TWG Update

- General update
- Issues scoping technical memos
- Reconnaissance field trips
- PM refinement

Issue Scoping/ Technical Memos

- Completed by subject matter experts
- Summary of existing information
- Assessment & analysis

Reconnaissance field trips

- Verify assumptions, learn first-hand
- SSWG:
  - Oct 2021 SSWG reservoir
  - May 2022 SSWG reservoir
- Ecofish/RT
  - June 2022 reservoir (low elevation)
  - July 2022 river/heli flight (high water)
  - July 2022 reservoir (high elevation)
  - Oct 2022 river (low water) and Cheslatta Lake


Manchester Fisheries Society of BC
MUSTANG SURVIVAL


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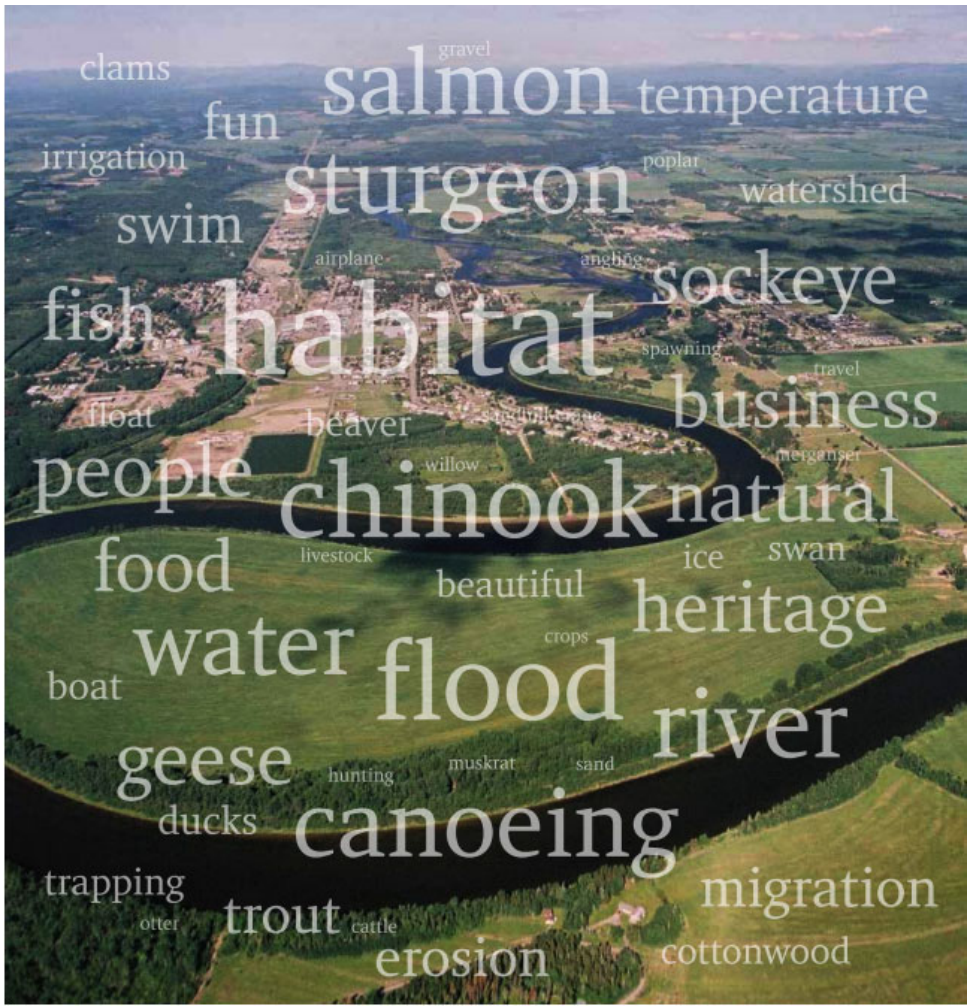
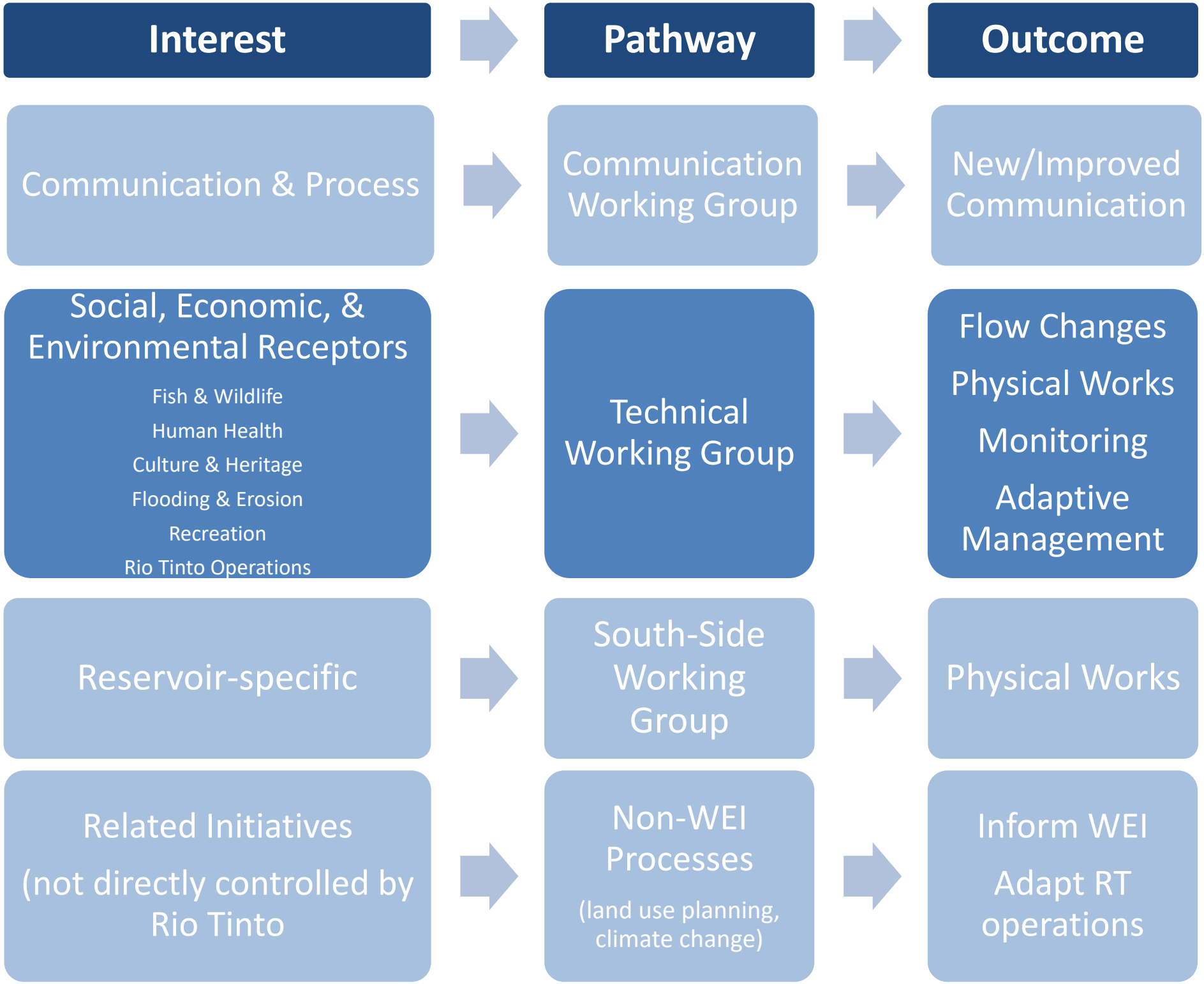
PM Refinement

- TWG scoping presentations, review of scoping memo
- Consider results of field reconnaissance
- Detailed review of PMs
- Short-listing for MT

WEI Issues Scoping Refresher




Interest
Pathway
Outcome
Communication & Process
Communication Working Group
New/Improved Communication
Social, Economic, & Environmental Receptors
Fish & Wildlife
Human Health
Culture & Heritage
Flooding & Erosion
Recreation
Rio Tinto Operations
Technical Working Group
Flow Changes
Physical Works
Monitoring
Adaptive Management
Reservoir-specific
South-Side Working Group
Physical Works
Related Initiatives
(not directly controlled by Rio Tinto
Non-WEI Processes
(land use planning, climate change)
Inform WEI
Adapt RT operations

Issues Scoping & Performance Measures

TWG Pathway Interests

Yes

Scoping
1) Summarize background information
2) Define and contextualize issue:
-timing
-location
-magnitude, duration, consequence
3) Identify pathway of effect
4) Propose pathway

SDM pathway

PM development
1) Gather information to develop performance measures

2) Sensitive over operational water level/flow range?

Yes

Develop specific PM

SDM pathway

Reject issue

Interest is not an issue

Alternative pathway

Physical works or other

Insufficient info

Flag as data gap

Additional studies

Redundant or insufficient info

Adopt proxy PM

No

Either a non-issue or identify alternative solution

Issue Scoping Summary

- 67 issues
- 6 allocated to SSWG
- 4 issues not related to flow
- 11 issues without PMs (work ongoing)
- 46 issues with 1 or more PMs
- 55 total PMs
- 15 issues, 20 PM shortlisted by TWG/Ecofish

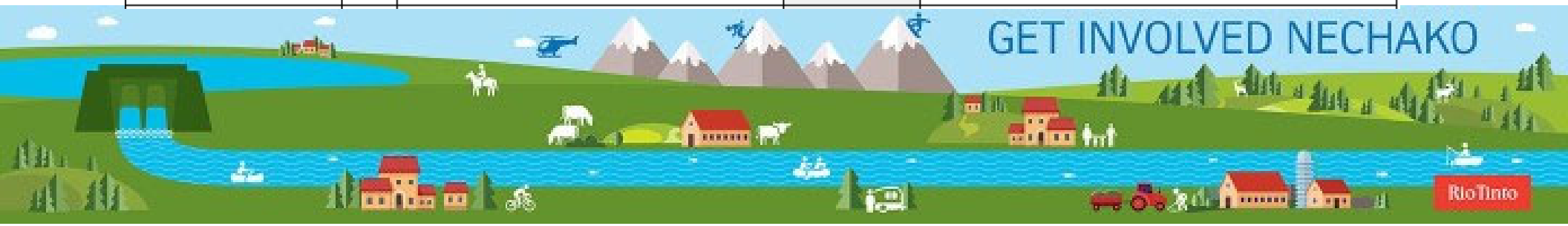
Issues and Performance Measures

Issues and Performance Measures

Issues	#	Performance Measures	Details	
Reservoir fish habitat	13	Average annual pelagic habitat	Location:	Nechako Reservoir
			Timing:	All Year
			Unit:	Km2
			Direction:	More is better
			MSIC:	20%

Issues and PMs: Fish & Wildlife

Issues	#	Performance Measures	Details	
Reservoir fish habitat	13	Average annual pelagic habitat	Location:	Nechako Reservoir
			Timing:	All Year
			Unit:	Km2
			Direction:	More is better
			MSIC:	20%
River water temperature and migrating salmon	18	a: # of days average daily temp exceeds 18C (at Finmore) b: # of days average daily temp exceeds 19C c: # of days average daily temp exceeds 20C	Location:	Chinook: entire Nechako River Sockeye: below confluence with Stuart River
			Timing:	Salmon migration period Jun 15 – Aug 29
			Unit:	Days
			Direction:	Fewer is better
			MSIC:	20%
River water temperature and juvenile salmon	19	Maximum # of consecutive days average daily temp >18C	Location:	Chinook: entire Nechako River
			Timing:	Growing season, Jun 15 – Aug 30
			Unit:	Days
			Direction:	Less is better
			MSIC:	20%
River Chinook spawning habitat	20	Average habitat based on flow curve	Location:	Nechako River between Cheslatta Falls and Vanderhoof
			Timing:	Aug 15 - Oct 15
			Unit:	m^2
			Direction:	More is better
			MSIC:	20%



Issues and PMs: Fish & Wildlife

Issues	#	Performance Measures	Details	
River Chinook rearing habitat	22	a: Amount of post-emergent habitat (Envirocon curve) b: Amount of pre-migrant habitat (Envirocon curve)	Location:	Nechako River below Cheslatta Falls
			Timing:	a: Apr 1 – May 15 b: May 15 – July 10
			Unit:	m^2
			Direction:	More is better
			MSIC:	20%
Resident fish rearing habitat	25	a: Average juvenile habitat b: Average adult habitat	Location:	Nechako River below Cheslatta Falls
			Timing:	May 1 – Sept 31
			Unit:	m^2
			Direction:	More is better
			MSIC:	20%
Reservoir caribou land links	32	# Of days water elevation is > 852 m	Location:	Nechako Reservoir
			Timing:	May 1 – July 7
			Unit:	Days
			Direction:	More is better
			MSIC:	20%
Reservoir osprey nesting habitat	38	Number of years where reservoir elevation exceeds 852.44m (fewer is better)	Location:	Nechako Reservoir
			Timing:	Spring nesting period May 1 – Aug 15
			Unit:	m
			Direction:	Fewer is better
			MSIC:	20%

