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July 7, 2021

### MEMORANDUM

**TO: Fish and Wildlife Committee Members**

**FROM: Leslie Bach**

**SUBJECT: Bonneville Report on Program Research**

#### **BACKGROUND:**

**Presenter:** Jody Lando, Bonneville Power Administration

**Summary:** Jody Lando will present an update on BPA-funded research linked to the Council's Columbia River Basin Fish and Wildlife Program. She will provide an overview of the types of scientific questions currently addressed by research projects, and where and how projects are implemented across the Columbia Basin. She will also highlight recent publications of key management significance and address the relationship to the Council's 2017 Research Plan and the Independent Scientific Advisory Board/Review Panel's 2016 Critical Uncertainties report.

**Relevance:** Part Four: Adaptive Management in the Council's 2014 Program notes that Research is an essential tool of adaptive management. It calls for research projects to address hypotheses relevant to management decisions, and for Bonneville to report annually to the Council on publications resulting from Program research.

**Background:** In 2017 the Council completed a Research Project progress review that included 25 research-focused Program projects. The research projects focused on topics such as evaluating movement and survival of fish, evaluating habitat and the effectiveness of restoration actions, and improving fish propagation. The review demonstrated that the research

projects are addressing a range of critical uncertainties as identified in the 2017 Research Plan and the ISAB/ISRP Critical Uncertainties report. The Council's Program calls for research projects to address hypotheses relevant to management decisions, with the results published in peer-reviewed journals.

More Info: [Council 2017 Research Plan](#)

[ISAB/ISRP 2016 Critical Uncertainties Report](#)

# 2019-2021 Research Review

July 13, 2021  
F&W Committee





# Presentation Overview

- Context
- Research principles
- Key questions
- BPA-funded research linked to the Council program
- Notable publications



# Context

- 2014 Council Program plan
  - *Bonneville will report annually to the Council on the publications resulting from program research*
- 2017 research plan
- ISRP 2018 research project status review (26 projects)
  - habitat and the effectiveness of restoration actions
  - fish propagation and the effectiveness of supplementation
  - fish and wildlife populations



# Research Principles\*

- Seek to resolve critical uncertainties
- Assess new methods and technologies to improve the program
- Prioritize research based on criteria:
  - Program & legal relevance
  - Broad applicability
  - Time bound
  - Statistical validity
  - Focal species
  - Cost vs. Value of Information





# Key questions

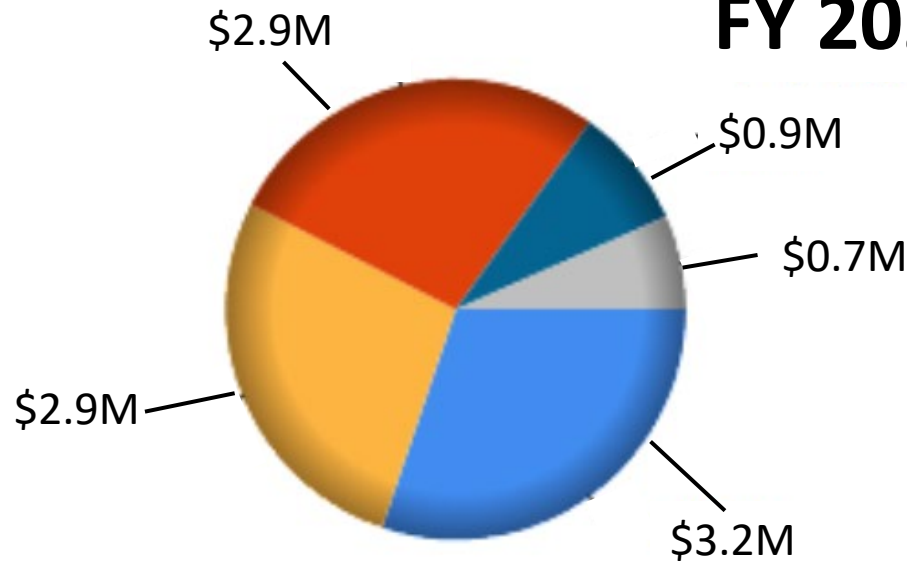
- **Hydro passage** – survival, timing, flow, GBT
- **Ocean survival** – climate change effects, delayed mortality
- **Avian predation** – additive vs. cumulative survival effects
- **Genetic assessment** – parentage, RRS for hatchery vs. wild, stock ID
- **Habitat effectiveness** – process restoration, carrying capacity
- **Hatchery practices** – precocious maturation & mgmt. influence, acclimation strategies



