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June 10, 2009

MEMORANDUM

TO: Council Members

FROM: John Fazio, Senior System Analyst

SUBJECT: Integrating Fish & Wildlife and Power Planning

One of the key elements in developing a resource plan for the region is to understand how its largest resource, namely the hydroelectric system, interacts with other resources, most importantly wind, and with non-power operations for the river system, in particular those to protect fish and wildlife. Appendix M describes the interaction of fish and wildlife and power planning, identifies future uncertainties that could affect both and offers suggestions to improve future planning efforts.

The appendix begins with a background section that describes the Council's requirements under the Northwest Power Act. This is followed by a description of current river operations aimed at fish and wildlife protection. Physical and economic impacts of these operations include effects to reservoir elevations, refill probabilities, river flows, hydroelectric generation and cost. The impacts to generation and cost are significant but have grown incrementally since the passage of the Act in 1980. This has given the power system ample time to adapt and to maintain an adequate, efficient, economic and reliable supply.

The appendix goes on to describe future uncertainties, which include climate change and related carbon policies, loss of hydroelectric flexibility due to wind integration, alternative fish and wildlife operations (potentially including dam breaching), potential improvements to fish passage operations and potential amendments to existing treaties and agreements among dam operators.

The appendix ends with a description of current efforts toward regional cooperation and suggests the creation of a long-term planning forum. This forum would bring together power planners and fish and wildlife managers to explore ways to address future uncertainties and to identify ways to more reliably provide for power and fish and wildlife needs.

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Integrating Fish & Wildlife and Power Planning



Appendix M Outline

- I. **Background: Northwest Power Act Requirements**
- II. **Current Situation**
 - Mainstem Measures
 - Effects on the Hydroelectric System
 - Cost Estimate
 - Impacts to Carbon Emissions
- III. **Dealing with an Uncertain Future**
- IV. **Regional Cooperation: Action Items**

Background

Northwest Power Act Requirements

- F&W program is part of the power plan
- Plan must provide an adequate, efficient, economical and reliable power supply
- It must also provide adequate and reliable implementation of F&W measures

Current Situation

- Flow augmentation and bypass spill
- Effects on reservoir elevation, refill, flow, and generation
- Cost of mainstem operations
- Cost of F&W program implementation
- Effect on the region's carbon footprint

AEERPS

- Hydro generation loss about 10%
- Cost is significant (about 20% of BPA's NRR)
- Mainstem measures have been implemented over a 30 year period
- Power system has had time to adapt
- Current assessment – power supply is adequate, efficient, economical and reliable

Dealing with an Uncertain Future

- Climate change and carbon policies
- Alternative F&W operations
 - ✓ Increased bypass spill
 - ✓ Dam breaching
 - ✓ Improved methods for passage
- Loss of hydro flexibility (wind integration)
- Changes to river operation treaties