Issues and PMs: Culture & Heritage

Issues		Performance Measures	Details	
Cheslatta watershed inundation of archeological sites	49	a: # of days > 330 CMS b: # of days > 300 CMS	PM Location:	Skins Lake Spillway
			Timing:	Year round (most sensitive during STMP)
			Unit:	Days
			Direction:	Fewer is better
			MSIC:	a: 1 day b: 7 days

Issues and PMs: Flooding & Erosion

Issues	Performance Measures		Details	
River open-water flooding	53	# Of days flow >550 m^3/s	Location:	Nechako River - focus at Vanderhoof Sandy-Beach subdivision / measured at Vdh
			Timing:	Ice-free period Apr 1 – Oct 31
			Unit:	Days
			Direction:	Fewer is better
			MSIC:	20%
River ice-jam flooding	55a	# Of days > 100 CMS during freeze up	Location:	Nechako River at Vanderhoof
			Timing:	Winter ice period Nov 1 – Dec 15
			Unit:	Days
			Direction:	Fewer is better
			MSIC:	20%

Issues and PMs: Recreation & Navigation

Issues		Performance Measures	Details	
River hiking trail access	64	# days flow > 355 CMS	Location:	Nechako River at Vanderhoof
			Timing:	Ice-free period Apr 1 – Oct 31
			Unit:	Days
			Direction:	Fewer is better
			MSIC:	20%

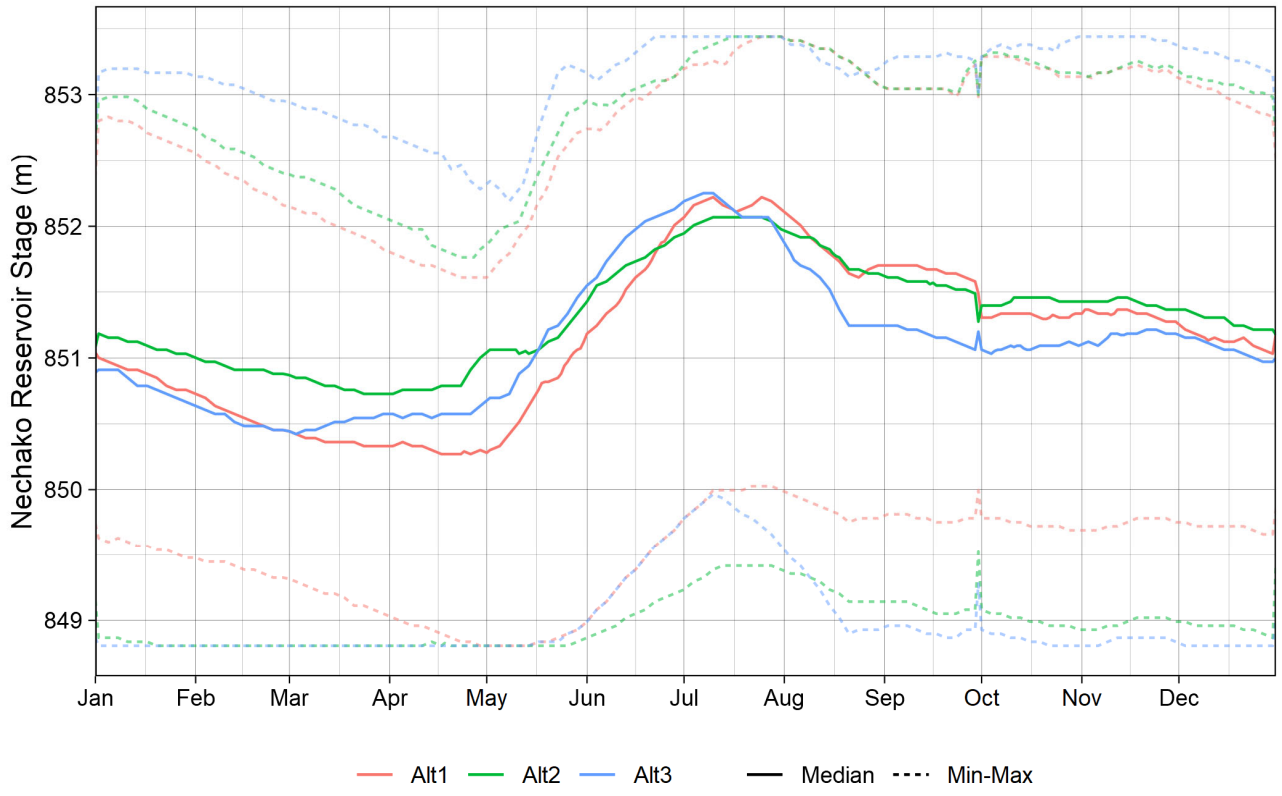
Issues and PMs: Rio Tinto Operations

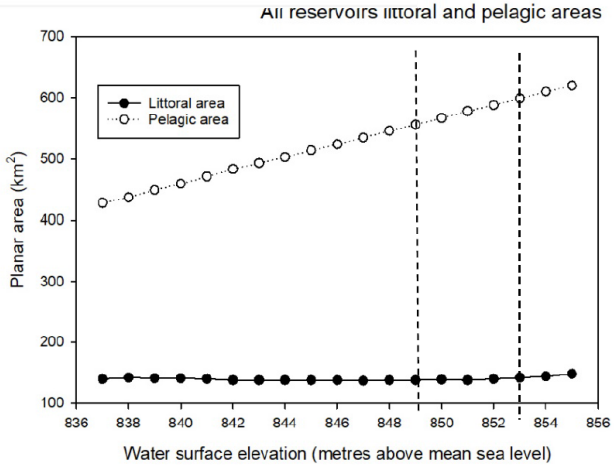
Issues		Performance Measures	Details	
Kemano power generation	65	Mean Kemano power generation	Location:	Kemano / Kitimat
			Timing:	Year round
			Unit:	MW
			Direction:	More is better
			MSIC:	Tbd
Kemano power exports	66	Mean Tier 1 power generation	Location:	Kemano / Kitimat
			Timing:	Year round
			Unit:	MW
			Direction:	More is better
			MSIC:	Tbd
Kemano power exports	67	Mean Tier 2 power generation	Location:	Kemano / Kitimat
			Timing:	Year round
			Unit:	MW
			Direction:	More is better
			MSIC:	Tbd

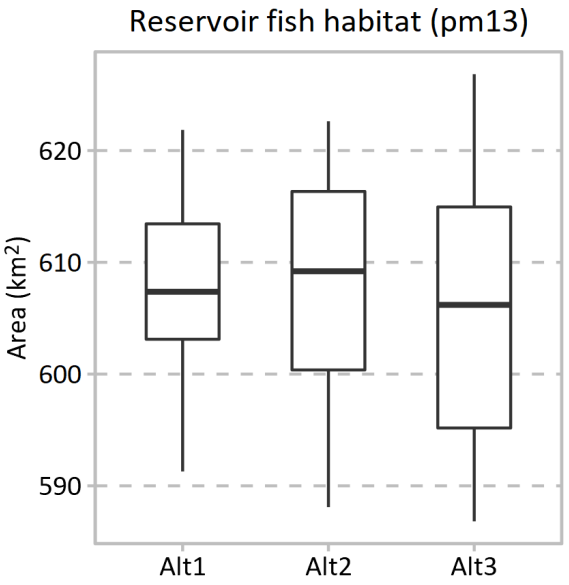
Performance Measure Results

Issue #13: reservoir fish habitat

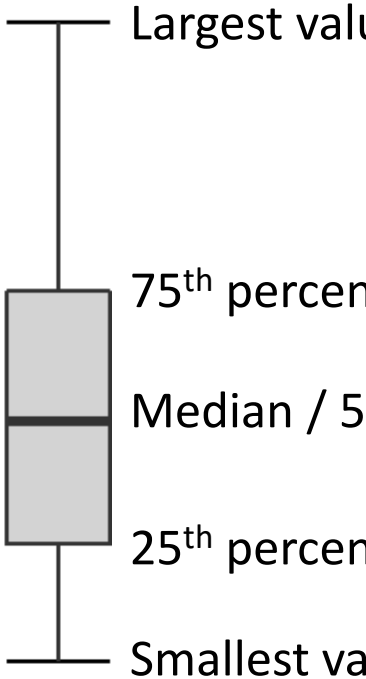
Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#13 Reservoir fish habitat	Median	Area of average annual pelagic habitat	km2	607.4	609.2	606.2







Box Plots



Largest value*

75th percentile

Median / 50th percentile

25th percentile

Smallest value
within 1.5 times interquartile
range below 25th percentile

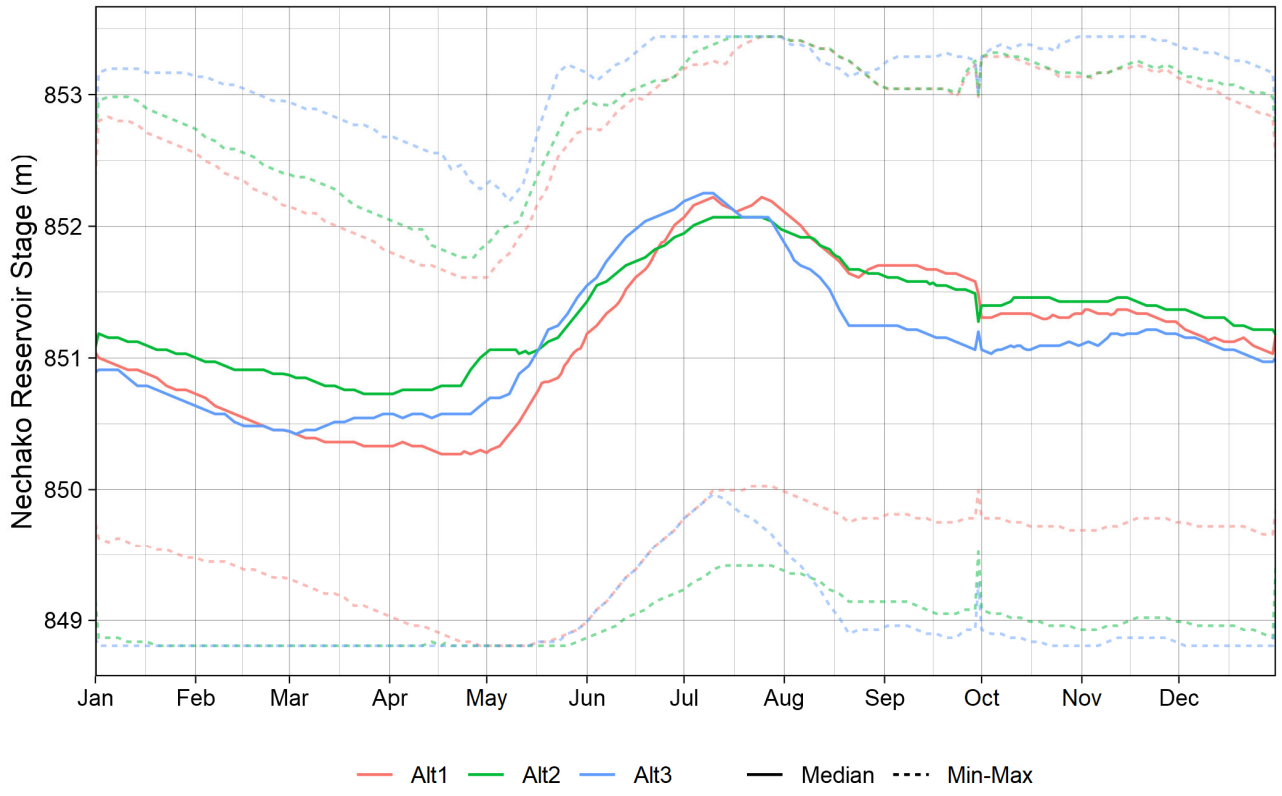
Interquartile range

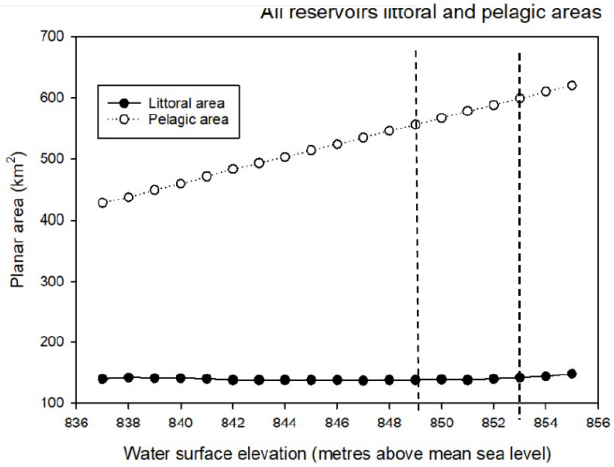
middle 50% of the values
are within the box