# BPA-funded research linked to the Council program

## Distribution of Research by Purpose

**FY 2021**



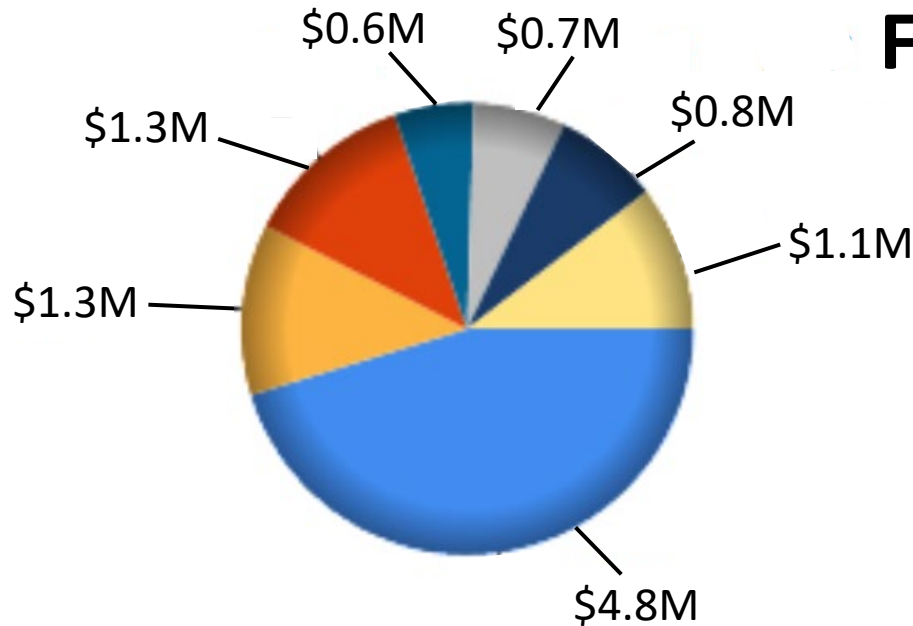
■ Programmatic 
 ■ Artificial Production 
 ■ Habitat 
 ■ Hydrosystem 
 ■ Predation



# BPA-funded research linked to the Council program

## Regional Distribution of Research Funds

**FY 2021**



- Basinwide
- Columbia Plateau
- Columbia Cascade
- Intermountain
- Mainstem
- Blue Mountain
- Ocean

# Notable Publications

## Hydro Passage Survival

- Harnish, R., Skalski, J., Townsend, R., & Ham, K. (2020). **In Search of a Cost-Effective Approach for Estimating Dam Passage Survival.** North American Journal of Fisheries Management, 40(4), 865-882.
- Skalski, J. R., Whitlock, S. L., Townsend, R. L., & A. Harnish, R. **Passage and Survival of Juvenile Salmonid Smolts through Dams in the Columbia and Snake Rivers, 2010–2018.** North American Journal of Fisheries Management.



# Notable Publications

## Ocean Survival

- Crozier, L. G., Siegel, J. E., Wiesebron, L. E., Trujillo, E. M., Burke, B. J., Sandford, B. P., & Widener, D. L. (2020). **Snake River sockeye and Chinook salmon in a changing climate: Implications for upstream migration survival during recent extreme and future climates.** PloS one, 15(9), e0238886.
- Sol, S. Y., B. Anulacion, D. P. Lomax, P. Chittaro, P. Moran, G. M. Ylitalo, A. Hanson, C. Corbett, and L. L. Johnson. 2021. **Juvenile Salmon Ecology in Tidal Freshwater Wetlands in the Lower Columbia River Estuary.** U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-162.