Regional Cooperation

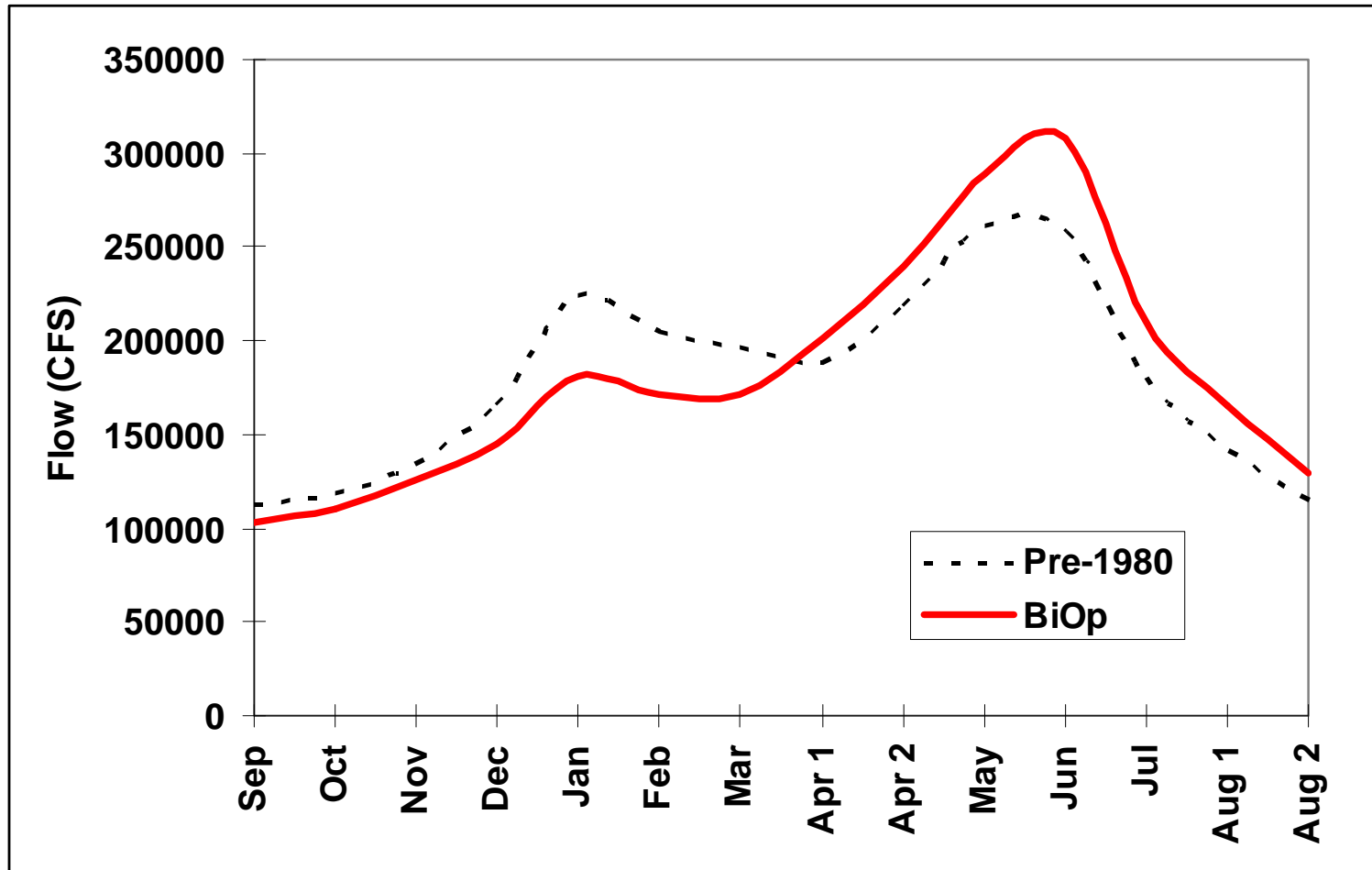
Proposed Action Items

- Create a Long-term Planning Forum
- Design Contingency Plans
- Enhance Analytical Capability
- Monitor Columbia River Treaty Discussions
- Examine Effects of Climate Change

Additional Slides

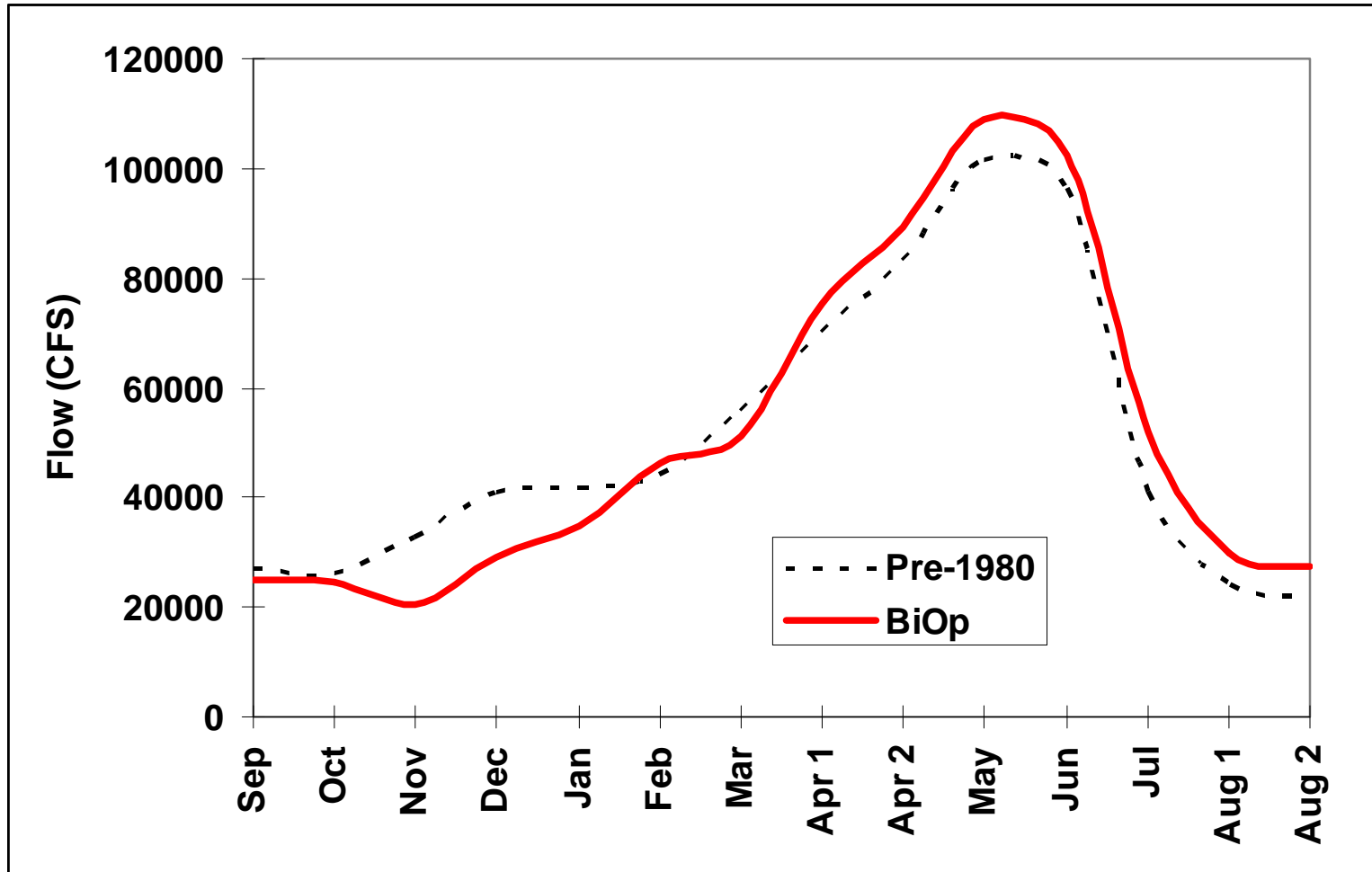
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Average Flow at The Dalles



