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# Eklutna Fish & Wildlife Program Background Briefing

August 8, 2023

# Agenda

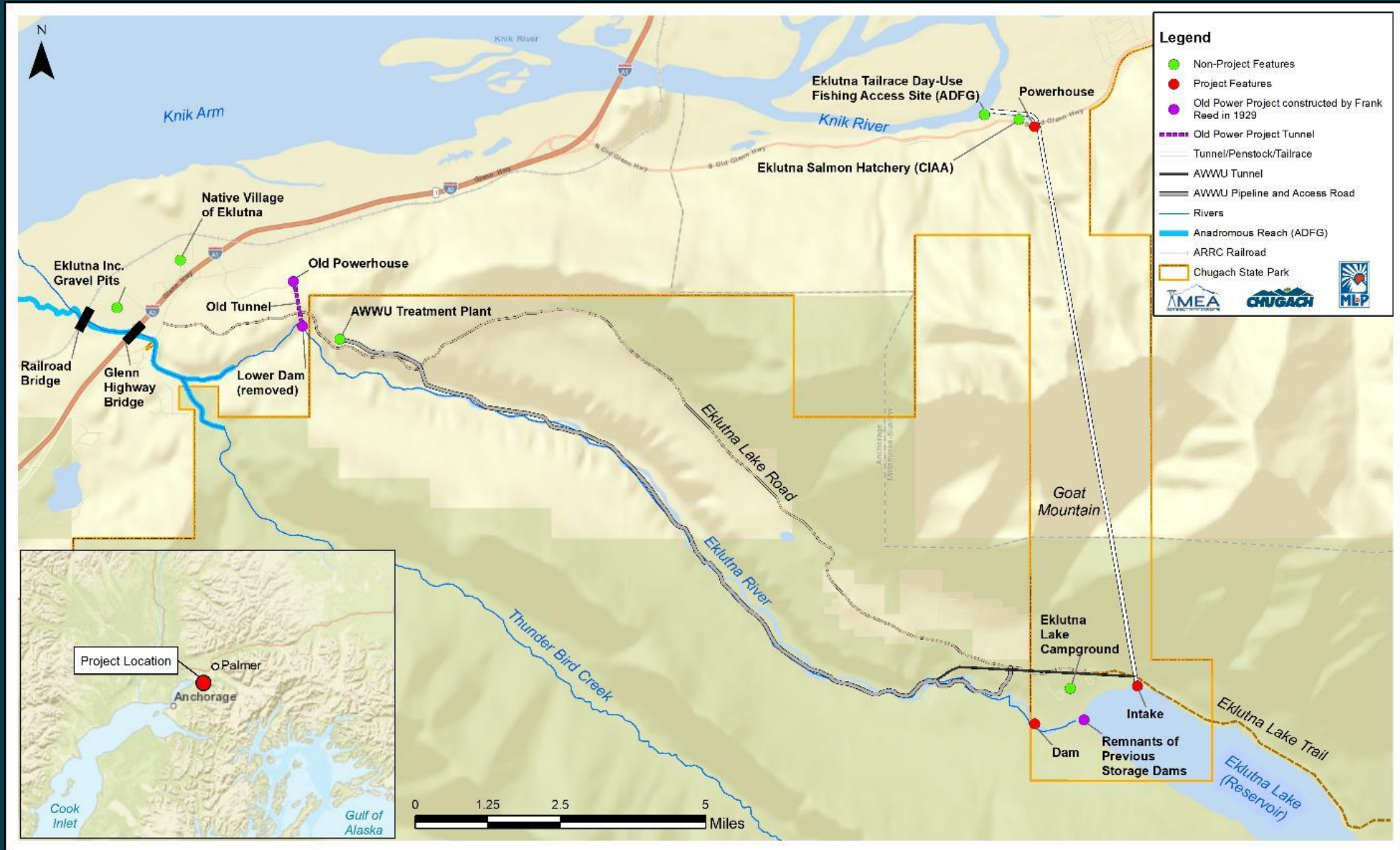
- Project Location
- History of Development
- 1991 Fish and Wildlife Agreement
- Early Consultation
- Study Planning & Implementation
- Study Results
- Alternatives Analysis
- Next Steps





# Project Location

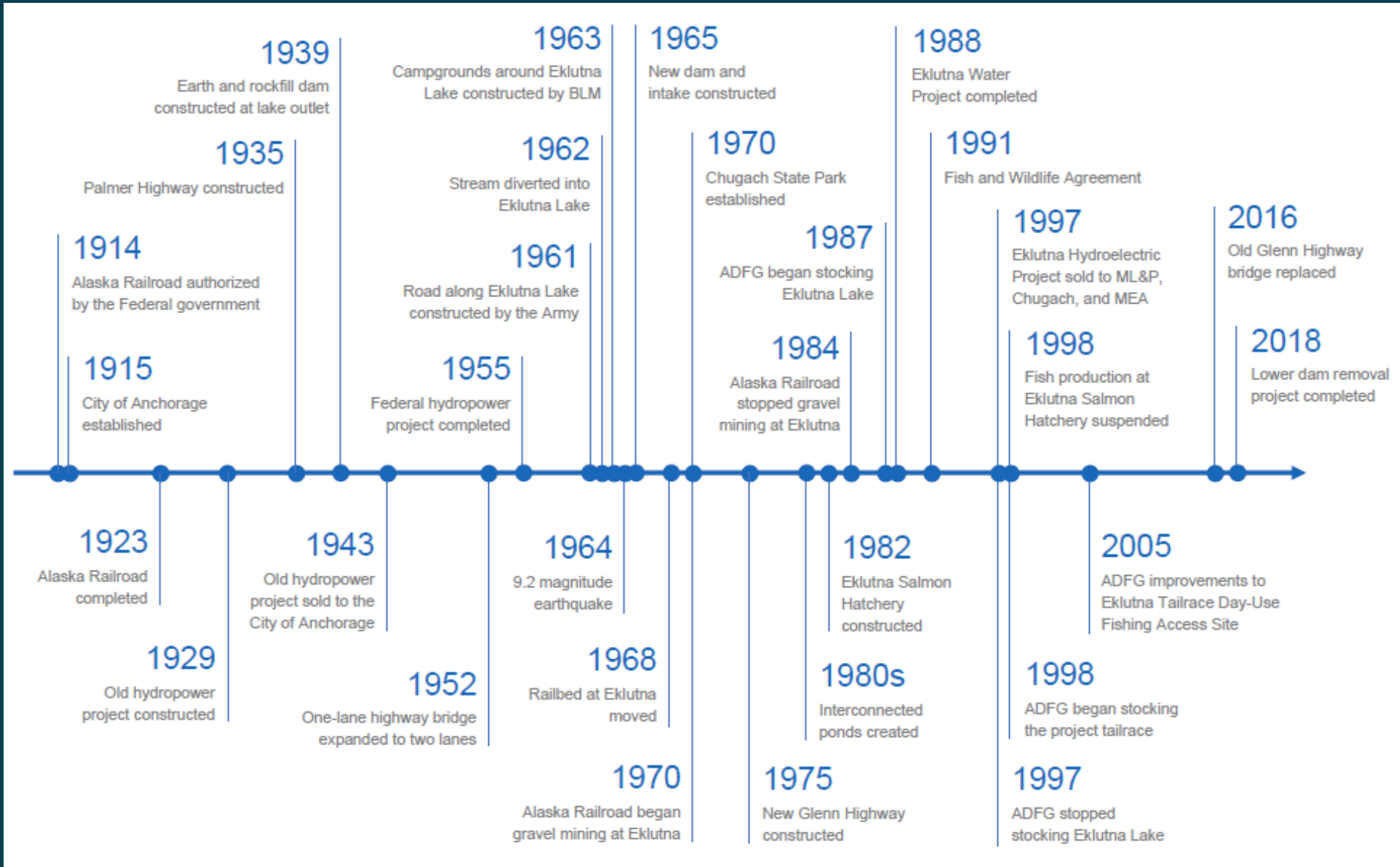
# Project Location





# History of Development

# History of Development





# 1991 Fish and Wildlife Agreement

# Requirements

Studies must examine and quantify if possible...

1. The project's impacts to fish and wildlife
2. Potential protection, mitigation, and enhancement measures for fish and wildlife
3. Consider the impact of fish and wildlife measures on electric rate payers, municipal water utilities, recreational users, and adjacent land use
4. As well as available means to mitigate those impacts



# Requirements

Governor must give equal consideration to...

