Modeling Results: Iteration One

COLUMBIA RIVER TREATY
2014/2024 REVIEW

CRPAG
July 26, 2012
Overview of Today’s Presentation

- Basics of Treaty Review
- Key Terms and Definitions
- Iteration 1 Alternatives
- Iteration 1 Modeling Results
- Next Steps for Treaty Review
Basics of Treaty Review

1. Understand
   - Start by understanding regional needs and priorities.

2. Determine
   - Can the current Treaty meet those needs?
   - Does the Treaty need to be changed?
   - Are the changes so significant that we have to start over with a new Treaty?

3. Arrive at that determination by:
   - Collecting information
   - Evaluating the results
   - Assessing impacts on various river interests
Basics, cont.

1. Evaluation takes place over three “iterations.”
2. Each iteration tests a number of scenarios or “alternatives.”
3. Information from each iteration used to refine approach and build alternatives for the next iteration.
Basics, cont.

- Iteration One has just been completed.
  - Current Condition (only for comparison)
  - Alternatives post 2024:
    - 450 kcf/s – Treaty Continues and Treaty Terminates
      - Uses current storage reservation diagrams
    - 600 kcf/s – Treaty Continues and Treaty Terminates
      - Uses relaxed storage reservation diagrams
Key Terms and Definitions

- Canadian Entitlement
- Effective Use
- Called Upon Flood Control
- Flood Flow Objective
- Storage Reservation Diagrams
- Peak Flows
Key Assumptions in Iteration 1

- Assumptions about Canadian Operations Post-2024 without the Treaty.
- Flood Risk Management: Effective Use and Called Upon
- Both assumptions affected outcomes across all scenarios.
Canadian Operations: With (TC) and without (TT) the Treaty

**Current Conditions/Treaty Continues**
- Outflows from Arrow are still limited by Treaty power and flood control requirements.
- The limited number of Called Upon years had less impact than the power requirements.

**Treaty Terminates**
- Outflows are relatively constant across the year.
- Flows are a result of an optimal power operation for Canada, not the Treaty.

**Under Treaty Continues alternatives, the bump in outflows from Arrow in the Aug/Sept/Oct period are a result of proportional draft requirements.**
Iteration 1 Results
Flood Risk Management

Effective Use
Called Upon
Peak Flows
Flood Risk Management Effective Use at 450 kcfs...

Treaty Continues
- Effective use in 18 out of 70 Years

Treaty Terminates
- Effective use in 23 out of 70 Years
Why is this important?

Under effective use most U.S. reservoirs are drawn down to lower water levels more frequently. This could:

- Limit a reservoir’s ability to refill.
- Hinder the ability to meet needs such as irrigation, summer fish flows, recreation and protection of cultural resources.
Flood Risk Management Effective Use at 600 kcfs...

Effective use 1 time in 70 Years, Treaty Continues or Terminates

Increases fish flows during the spring and keeps some U.S. reservoirs fuller.

May increase flood risk. Increases peak river flows

Average: 17-21 kcfs higher
In 10 wettest years: 28-49 kcfs higher
(more analysis in iteration 2)
Flood Risk Management
How often do we “Call Upon” Canada for more storage?

At 450 kcfs...
• Treaty Continues – 4 times in 70 Years
• Treaty Terminates – 6 times in 70 Years

At 600 kcfs...
• 0 times in 70 Years
Why is this important?

Called Upon has financial impacts to U.S. – $4-$34 million per request (based on power cost to Canada).

For Iteration 2…
Analysis of the annual average payment required for Called Upon.
Iteration 1 Results
Ecosystem-Based Function

Reservoir Levels
River Flows
Ecosystem-Based Function

Reservoir Elevations

- Effective use resulted in deeper draw downs and less frequent refill for some reservoirs. Could have an impact on resident fish, cultural resources, recreation, and irrigation.

- In several tributary sub-basins, Treaty operations had little or no effect on reservoir elevations and outflows.
Ecosystem-Based Function

River Flows

- In the Lower Columbia Basin, Treaty Terminates alternatives resulted in:
  - Lower winter flows
  - Higher spring flows
  - Lower late summer flows
- 600 kcfs alternatives increased peak river flows in the spring – Treaty or no Treaty.
Why is this important?

- Lower summer flows could affect ability to meet summer fish flow objectives.
- Reduction in winter flows could affect salmon protection flow objectives.
- Higher spring flows could benefit juvenile salmon migration.

For Iteration 2...
We will continue to examine these preliminary results.
Iteration 1 Results

Hydropower

Canadian Entitlement

Hydropower Generation
Canadian Entitlement

If the Treaty continues, U. S. payment of Canadian Entitlement also continues:

- Energy -- 442aMW  Capacity -- 1331 MW

Estimated value of Canadian Entitlement in 2024:

- Energy -- $113-$219 million
- Capacity -- $115 million
- Combined -- $229-$335 million per year
Hydropower Generation

Net effect of terminating the Treaty on total power and power costs (including the entitlement) for each country:

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Annual Hydropower Generation (aaMW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>410 loss ($-220 to -$320 million)</td>
</tr>
<tr>
<td>United States</td>
<td>325 – 350 gain ($+180 to $280 million)</td>
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</tbody>
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Next Steps for Treaty Review

- End of 2012: Iteration 2 Completed
- Winter 2013: Stakeholder Listening Sessions on Iteration 2
- Website: http://www.crt2014-2024review.gov/