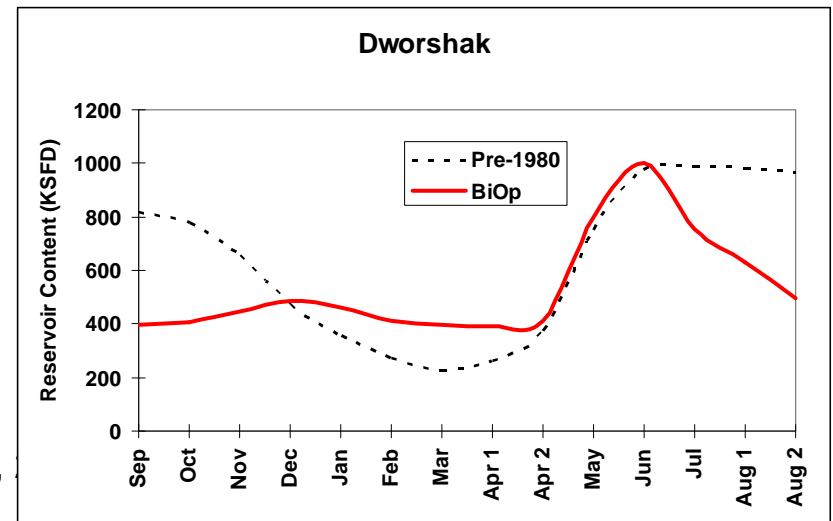
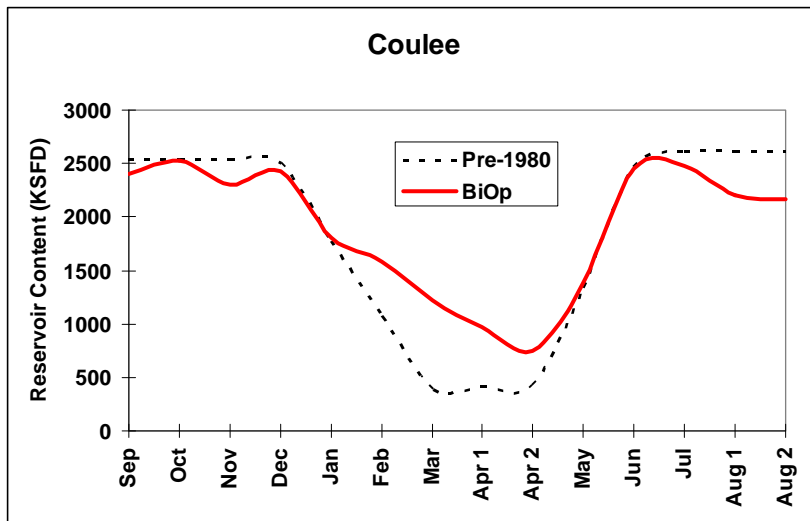
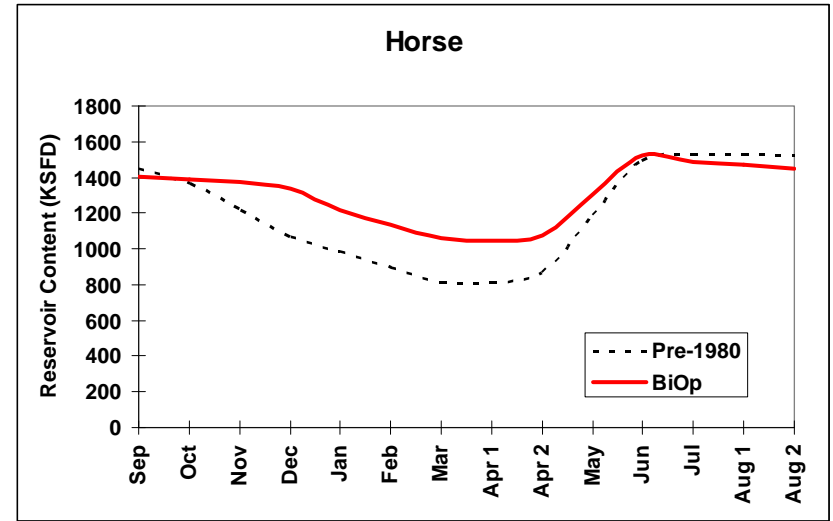
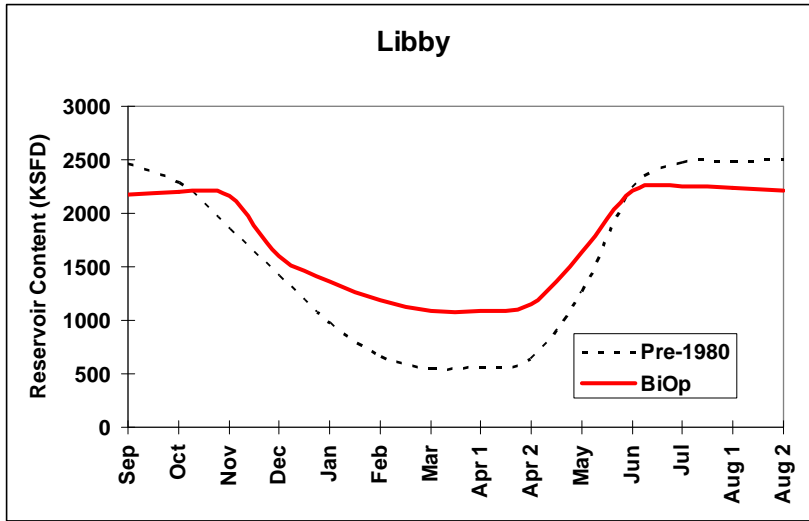
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Average Flow at Lower Granite

