

Archaeology Breakout Session

Columbia River Treaty Review

Castlegar Conference

March 22, 2013

Objective of this Session

To examine the assumptions and rationales underpinning archeology performance measures which inform water modelling processes and understandings of implications for archeological values, including:

1. History behind the development of the Performance Measures
2. Inundation Parameters and Exposure Parameters and accompanying rationale
3. Field Observations from work in the reservoirs

Proposed Agenda and Panel Structure

A. Introductory Overviews

- 1. Overview of Panel Discussion**
- 2. Introduction to participants and opening comments**
- 3. Overview of Archeology Performance Measures**
 - History/Development of Performance Measures
 - Inundation and Exposure Parameters and accompanying rationale

B. Panel Discussion

- 1. Archeology Performance Measure review which could including:**
 - Comments on development process and parameter rationales
 - Experiences and observations from the field
- 2. Additional thoughts and next steps**

Overview of Archeology Performance Measures

- History/Development of Performance Measures
- Inundation and Exposure Parameters and accompanying rationale

History/Development

- Originated during the Columbia River Water Use Plan process 2001 – 2004
 - Consultative Committee examined multiple operating alternatives and examined their effect across multiple objectives:
 - Culture and Heritage (Archaeological zones)
 - Fish and Aquatic Resources
 - Wildlife and Vegetation
 - Flooding and Erosion Control
 - Navigation
 - Recreation
 - Power Generation

History/Development

- Objectives (WUP):
 - *Minimize impacts of erosion and destructive human behaviour on potential archaeological zones*
 - *Maintain the cultural, aesthetic and ecological context of important sites*

History/Development

- Steps taken during the WUP:
 - Culture and Heritage Subcommittee formed
 - Archaeological investigation of Kinbasket, Revelstoke and Arrow Lakes Reservoirs and the Lower Columbia River (Choquette, 2002)
 - Development of the Performance Measures for Arrow Lakes Reservoir

History/Development

- WUP Performance Measures on Arrow Reservoir

Performance Measure	Units	Description
Water Erosion	# days per year at or above 436 m	Frequency (in days per year) at which water levels on Arrow Lakes are between 436 and 440.4 m. This is the elevation of a major escarpment on which First Nations heritage sites are believed to exist.
Wind Erosion	3 point scoring system	Based on vegetation presence at elevations 434 to 440 m.

History/Development

- Steps taken Post-WUP:
 - Archaeological overview assessments in Kinbasket and Arrow reservoirs (2008-2009)
 - new sites identified
 - Reservoir Archaeology Program (RAP) initiated
 - Non-Treaty Storage (NTS) planning process from 2010-2011
 - Examined the same set of objectives and performance measures used in the WUP, yet updated methodologies based on ongoing studies and consultations.

History/Development

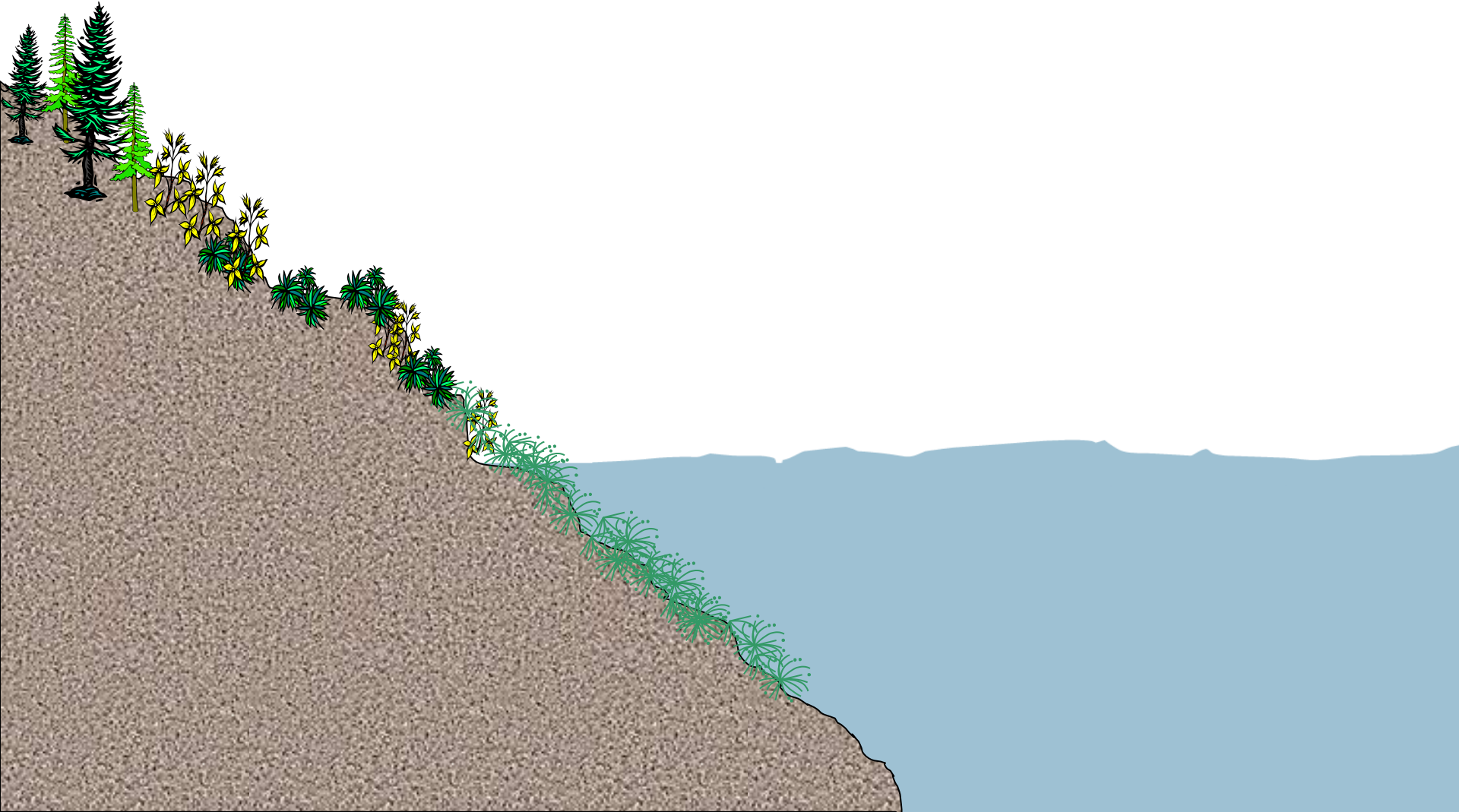
- NTSA and current CRT Review Performance Measures on both Kinbasket and Arrow Reservoirs:
 - Incorporation of newly identified sites, including those obtained from the *Remote Access to Archaeological Data (RAAD) database* of the Archaeology Branch
 - Addition of a second “Inundation” performance measure in addition to the “Exposure/Erosion” performance measure.