# Notable Publications

## Predation

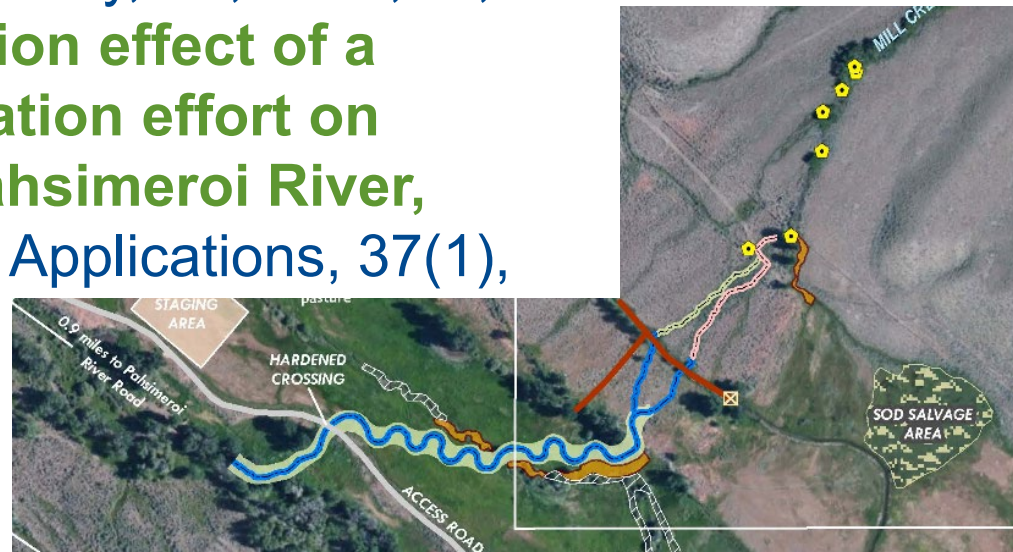
- Tiffan, K. F., Erhardt, J. M., Hemingway, R. J., Bickford, B. K., & Rhodes, T. N. (2020). **Impact of smallmouth bass predation on subyearling fall Chinook salmon over a broad river continuum.** Environmental Biology of Fishes, 103(10), 1231-1246
- Evans, A. F., Payton, Q., Cramer, B. M., Collis, K., Hostetter, N. J., Roby, D.D., & Dotson, C. (2019). **Cumulative Effects of Avian Predation on Upper Columbia River Steelhead.** Transactions of the American Fisheries Society, 148(5), 896-913



# Notable Publications

## Population diversity and managing for resilience

- Dobos, M. E., Bowersox, B. J., Copeland, T., & Stark, E. J. (2020). **Understanding life history diversity of a wild steelhead population and managing for resiliency.** *North American Journal of Fisheries Management*, 40(5), 1087-1099.
- Copeland, T., Blythe, D., Schoby, W., Felts, E., & Murphy, P. (2021). **Population effect of a large-scale stream restoration effort on Chinook salmon in the Pahsimeroi River, Idaho.** *River Research and Applications*, 37(1), 100-110.



# Notable Publications

## Harvest and Hatchery Management

- Steele, C. A., Hess, M., Narum, S., & Campbell, M. (2019). **Parentage-Based Tagging: Reviewing the Implementation of a New Tool for an Old Problem.** Fisheries.
- Johnson, E. L., Kozfkay, C. C., Powell, J. H., Peterson, M. P., Baker, D. J., Heindel, J. A., ... & Kline, P. A. (2020). **Evaluating Artificial Propagation Release Strategies for Recovering Endangered Snake River Sockeye Salmon.** North American Journal of Aquaculture.
- Larsen, D. A., Harstad, D. L., Fuhrman, A. E., Knudsen, C. M., Schroder, S. L., Bosch, W. J., ... & Beckman, B. R. (2019). **Maintaining a wild phenotype in a conservation hatchery program for Chinook salmon: The effect of managed breeding on early male maturation.** PloS one, 14(5), e0216168.



# Notable Publications

## Indirect funding and/or use of BPA-funded data

- Faulkner, J. R., Bellerud, B. L., Widener, D. L., & Zabel, R. W. (2019). **Associations among fish length, dam passage history, and survival to adulthood in two at-risk species of Pacific salmon.** *Transactions of the American Fisheries Society*, 148(6), 1069-1087.
- Chittaro, P. M., Hegg, J. C., Kennedy, B. P., Weitkamp, L. A., Johnson, L. L., Bucher, C., & Zabel, R. W. (2019). **Juvenile river residence and performance of Snake River fall Chinook salmon.** *Ecology of Freshwater Fish*, 28(3), 396-410.

# Forthcoming Publication

Gosselin, J.L., Buhle, E., Van Holmes, C., Beer, N., and Anderson, J.J.. *In press*. **Relative importance of direct and carryover effects on survival across life stages of wild Chinook salmon migrating through a hydropower system.** Ecological Applications.

- *...a multi-stage life cycle model of spring/summer Chinook salmon (2001-2019)*
- *significant management implications for understanding delayed mortality (carryover effects) and the influence of environmental factors (freshwater and marine) on SAR*