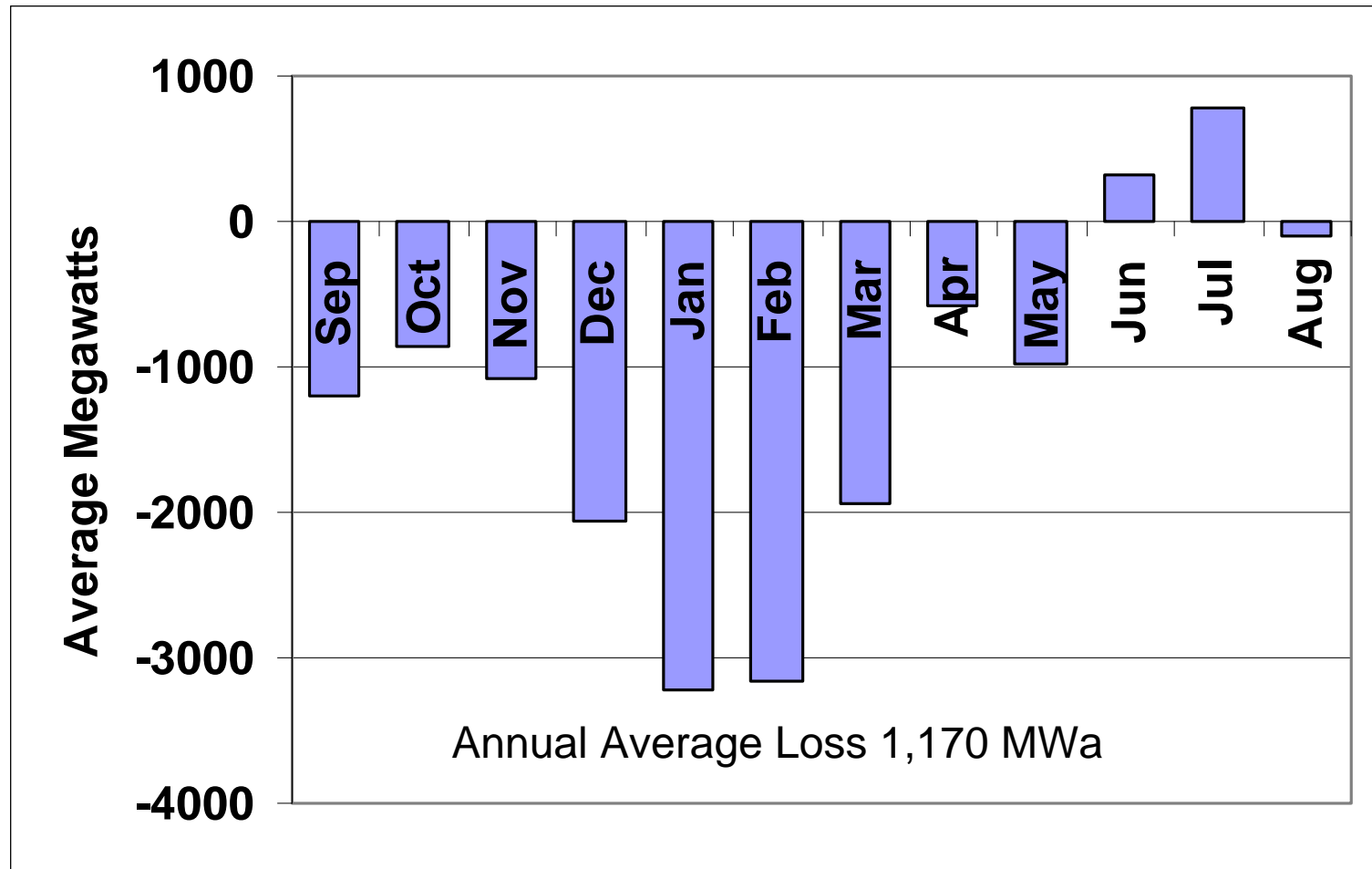


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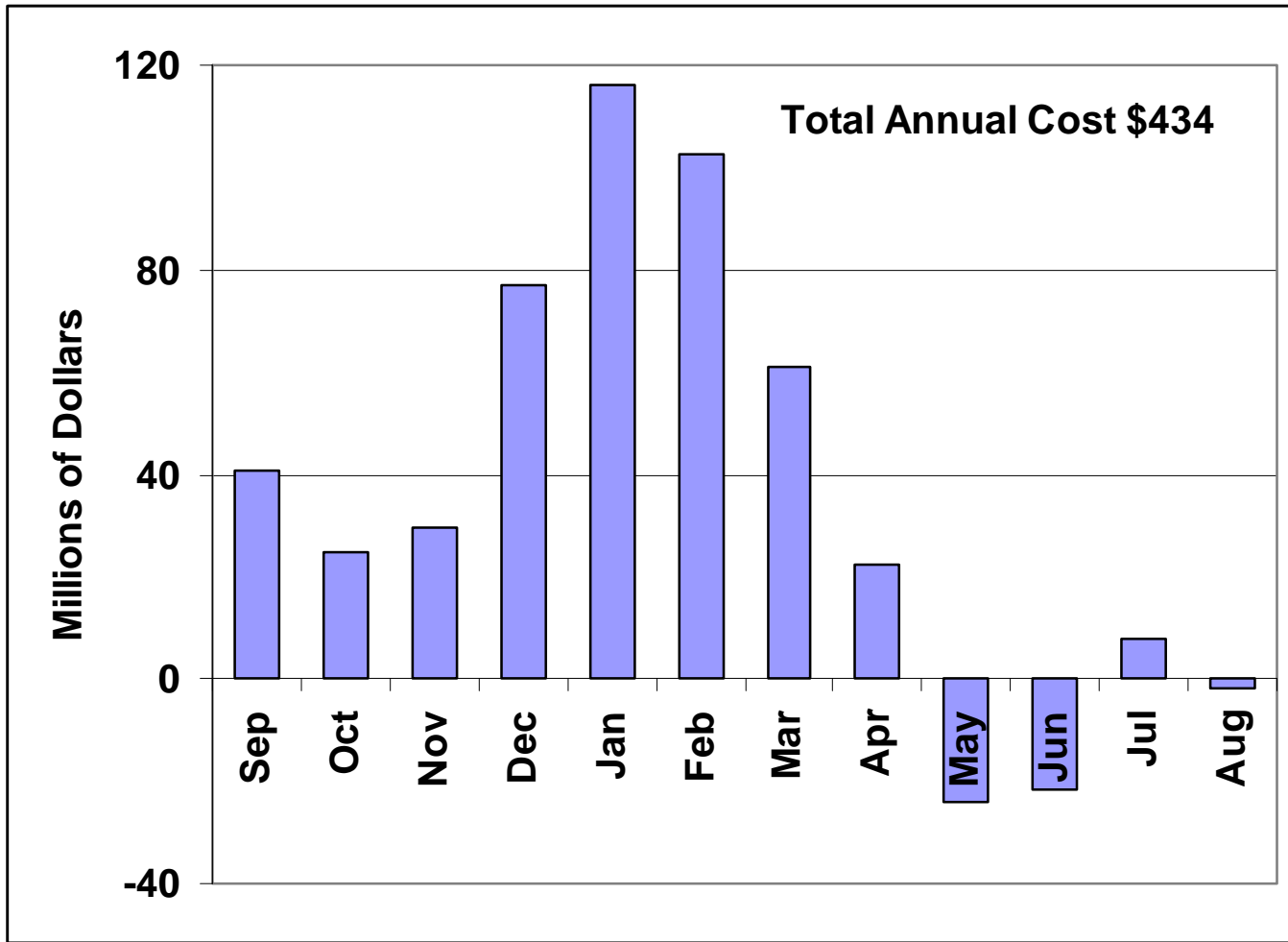
Average Reservoir Contents



