

Columbia River Treaty Review – Technical Studies Report

Presented at March 22, 2013 Conference in Castlegar



FOR GENERATIONS

OVERVIEW

Approach to Studies - Columbia

- Overview of three Scenarios
- Alternatives modelled
- Performance measures
- Summary of results
- Key Findings

Approach to Studies - Kootenay

- Performance measures
- Alternatives modelled
- Summary of results
- Key Findings

Strategic Decision Scenarios

Terminate

- Called Upon Flood Control
- Minimal coordination



Detailed Operating Alternatives

- Developed in future WUP reviews (~2020)
- Consider multiple objectives in Canada

Treaty Continue

- Called Upon Flood Control
- (potential for Coordinated Flood Risk Management)
- Coordination



Detailed Operating Alternatives

- Consistent with WUP (next review ~2020)
- Potential to develop additional US flood risk management and share benefits

Treaty Plus

- Flood Control same as Treaty Continue
- Coordination Plus (enhance coordination for ecosystem and other interests)



Detailed Operating Alternatives

- Consistent with WUP
- Opportunities for enhancing other interests

Strategic Decision Scenarios - Columbia

Terminate

Treaty Continue

Treaty Plus



Possible Operating Alternatives

- Power
- Power + current fish operations (includes Arrow recreation)
- Arrow wildlife & vegetation
- Mica environmental/recreation
- Fisheries #1– below Arrow
- Fisheries #2– sturgeon

Possible Operating Alternatives

- Power
- Power + current fish operations
- Arrow wildlife & vegetation
- Mica environmental/recreation

Possible Operating Alternatives

- Not modelled

Which elements?

Columbia Performance Measures (Appendix F)

Example 1 - Kinbasket Reservoir

Vegetation

- # of 2m elevation bands between 735-755m that are inundated more than 18 weeks per year

Example 2 – Arrow Reservoir

Bull trout & Kokanee tributary access in Arrow Lakes Reservoir

- # of days reservoir is > 1430 ft between 25 August to 15 November (spawning period)

Example 3 – Lower Columbia River

Frequency of Flood Flows

- # of days per year flows > 165,000 kcfs (at Birchbank)
- # of days per year flows > 177,000 kcfs (at Birchbank)

Results by Geographic Region

- Example Mid Columbia: Vegetation/wildlife, river habitat, and shore based recreation favour lower spring/summer Arrow Lakes Reservoir levels

Objective	Performance Measure	Units	Dir	Ref TC	3TC	4 TC	Ref TT	3 TT	4 TT	5 TT	6 TT	PM
Mid Columbia River												
Veg & Wildlife - Veg Flooding	Hectares flooded > 18 wks	Hectares	L	2,352	1,388	1,388	3,234	2,352	3,426	3,234	1,871	(#11)
Veg & Wildlife - Nesting birds	% Useable habitat	Percent	H	20	48	40	-	17	-	0	70	(#13)
Veg & Wildlife - Fall Mig. Birds	% Useable habitat	Percent	H	15	87	71	-	55	-	0	34	(#13)
Aquatic - River Habitat	Functional large river habitat	Km	H	31	35	34	18	23	19	19	26	(#12)
Aquatic - Sturgeon	Larval habitat availability	Km	H	2.84	2.85	2.85	2.77	2.85	2.83	2.79	2.85	(#12)
Rec - Boat Access	Days > 1435	Days	H	64	2	21	153	26	153	145	59	(#10)
Rec - Shore Access	Days < 1435	Days	H	119	181	162	-	157	-	8	94	(#10)