Archaeology Performance Measures

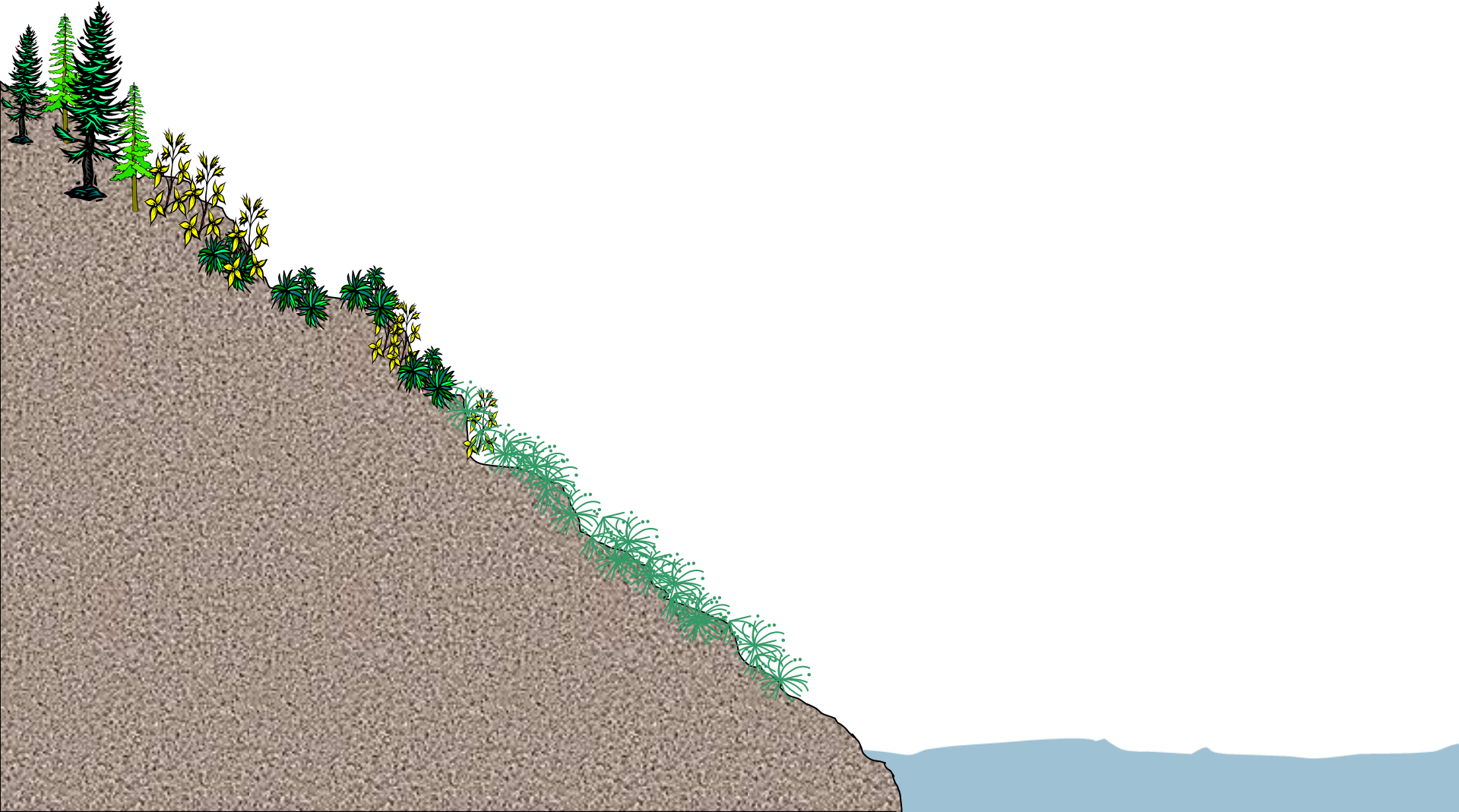
Objective / Location	Performance Measure	Units	Description
Culture & Heritage / Arrow / Kinbasket Reservoir	Archaeological sites – Wave Erosion	Weighted-Days reservoir is within sensitive elevation zones	Total number of weighted days that the reservoir is potentially eroding archaeological sites through wave action
	Archaeological sites – Full inundation	Weighted Days of full inundation	Total number of weighted days that the reservoir is potentially protecting archaeological sites by fully inundating them.