1. Purposes of efficient and economical power production
2. Energy conservation
3. Fish and wildlife
4. Protection of recreation opportunities
5. Municipal water supplies
6. Preservation of other aspects of environmental quality
7. Other beneficial public uses
8. Requirements of State law

# Requirements

- **1997** – Transaction Date
- **2022** – Initiate the consultation process no later than 25 years after the transaction date
- **2024** – Issuance of the Final F&W Program by the Governor at least 3 years prior to implementation
- **2027** – Begin implementation of the F&W Program no later than 30 years after the transaction date
- **2032** – Complete implementation of the F&W Program no later than 35 years after the transaction date

# Early Consultation

# |||| Initiated Consultation in 2019

- Native Village of Eklutna (NVE)
- Eklutna, Inc.
- Alaska Department of Fish and Game (ADFG)\*
- Alaska Department of Environmental Conservation (ADEC)\*
- Alaska Department of Natural Resources (ADNR)\*
  - Water Resources Section
  - Chugach State Park
  - Office of History and Archaeology
- National Marine Fisheries Service (NMFS)\*
- U.S. Fish and Wildlife Service (USFWS)\*
- U.S. Army Corps of Engineers (USACE)
- Anchorage Water and Wastewater Utility (AWWU)
- Alaska Department of Transportation & Public Facilities (ADOT&PF)
- Alaska Railroad Corporation (ARRC)
- The Conservation Fund

*\*Consultation required by the 1991 Agreement*



# Initial Information Package

- Compiled all relevant existing information into one comprehensive summary document
- Draft version distributed in March 2020 for review and comment
- Stakeholder meeting in April 2020 to review the draft
- Final version and all reference documents are available on the project website [www.eklutnahydro.com](http://www.eklutnahydro.com)



# Study Planning & Implementation

# Technical Working Groups

Entity	Aquatics	Terrestrial	Recreation	Cultural
Native Village of Eklutna	X	X	X	X
Alaska Department of Fish and Game	X	X	X	
ADNR Chugach State Park			X	
ADNR Office of History and Archaeology				X
U.S. Fish and Wildlife Service	X	X		X
National Marine Fisheries Service	X			
Trout Unlimited	X		X	
Alaska Pacific University	X	X		
Hydropower Project Owners	X	X	X	X

# Year 1 Study Planning

- **September 2020** – TWG meeting to review study program framework
- **October 2020** – Distributed draft study plans for review
- **November 2020** – TWG meeting to review comments
- **January 2021** – Distributed revised draft study plans for review
- **January 2021** – TWG meeting to review major revisions
- **February 2021** – Distributed proposed final study plans to parties
- **March/April 2021** – Received concurrence from all parties
- **May 2021** – Initiated field work

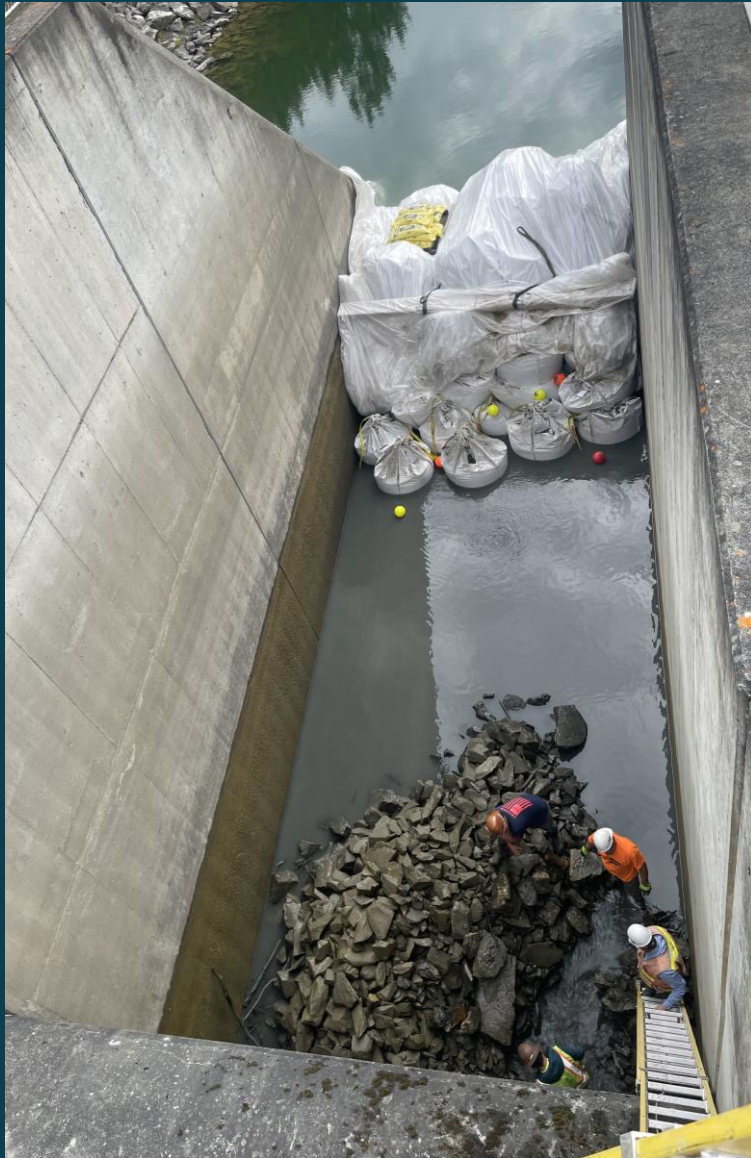


# Year 1 Study Program

- Instream Flow Study
- Geomorphology Study
- Lake Fish Study
- River Fish Study
- Macroinvertebrate Study
- Water Quality Study
- Stream Gaging
- Lakeside Trail Erosion Study
- Infrastructure Assessment
- Hydro Operations Model



# Gate Replacement



# Study Flow Releases



# Study Flow Releases



# Year 2 Study Planning

- **November 2021** – TWG meetings to review study program framework
- **February 2022** – Distributed draft year 2 study plans for review
  - Also distributed draft year 1 study reports for review
- **March 2022** – TWG meetings to review comments
- **April 2022** – Distributed proposed final year 2 study plans to parties
  - Received concurrence from all parties
  - NMFS and USFWS did not concur w/ Instream Flow or Geomorphology Studies
  - This was due to a request for a higher calibration flow which the hydro project owners determined was not necessary
  - This issue has since been resolved
- **May 2022** – Initiated field work

# Year 2 Study Program

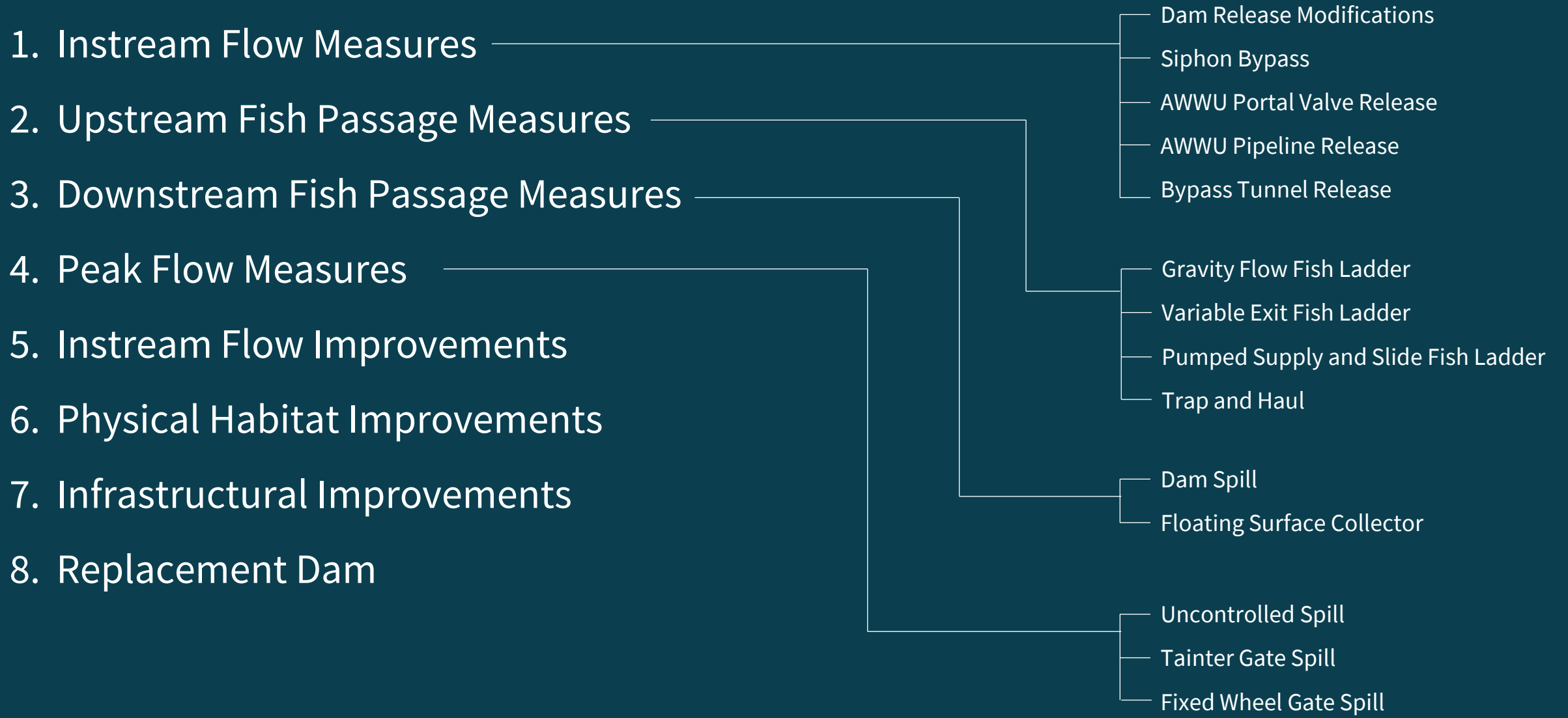
- Instream Flow Study (cont.)
- Geomorphology Study (cont.)
- Lake Fish Study (cont.)
- River Fish Study (cont.)
- Water Quality Study (cont.)
- Stream Gaging (cont.)
- Wetlands and Wildlife Habitat Mapping
- Terrestrial Wildlife Surveys
- Recreation Study
- Cultural Resources Study
- Engineering Feasibility and Cost Assessment
- Hydro Valuation Study