Average Change in Generation

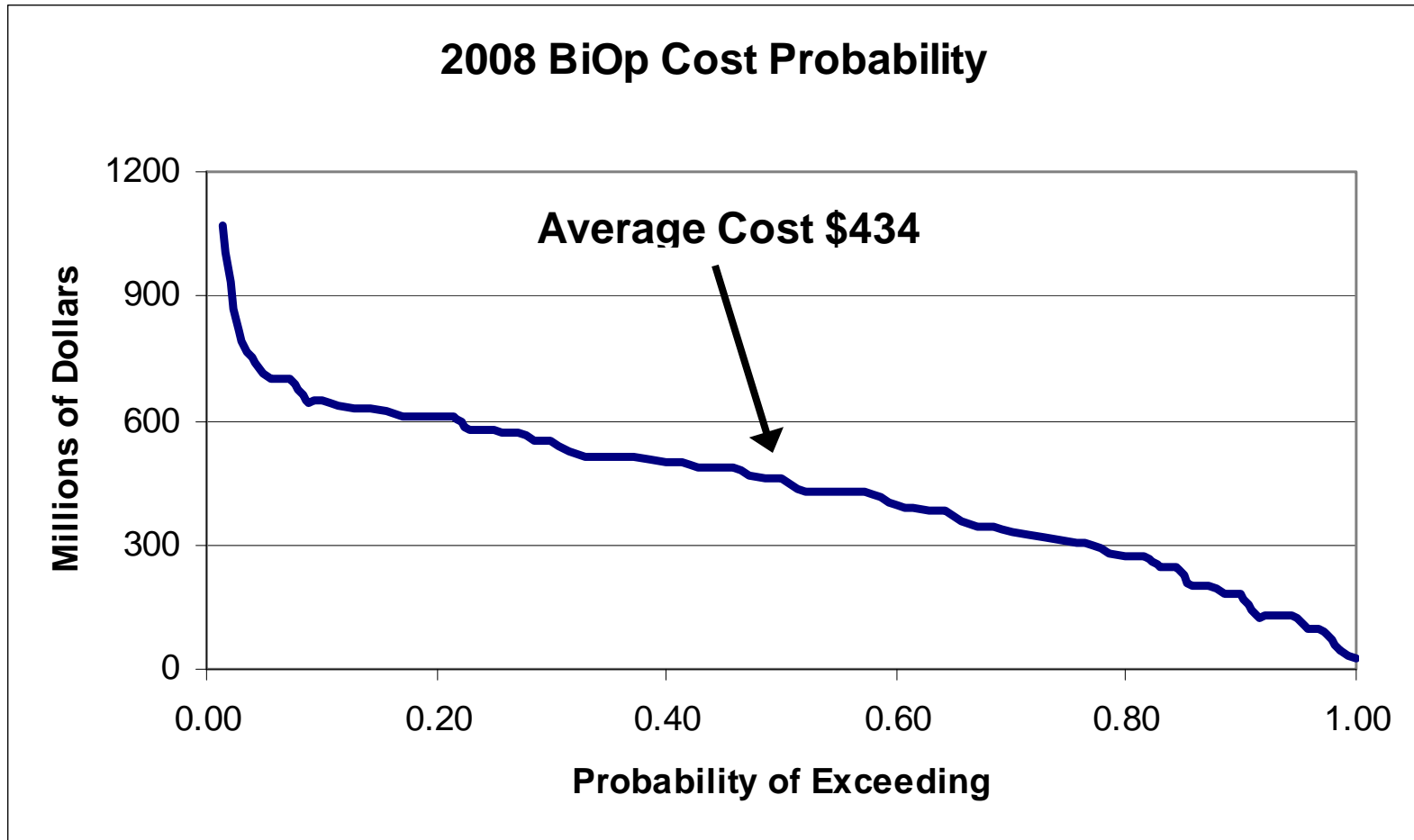


Average Power System Cost

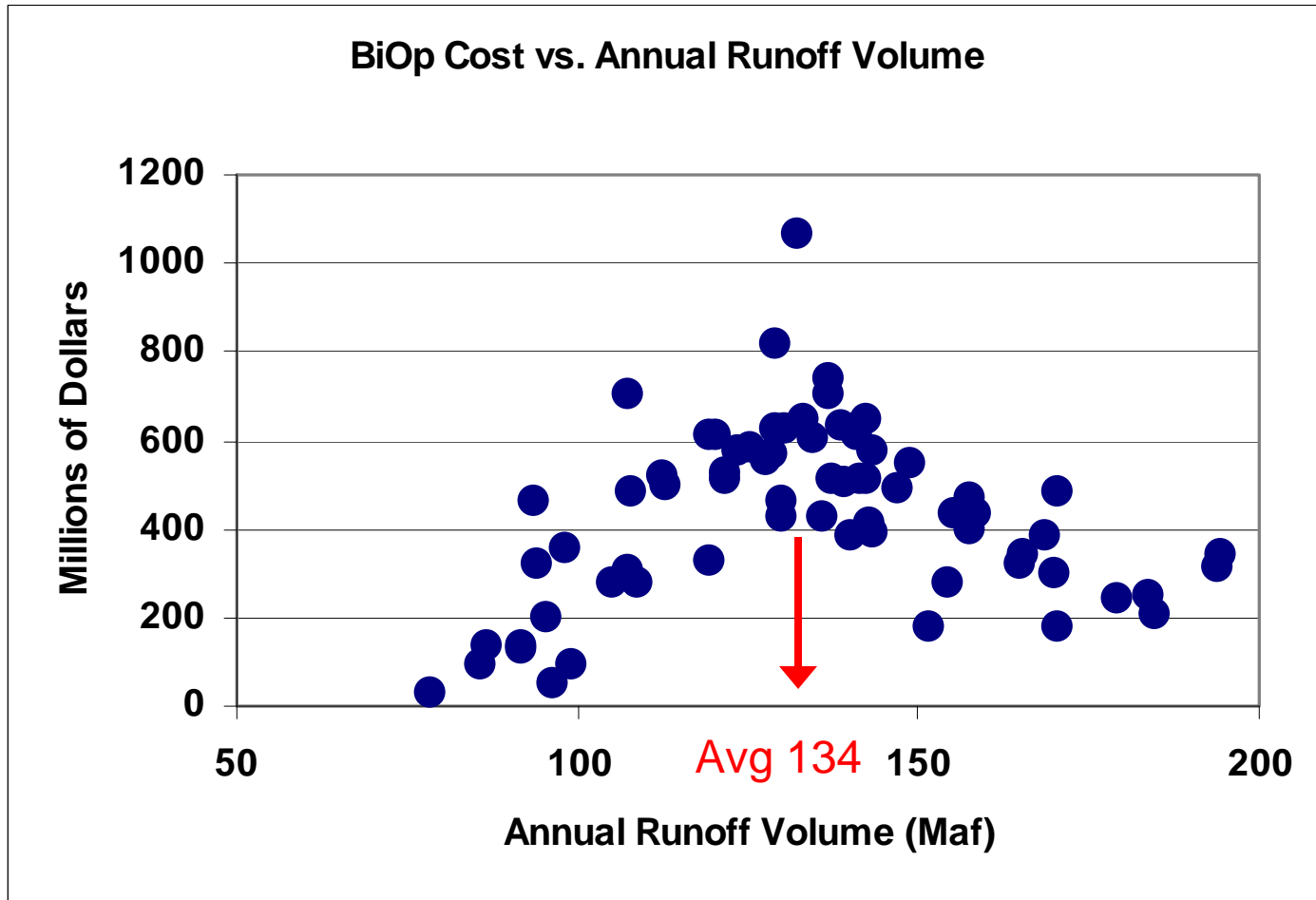