Exposure / Erosion Performance Measure

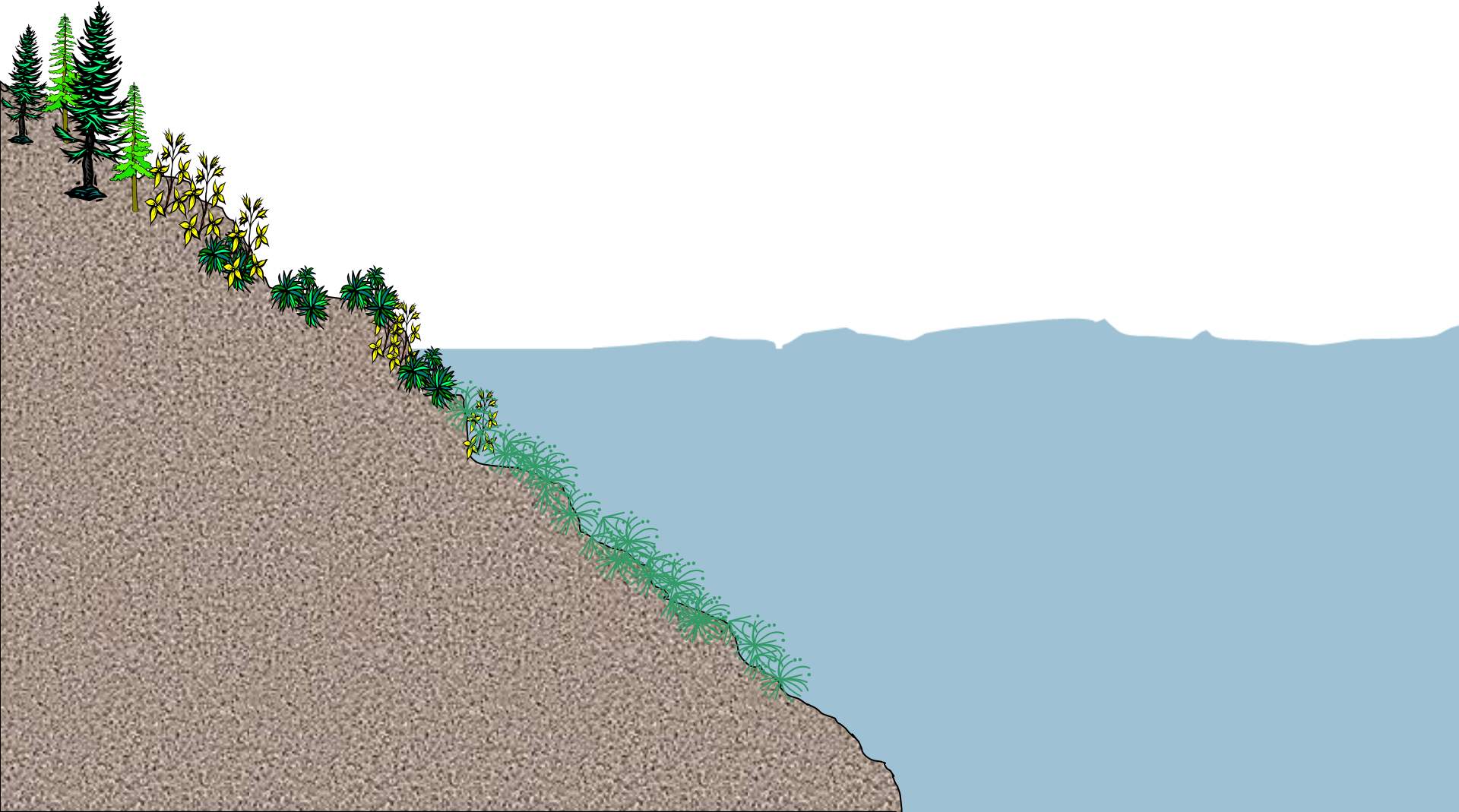
Exposure / Erosion Performance Measure



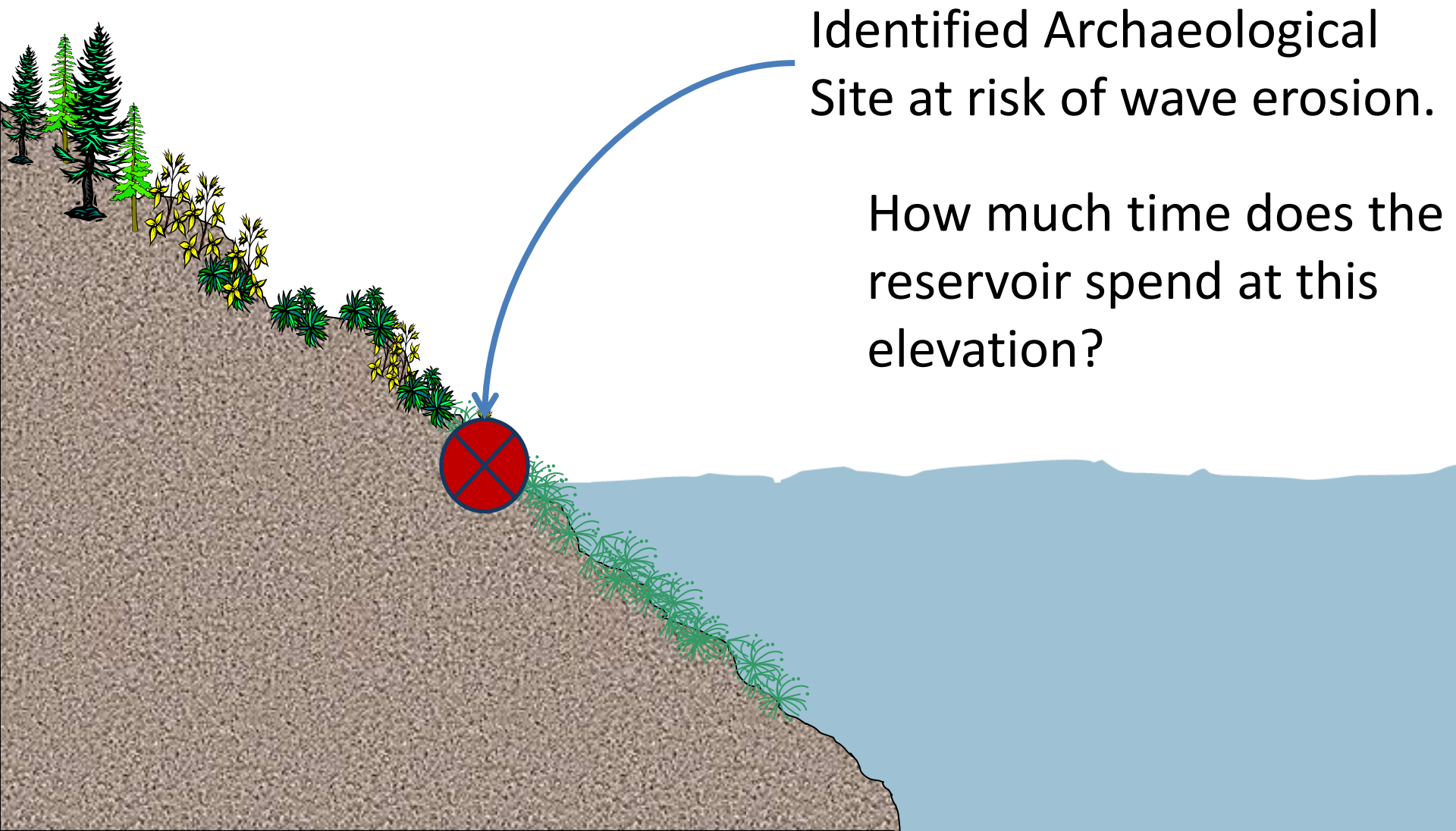
Exposure / Erosion Performance Measure