# Study Results

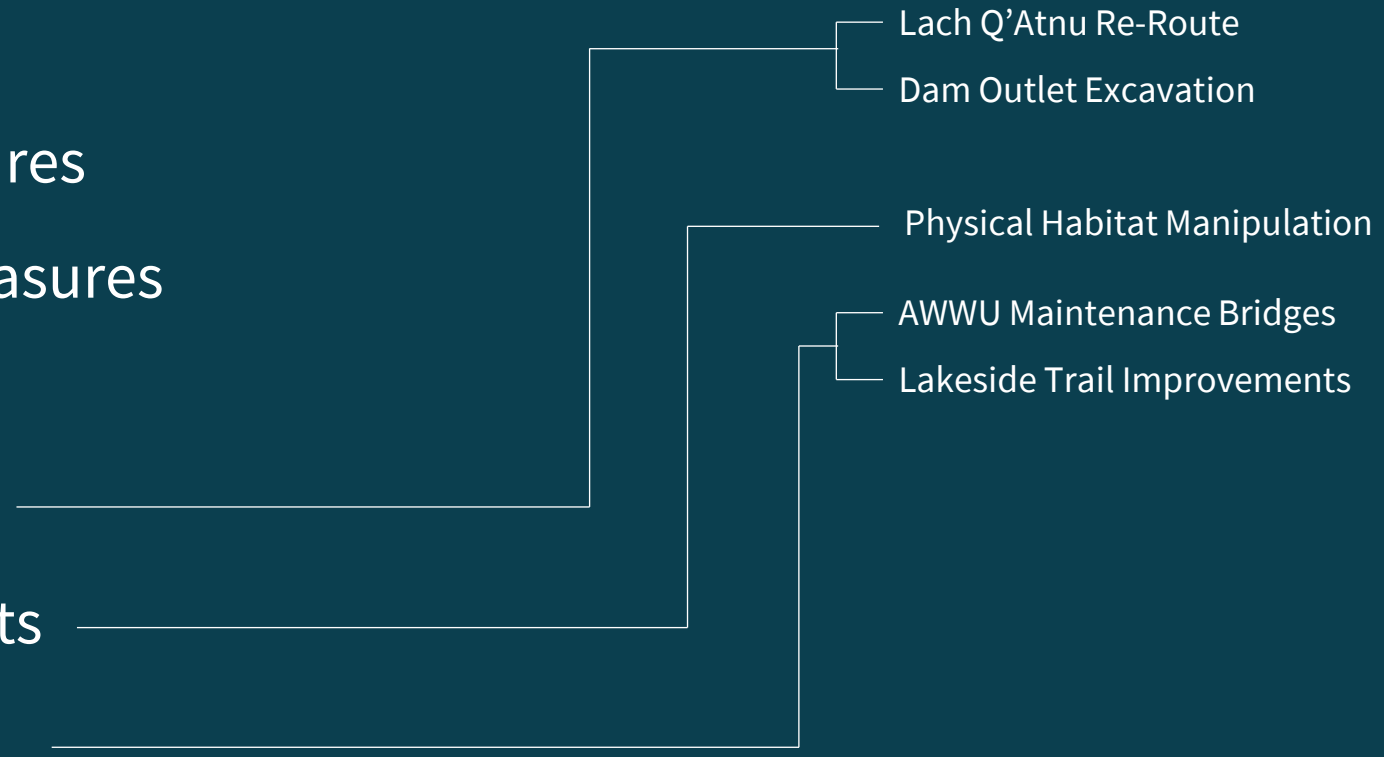
# Phase 1 Engineering

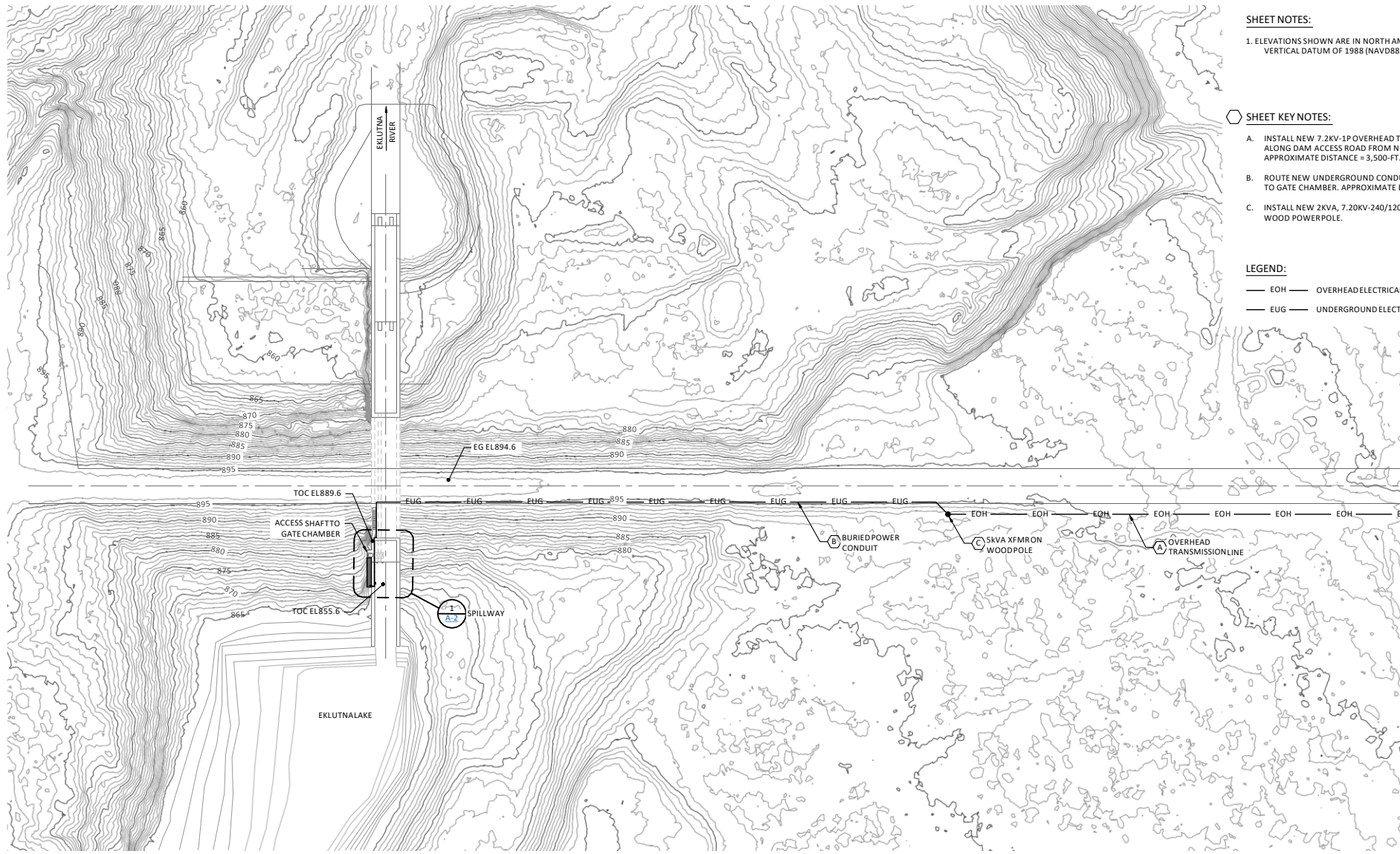




# Phase 1 Engineering

1. Instream Flow Measures
2. Upstream Fish Passage Measures
3. Downstream Fish Passage Measures
4. Peak Flow Measures
5. Instream Flow Improvements
6. Physical Habitat Improvements
7. Infrastructural Improvements
8. Replacement Dam





**SHEET NOTES:**

1. ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

**SHEET KEY NOTES:**

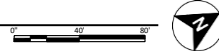
- A. INSTALL NEW 7.2KV-1P OVERHEAD TRANSMISSION LINE ALONG DAM ACCESS ROAD FROM NEAREST POI. APPROXIMATE DISTANCE = 3,500-FT.
- B. ROUTE NEW UNDERGROUND CONDUIT FROM POWER POLE TO GATE CHAMBER. APPROXIMATE DISTANCE = 600-FT.
- C. INSTALL NEW 2KVA, 7.20KV-240/120V TRANSFORMER ON WOOD POWERPOLE.

