Environmental Discussion Paper
Columbia Treaty Review

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Columbia Basin Regional Advisory Commitee

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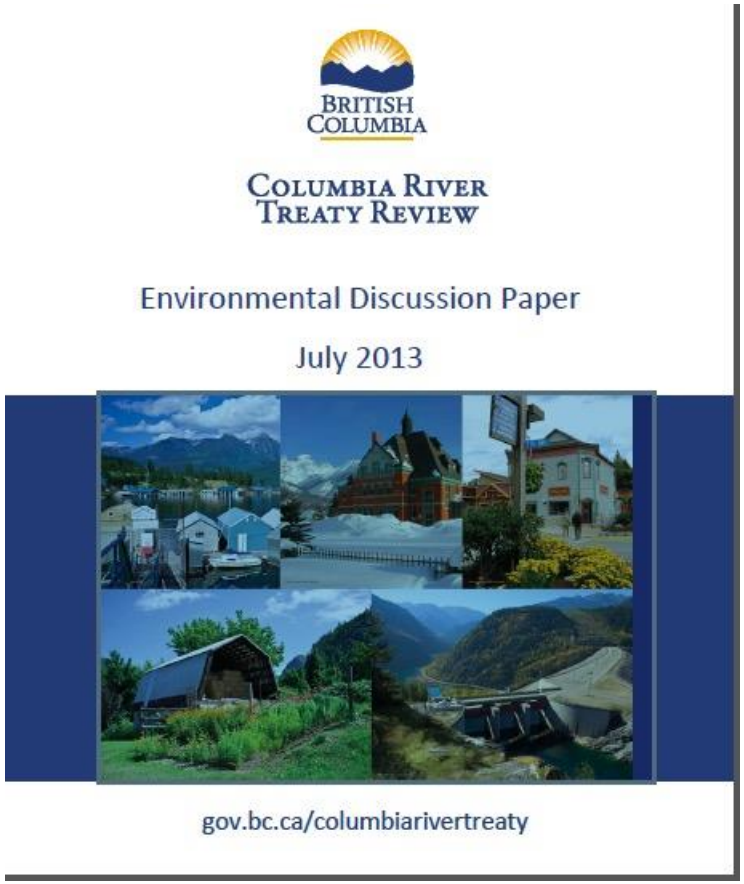
Agenda

- Overview of Paper
- Environmental values and activities
- Modelling Bookends
- Results
- Thoughts

Overview



…explore environmental interests which may be affected by potential alterations in reservoir elevations and discharge levels of treaty facilities..

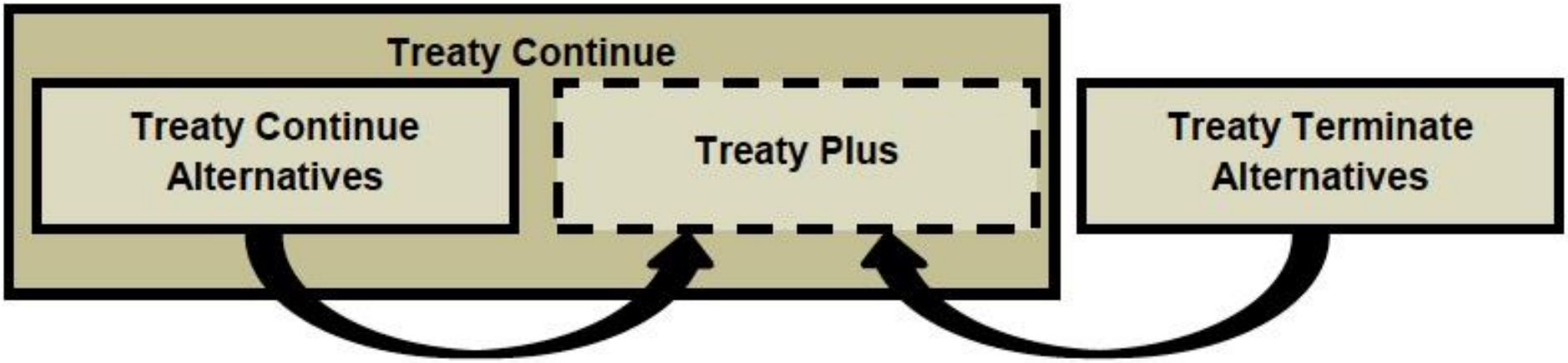
Interests

- General
- Environment & CC
  - Climate Change
  - Ecosystem Function & Resilience
  - Fish and Aquatics
  - Wildlife and Vegetat.
- Culture
- Flood and Erosion
- Learning
- Recreation
- Power
  - Revenues
- Quality of life