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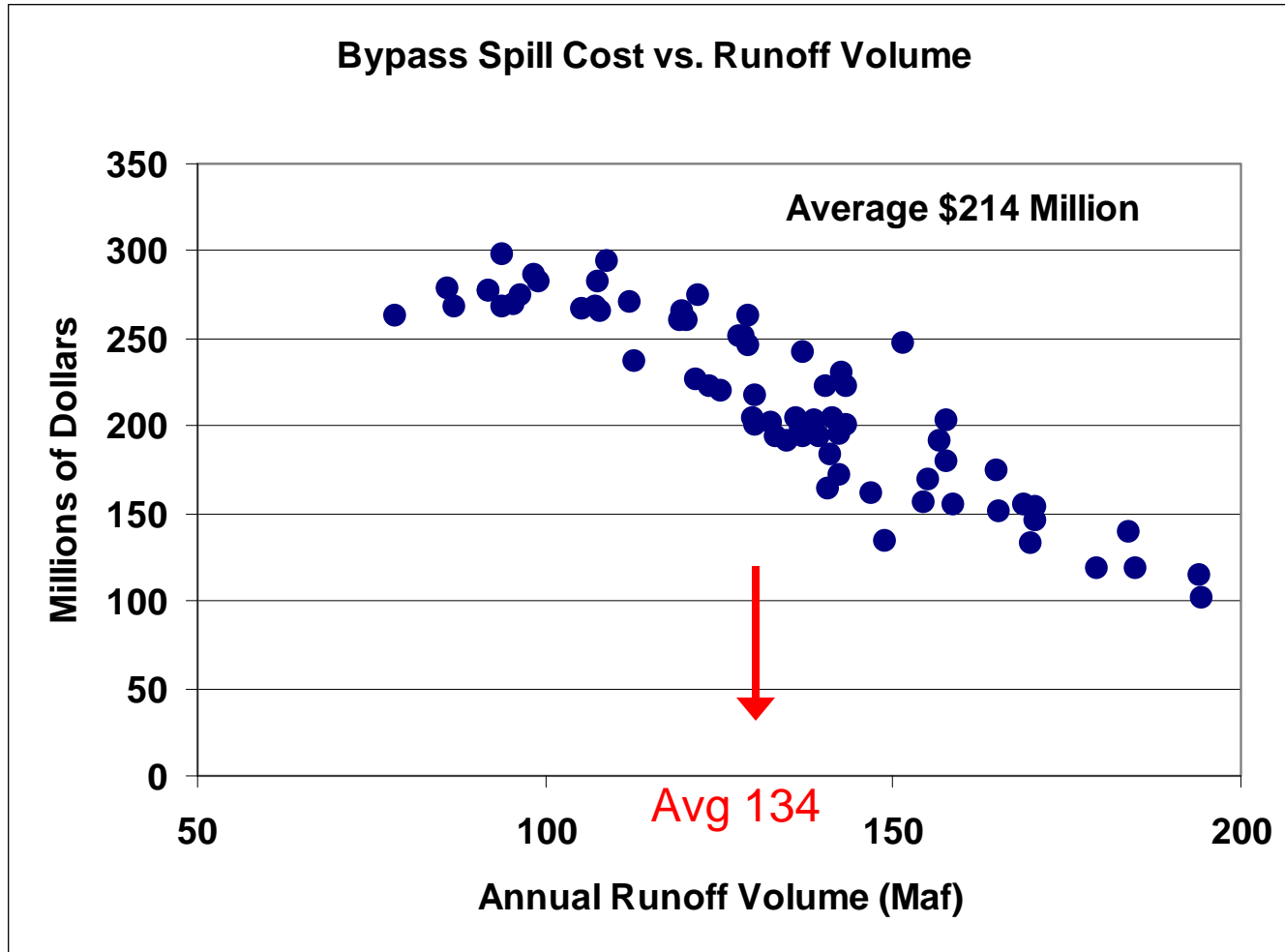
Range of Cost