**LEGEND:**

- EOH — OVERHEAD ELECTRICAL/POWER
- EUG — UNDERGROUND ELECTRICAL

**SITE PLAN**

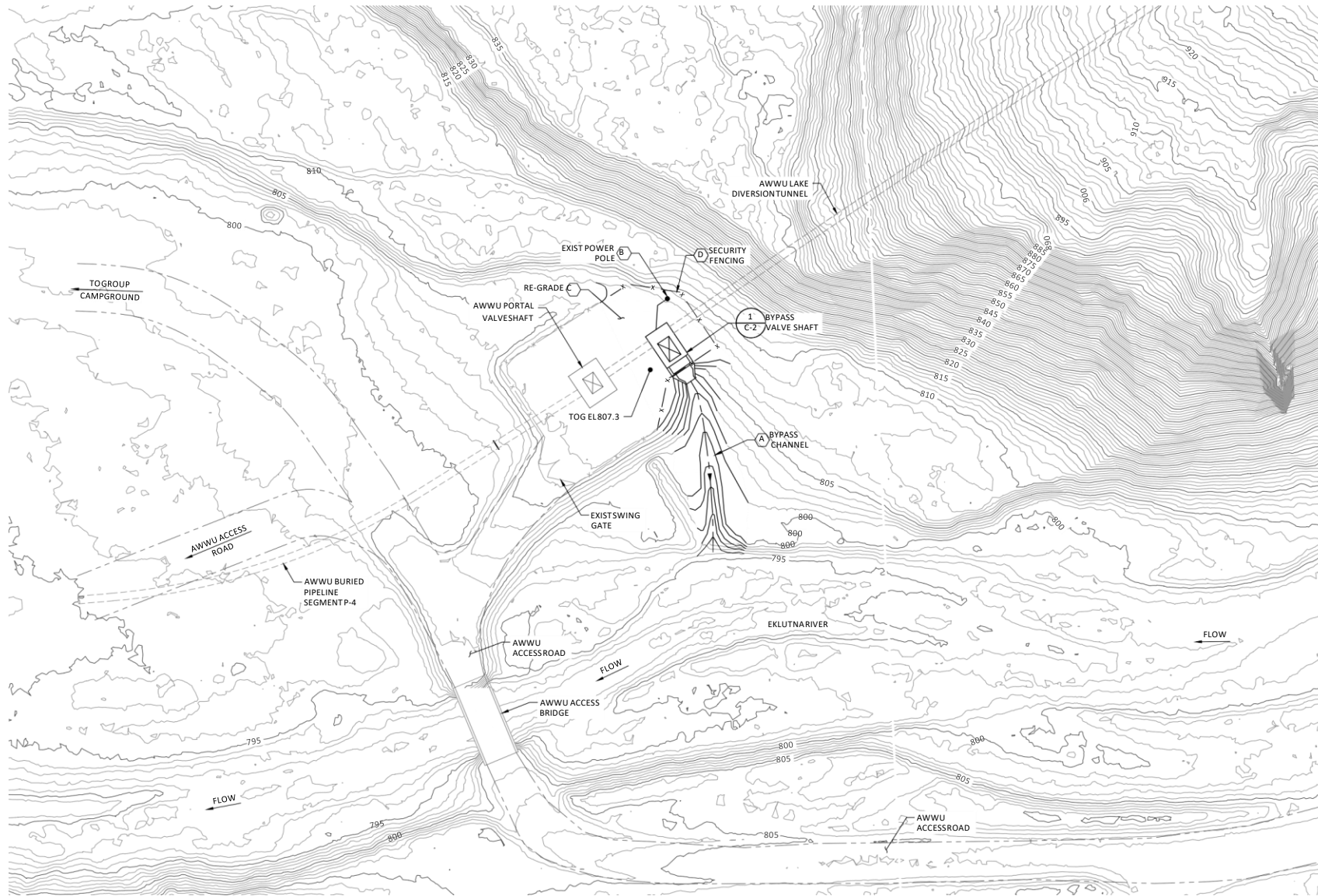
SCALE: 1" = 40'



PROJECT: EKLUTNA FISH & WILDLIFE PROJECT - ENGINEERING FEASIBILITY STUDY; DATE: 12/23/22; DRAWN BY: R. GUERRERO; CHECKED BY: J. BOAG; DESIGNED BY: S. ELLENSON; PROJECT NO: 2022-03-25-001; CAD USER: GUAERRERO@CHUGACH.COM

REV			<p>WARNING</p> <p>IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.</p>			<p>EKLUTNA FISH &amp; WILDLIFE PROJECT ENGINEERING FEASIBILITY STUDY</p>		DESIGNED <u>S. ELLENSON</u>	DRAWING
						<p>PME ALTERNATIVES ANALYSIS - INSTREAM FLOW DAM RELEASE MODIFICATIONS SITE PLAN</p>		CHECKED <u>J. BOAG</u>	
							PROJECT DATE <u>12/23/22</u>		

JOB NO: 000000



**SITE PLAN**  
SCALE: 1" = 30'

**SHEET NOTES:**

1. ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).


**SHEET KEY NOTES:**

- A EXCAVATE NEW TRAPEZOIDAL BYPASS CHANNEL FROM BYPASS VALVE WET WELL TO EKLUTNARIVER.
- B TAP NEW 240V-3P FEEDER OFF EXISTING 7.2 KV TRANSMISSION LINE.
- C FOLLOWING EXCAVATION FOR BYPASS VALVE SHAFT, RE-GRADE PAD TO ELEVATION 807.3 FT IN VICINITY OF BYPASS VALVE STRUCTURE.
- D EXTEND SECURITY FENCING AROUND PERIMETER OF NEW STRUCTURE.

PROJECT: \\\n\m\chugach\electric\eklutna\feasibility\study\c1.dwg; PLOT DATE: MAR 15, 2024 03:35 PM; CAD USER: GUERRERO ROBERT

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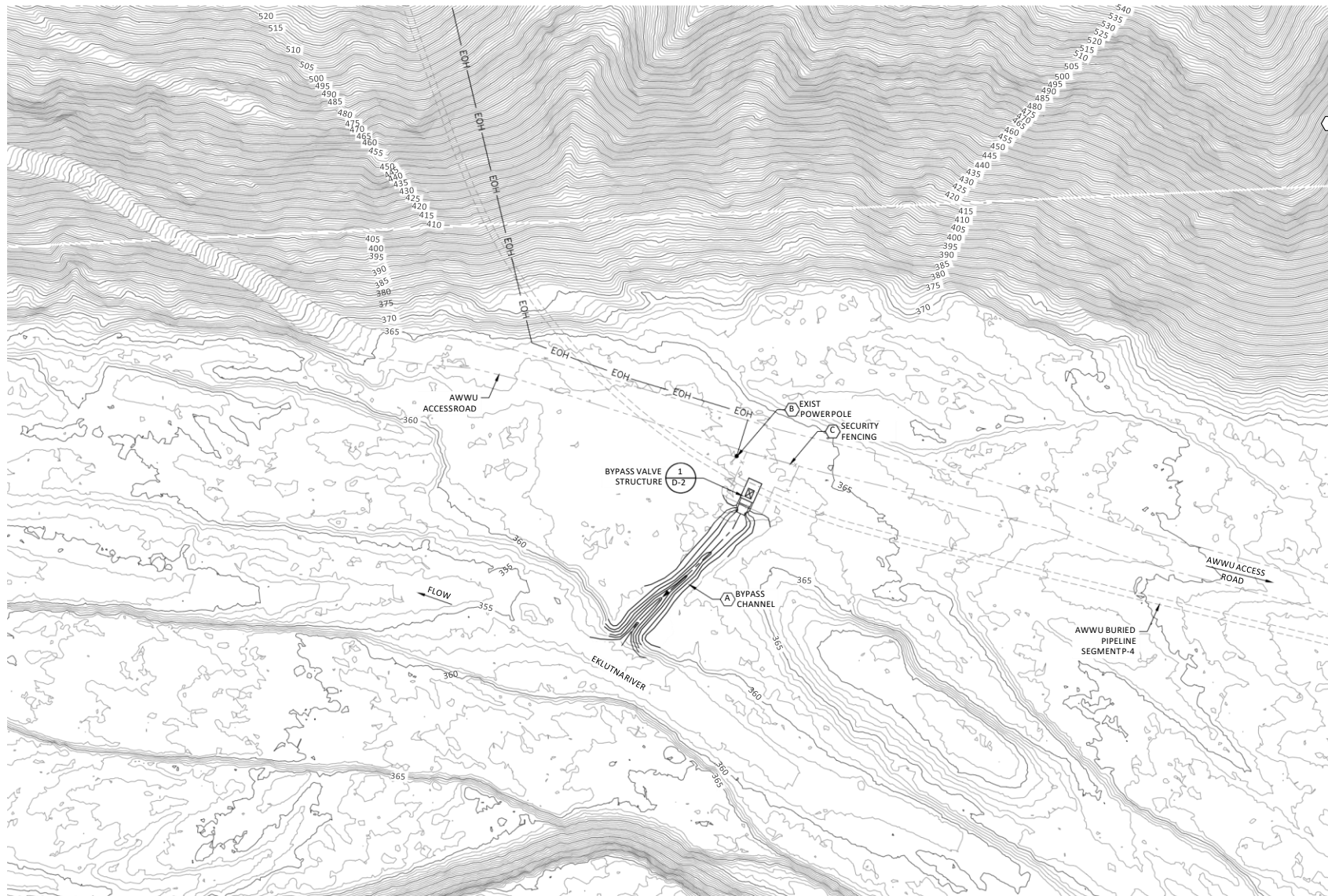