Exposure / Erosion Performance Measure



Exposure / Erosion Performance Measure

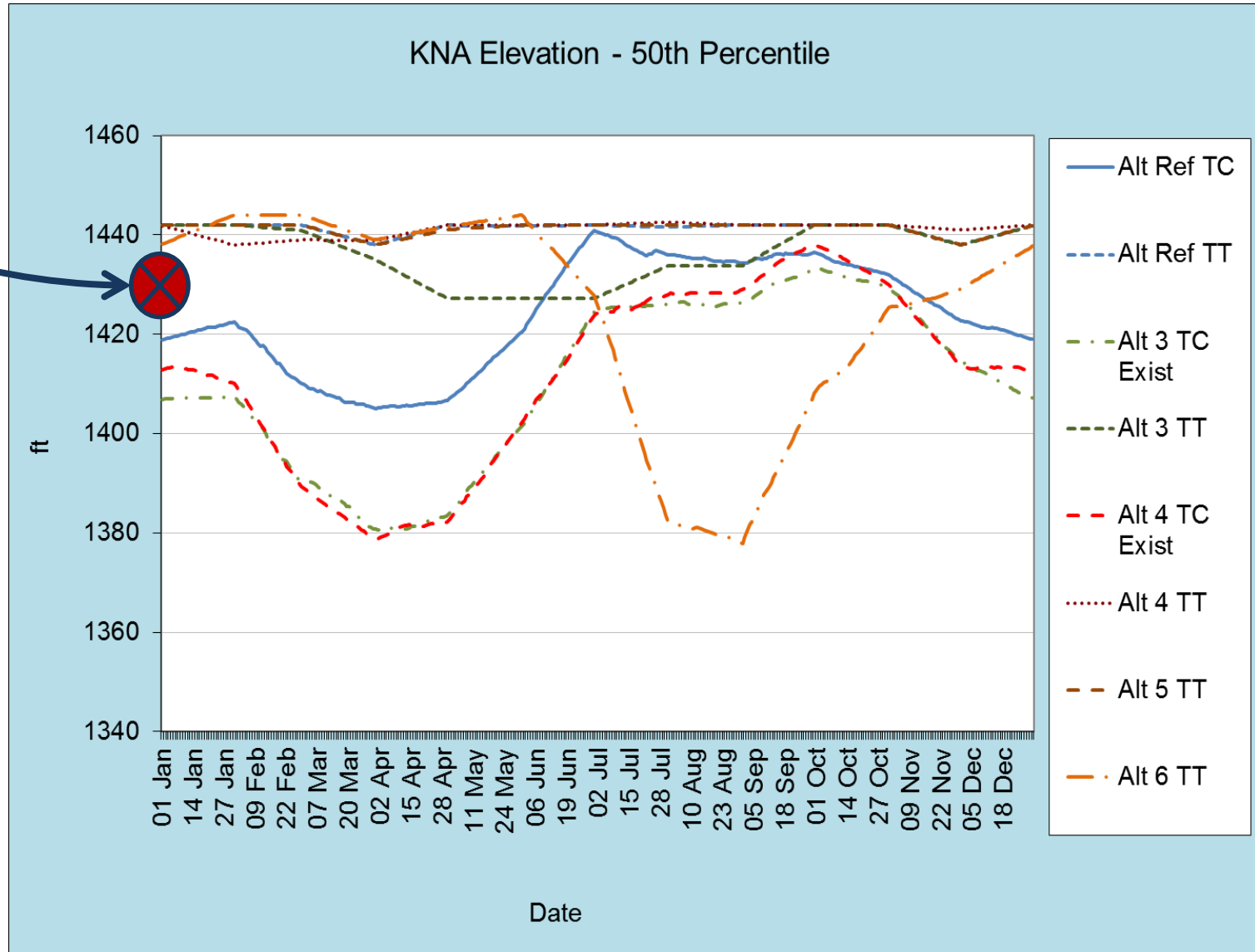


Identified Archaeological
Site at risk of wave erosion.

How much time does the
reservoir spend at this
elevation?