Activities to Address Interests

- Coordination and Communication
- FWCP
- WUP
  - Recommended changes
  - Monitoring programs
- Species at Risk and Recovery Strategies
- Flexibility within CRT
  - Unilateral actions
  - Mutual consent : Non power use agreements

Modelling Alternatives

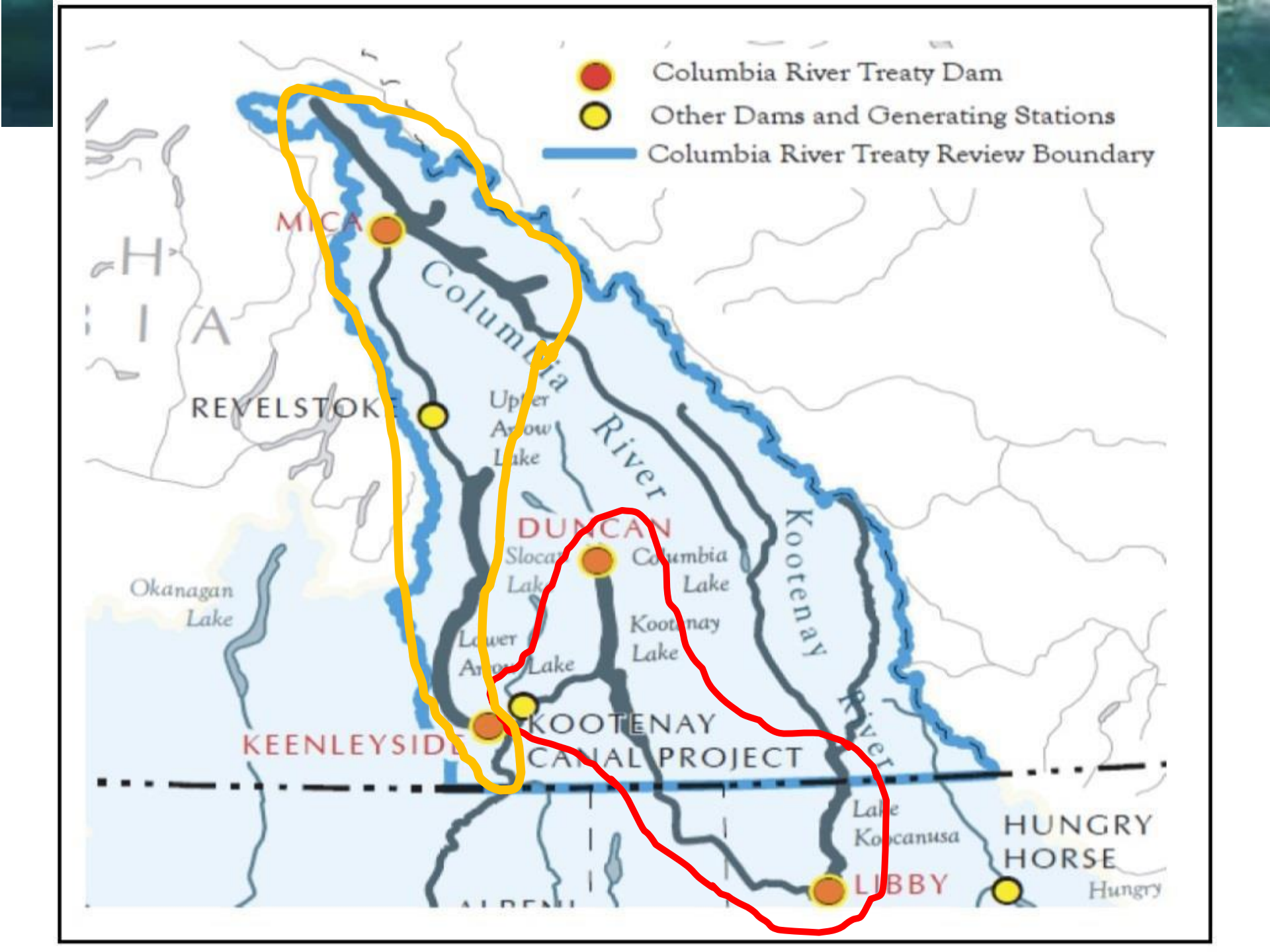


Modelled Alternatives inform Treaty Plus

Modelling

- Modelling was conducted to explore ‘bookends’ of potential operations to focus on enhancing specific values