EKLUTNA FISH & WILDLIFE PROJECT ENGINEERING FEASIBILITY STUDY	
PME ALTERNATIVES ANALYSIS - INSTREAM FLOW AWWU PORTAL VALVE RELEASE SITE PLAN	

DESIGNED	S. ELLENSON
DRAWN	R. GUERRERO
CHECKED	J. BOAG
PROJECT DATE	12/23/22

DRAWING  
**C-1**

JOB NO: 000000



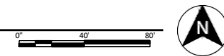
**SHEET NOTES:**

1. ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

**SHEET KEY NOTES:**

- A. EXCAVATE NEW TRAPEZOIDAL BYPASS CHANNEL FROM BYPASS VALVE WET WELL TO EKLUTNA RIVER.
- B. INSTALL NEW 7.2KV-3P OVERHEAD TRANSMISSION LINE ALONG AWWU ACCESS ROAD FROM NEAREST POI. APPROXIMATE DISTANCE = 2,000-FT.
- C. CONSTRUCT SECURITY FENCING AROUND PERIMETER OF NEW STRUCTURE.

**SITE PLAN**  
SCALE: 1"= 40'



REV									
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WARNING  
  
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.



EKLUTNA FISH & WILDLIFE PROJECT  
 ENGINEERING FEASIBILITY STUDY  
 PME ALTERNATIVES ANALYSIS - INSTREAM FLOW  
 AWWU PIPELINE RELEASE  
 SITE PLAN

DESIGNED S. ELLENSON  
 DRAWN R. GUERRERO  
 CHECKED J. BOAG  
 PROJECT DATE 12/23/22

DRAWING  
**D-1**

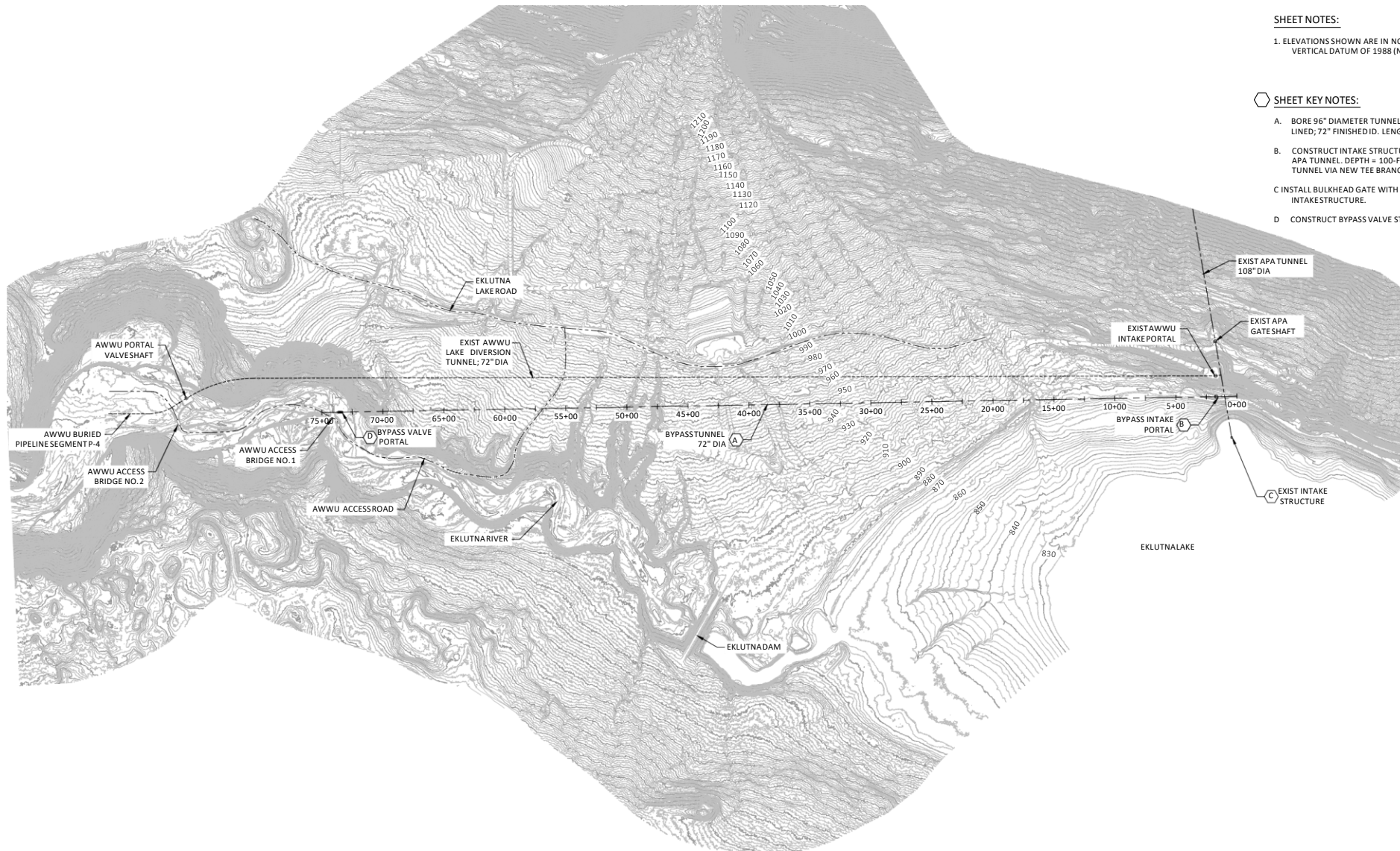
PROJECT: EKLUTNA FISH & WILDLIFE PROJECT - ENGINEERING FEASIBILITY STUDY (P-4) AWWU PIPELINE RELEASE  
 DATE: 12/23/22  
 DRAWN BY: R. GUERRERO  
 CHECKED BY: J. BOAG  
 PROJECT NO: 2022-00000

**SHEET NOTES:**

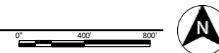
1. ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

**SHEET KEY NOTES:**

- A. BORE 96" DIAMETER TUNNEL; SEGMENTALLY CONCRETE LINED; 72" FINISHED I.D. LENGTH = 7,200-FT.
- B. CONSTRUCT INTAKE STRUCTURE ADJACENT TO EXISTING APA TUNNEL. DEPTH = 100-FT. TAP INTO EXISTING TUNNEL VIA NEW TEE BRANCH SEGMENT.
- C. INSTALL BULKHEAD GATE WITH DIVERS IN EXISTING INTAKE STRUCTURE.
- D. CONSTRUCT BYPASS VALVE STRUCTURE. DEPTH = 30-FT.