Total Power System Cost vs. Runoff Volume



Bypass Spill Cost vs. Runoff Volume

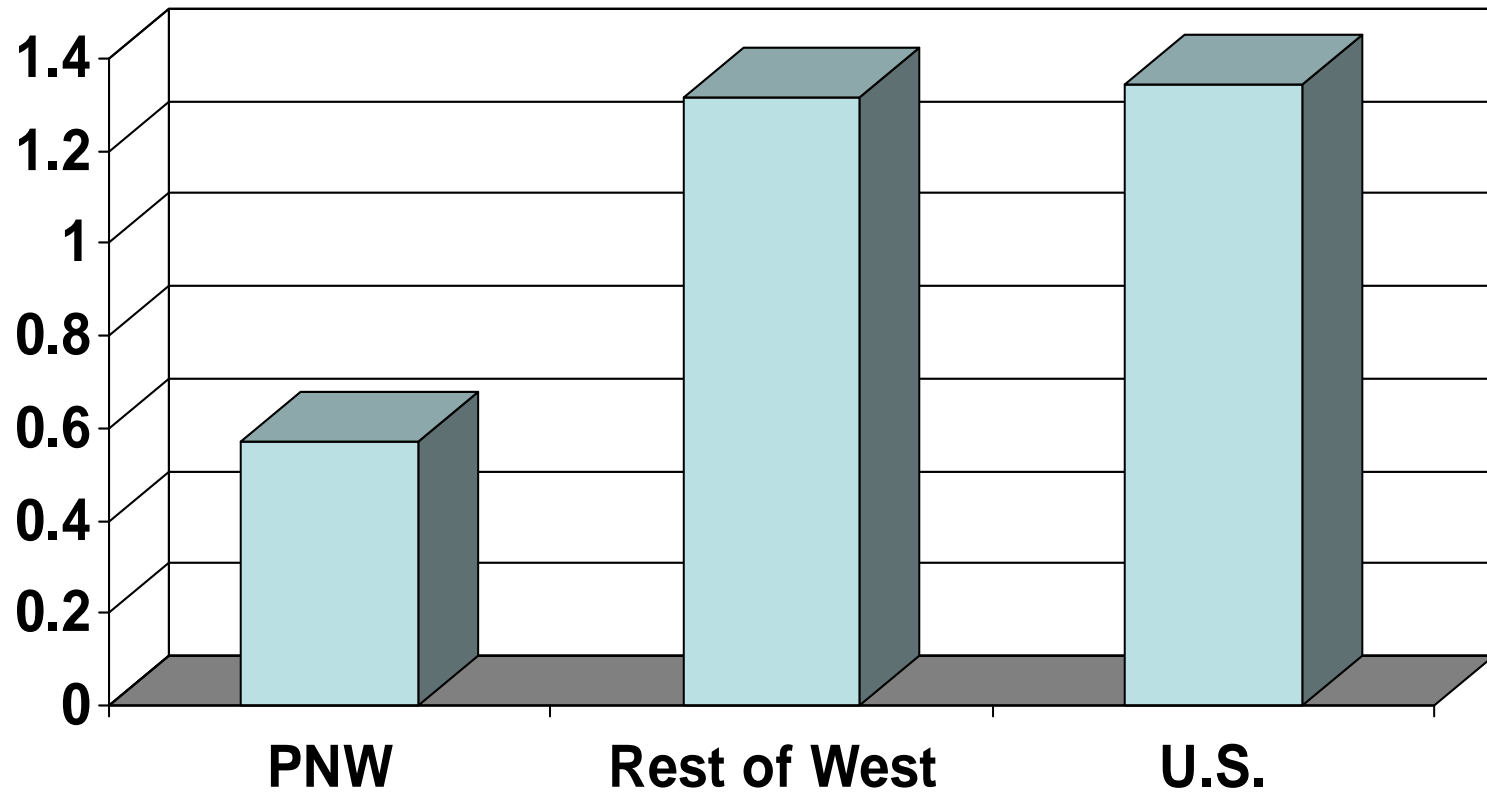


Total Est'd Cost of F&W Program

- \$ 434 Million – Mainstem
- \$ 56 Million – F&W capital expenses
- \$ 231 Million – Non-mainstem program measures
- **\$ 721 Million – Total cost**
