

Modeling Results: Iteration One

COLUMBIA RIVER TREATY 2014/2024 REVIEW

Stakeholder Listening Sessions
June-July 2012



Overview of Today's Presentation

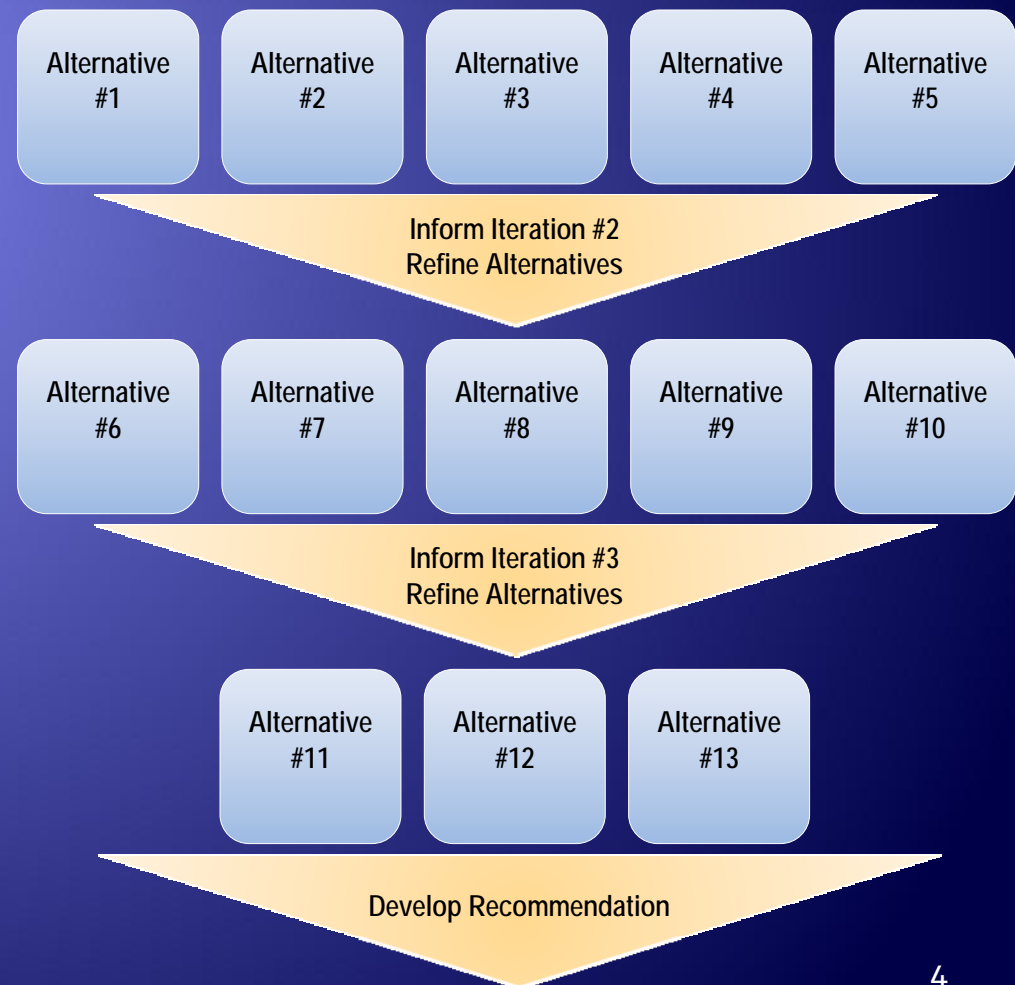
- ◆ Mechanics of Treaty Review
- ◆ Key Terms and Definitions
- ◆ Iteration 1 Alternatives
- ◆ Iteration 1 Modeling Results
- ◆ Next Steps and Schedule

Mechanics 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

Mechanics, 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.



Mechanics, cont.