**SITE PLAN**  
SCALE: 1" = 400'



PROJECT: WILDLIFE/CHUGACH ELECTRIC/FEASIBILITY STUDY/1. LANG POST CENTER: AWC 15, 0024 03 25 10m CAD USER: GUERRERO.DWT

JOB NO: 000000

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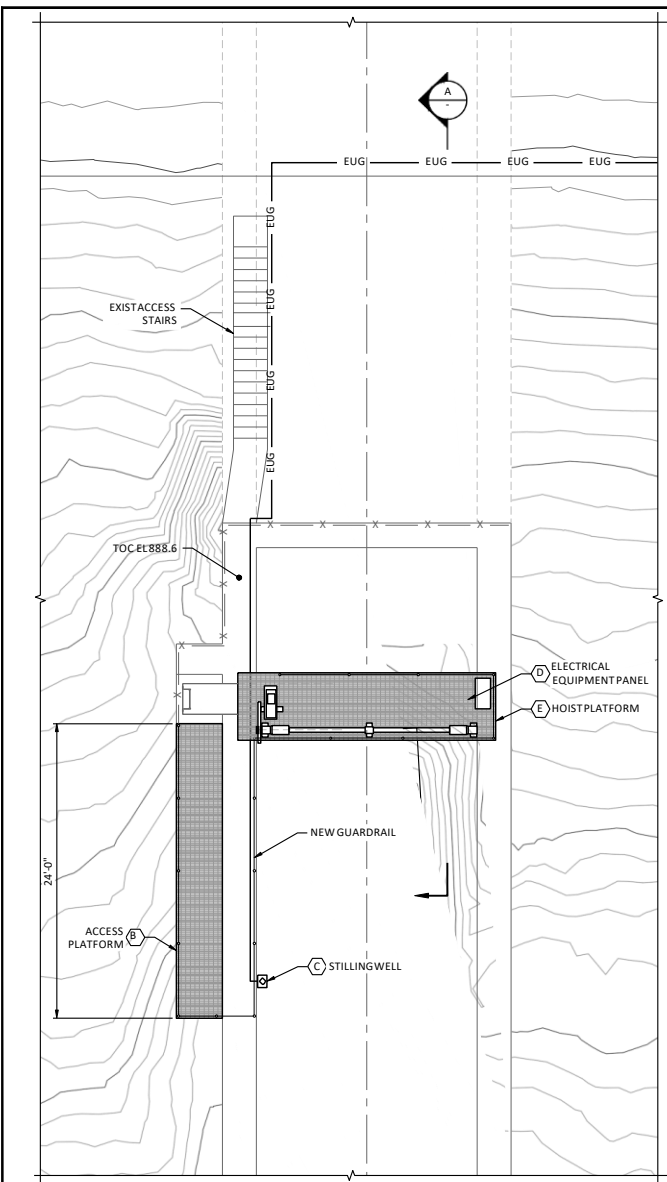
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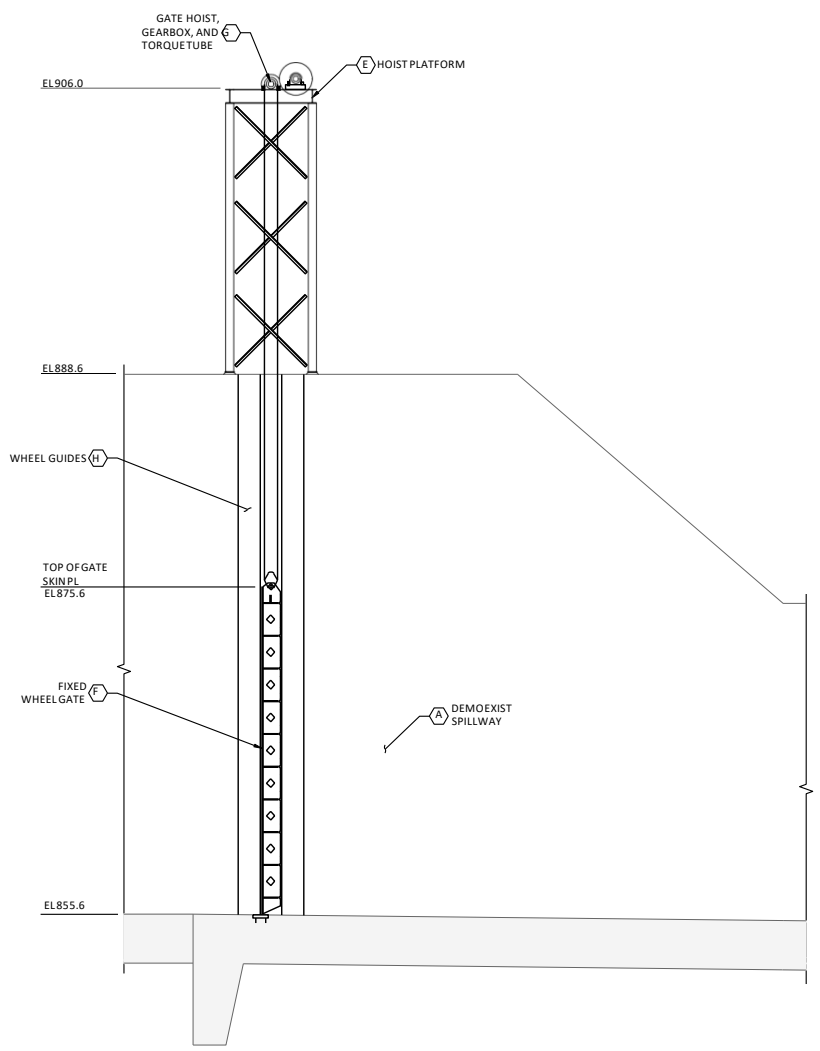
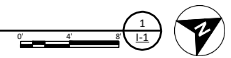
EKLUTNA FISH & WILDLIFE PROJECT ENGINEERING FEASIBILITY STUDY	
PME ALTERNATIVES ANALYSIS - INSTREAM FLOW BYPASS TUNNEL RELEASE SITE PLAN	

DESIGNED	S. ELLENSON
DRAWN	R. GUERRERO
CHECKED	J. BOAG
PROJECT DATE	12/23/22

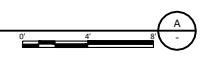
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**SPILLWAY DETAIL**  
SCALE: 3/16" = 1'-0"



**SECTION**  
SCALE: 1/4" = 1'-0"



**SHEET NOTES:**

1. ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

**SHEET KEY NOTES:**

- A DEMOLISH EXISTING CONCRETE SPILLWAY, GATE CHAMBER, AND OUTLET GATE TO EXISTING SPILLWAY SLAB EL. 855.6.
- B. INSTALL O&M ACCESS PLATFORM ON SPILLWAY TRAINING WALL.
- C. INSTALL STILLING WELL WITH SUBMERSIBLE PRESSURE TRANSDUCER.
- D. INSTALL ELECTRICAL EQUIPMENT AND CONTROLS PANEL.
- E. INSTALL O&M HOIST PLATFORM ABOVE SPILLWAY.
- F. INSTALL 16-FT WIDE X 20-FT TALL FIXED WHEEL GATE WITHIN THE EXISTING SPILLWAY STRUCTURE. INSTALL SEALING SURFACE ON LIP OF EXISTING SPILLWAY CREST.
- G. INSTALL HOIST, GEAR REDUCER, TORQUE TUBE, AND BEARINGS ON HOIST PLATFORM.
- H. MODIFY EXISTING SPILLWAY TRAINING WALLS. INCLUDE NEW WHEEL GUIDE BLOCKOUTS FOR FIXED WHEEL GATE.

PATH: C:\Users\jacob.jacobs\OneDrive\Documents\Projects\Electrical\Feasibility Study\F2.dwg Plot Date: Tue, 15, 2022 03:28:59pm CAD User: jacob.jacobs

DATE BY

REV	DATE	BY	DESCRIPTION
A	12/23/22	SPE	CONCEPTUAL DESIGN

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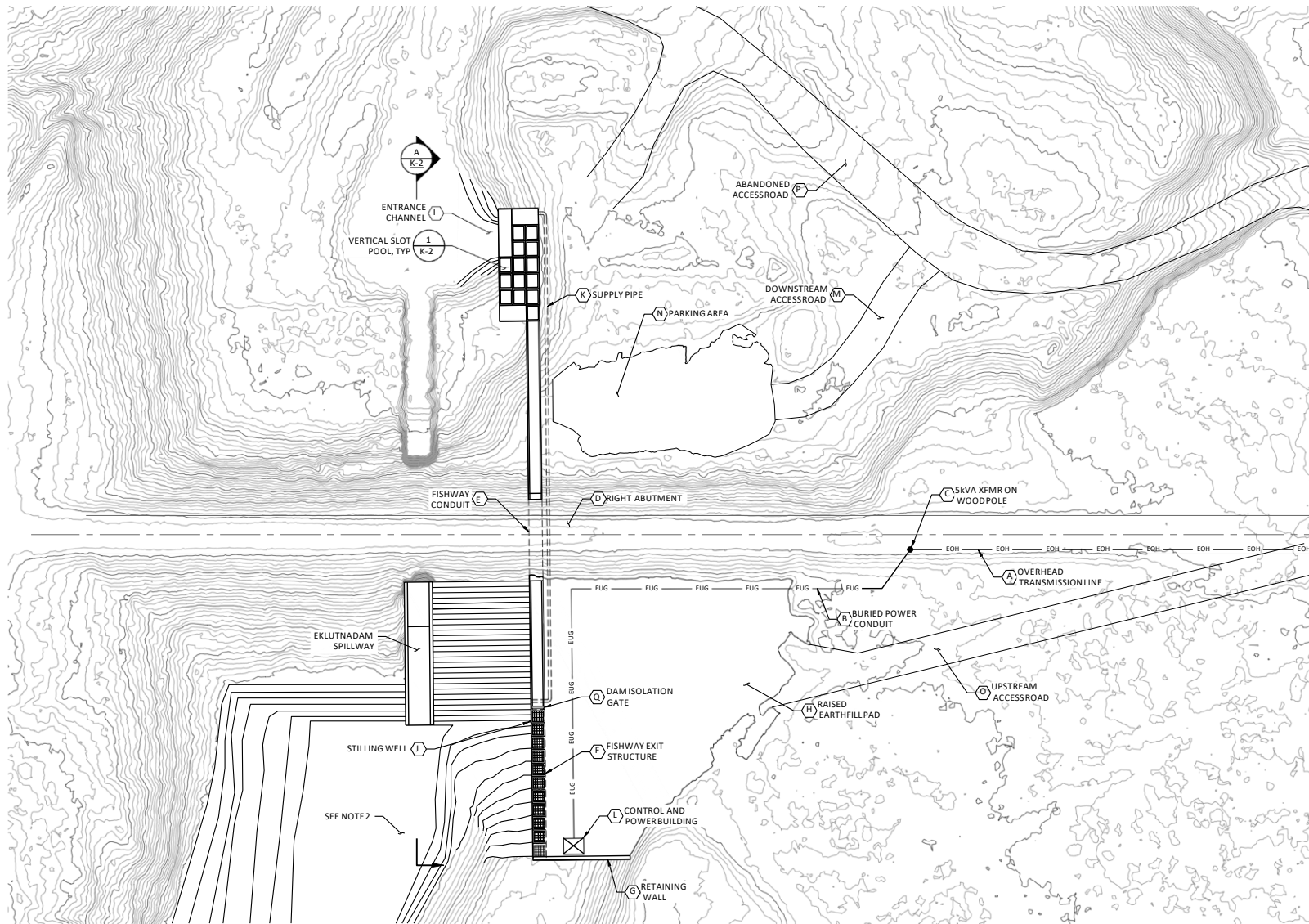