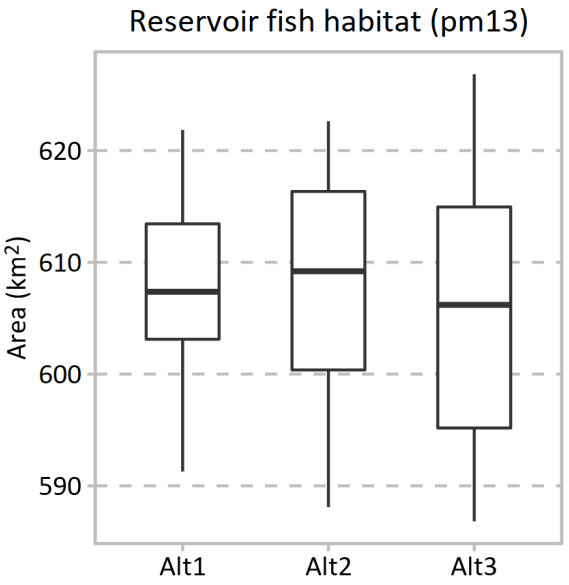
- Outlier – value is farther than 1.5 times the interquartile range below the 25th percentile

Issue #13: reservoir fish habitat

Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#13 Reservoir fish habitat	Median	Area of average annual pelagic habitat	km2	607.4	609.2	606.2

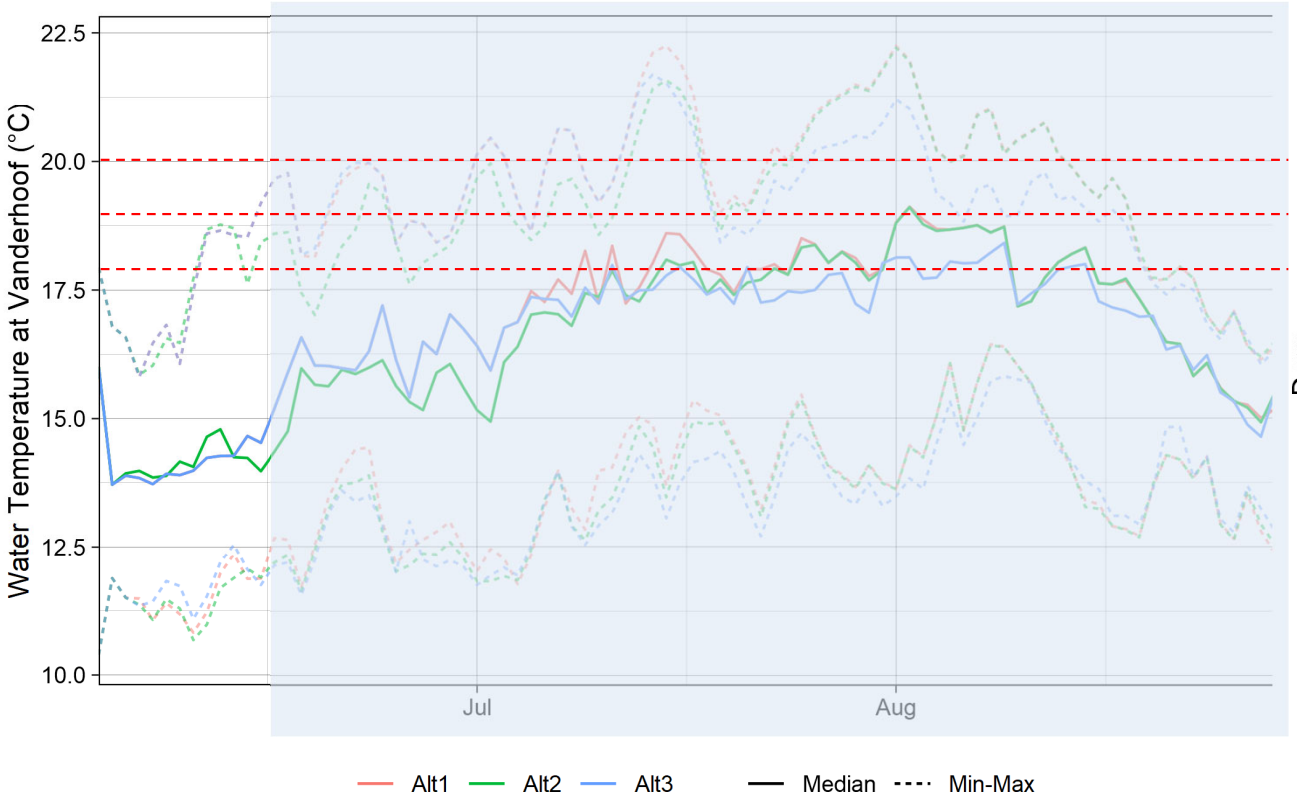


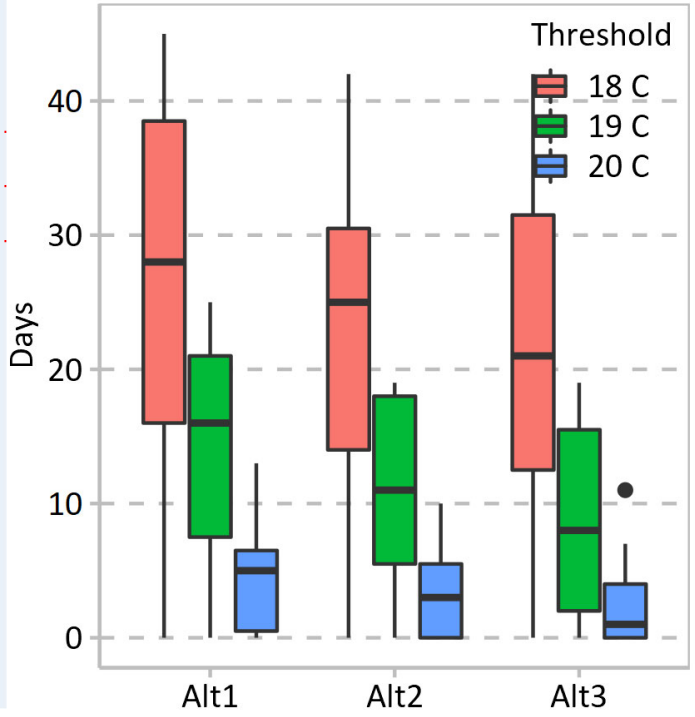




Issue #18: River water temperature and migrating salmon

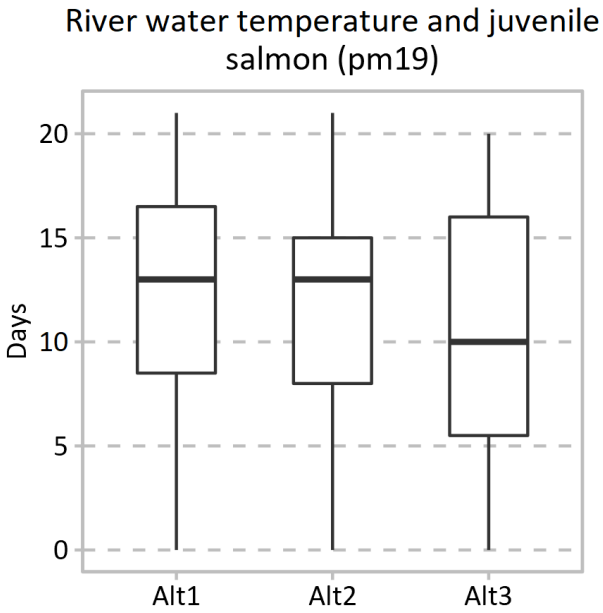
Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#18a River water temperature and migrating salmon	Median	Number of days average daily temp exceeds 18C	Days	28	25	21
#18b River water temperature and migrating salmon	Median	Number of days average daily temp exceeds 19C	Days	16	11	8
#18c River water temperature and migrating salmon	Median	Number of days average daily temp exceeds 20C	Days	5	3	1





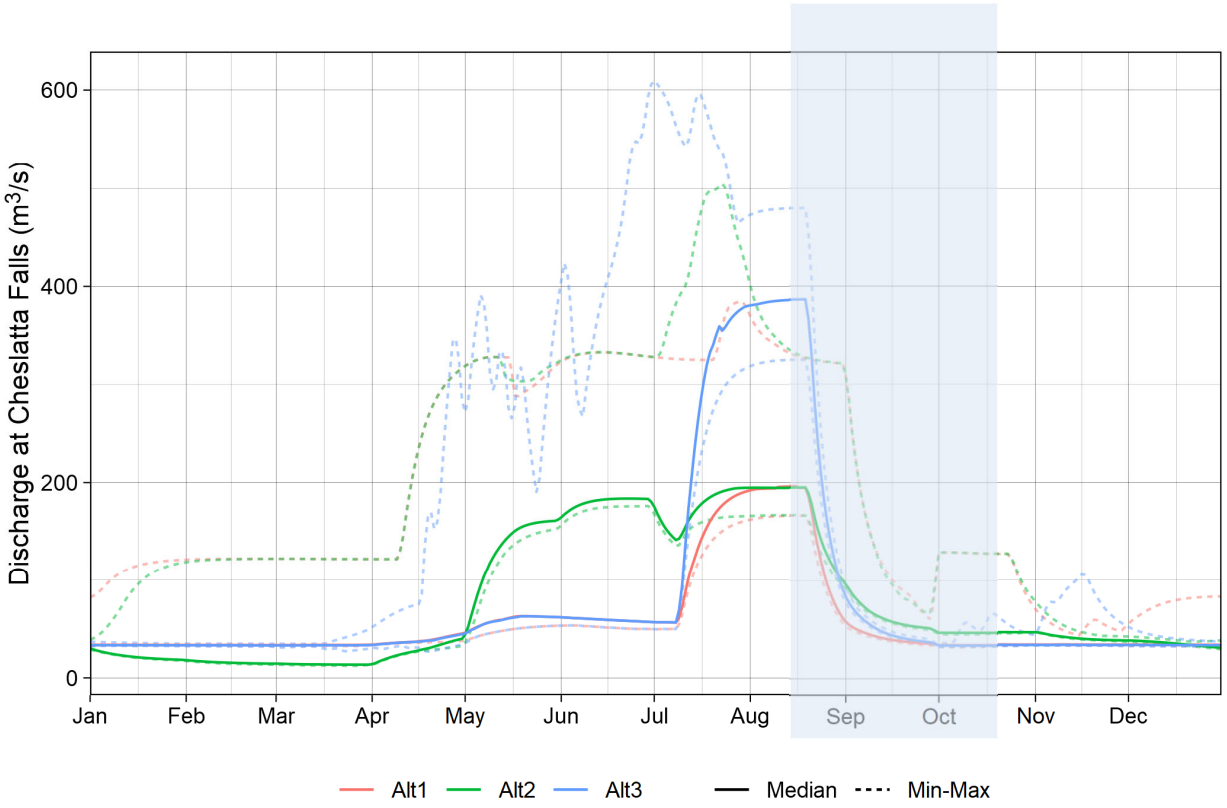
Issue #19: River water temperature and juvenile salmon

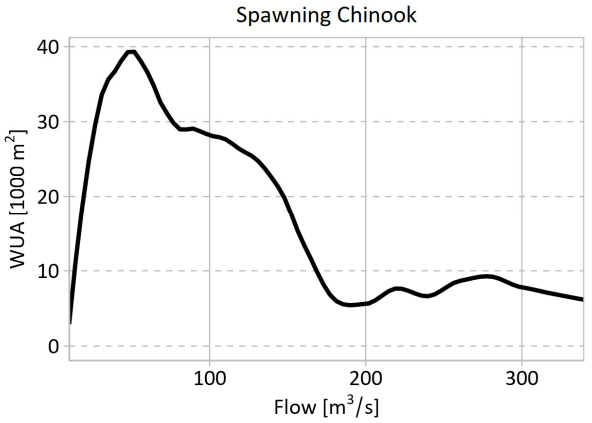
Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#19 River water temperature and juvenile salmon	Median	Maximum # of consecutive days average daily temp >18C	Days	13	13	10

