	\$46.93	\$69.89
R + L + H + S	\$215.80	\$141.60	\$214.20	\$284.50

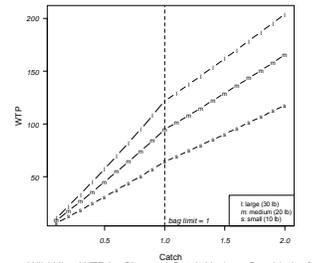
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**Anderson, L. E., S. T. Lee. 2013.**  
 Untangling the Recreational Value of Wild and Hatchery Salmon. *Marine Resource Economics*, 28(2):175-197.

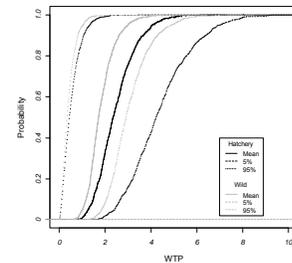
The researchers used a non-market value method to estimate the economic value of recreational fishing to anglers in WA and OR marine waters.

In particular, the study measured the economic value of catching coho and Chinook salmon, and tried to determine whether a fish's origin, "hatchery" or "wild", affects the value anglers place on either retained or released catch.

Significant differences in value are found between hatchery and wild salmon catch, especially for fish that must be released because of a bag limit. The effects of changes in bag limits and catch rates are examined.



Wild King WTP by Size and Catch Under a Bag Limit of 1



CDFs of WTP per Choice Occasion for Equivalent Increase in Catch

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## Potential Needs

- Welfare estimates for whale watching
- Evaluations to see whether cost estimates and economic impacts from prior studies (critical habitat cost, RIR, RFA) were accurate
- More cost-effectiveness work to prioritize actions to promote salmon recovery
- Valuation work to prioritize trade-offs in activities to promote salmon recovery (e.g. fast recovery vs. resilience)

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