EKLUTNA FISH & WILDLIFE PROJECT	
ENGINEERING FEASIBILITY STUDY	
PME ALTERNATIVES ANALYSIS - PEAK FLOW SPILLWAY MODIFICATIONS - FIXED WHEEL GATE EL 855.6 SECTIONS AND DETAILS	

DESIGNED	S. ELLENSON
DRAWN	R. GUERRERO
CHECKED	J. BOAG
PROJECT DATE	12/23/22

DRAWING  
**I-2**

JOB NO: 000000



- SHEET NOTES:**
- ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
  - POND BATHYMETRIC PROFILE IS UNKNOWN, TOPOGRAPHY ESTIMATED BASED ON AS BUILT DRAWINGS OF DAM AND FIELD DATA.

- SHEET KEY NOTES:**
- A INSTALL NEW 7.2KV-3P OVERHEAD TRANSMISSION LINE ALONG DAM ACCESS ROAD FROM NEAREST POI. APPROXIMATE DISTANCE = 3,500-FT.
  - B ROUTE NEW UNDERGROUND CONDUIT FROM POWER POLE TO CONTROL ENCLOSURE. APPROXIMATE DISTANCE = 500-FT.
  - C INSTALL NEW SKVA, 7.20KV-240/120V TRANSFORMER ON WOOD POWER POLE.
  - D. EXCAVATE RIGHT ABUTMENT OF EXISTING DAM TO ELEVATION 859.0.
  - E. CONSTRUCT NEW CONCRETE FISHWAY THROUGH DAM SECTION.
  - D. CONSTRUCT NEW GATED EXITCHANNEL.
  - E. CONSTRUCT RETAINING WALL TO ELEVATION 888.6.
  - F. CONSTRUCT NEW RAISED EARTHFILL PAD TO EL. 888.6 ADJACENT TO NEW FISHWAY.
  - G. EXCAVATE NEW CHANNEL WITHIN EXISTING PLUNGE POOL TO FISHWAY ENTRANCE POOL.
  - H. INSTALL NEW STILLING WELL WITH REDUNDANT PRESSURE TRANSDUCERS UPSTREAM OF FISHWAY STRUCTURE..
  - K INSTALL NEW 24" SUPPLY PIPE TO ENTRANCE POOL. L CONSTRUCT NEW CONTROL AND POWERBUILDING.
  - M CONSTRUCT NEW ACCESS ROAD TO DOWNSTREAM TOE OF DAM.
  - N CONSTRUCT NEW PARKING AND EQUIPMENT PAD AT DOWNSTREAM TOE OF DAM.
  - O CONSTRUCT NEW ACCESS ROAD TO FISHWAY EXITSTRUCTURE.
  - P. REGRADE, REPAIR, AND IMPROVE EXISTING ABANDONED ACCESS ROAD DOWNSTREAM OF DAM RIGHTABUTMENT.
  - Q. INSTALL DAM ISOLATION BULKHEAD GATE AT DOWNSTREAM EXTENT OF EXITSTRUCTURE.

- LEGEND:**
- EOH — OVERHEAD ELECTRICAL/POWER
  - EUG — UNDERGROUND ELECTRICAL

**SITE PLAN**  
SCALE: 1" = 40'

WARNING  
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.



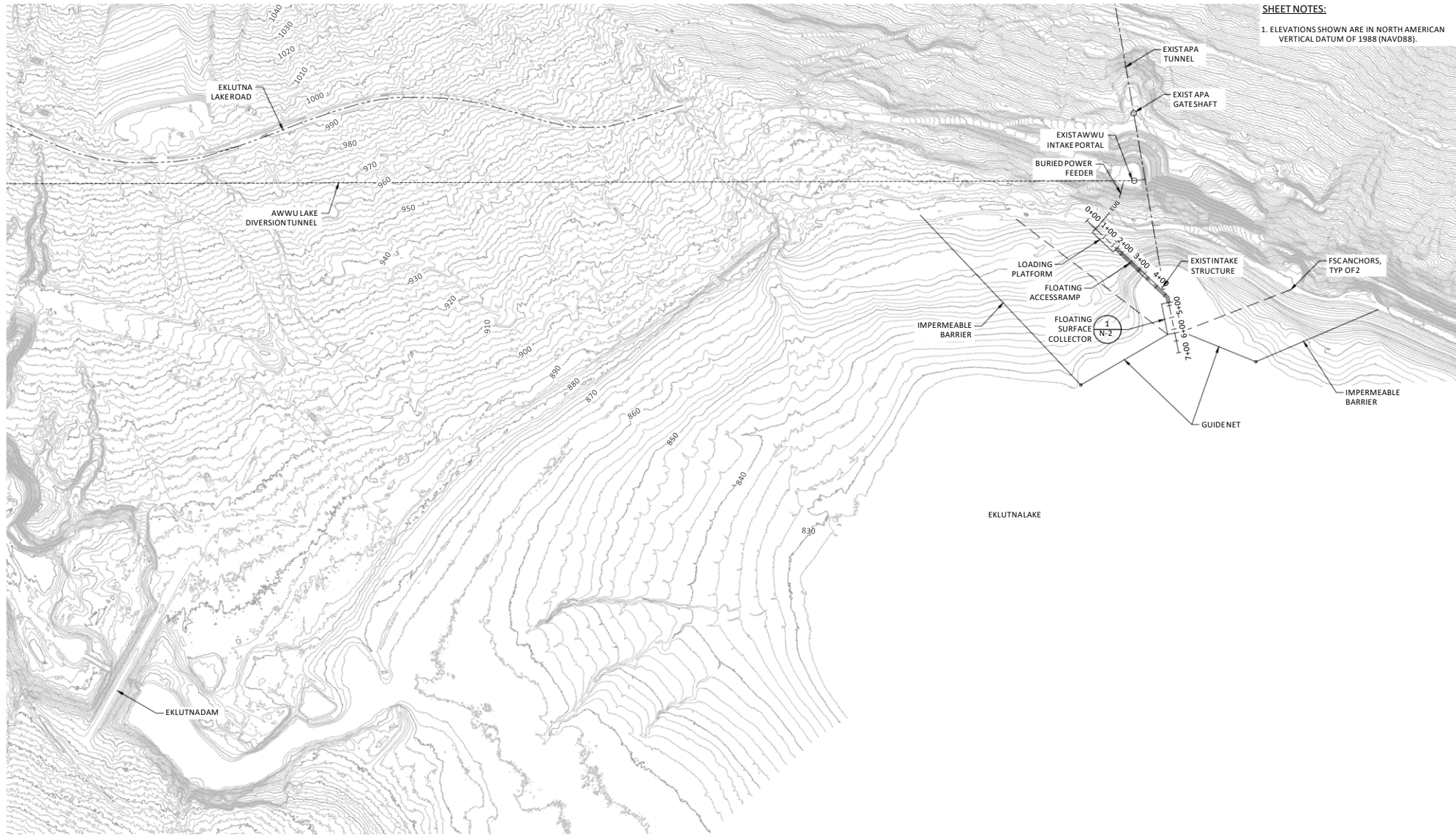
EKLUTNA FISH & WILDLIFE PROJECT  
ENGINEERING FEASIBILITY STUDY

PME ALTERNATIVES ANALYSIS - FISH PASSAGE  
VARIABLE EXIT FISH LADDER  
SITE PLAN

DESIGNED S. ELLENSON  
DRAWN R. GUERRERO  
CHECKED J. BOAG  
PROJECT DATE 12/23/22

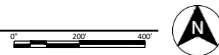
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**SHEET NOTES:**  
 1. ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

**SITE PLAN**  
 SCALE: 1" = 200'



PROJECT: VULNERABILITY ASSESSMENT FOR EKLUTNA LAKE FISH PASSAGE PROJECT DATE: JAN 15, 2024 03:45:50 PM, CAD USER: GWYNN@CHUGACH