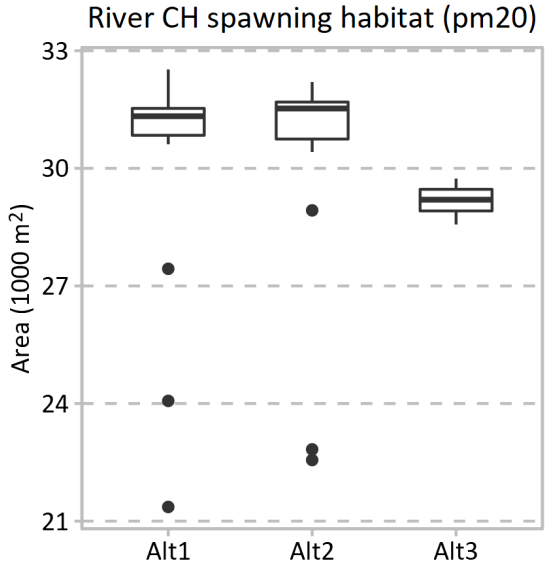


Issue #20: River CH spawning habitat

Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#20 River Chinook spawning habitat	Median	Average habitat based on flow curve		31,328.7	31,526.4	29,199.7

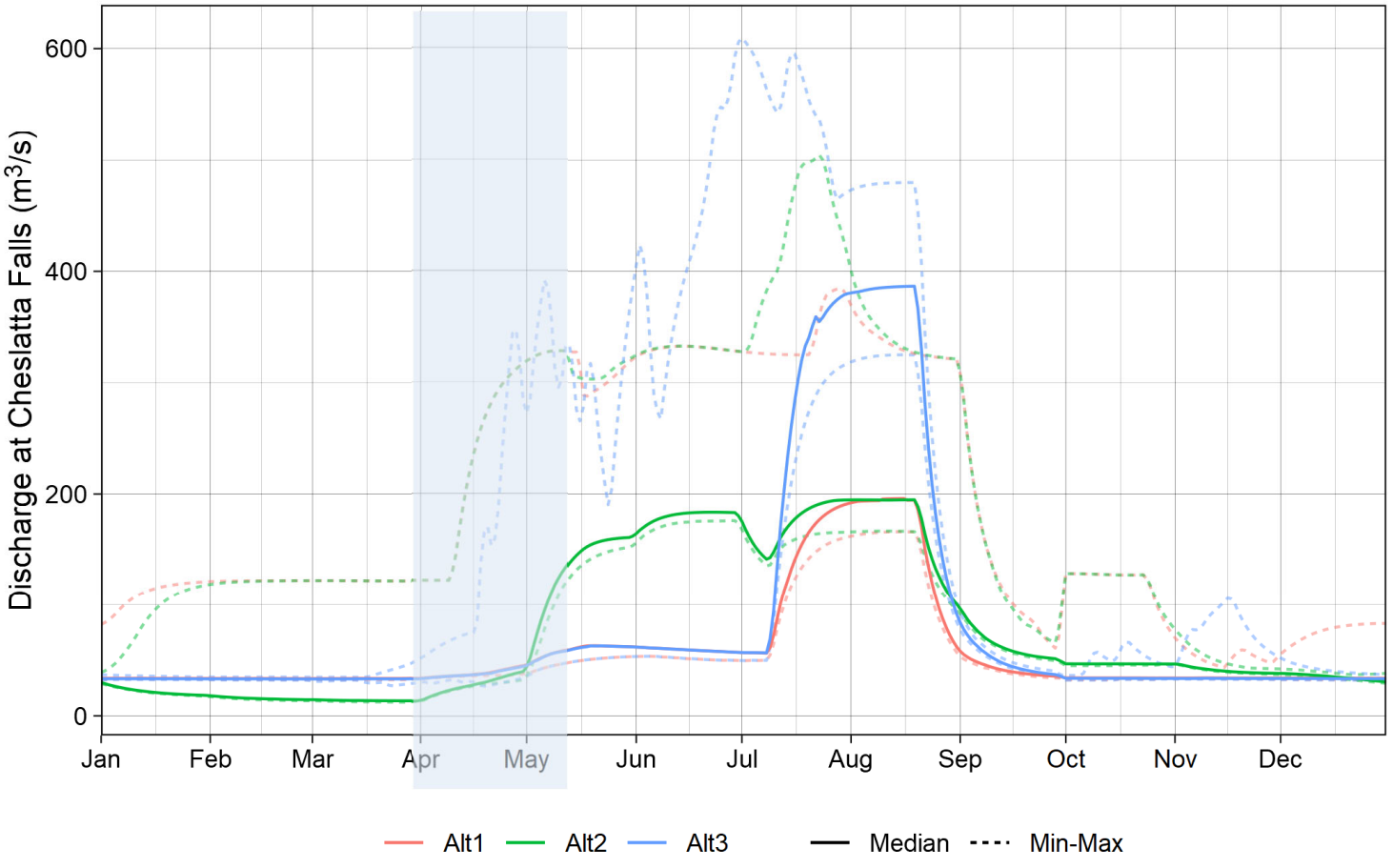


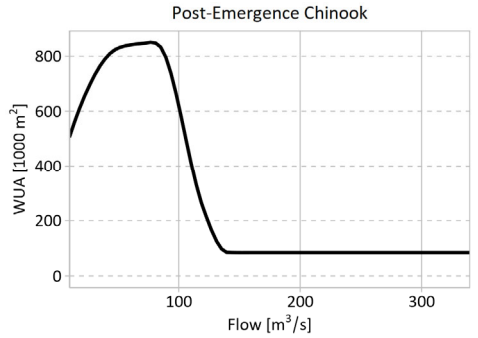


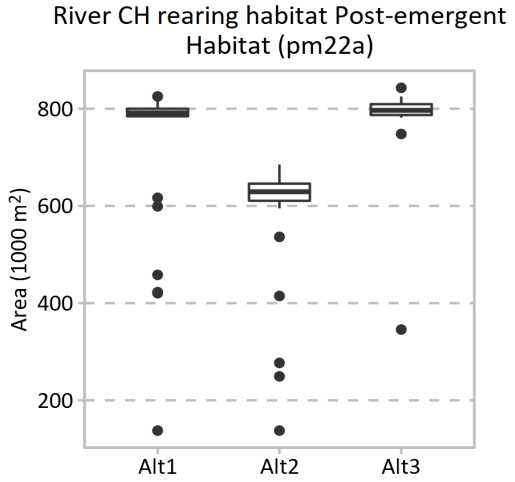


Issue #22a: River CH rearing habitat

Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#22a River Chinook rearing habitat	Median	Amount of post-emergent habitat (Envirocon curve)	m2	791,463.6	629,240.7	796,736.8
#22b River Chinook rearing habitat	Median	Amount of pre-migrant habitat (Envirocon curve)	m2	357,938	95,059.6	355,758.9

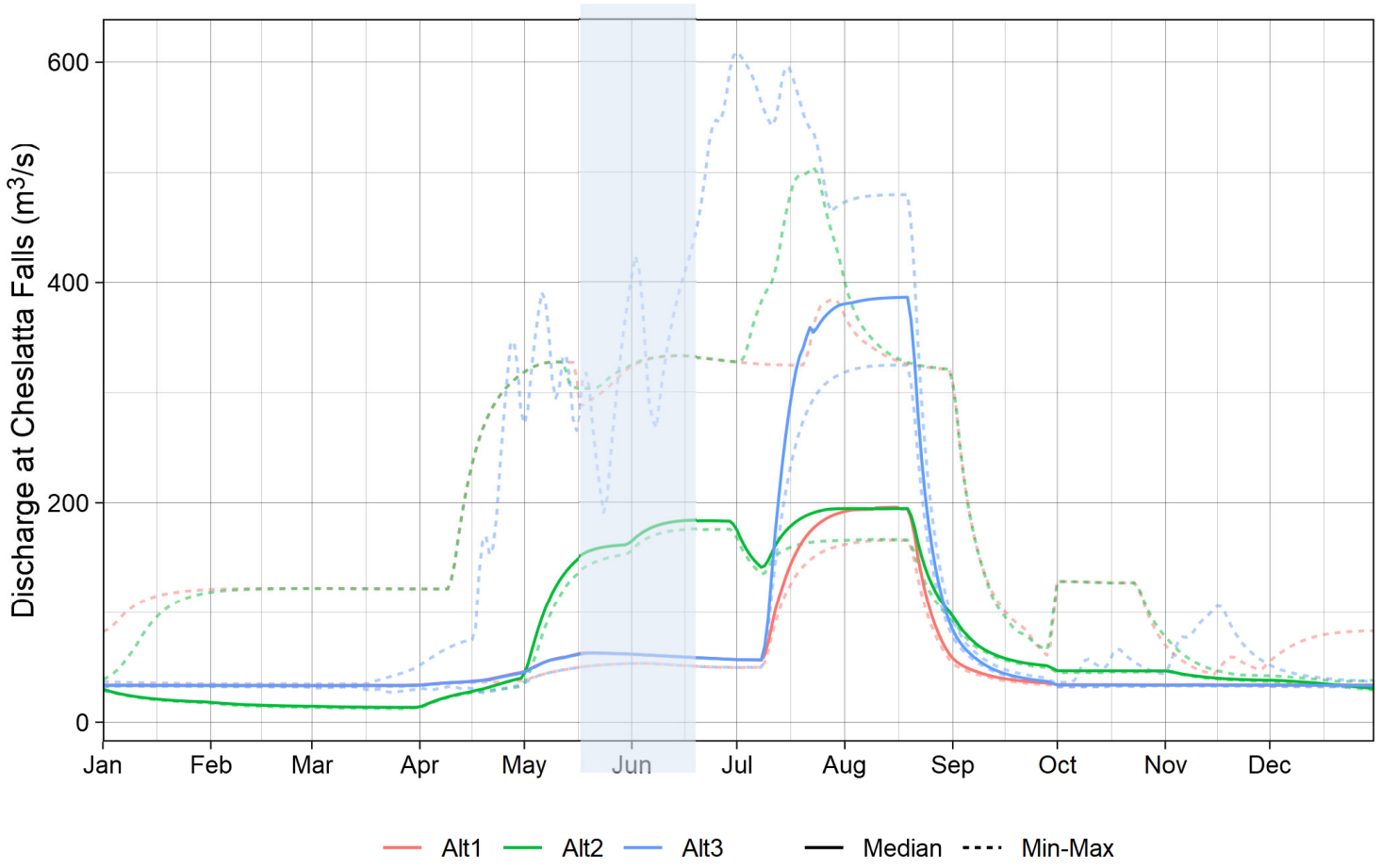


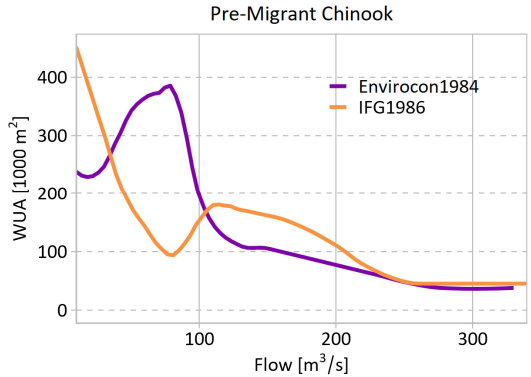


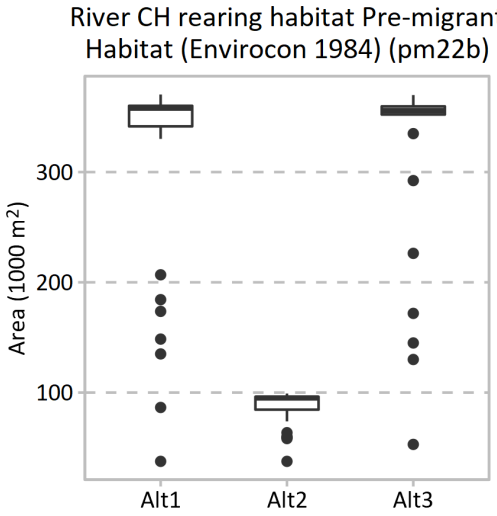


Issue #22b: River CH rearing habitat

Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#22a River Chinook rearing habitat	Median	Amount of post-emergent habitat (Envirocon curve)	m2	791,463.6	629,240.7	796,736.8
#22b River Chinook rearing habitat	Median	Amount of pre-migrant habitat (Envirocon curve)	m2	357,938	95,059.6	355,758.9