CRT - Alternatives

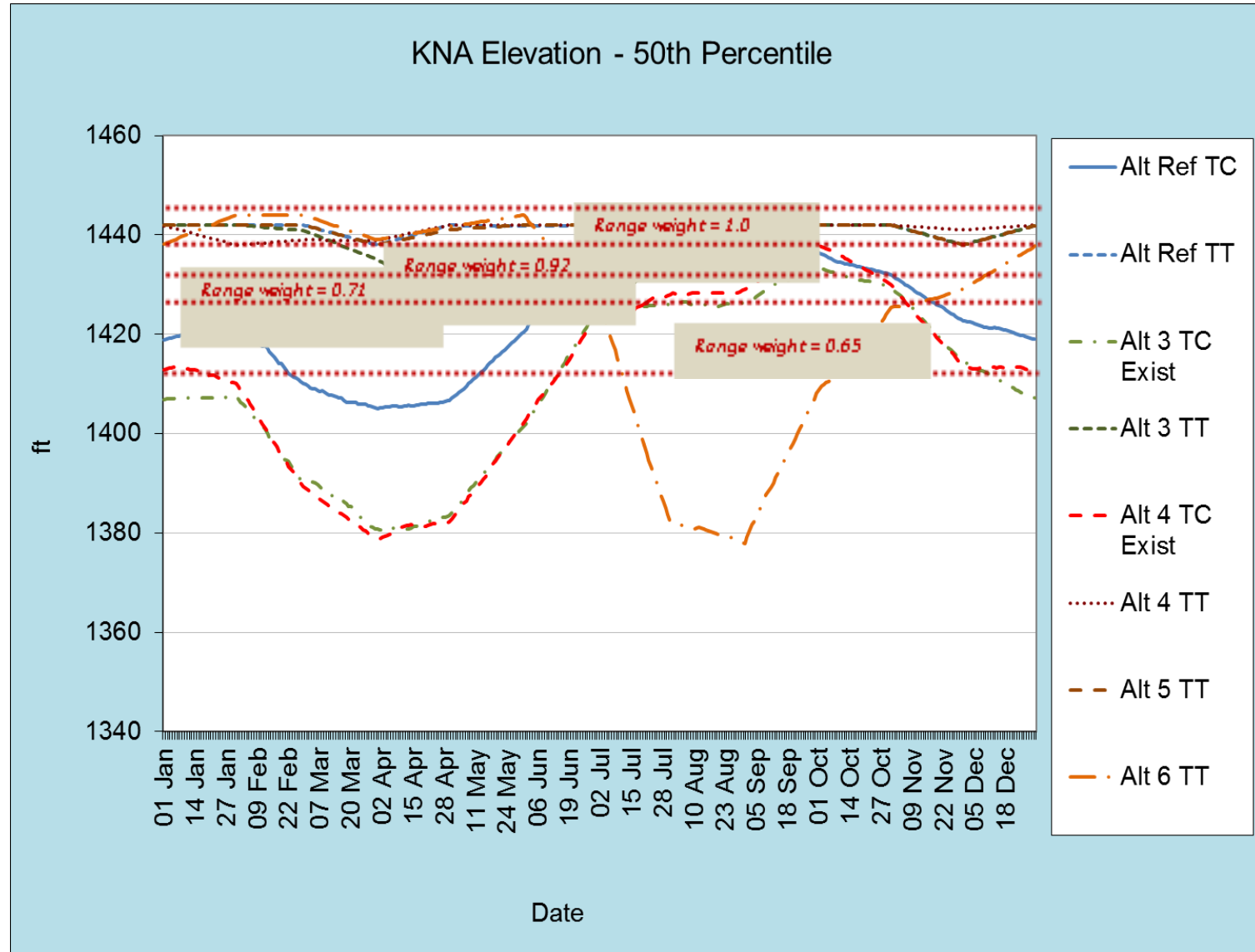
Site
Elevation



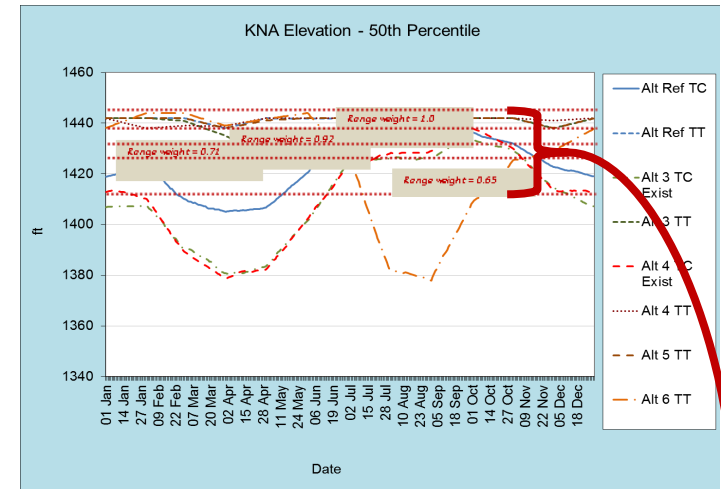
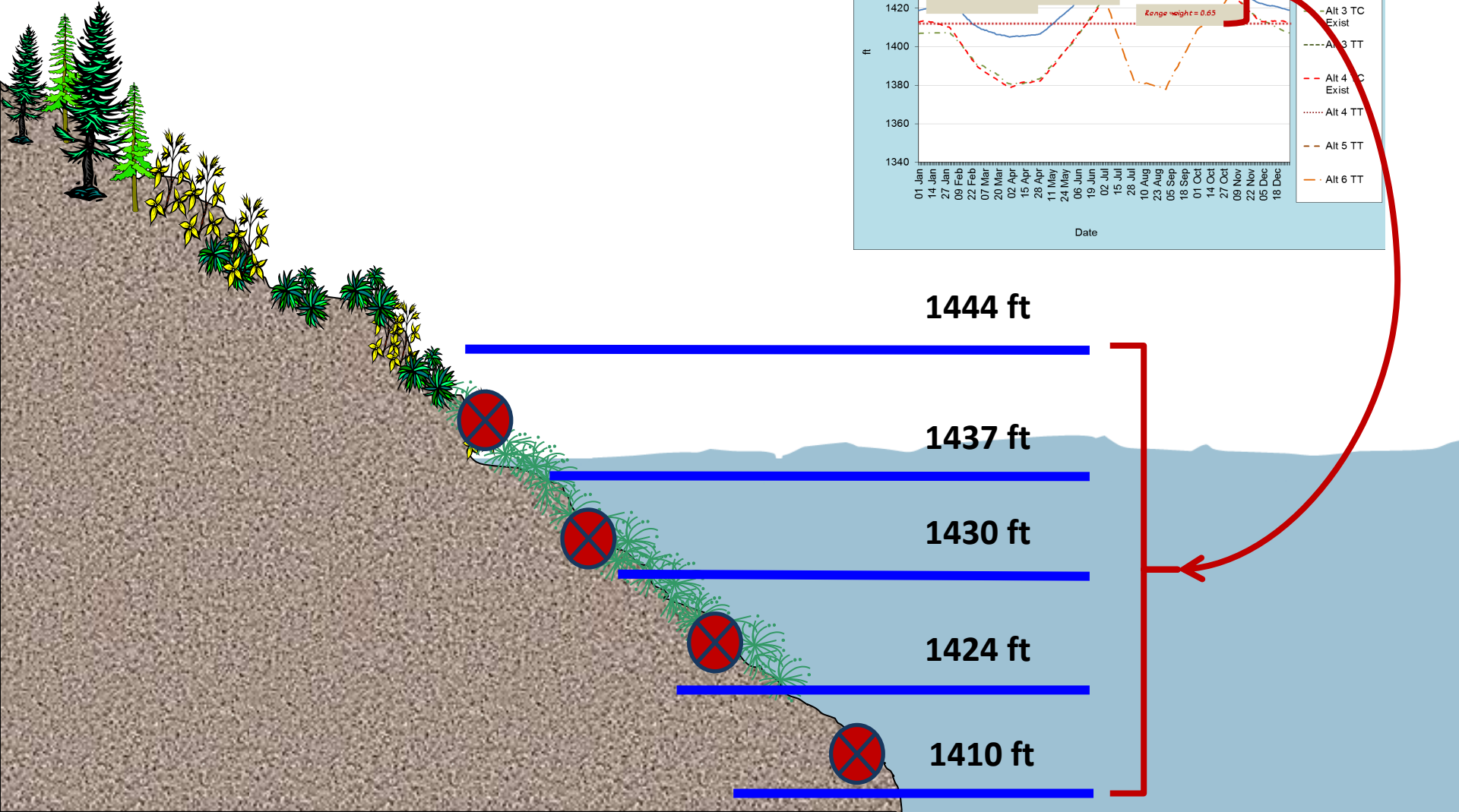
Sites = 'Weight' applied to each elevation band

	Elevation Range (ft)			
	1410<band<1424	1424<band<1430	1430<band<1437	1437<band<1444
Total sites within elevation band	49	53	69	75
Proportion of sites within band	19.9%	21.5%	28.0%	30.5%
Relative day weight	0.65	0.71	0.92	1