Legend

Better than highlighted alt

Worse than highlighted alt

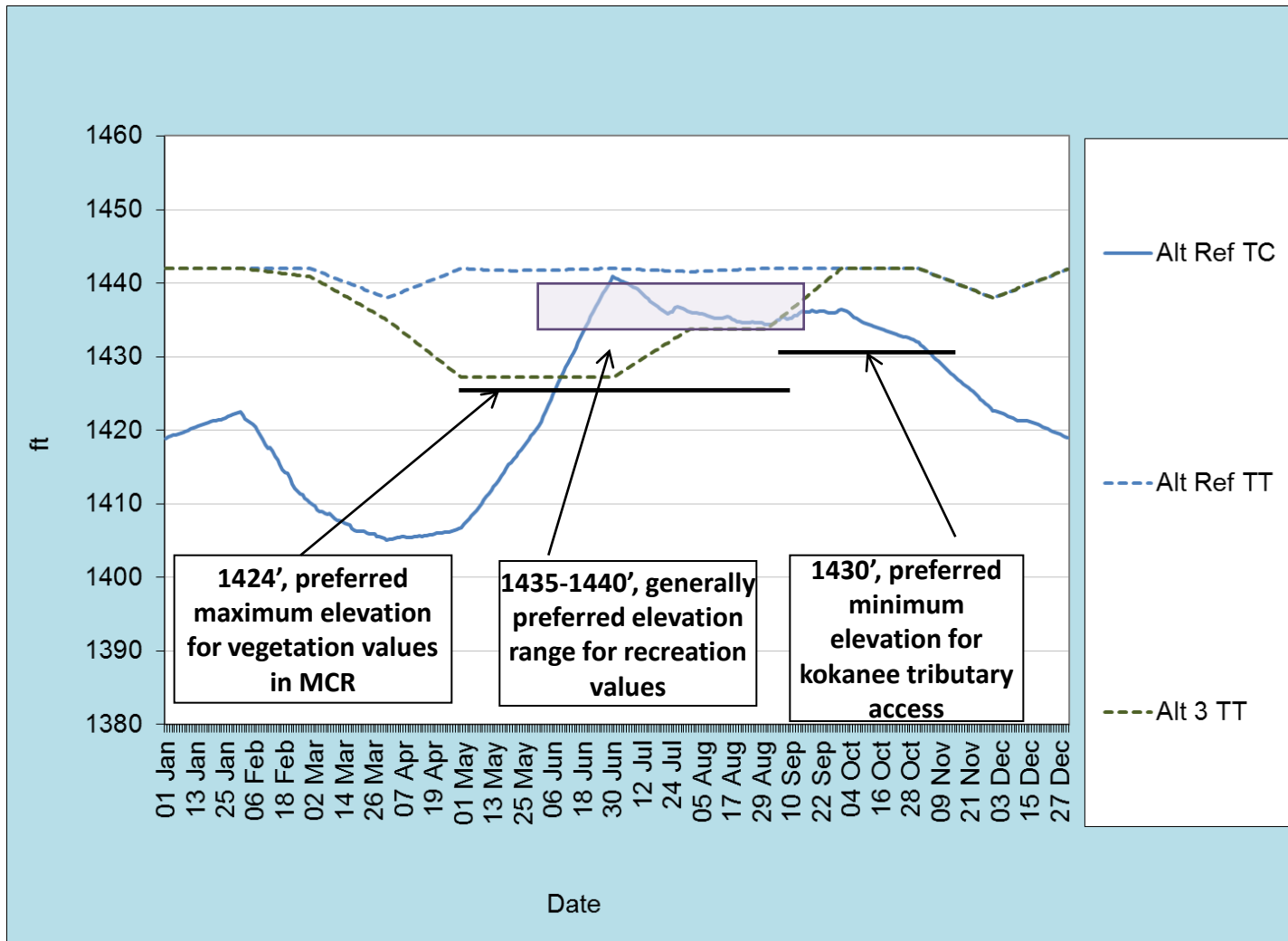
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Summary of Results – System Wide

	Treaty Continue			Treaty Terminate				
	Ref TC	3TC	4 TC	Ref TT	3 TT	4 TT	5 TT	6 TT
Kinbasket Rec/ Nav / Dust	NA	Rec Days (+15-30%)	Rec Days (+5- 30%)			Rec Days (+0- 20%)		
Mid-Columbia River Veg / Wildlife/River Habitat		Veg Area (+40%)	Veg Area (+40%)	Veg Area (-38%)		Veg Area (-46%)	Veg Area (-38%)	Veg Area (+70%)
		Bird Hab. (+>100%)	Bird Hab. (+>100%)	All Bird Habitat Lost		All Bird Habitat Lost	All Bird Habitat Lost	Bird Hab. (+>100%)
		River Hab (+12%)		River Hab (-40%)	River Hab (-25%)	River Hab (-40%)	River Hab (-39%)	River Hab (-17%)
Arrow Rec / Dust /Kokanee access		Rec Days (-23%)	Rec Days (-26%)	Rec range all season	Rec range all season	Rec range all season	Rec range all season	Res drops 60' in summer
		Kok Access (-38%)	Kok Access (-17%)	Full Kok Trib Access	Full Kok Trib Access	Full Kok Trib Access	Full Kok Trib Access	
LCR Fish				Possibly better for MW / RBT		Possibly better for MW / RBT		Major sturgeon pulse
LCR Flooding							Flow >177kcfs (5012 cms) every year	Flow >177kcfs (5012 cms) every year
Annual Power Value Change		-\$22m	-\$180m	-\$180m	-\$190m	-\$350m	-\$180m	-\$200m

