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## MEMORANDUM

**TO:** Power Committee members

**FROM:** John Fazio, Senior Power System Analyst

**SUBJECT:** Review of Appendix M: Fish and Wildlife Interactions

By statute, mainstem hydroelectric operations specified in the Council's fish and wildlife program automatically become a part of the power plan. The plan is to be designed so that fish and wildlife operations are implemented in an adequate and reliable way. This appendix describes how the plan accommodates changes in hydroelectric generation and cost related to program actions. The attached version is still a work in progress, in that it is still being reviewed by the Fish and Wildlife and Legal Divisions.

Although actions specified in the program have a sizeable impact on hydroelectric generation, current analysis indicates that the power system can reliably provide program actions (and absorb their cost) while maintaining an adequate, efficient, economic and reliable energy supply. On average, hydroelectric generation is reduced by about 1,170 average megawatts, which represents about 10 percent of its firm generating capability. This loss translates into an average regional cost of \$434 million per year. Adding related fish capital expenses and other program costs yields a total regional annual cost of \$720 million, which amounts to about 20 percent of Bonneville's annual net revenue requirement.

Looking toward the future, the appendix discusses a number of uncertainties. Generation may be further reduced by actions to increase bypass spill, flow augmentation volumes, or by physically removing dams. On the other hand, spillway weirs offer the potential to increase generation by reducing bypass spill. Climate change models indicate that snow pack and river flows are likely to change, which would affect both power production and fish survival. Finally, agreements among hydroelectric project owners, such as the Canadian Treaty and the Coordination Agreement could change, leading to different operations. The resource strategy developed for the power plan must be sufficiently dynamic and robust to accommodate these potential changes. To the extent possible, the impacts of these uncertainties will be evaluated and used in the development of the plan's resource strategy. The appendix suggests possible action items to enhance the ability to analyze and coordinate interactions between the Fish and Wildlife Program and the Power Plan.

# Appendix M

## Fish and Wildlife Interactions



## Appendix M Outline

- I. **Background:** Describes Northwest Power Act requirements, which include developing an adequate, efficient, economical and reliable power supply while protecting, mitigating and enhancing fish and wildlife. By statute, the fish and wildlife program is part of the power plan and its operations and costs must be incorporated into the Council's resource strategy.
- II. **Current Situation:**
  - This section briefly describes current operations for fish and wildlife as described in the program that will affect the power supply, in particular flow augmentation and bypass spill.
  - It summarizes the cost of these operations and identifies other fish and wildlife costs that must be borne by the power system. The current system can accommodate program actions.
  - The methodology used to assess costs is described and a summary of physical impacts and cost, including effects on carbon emissions is provided.
- III. **Dealing with the Future:** This section describes the wide range of future uncertainties that surround factors that can affect power supply and fish protection. Potential uncertainties include; increased actions to protect fish, climate change, dam removal, modifications to regional and international treaties related to hydroelectric operations, potential effects of aquatic invasive species, improvements to fish passage technologies and integration of variable resources (such as wind).
- IV. **Recommendations**