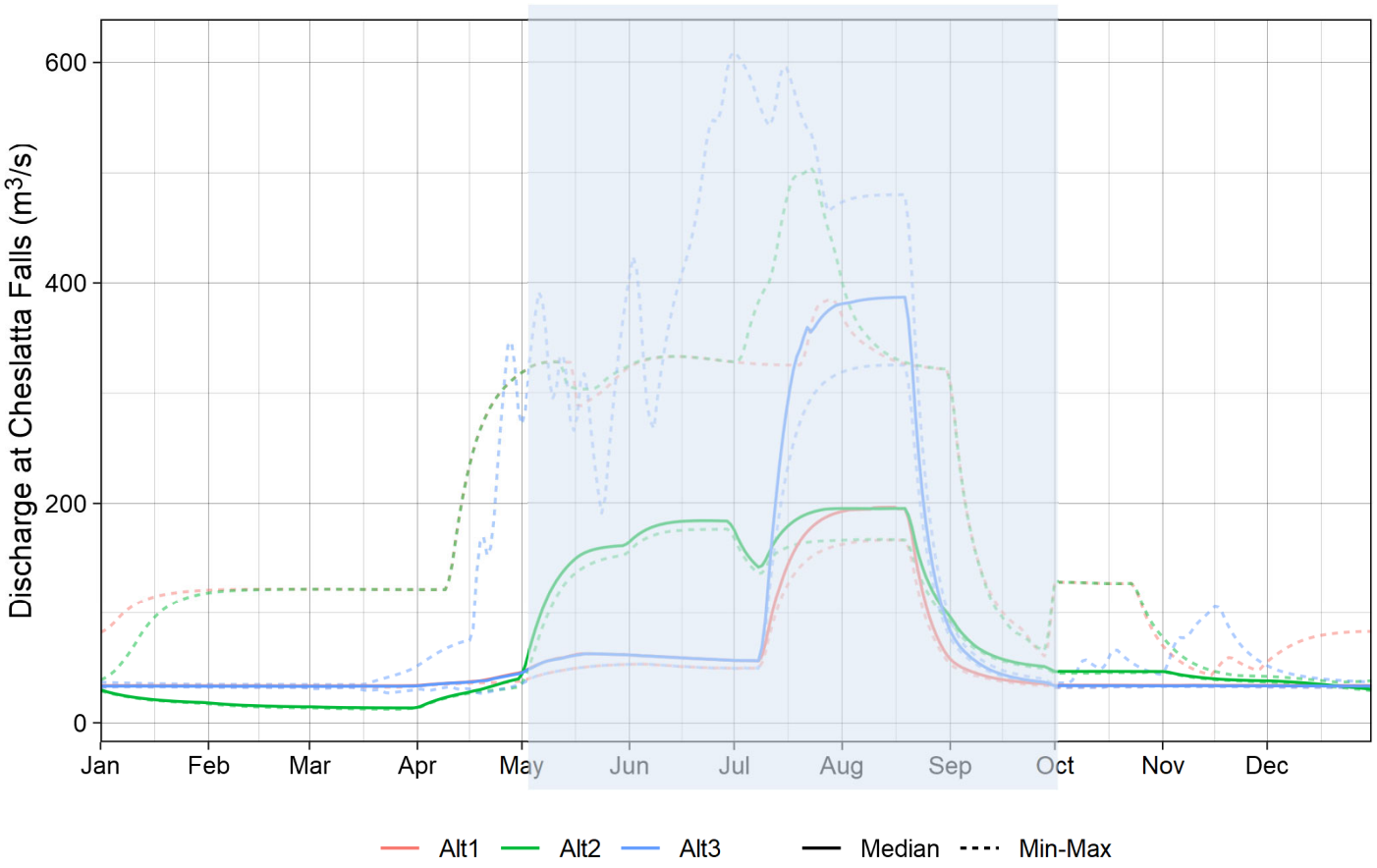


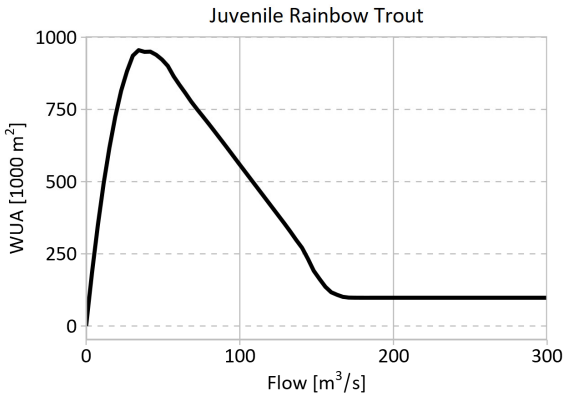


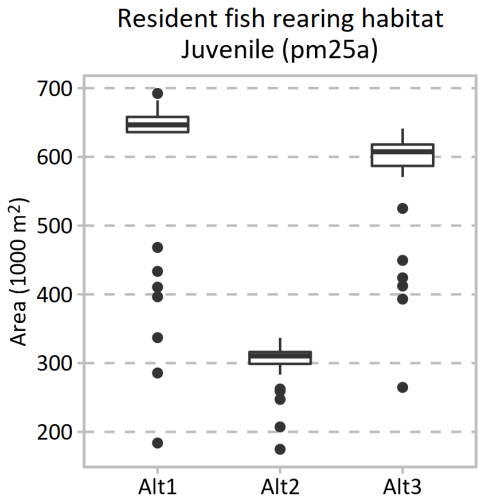


Issue #25a: Resident fish rearing habitat

Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#25a Resident fish rearing habitat	Median	Average juvenile habitat	m2	646,567.9	310,417.2	607,430.3
#25b Resident fish rearing habitat	Median	Average adult habitat	m2	1,574,358.5	1,257,534.7	1,367,051.8

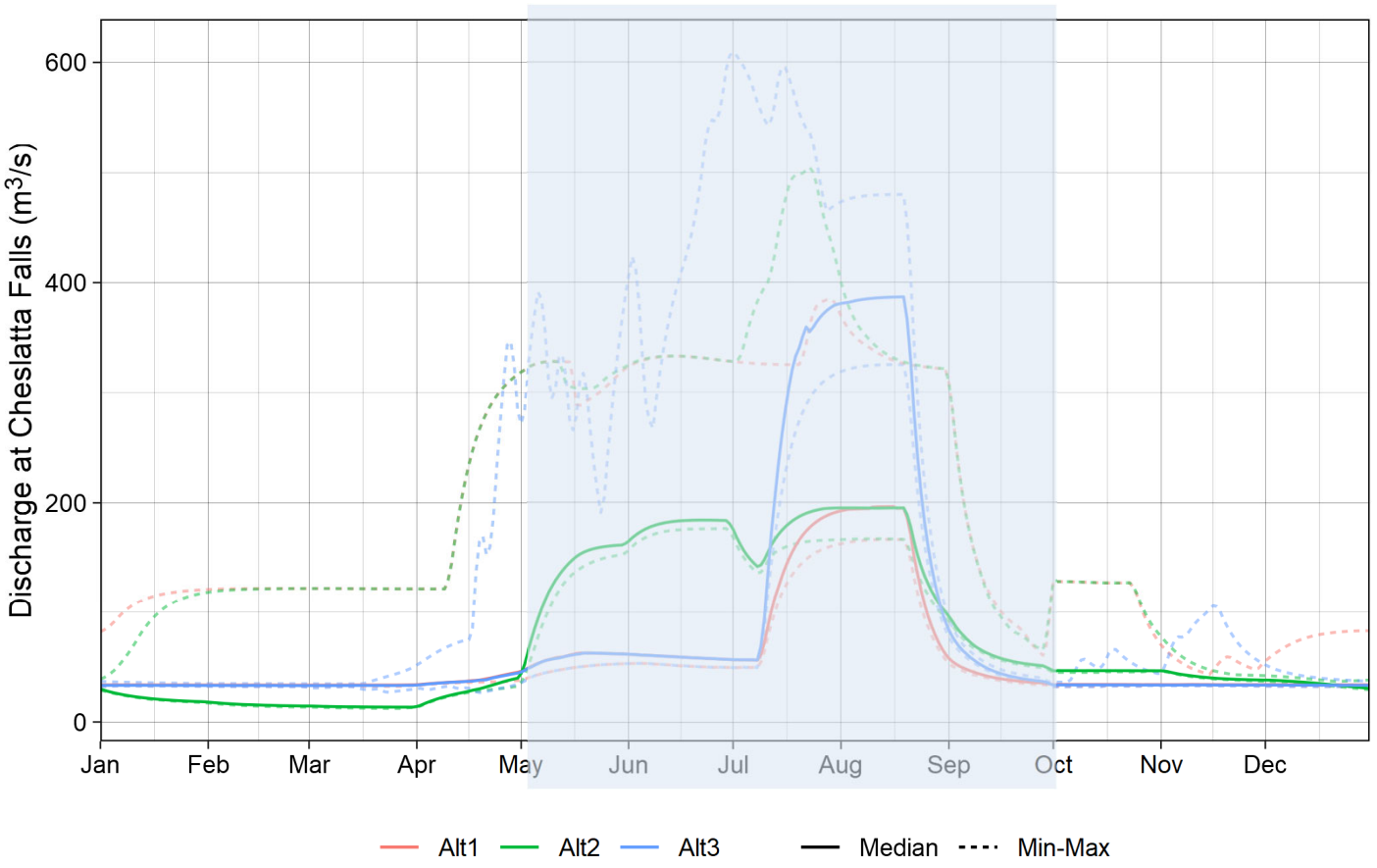


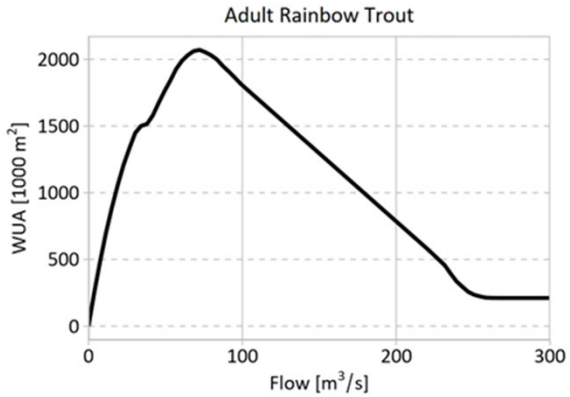


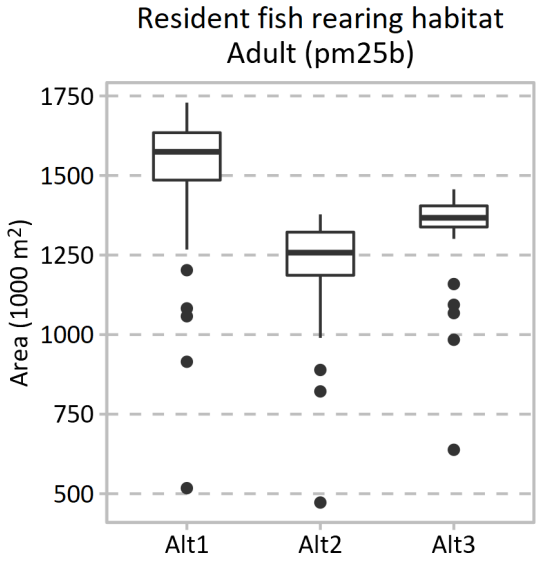


Issue #25b: Resident fish rearing habitat

Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#25a Resident fish rearing habitat	Median	Average juvenile habitat	m2	646,567.9	310,417.2	607,430.3
#25b Resident fish rearing habitat	Median	Average adult habitat	m2	1,574,358.5	1,257,534.7	1,367,051.8