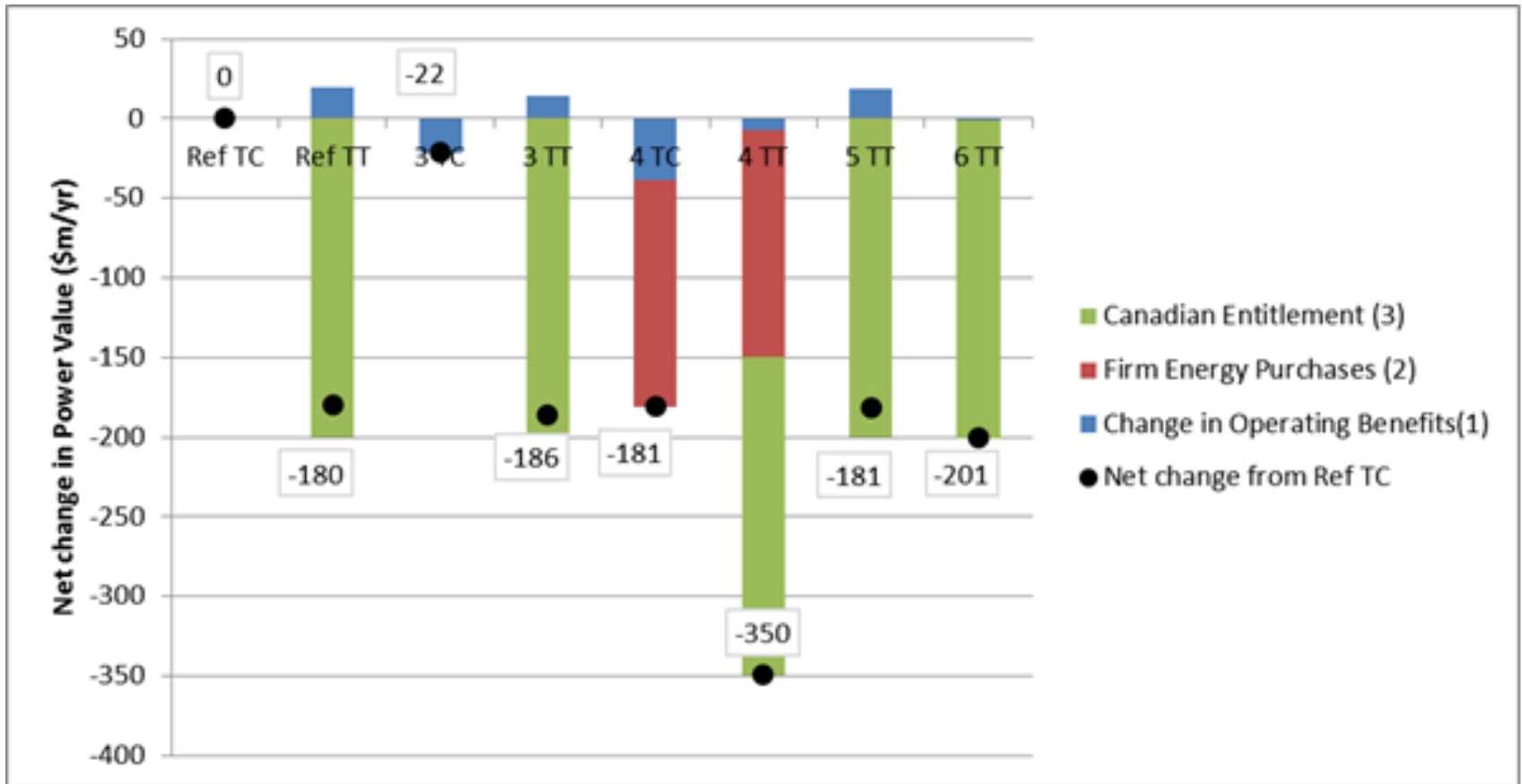
Arrow Lakes Reservoir

- Preferred ranges for vegetation, recreation, tributary access



Power Value

- 3 components: changes in operations, firm energy replacement, Canadian Entitlement