- ◆ Iteration One has just been completed.
- ◆ First round of studies: very fundamental assumptions.
- ◆ Reference case and four alternatives:
 - ◆ A reference, or “base case” scenario
 - ◆ 4 alternatives for post-2024:
 - ◆ Compare and contrast physical impacts of system operations
 - ◆ Based on results of hydroregulation models
 - ◆ Focused primarily on reservoir operations and downstream flows

Key Terms and Definitions

- ◆ Canadian Entitlement
- ◆ Effective Use
- ◆ Called Upon Flood Control
- ◆ Flood Flow Objective

Key Terms and Definitions

- ◆ Reservoir Elevations
- ◆ Reservoir Storage Diagrams
- ◆ Peak Flows
- ◆ Inflows and Outflows
- ◆ Hydropower Generation



Iteration 1 Alternatives

Operating Criteria	CC	TC 450	TT 450	TC 600	TT 600
Treaty Status					
Treaty Continues	✓	✓		✓	
Treaty Terminates			✓		✓
Flood Control Operations					
FCOP with 8.95 MAF	✓				
Called Upon with Current SRDs		✓	✓		
Called Upon with Modified SRDs				✓	✓
Power Operations					
Coordinated Treaty Planning	✓	✓		✓	
Uncoordinated Canadian Operation			✓		✓
Ecosystem Function Operations					
1 MAF Supplemental Agreement for flow augmentation	✓	✓		✓	
BiOp Operations	✓	✓	✓	✓	✓

Key Assumptions in Iteration 1

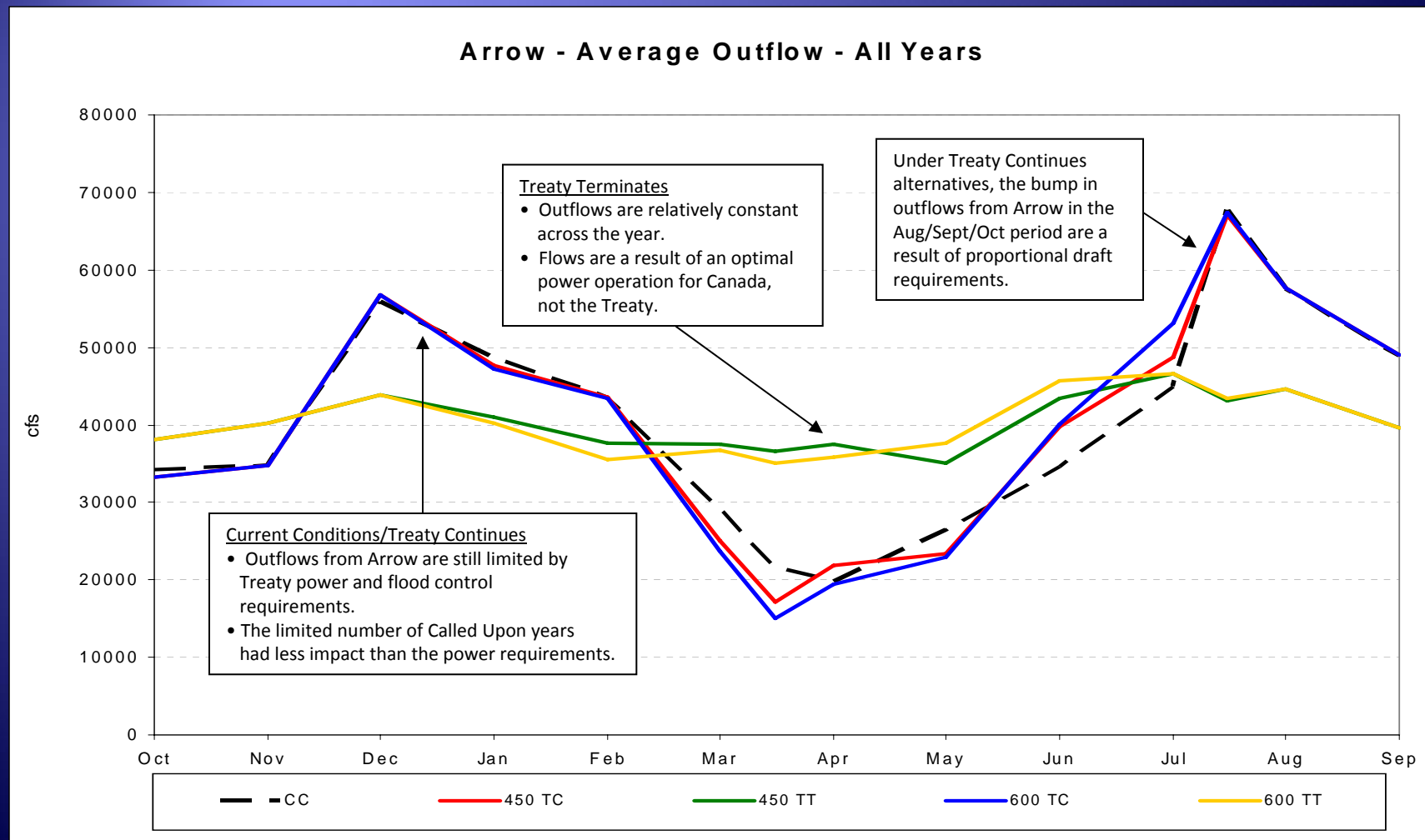
- ◆ Canadian Operations
- ◆ Flood Risk Management: Effective Use and Called Upon