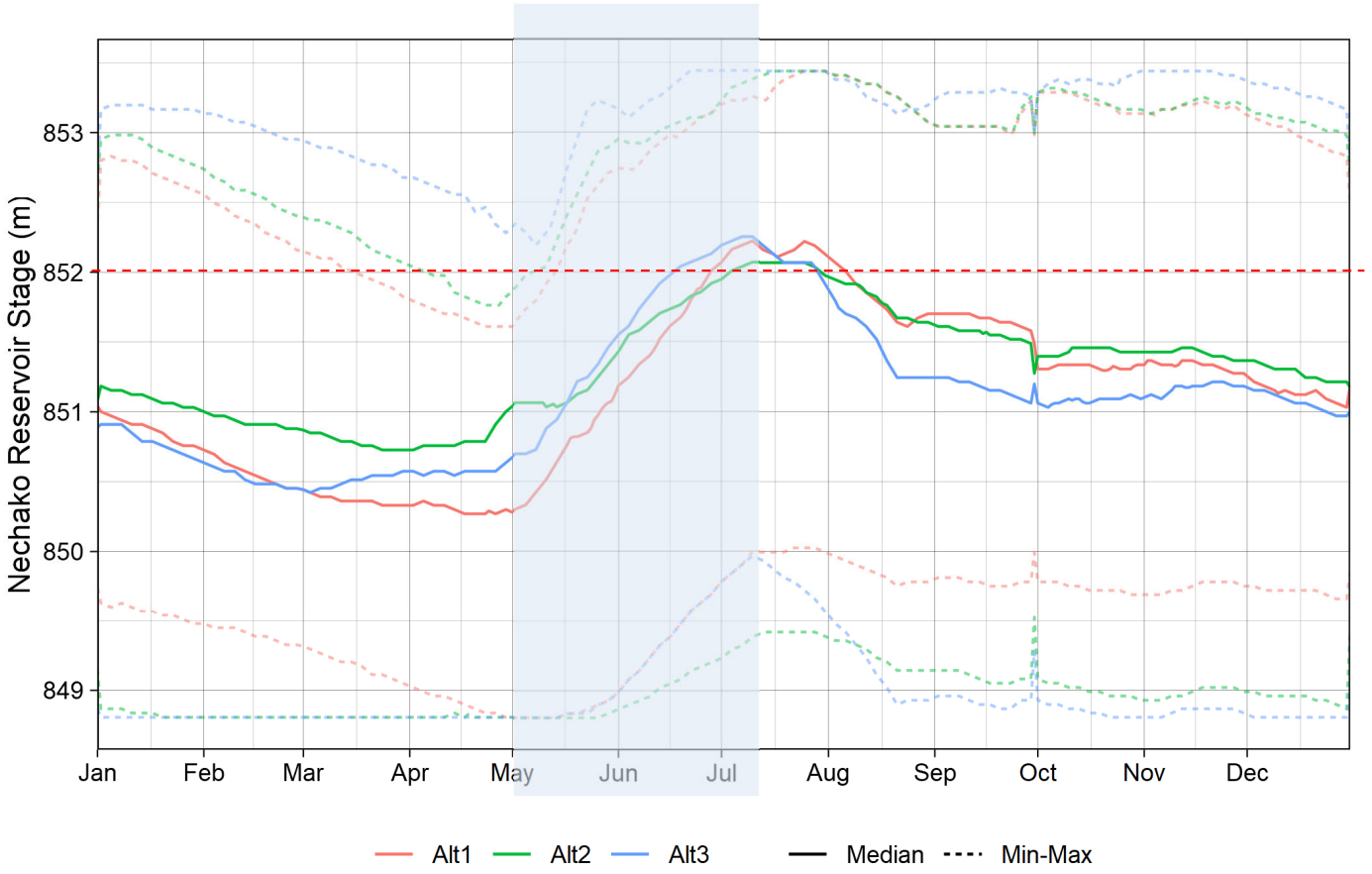


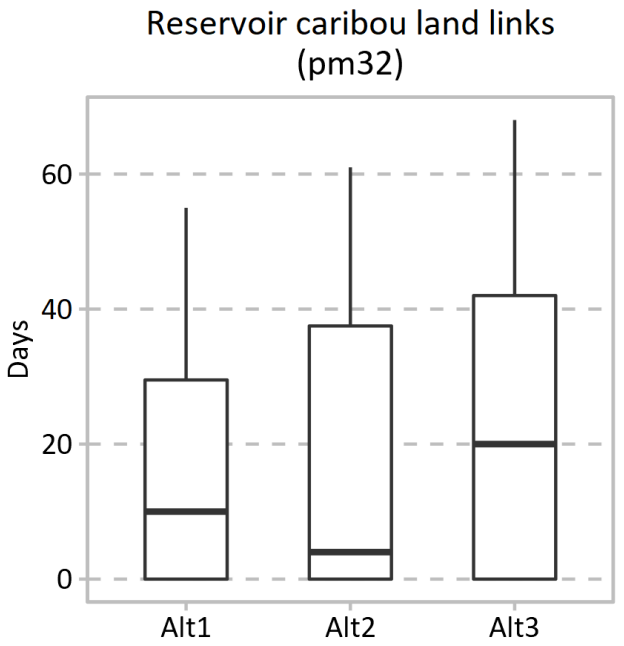




Issue #32: Reservoir caribou land links

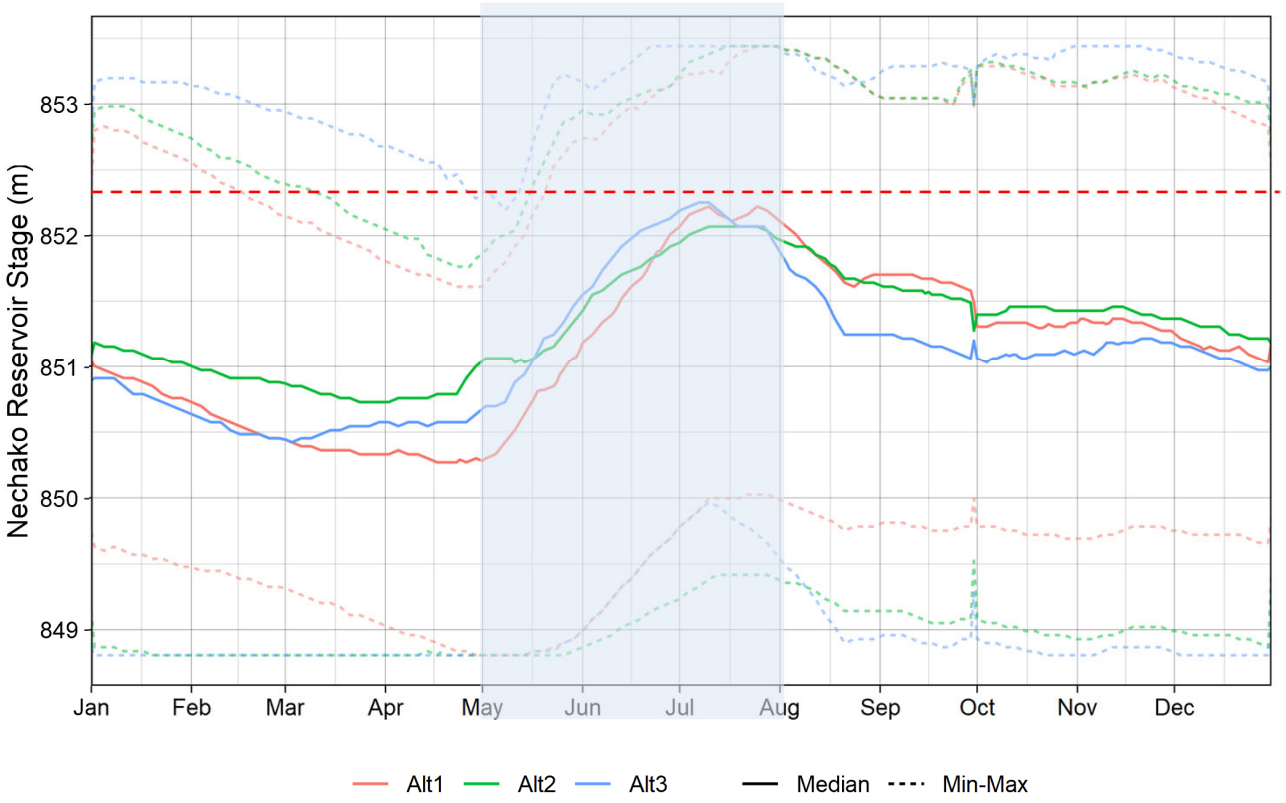
Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#32 Reservoir caribou land links	Median	# of days water elevation is > 852 m	Days	10	4	20

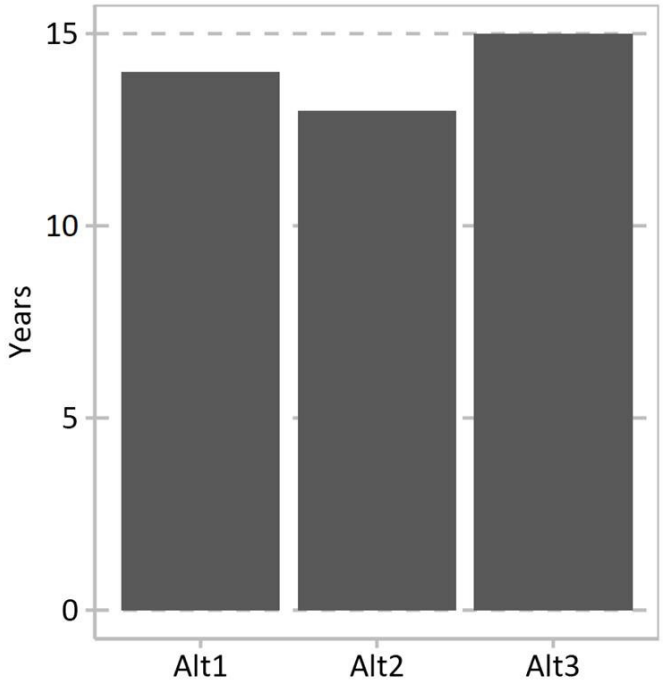




Issue #38: Reservoir osprey nesting habitat

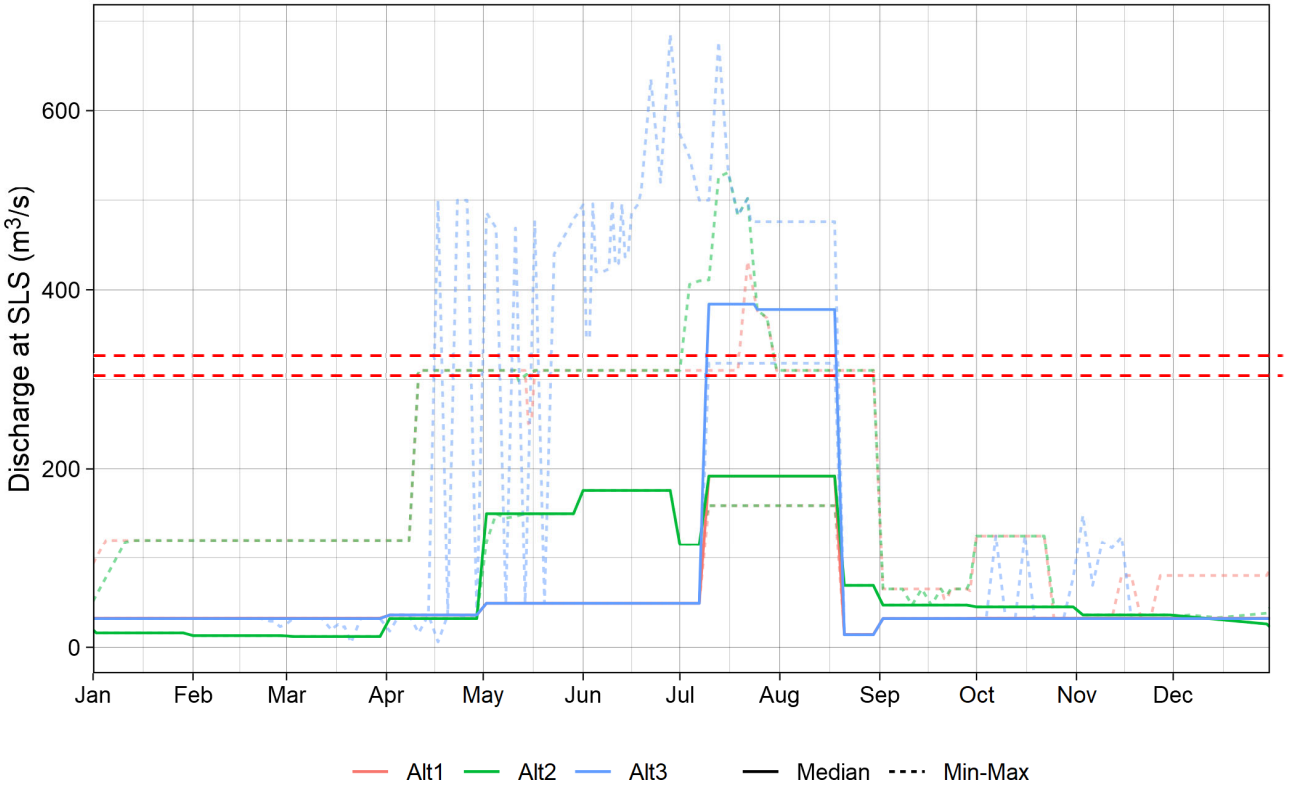
Criteria		Performance Measures	Unit	Preferred Direction	MSIC	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrographic Species	Alternative 3 Sockeye
#38 Reservoir osprey nesting habitat	Median	Number of years where reservoir elevation exceeds 852.44m	m	Lower	20%	14	13	15