Key Findings - Columbia

- **Operating constraints on Kinbasket reservoir have the highest costs (especially if firm energy is impacted), regardless of Treaty Termination**
- **With Treaty Termination, Arrow Lakes operational choices become less linked to choices made at Kinbasket**
- **Regardless of the Treaty's future, value trade-offs at Arrow will remain**
- **Treaty Terminate opens up new trade-off opportunities / constraints between Arrow and the Lower Columbia River**
- **Others??**

Kootenay Performance Measures (Appendix G)

Example 1 – Koocanusa Reservoir

Primary Productivity (tonnes of biomass)

- Generated from a model using seasonal changes in reservoir area and Libby dam discharge

Example 2 – Creston Valley Flood Plain

Farming and wetland protection (dyke management & pumping)

- # of days < 1750 ft (533.4m) between 1 January to 15 June

Example 3 – Kootenay Lake

West Arm Kokanee Spawner Length

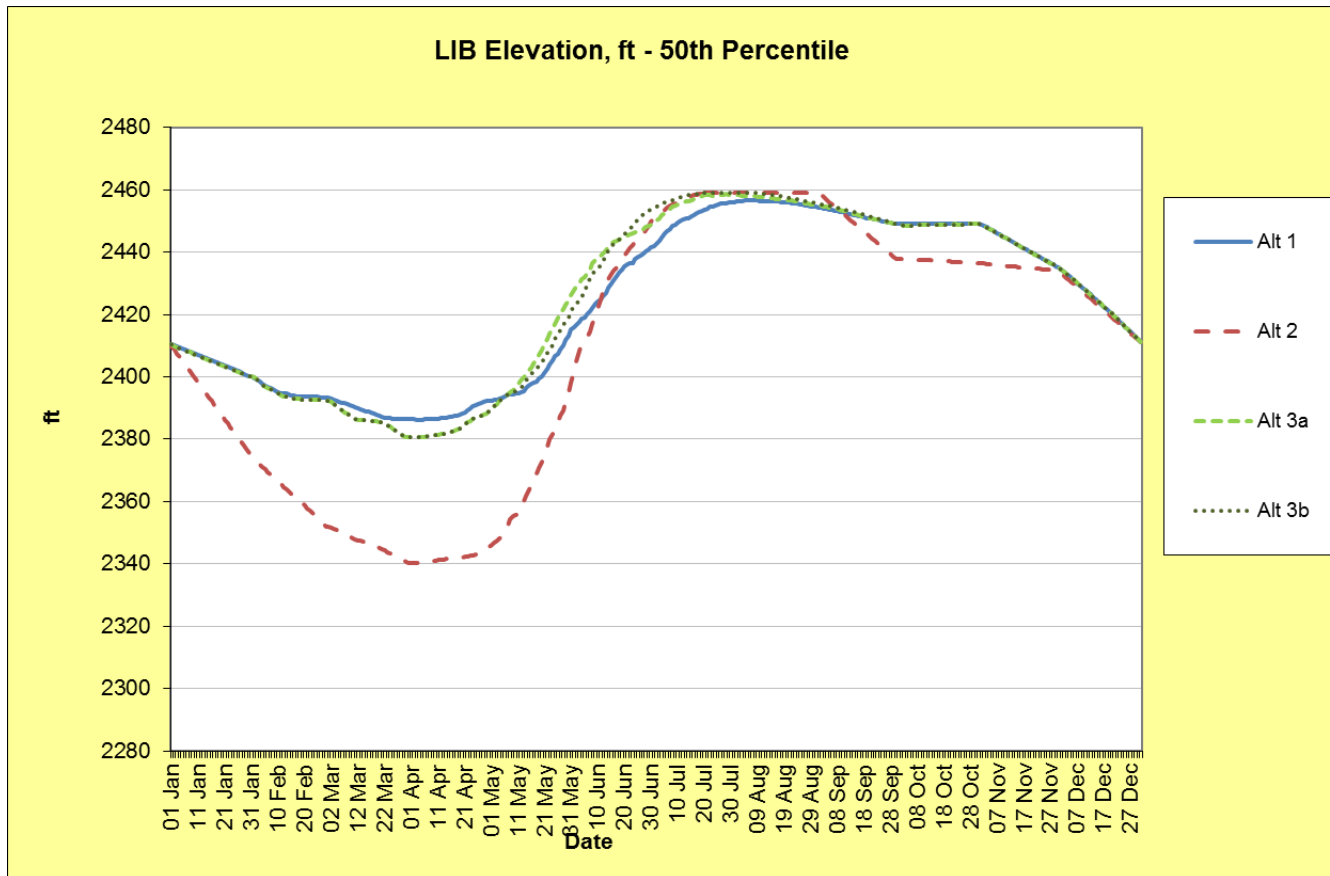
- Average annual kokanee spawner length predicted by relationships between operations and mysis biomass, and mysis biomass and spawner length