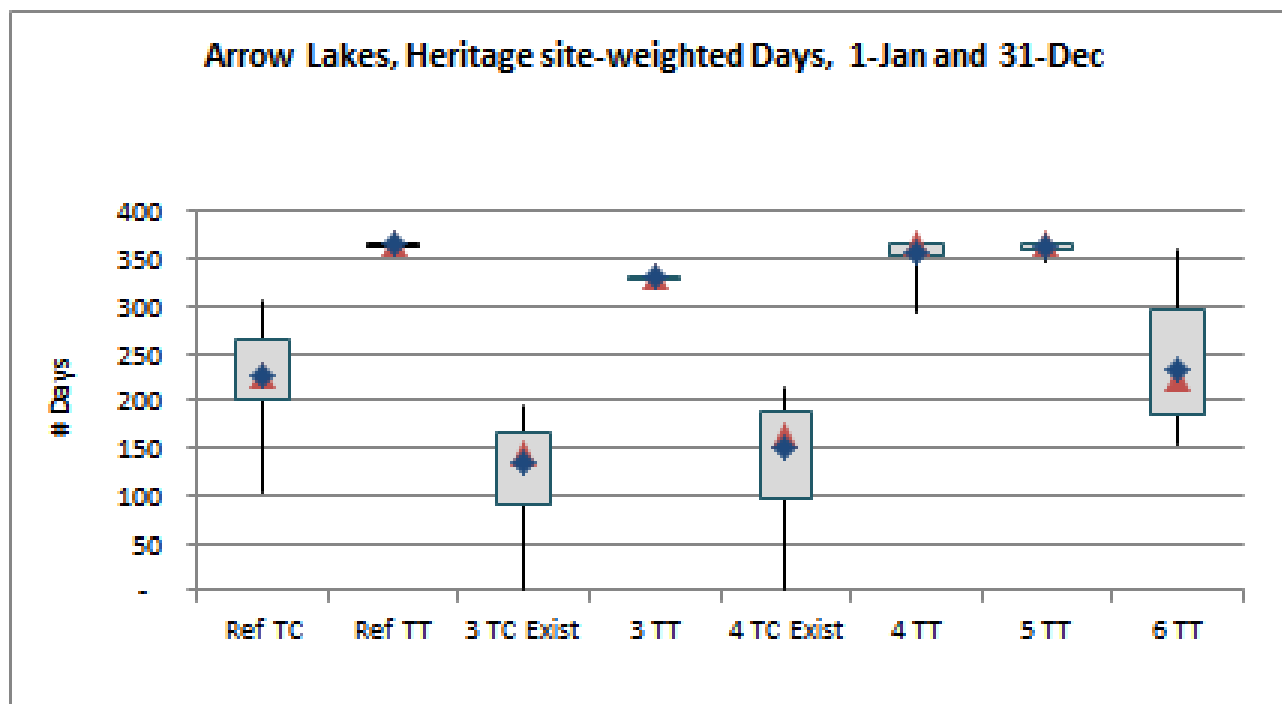
CRT - Alternatives



Exposure / Erosion Performance Measure

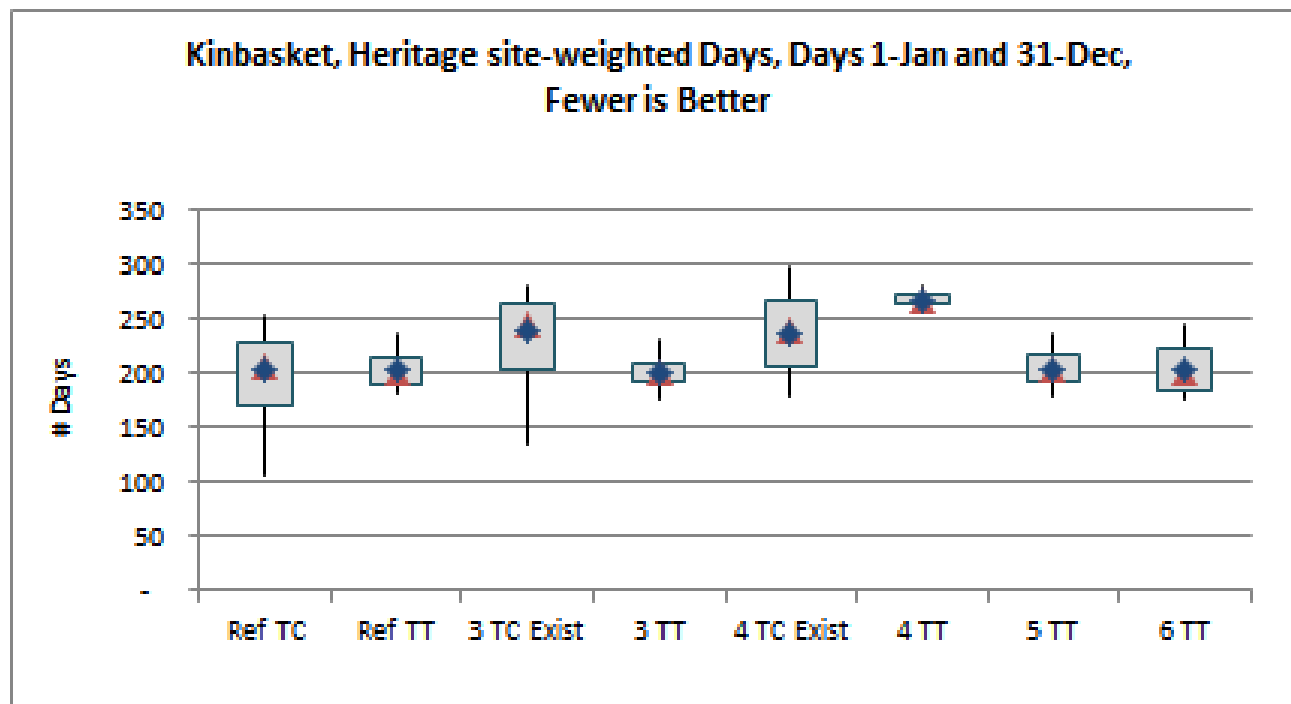


Exposure PM Results - ARROW



Ref TC	Ref TT	3TC Exist	3 TT	4 TC Exist	4 TT	5 TT	6 TT	
305	365	195	333	213	365	365	360	Max
266	365	166	332	188	365	365	295	90th
225	365	144	332	163	365	365	223	Med
227	365	135	332	151	357	363	233	Mean
200	365	91	332	96	352	361	185	10th
104	365	1	331	-	292	346	154	Min

Exposure PM Results - KINBASKET



Ref TC	Ref TT	3TC Exist	3 TT	4 TC Exist	4 TT	5 TT	6 TT	
253	238	281	230	299	282	238	244	---
228	214	265	208	268	272	216	223	---
206	202	245	200	239	267	204	201	---
203	203	239	201	238	267	204	202	---
170	190	204	191	207	264	192	185	---
106	181	135	176	178	262	179	176	---