- 18 to 24 % – of BPA's annual net revenue requirement (ranges from \$3 to \$4 billion)

Carbon Footprint for the Northwest

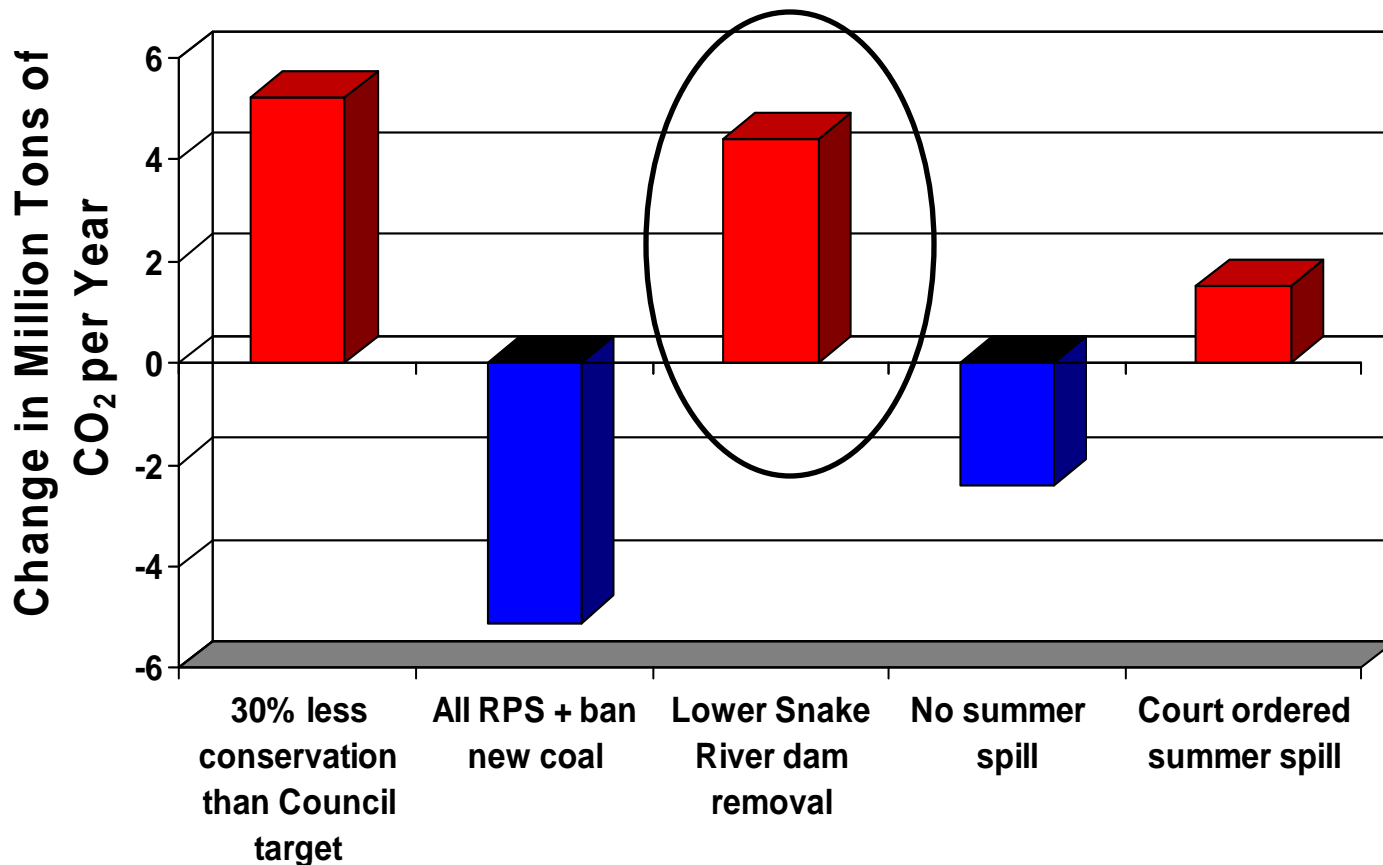
Pounds of CO2 Per kWh



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Emission Impacts of Various Actions

Effects on 2024 Western CO₂ emissions



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