- Columbia and Kootenay systems modelled separately


Columbia River Treaty Dam
Other Dams and Generating Stations
Columbia River Treaty Review Boundary
MICA
REVELSTOKE
Columbia River
Upper Arrow Lake
DUNCAN
Columbia Lake
Kootenay Lake
Lower Arrow Lake
Okanagan Lake
KEENLEYSIDE
KOOTENAY CANAL PROJECT
Kootenay River
Lake Koocanusa
LIBBY
HUNGRY HORSE
Hungry

Modelling parameters

- Most efficient means of addressing electrical demand through:
  - Fixed generation from Kootenay system
  - BCH large generating systems in Columbia
  - Gas fired generation
  - Importing/exporting electricity
- Need to change values to Performance Measures
- 60 year data set used
- Climate change considered similar to past

PMs

Different sections of the Columbia and the PMs used in the modelling.

Kinbasket Reservoir
Fish and aquatic productivity
Wildlife and vegetation
Mid-Columbia River
Aquatic river habitat
Sturgeon habitat
Vegetation flooding
Spring nesting birds
Fall migratory birds
Arrows Lakes Reservoir.
Kokanee access
Aquatic productivity
Lower Columbia River
Whitefish and trout
Sturgeon
Power Value $M/yr

Alternatives modelled

0 – Current Operations

1 – Arrow Lake lower (early summer for veg.)

2 – Minimum level at Kinbasket

3 – Arrow Lake high

4 - Arrow Lake lower – early summer

5 – Minimum level at Kinbasket

7 – Flush flow lower Columbia

8 – Sturgeon flow lower Columbia

9 – Stable Arrow Lake (1425)

10 – Ecosystem Flows.

Results on Columbia

The potential operating alternatives are compared against current operations	Arrow Lakes lower in early summer for vegetation	Minimum level at Kinbasket (Treaty constraints)	Keep Arrow Lakes high	Arrow Lakes lower in early summer	Minimum level at Kinbasket	Short flushing flows in Lower Columbia	Sturgeon flows in Lower Columbia	Stable Arrow Lakes (1425 ft)	Ecosystem
Kinbasket Reservoir									
Fish and aquatic productivity									
Wildlife and vegetation									
Mid-Columbia River									
Aquatic river habitat									
Sturgeon habitat									
Vegetation flooding									
Spring nesting birds									
Fall migratory birds									
Arrows Lakes Reservoir.									
Kokanee access									
Aquatic productivity									
Lower Columbia River									
Whitefish and trout									
Sturgeon									
Power Value $M/yr	-22	-181	-180	-186	-350	-181	-201	-203	-456