Max

90th

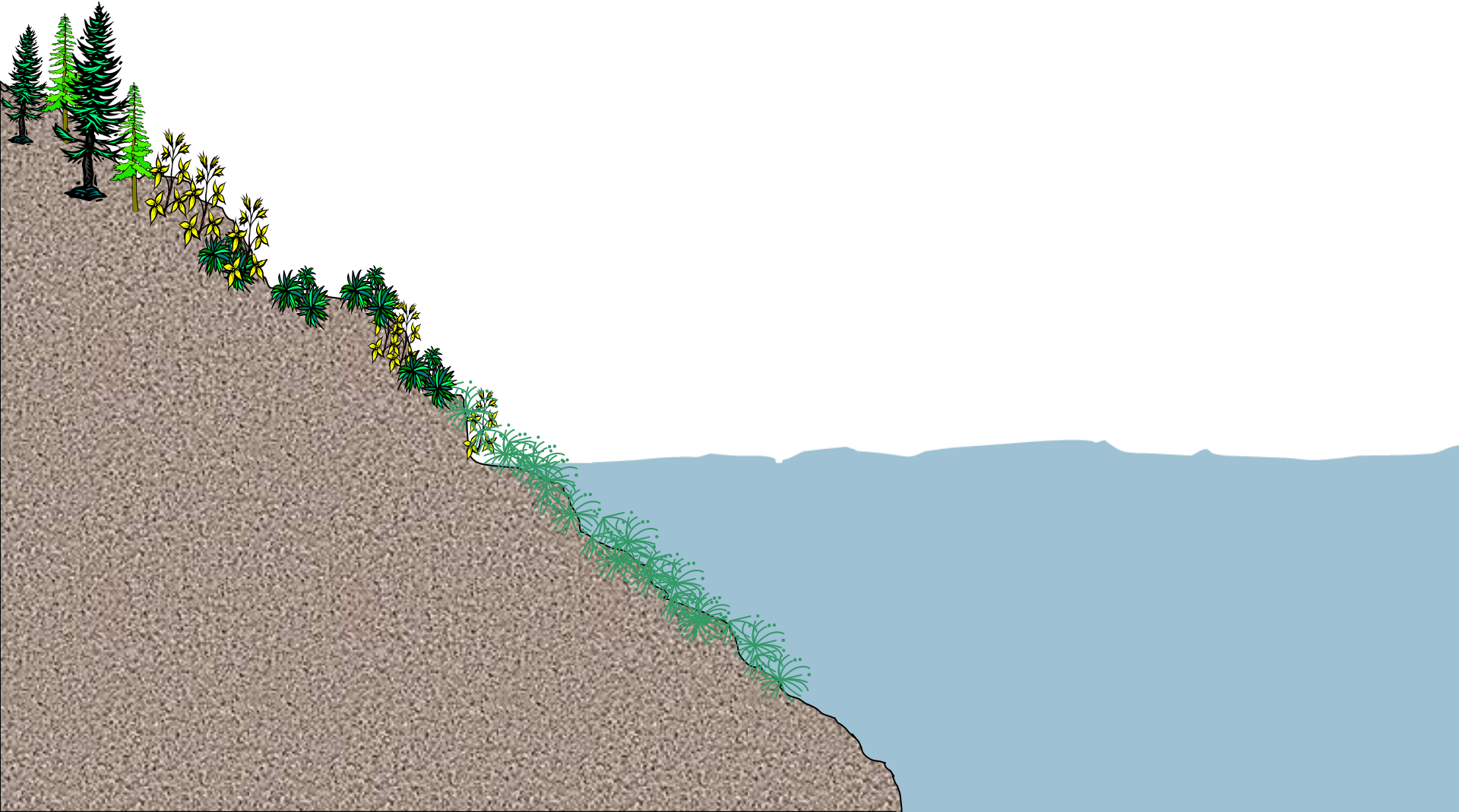
Med

Mean

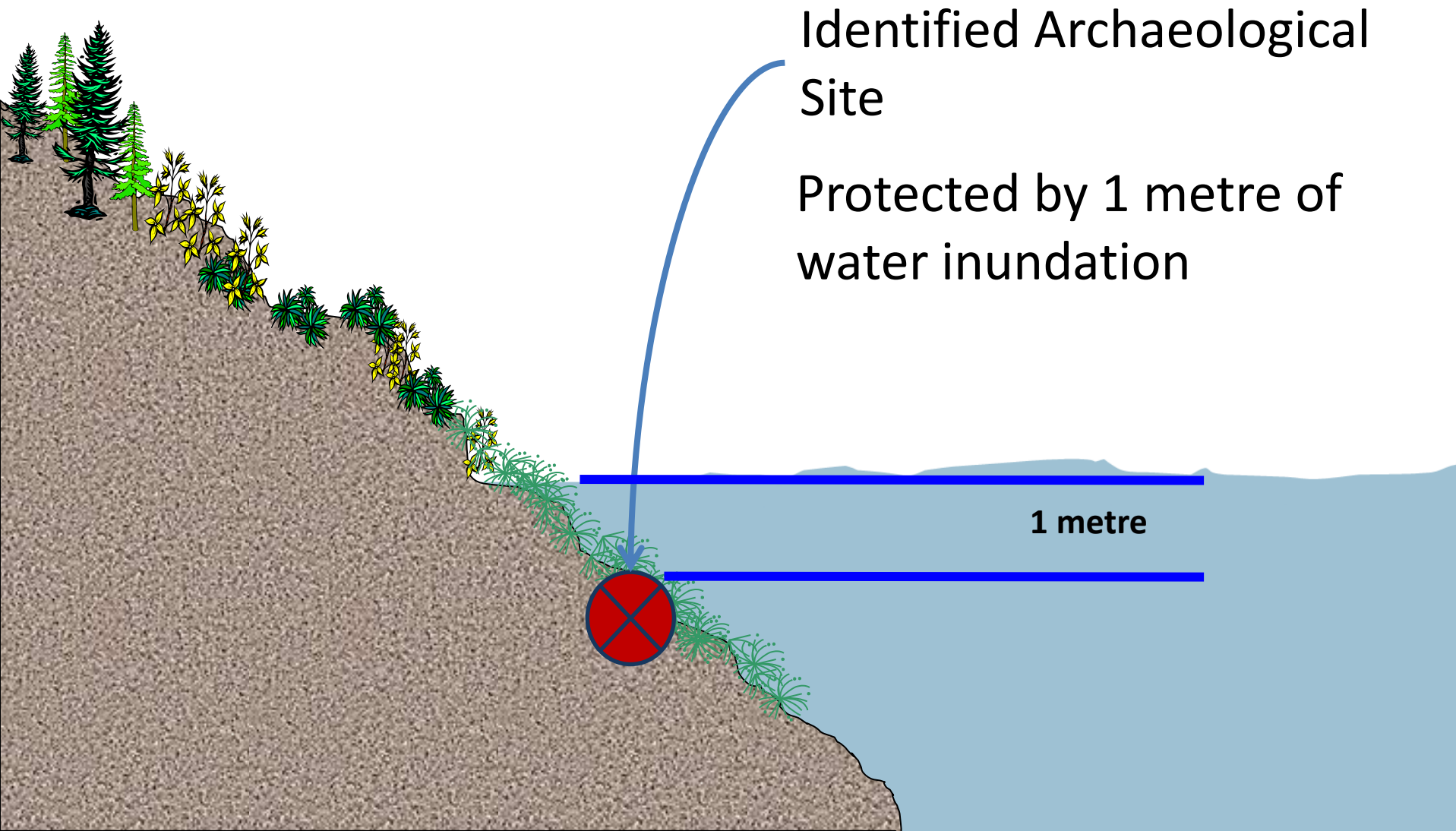
10th

Min

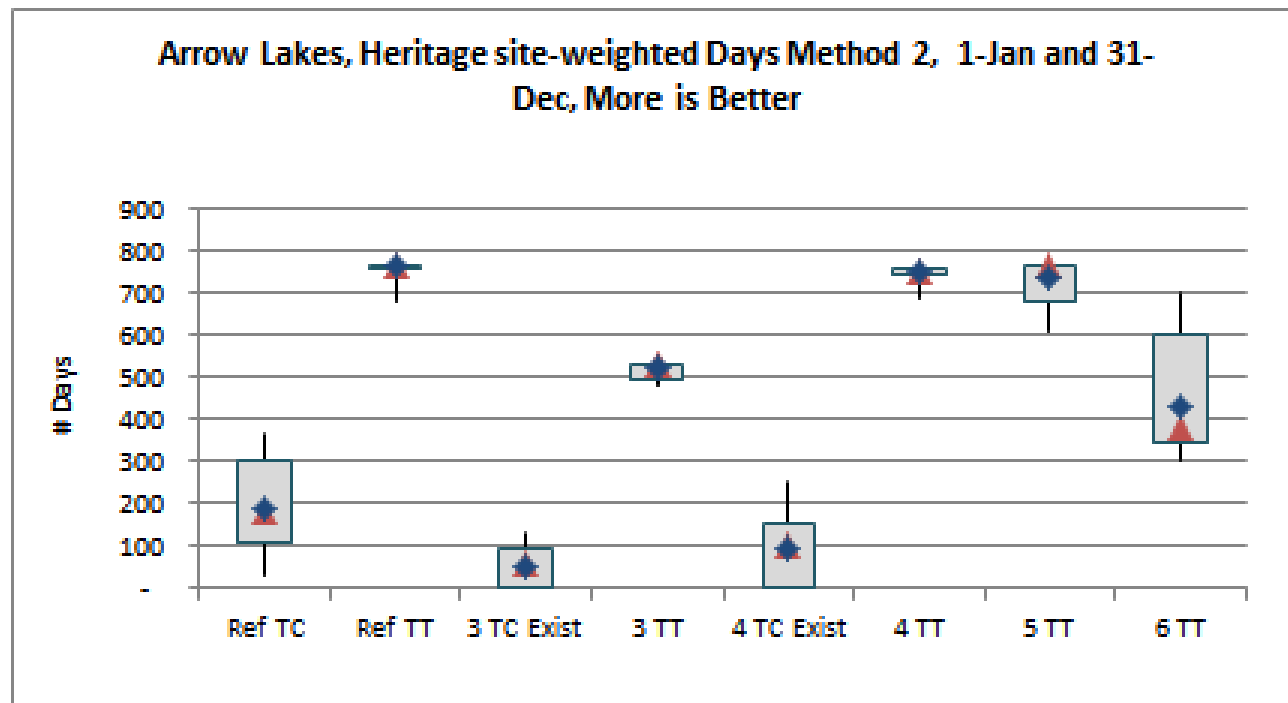
Inundation Performance Measure



Inundation Performance Measure



Inundation PM Results - ARROW



Ref TC	Ref TT	3TC Exist	3 TT	4 TC Exist	4 TT	5 TT	6 TT	
365	772	131	533	255	768	772	700	---
303	768	96	530	154	759	767	604	---
180	768	59	530	100	749	763	380	---
190	763	56	524	95	750	735	430	---
109	758	1	497	-	747	678	342	---
29	680	-	481	-	689	610	302	---