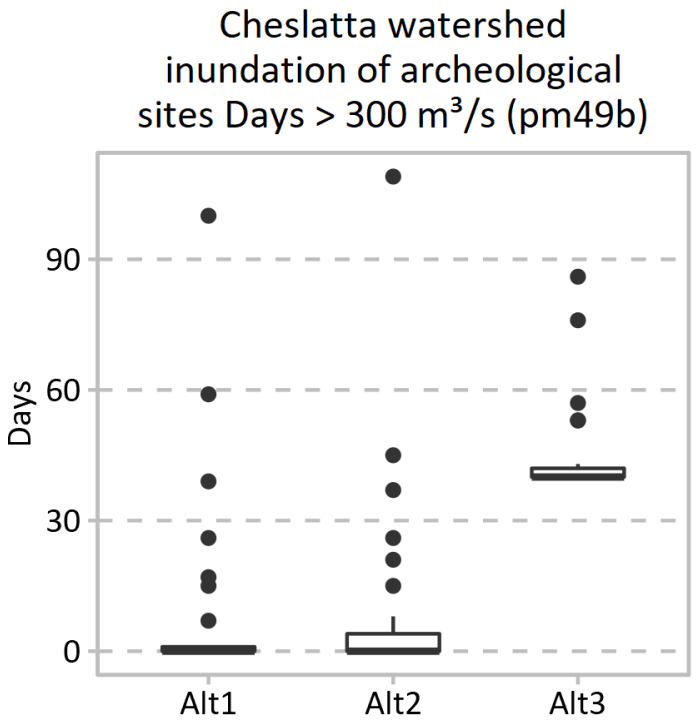




Issue #49: Cheslatta watershed inundation of archeological sites

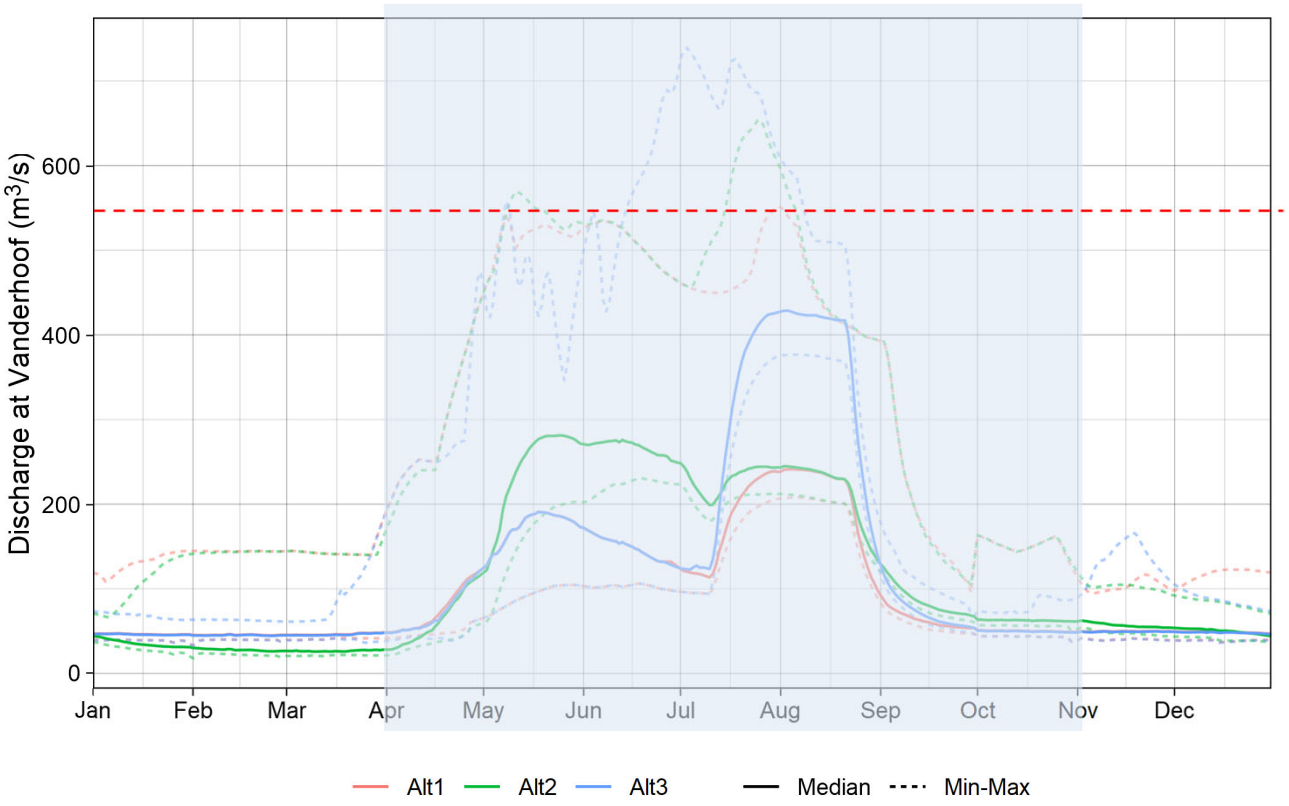
Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#49a Cheslatta watershed inundation of arch sites	Median	# of days > 330 cms	Days	0	0	40
#49b Cheslatta watershed inundation of arch sites	Median	# of days > 300 cms	Days	0	0	40

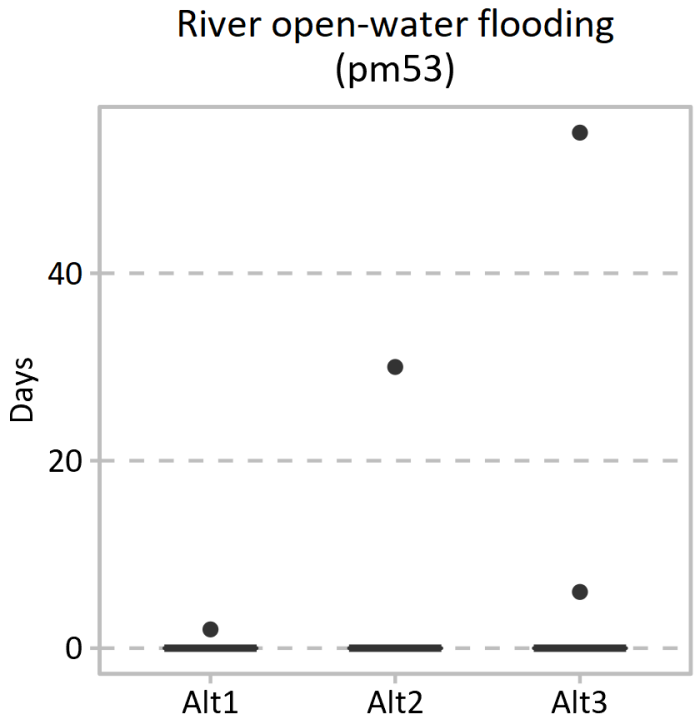




Issue #53: River open-water flooding

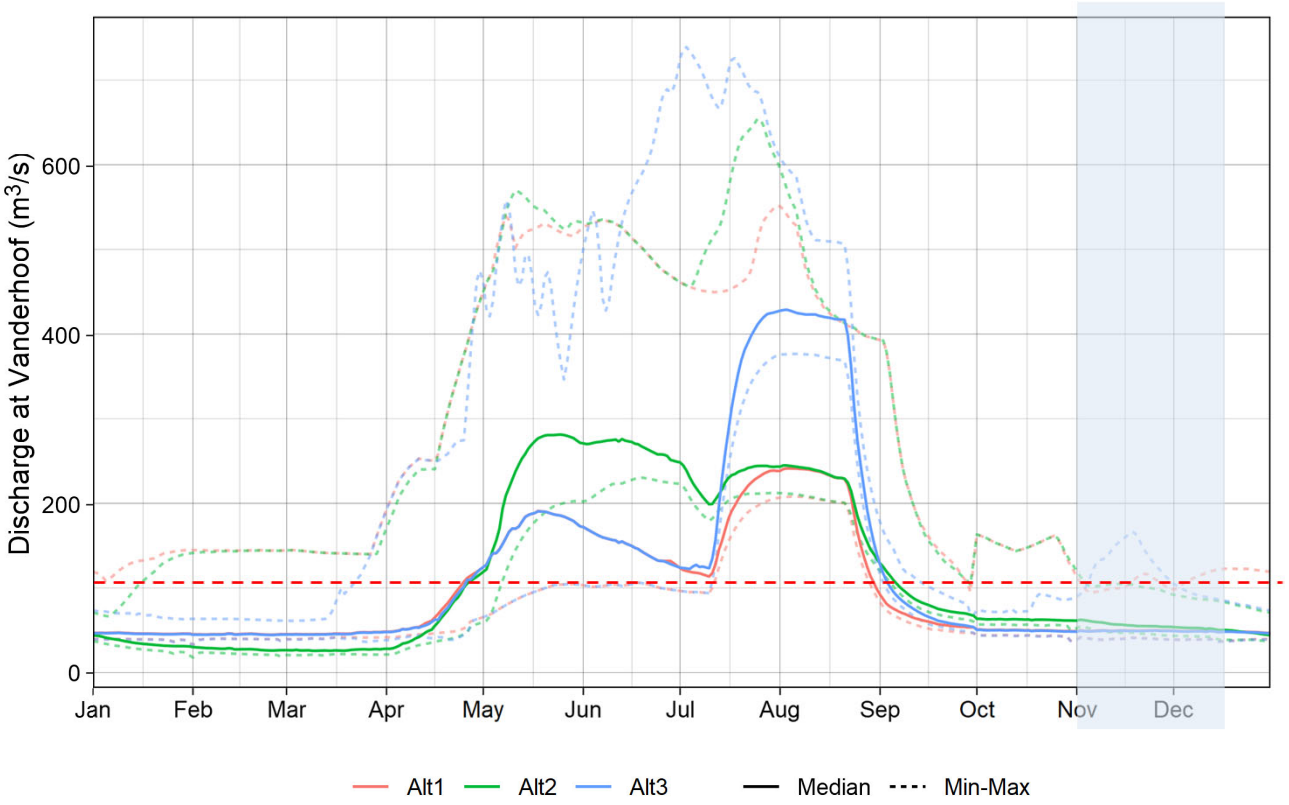
Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#53 River open-water flooding	Median	# of days flow >550 at Vanderhoof	Days	0	0	0

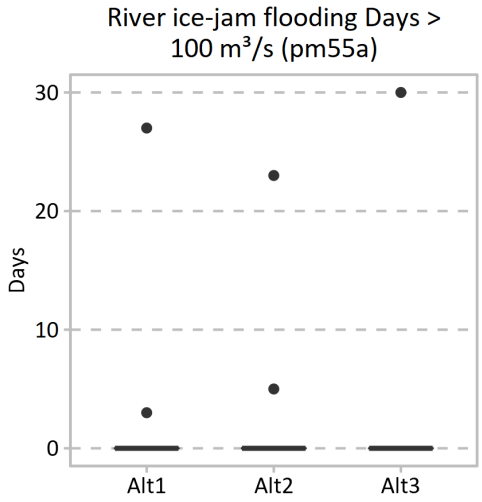




Issue #55: River ice-jam flooding

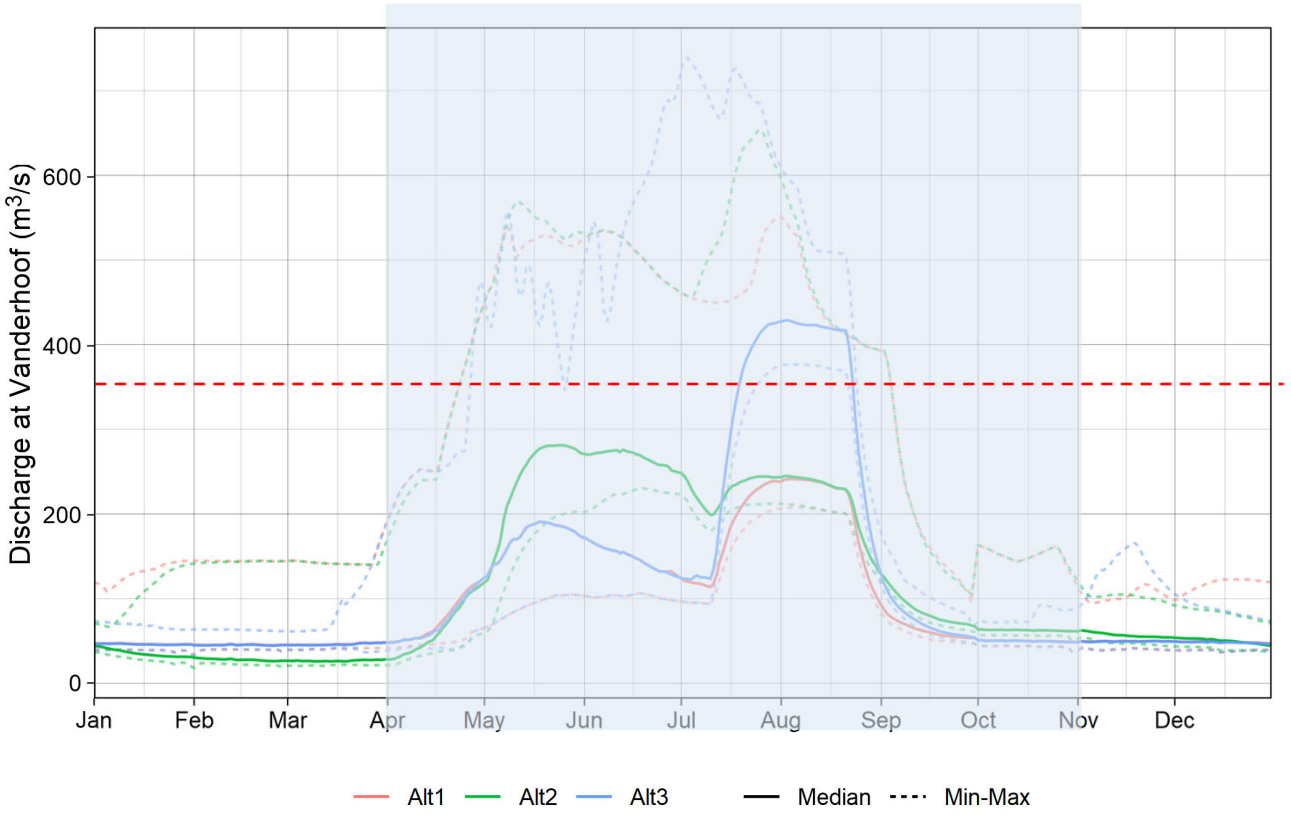
Criteria		Performance Measures	Unit	Preferred Direction	MSIC	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrologic Model	Alternative 3 Sockeye
#55a River ice-jam flooding	Median	# of days > 100 cms during freeze up	Days	Lower	7	0	0	0