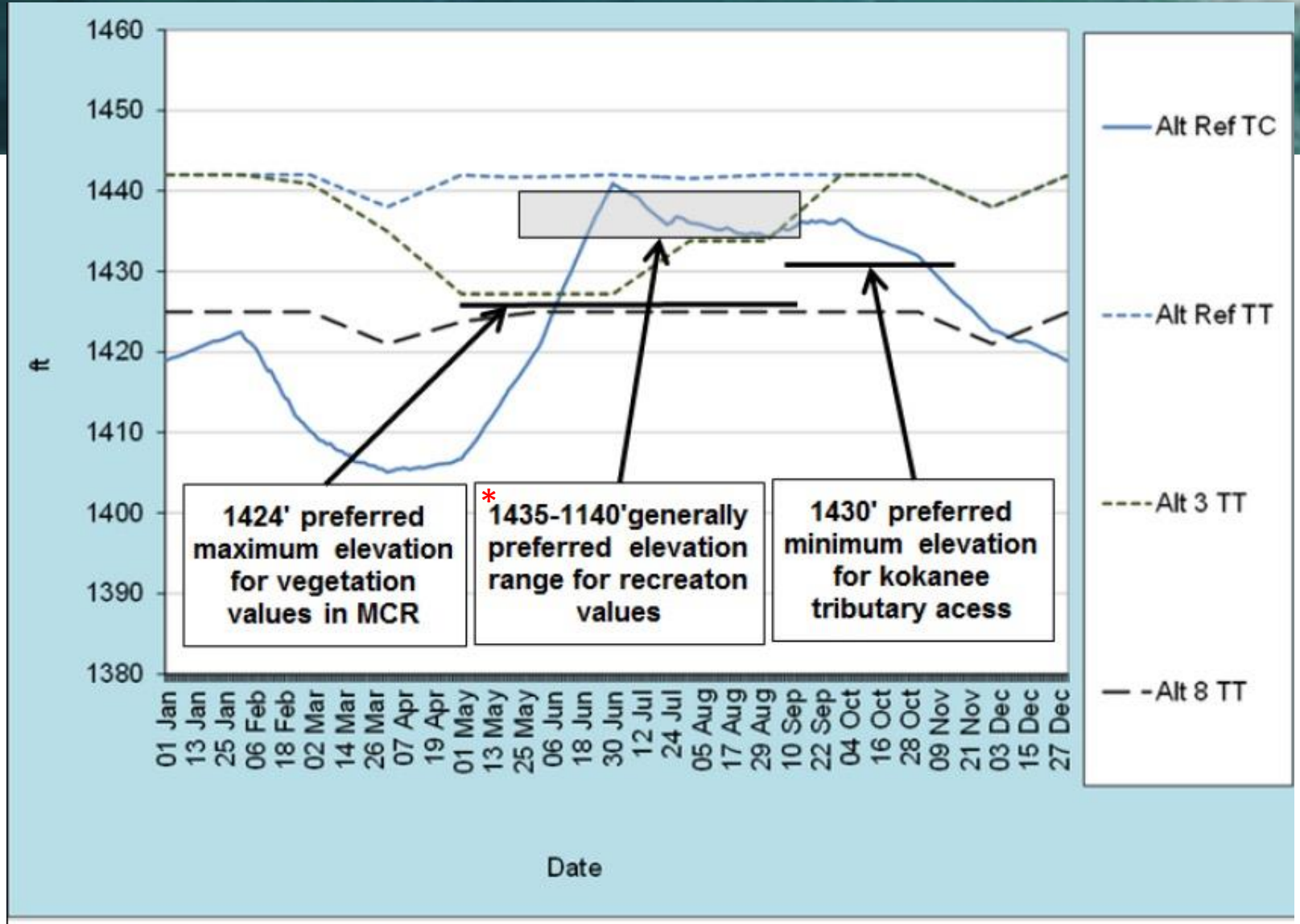
% Change from Current Operation	-20% ←	-19% ←→ -10%	-9% ←→ +9%	+10% ←→+19%	→+20%

Discussion on Columbia

Treaty continue: the primary trade-offs are related to the Kinbasket-Arrow Lakes “see-saw”

Treaty terminate: different tradeoffs emerge:

- Poor vegetation effects at Kinbasket
- Limited aquatic productivity (Kinbasket)
- Wildlife vs fish (mid Arrow)
- Low residence time = low productivity (Arrows)
- Lower Columbia Flows for fish vs Arrow prod.



Alt Ref TC – refers to the current operations.
Alt Ref TT – refers to a 'keep Arrow Lakes high' alternative under Treaty Terminate
Alt 3 TT – refers to a, 'Arrow Lakes lower in early summer' alternative under Treaty Terminate
Alt 8 TT – refers to the ecosystem alternative under Treaty Terminate.

**correction: should be 1435'–1440'*

Modelling on Kootenay

- Understand implications of “Called Upon” flood control
- Inform potential discussion on the Treaty to influence coordination of Libby.
- VarQ used as comparison standard.
- 10 PMs developed in the system
- Duncan assessed based on WUP studies.
- Main alternative attempted to fill reservoir by 30th June.

Modelling on Kootenay

0 - VarQ used as comparison standard.

1 - Deeper spring drawdown, and drafting in August for salmon

2 - Main Canadian interest alternative attempted to fill reservoir by 30th June for fish and recreational interests.

Results on Kootenay

- Deeper spring drawdown **worse for reservoir interests,** but **improves wildlife and veg**. benefits for **lower Kootenay below** Cora Linn.

- Fill by 30 June – not much change to Koocanusa interests, **reduced TDG levels** below C. Linn. Slight **increase in power**.

- Modelled alternatives **reduce risk of Kootenay Lake flooding.**

Key Findings

1: With Treaty Termination, Arrow Lakes operational choices become less linked to choices made at Kinbasket.

2: Operating constraints on Kinbasket reservoir will have the highest costs.

3: Operations at Arrow Lakes will have trade-offs with mid-Columbia under any scenario

Key Findings

4: Terminating the treaty comes at large power loss costs

5: There are constraints in all scenarios

6: ‘Called upon’ FC will impact operations at Libby

7: Deeper spring drafts at Libby improve downstream but worsen reservoir interests

8: US is likely constrained by US Legislation at Libby to current operations