Key Assumptions: Iteration 1

Impact of Canadian Operations

- ◆ Assumptions about Canadian Operations Post-2024 had a major influence on the outcomes.
- ◆ These effects could be seen across flood risk management, ecosystem-based function, and hydropower.

Impact of Canadian Operations



Key Assumptions: Iteration 1

Effective Use/Called Upon

- ◆ The assumptions made about Effective Use and Called Upon operations had a significant impact on the modeling results.
- ◆ These effects could be seen across flood risk management, ecosystem-based function, and hydropower.

Iteration 1 Results

Flood Risk Management

Effective Use
Called Upon
Peak Flows



Flood Risk Management Effective Use at 450kcfs...

Treaty Continues

- ◆ EU in 18 out of 70 Years

Treaty Terminates

- ◆ EU in 23 out of 70 Years

Why is this important?

Under EU, most U.S. reservoirs were 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.

Flood Risk Management Effective Use at 600 kcfs...

EU 1 time in 70 Years, Treaty Continues or
Terminates



Why is this important?

This less “conservative” approach to flood risk, 600 kcfs, reduced needed flood storage space in reservoirs. This would:

- ◆ Increase fish flows during the spring
- ◆ Keep some U.S. reservoirs fuller

For Iteration 2...

More analysis of the flood risk and hydropower generation impacts of 600 kcfs.

Flood Risk Management Called Upon

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.

For Iteration 2...

Analysis of the annual average payment required for
Called Upon.

Flood Risk Management Peak Flows

When compared to 450 kcfs –
600 kcfs alternatives increased peak river flows –
Treaty or no Treaty.

- ◆ Average: 17-21 kcfs higher
- ◆ In 10 wettest years: 28-49 kcfs higher

Why is this important?

Higher flows could improve ability to meet fish flow objectives...

But --

Might result in increased flood risk.

For Iteration 2...

More detailed analysis at possible increases in flood risk.

Iteration 1 Results

Ecosystem-Based Function

Reservoir Levels

River Flows



Ecosystem-Based Function

Reservoir Elevations

- ◆ Effective use resulted in deeper drawdowns and less frequent refill for some reservoirs.

Why is this important?

Could have an impact on resident fish, cultural resources, recreation, and irrigation.

For Iteration 2...

More detailed analysis on reservoirs that will be impacted the most.

Ecosystem-Based Function Elevations and Outflows

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

Why is this important?

Allows us to focus on areas where greatest impacts are anticipated.

For Iteration 2...

More detailed analysis on areas where we anticipate most impact.

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



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

Why is this important?

Is the cost of Canadian Entitlement equal to the power benefits realized from the Treaty? Could have impacts on ratepayers and regional economics.

- ◆ Estimated value of Canadian Entitlement in 2024:
 - ◆ Energy -- \$113-\$219 million
 - ◆ Capacity -- \$115 million
 - ◆ Combined -- \$229-\$335 million per year

For Iteration 2...

Further assessment of power benefits of the Treaty to the U.S.

Hydropower Generation

Treaty Continues vs. Treaty Terminates alternatives resulted in various gains and losses in hydropower generation (and revenue) for Canada and the U.S.

	Average Annual Hydropower Generation (aaMW)
Canada	~410 loss (-\$220 to -\$320 million)
United States	~325 – 350 gain (+\$180 to \$280 million)

Why is this important?

Possible impacts to ratepayers and regional economics. It is important to review the power benefits of the Treaty to both Canada and the U.S.

For Iteration 2...

Further assessment of power cost/benefits of Treaty.

Next Steps for Today

- ◆ Detailed discussions in Breakout Rooms
- ◆ Reconvene at 2:30 to share results and discuss Iteration 2

Next Steps for Treaty Review

- ◆ End of 2012: Iteration 2 Completed
- ◆ Winter 2013: Stakeholder Listening Sessions on Iteration 2

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