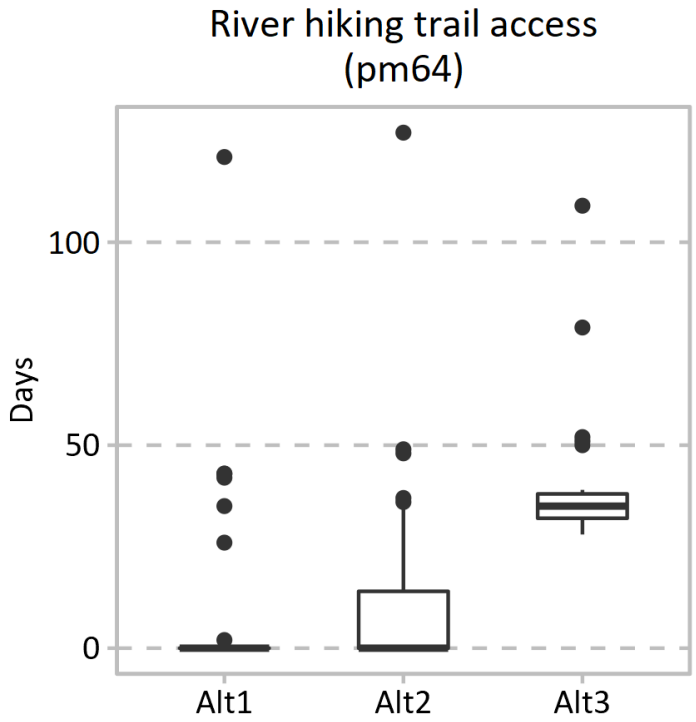




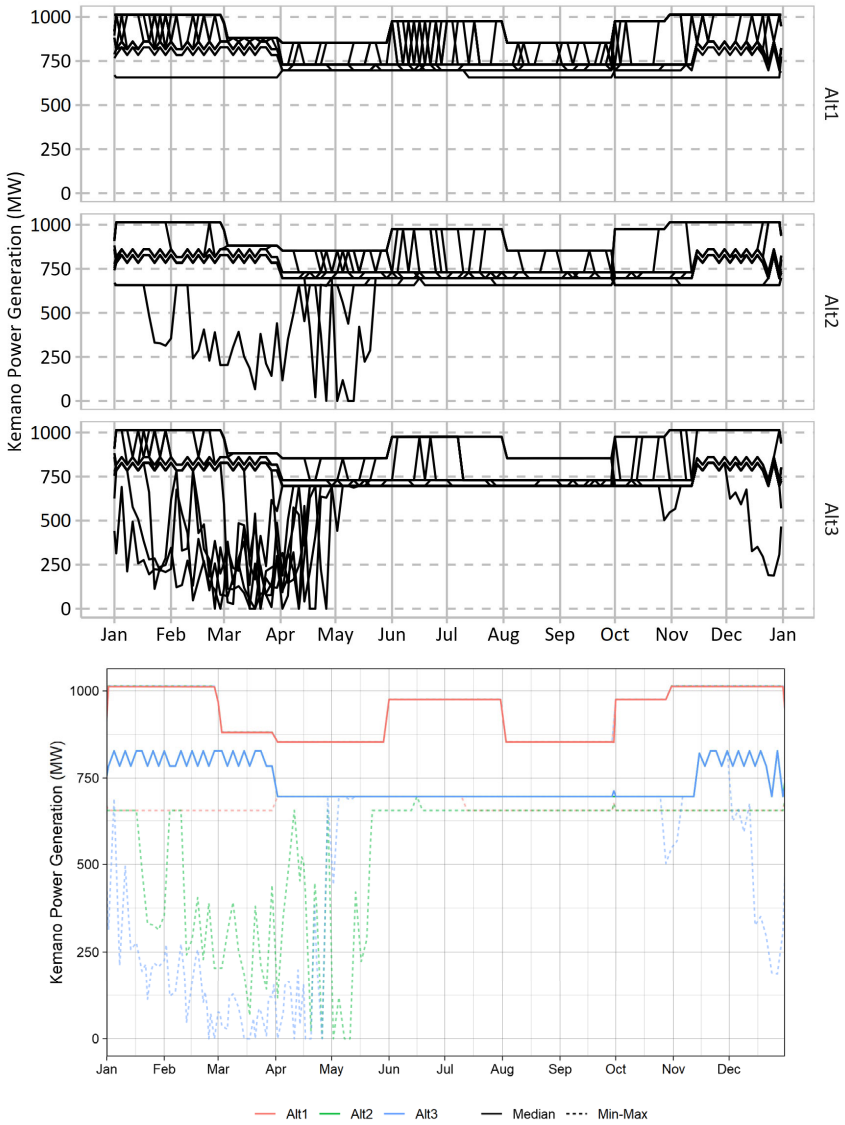
Issue #64: River hiking trail access

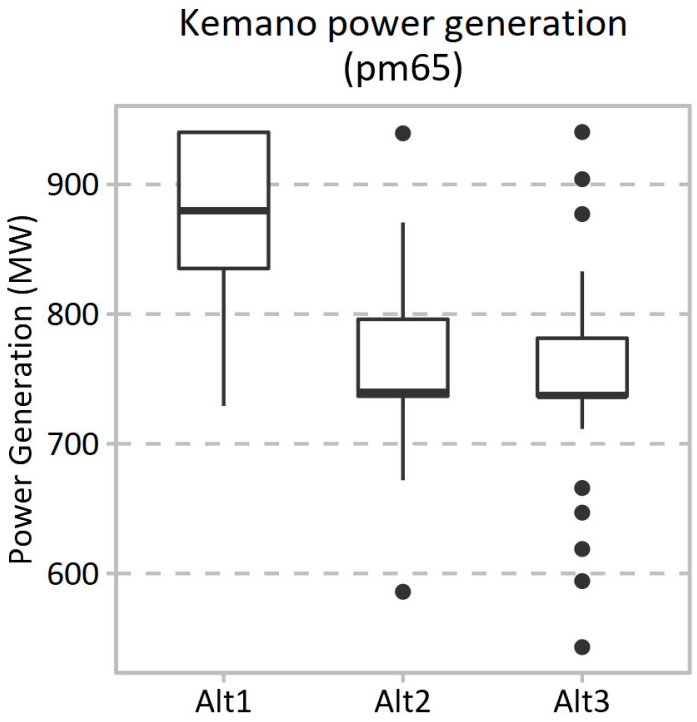
Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#64 River hiking trail access	Median	# days flow > 355 cms	Days	0	0	35



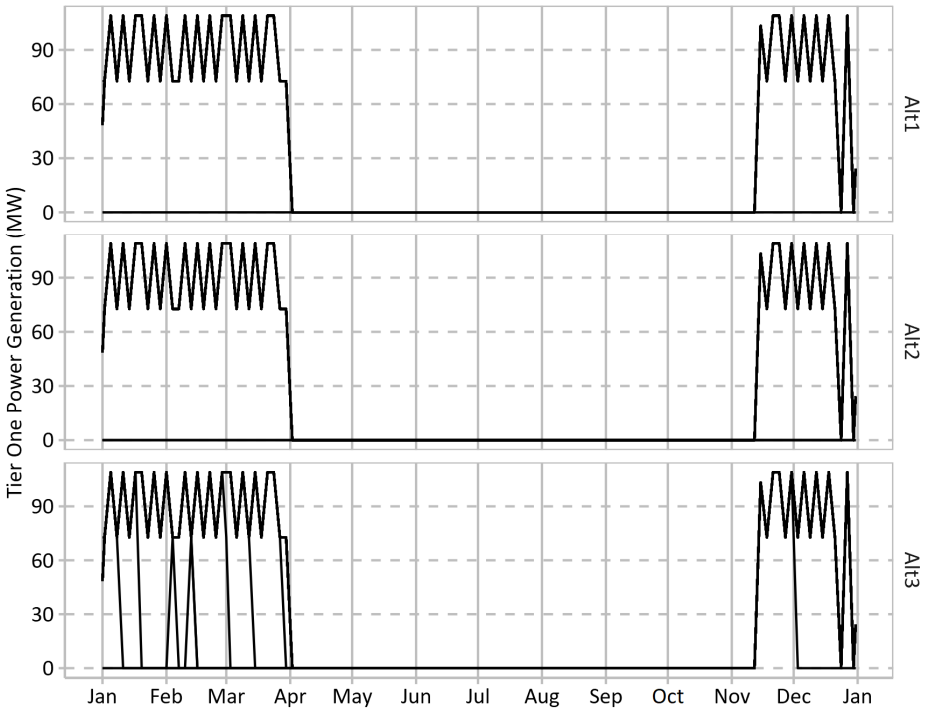


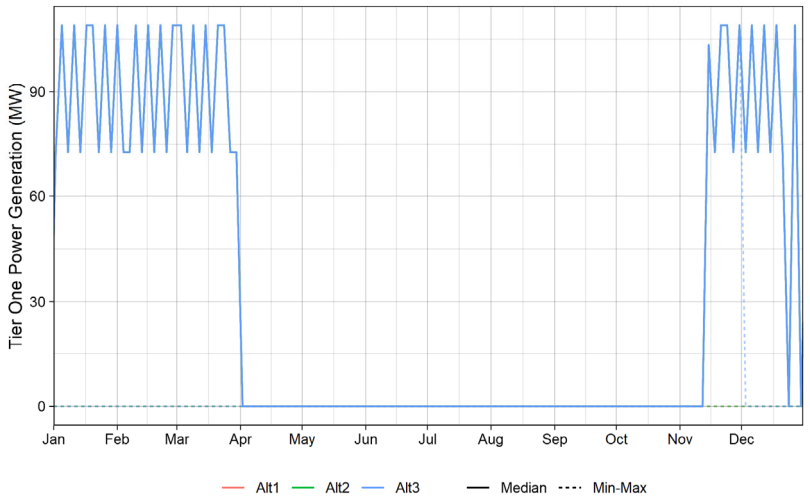
Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#65 Kemano power generation	Median	Mean Kemano power generation	MW	879.7	739.8	737.3

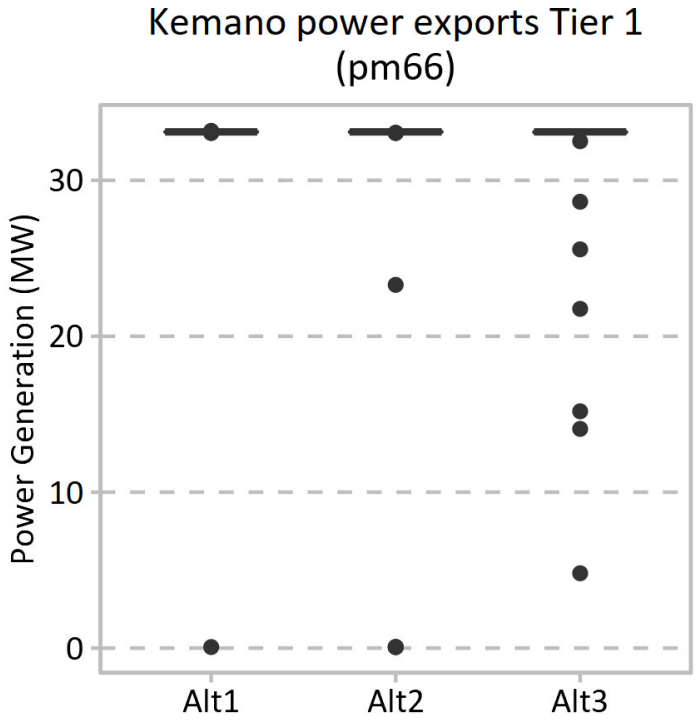




Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#66 Kemano power exports (Tier 1)	Median	Mean Tier 1 power generation	MW	33.1	33.1	33.1







Criteria		Performance Measures	Unit	Alternative 1 Status Quo	Alternative 2 Nat'l Hydrograph / Aquatic Species	Alternative 3 Sockeye
#67 Kemano power exports (Tier 2)	Median	Mean Tier 1 power generation	MW	116.6	6.8	6.8