Kootenay Alternatives

Alternative 1: Current Conditions

Alternative 2: Power & Standard Flood Control

Alternative 3b: Refill by 30 Jun



Summary of Results – Kootenay

Objective	Performance Measure	Units	Dir	Alt 1	Alt 2	Alt 3b	PM #
Kootenusa Reservoir							
Reservoir Vegetation and Wildlife	Hectares flooded >10 wks	Hectares	L	2,673	1,443	2,720	(#50)
Fish and Aquatic Ecosystem Health	Primary production	Tons	H	14.5	12.6	15.2	(#51)
General Recreation and Tourism	Preferred Elevation Range	Days	H	28.5	16.5	27.0	(#52)
Kokanee Angling	Angling Effort	Angler Days	H	23,629	26,627	29,008	(#52)
Kootenai River and Creston Valley Floodplain							
Dyke Management Operations	Preferred Lake Elevation	Days	H	163	165	165	(#53)
Farming Equipment Handling	Preferred Lake Elevation	Days	H	21	19	21	(#53)
Kootenay Lake							
Fish and Aquatic Ecosystem Health	West Arm Spawner Length	cm	H	31.1	30.2	30.9	(#55)
Recreation, Tourism and Industry	Preferred Lake Elevation	Days	H	67	65	73	(#56)
Flooding	% Yrs above 1752'	Days	L	14%	6%	8%	(#57)
Kootenay River Downstream of Corra Linn Dam							
Vegetation and Wildlife	Cumulative Habitat Loss	Ha	L	4,307	3,242	4,089	(#58)
Fish and Aquatic Ecosystem Health	Total Dissolved Gases	% Sat'n Days	L	45	29	40	(#59)
System-Wide Impacts							
Canadian Financial Value	Increase in Value of Energy	\$m/yr	H	-	19.4	4.6	(#60)
US Jurisdiction							
Sturgeon & Bull trout in the Kootenai R	Meets US regulations	Yes / No	H	Yes	No	No	App H
Salmon in the United States	Meets US regulations	Yes / No	H	Yes	No	Maybe	App H

Legend

Better than highlighted

Worse than highlighted

Highlighted

Key Findings - Kootenay

- **Deeper Libby drafts.**
 - **Benefits of Deeper draft:** Less flooding on Kootenay Lake, more power benefit, improvements for aquatic health in Kootenay River below Nelson, potential benefit to vegetation and wildlife on Kooconusa Reservoir.
 - **Impacts of Deeper Draft:** Potential negative impacts on aquatic productivity and recreation on Kooconusa reservoir

- **Current operations could potentially be altered to benefit a wider range of interests in Canada**
 - **Benefits:** May benefit Kooconusa resident fish and recreation, flood reduction at Kootenay Lake, reduced spill in the Kootenay River which produces environmental benefits and power benefits
 - **Impacts:** May increase the risk of surcharging Kooconusa Reservoir. Does not meet the current U.S. fisheries requirements

- **Others??**

Questions?