Max

90th

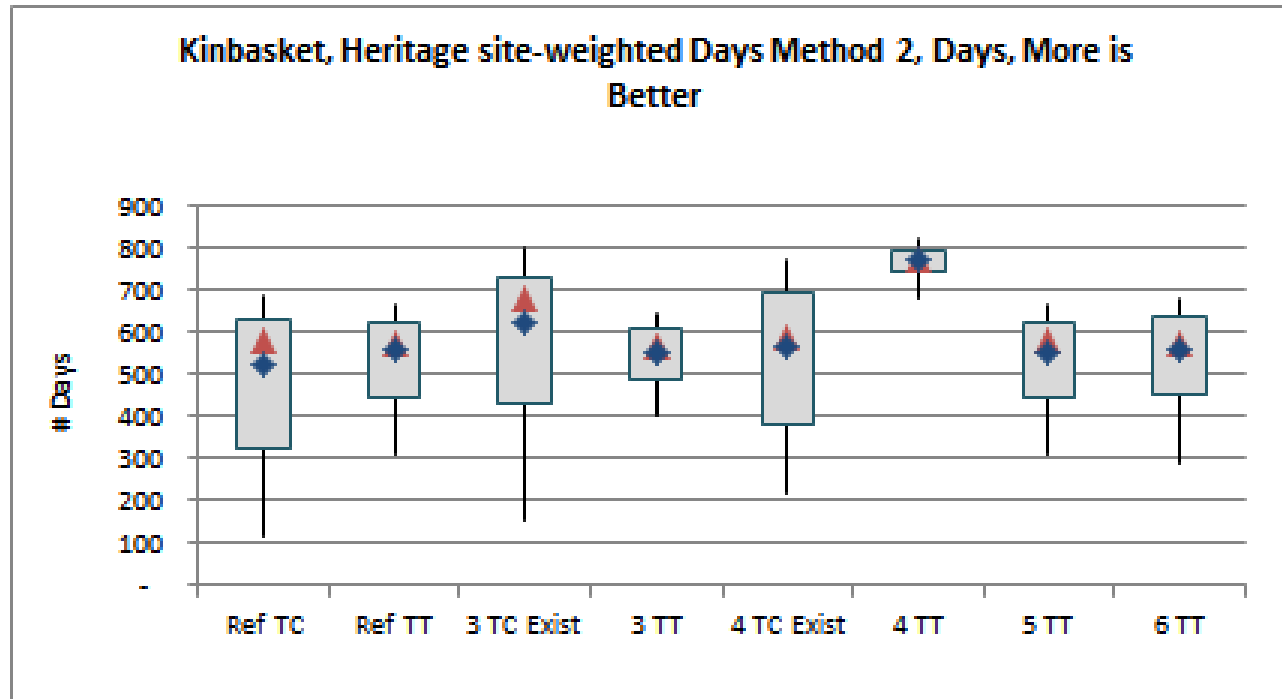
Med

Mean

10th

Min

Inundation PM Results - KINBASKET



Ref TC	Ref TT	3 TC Exist	3 TT	4 TC Exist	4 TT	5 TT	6 TT	
690	667	800	644	772	823	665	677	---
632	623	728	606	698	797	624	637	---
583	576	683	570	591	771	578	577	---
524	556	627	555	568	770	555	559	---
325	447	429	487	381	745	443	455	---
114	313	152	400	218	679	311	286	---

Max

90th

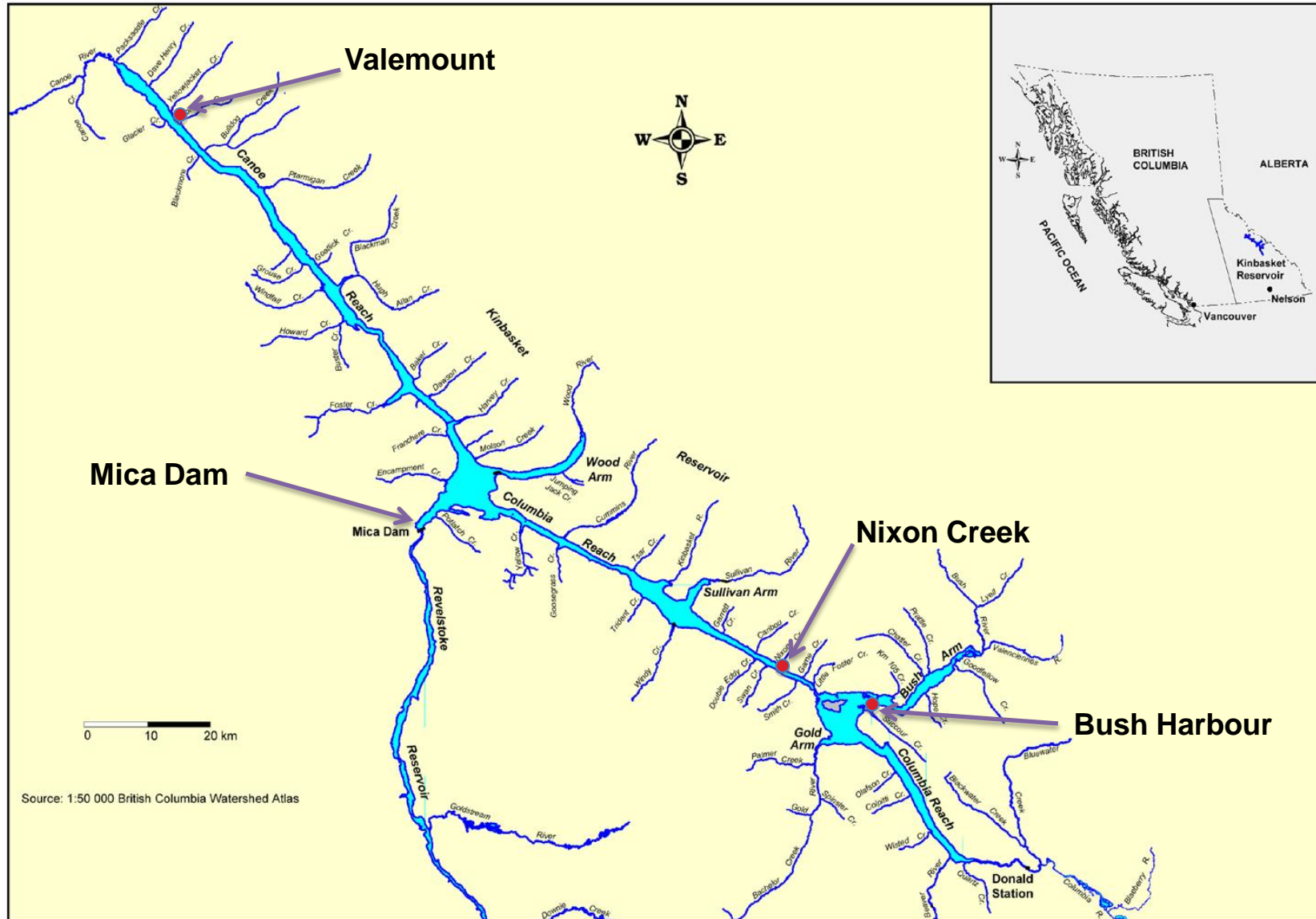
Med

Mean

10th

Min

Kinbasket Reservoir



Arrow Lakes Reservoir