REV	DESCRIPTION

**WARNING**  
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.



EKLUTNA FISH & WILDLIFE PROJECT  
 ENGINEERING FEASIBILITY STUDY

PME ALTERNATIVES ANALYSIS - FISH PASSAGE  
 FLOATING SURFACE COLLECTOR  
 SITE PLAN

DESIGNED: S. ELLENSON  
 DRAWN: R. GUERRERO  
 CHECKED: J. BOAG  
 PROJECT DATE: 12/23/22

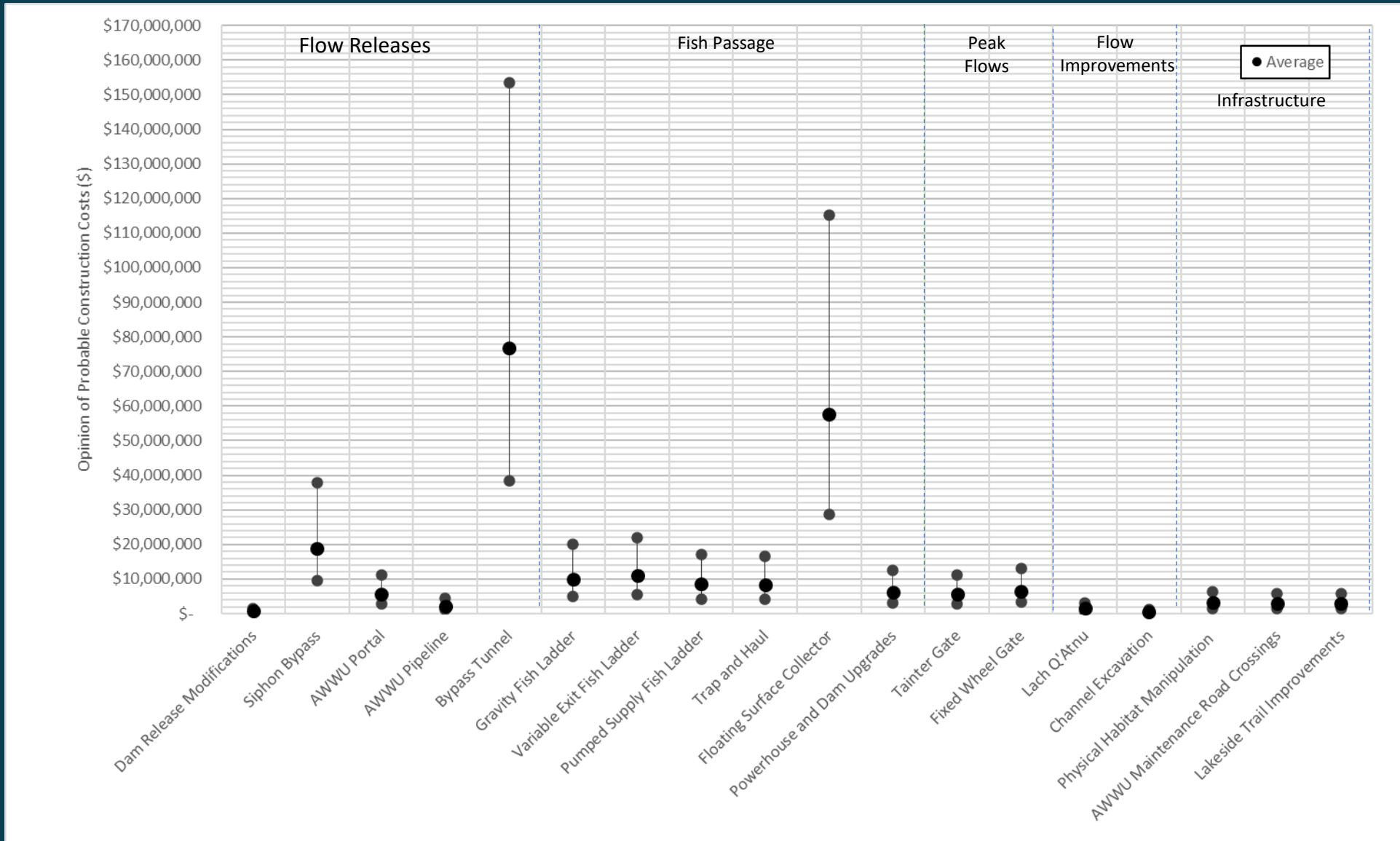
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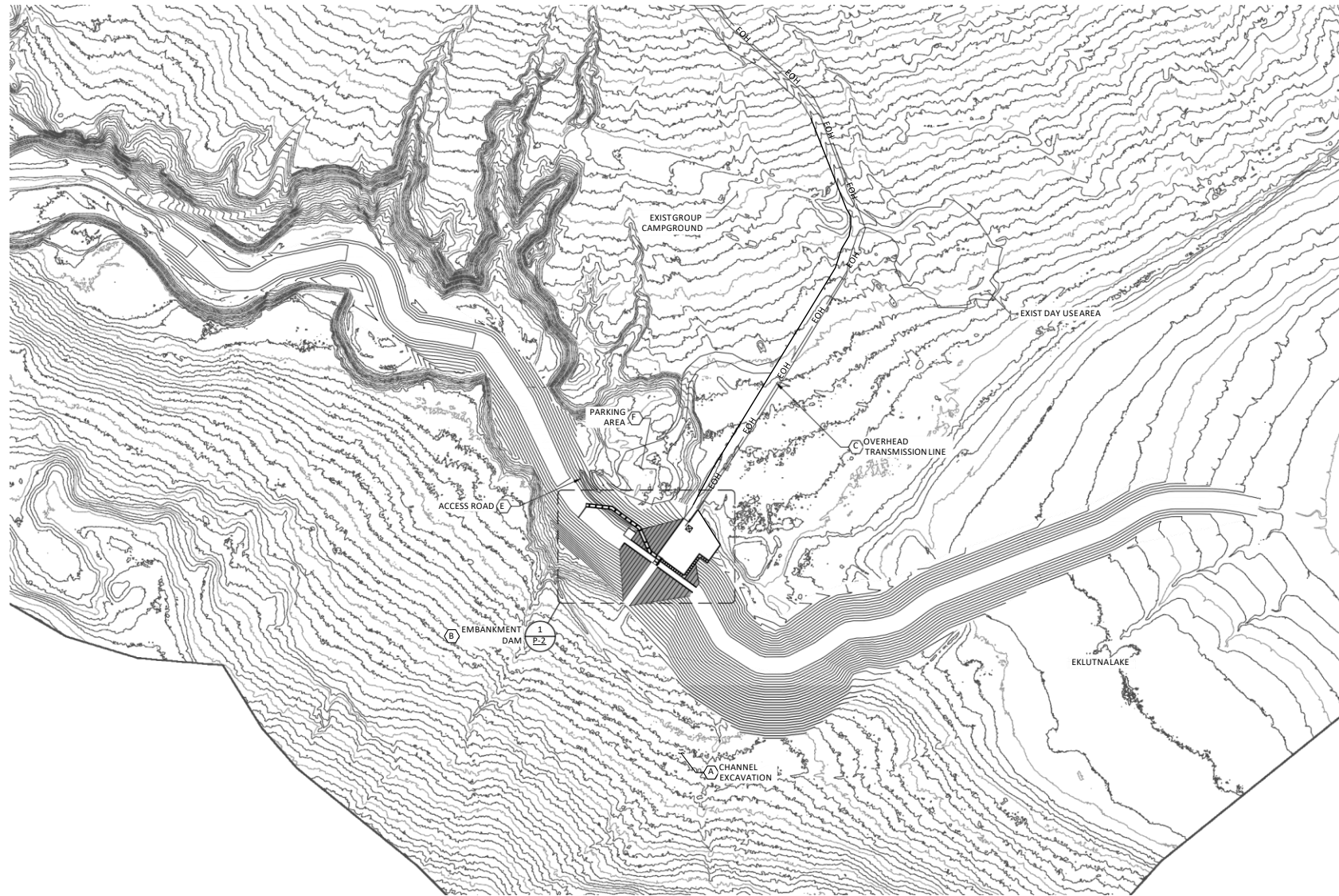
DATE BY





# Class 5 Opinion of Probable Construction Costs





**SHEET NOTES:**

1. ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

**SHEET KEY NOTES:**

- A EXCAVATE CHANNEL THROUGH RESERVOIR OUTLET AND EXISTING EKLUTNA DAM TO EL. 838.6 MSL. APPROXIMATE LENGTH = 5,200-FT. APPROXIMATE IN-SITU VOLUME = 550,000 CY.
- B CONSTRUCT NEW EARTHFILL EMBANKMENT DAM. HEIGHT = 56-FT. APPROXIMATE VOLUME = 82,000 CY.
- C INSTALL NEW 7.2 KV - 3P OVERHEAD TRANSMISSION LINE ALONG DAM ACCESS ROAD FROM NEAREST POI. APPROXIMATE DISTANCE = 3,500-FT.
- D REGRADE, REPAIR AND IMPROVE EXISTING ABANDONED ACCESS ROAD DOWNSTREAM OF DAM RIGHT ABUTMENT.
- E CONSTRUCT NEW ACCESS ROAD TO DOWNSTREAM TOE OF DAM.
- F CONSTRUCT NEW PARKING AREA DOWNSTREAM OF DAM RIGHT ABUTMENT.

**LEGEND:**

— EOH — OVERHEAD ELECTRICAL/POWER

**SITE PLAN**

SCALE: 1"= 200'



REV	DATE	BY	DESCRIPTION
B	05/12/23	SPE	ADDED FISH PASSAGE ALTERNATIVE
A	05/12/23	SPE	CONCEPTUAL DESIGN

**WARNING**  
  
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

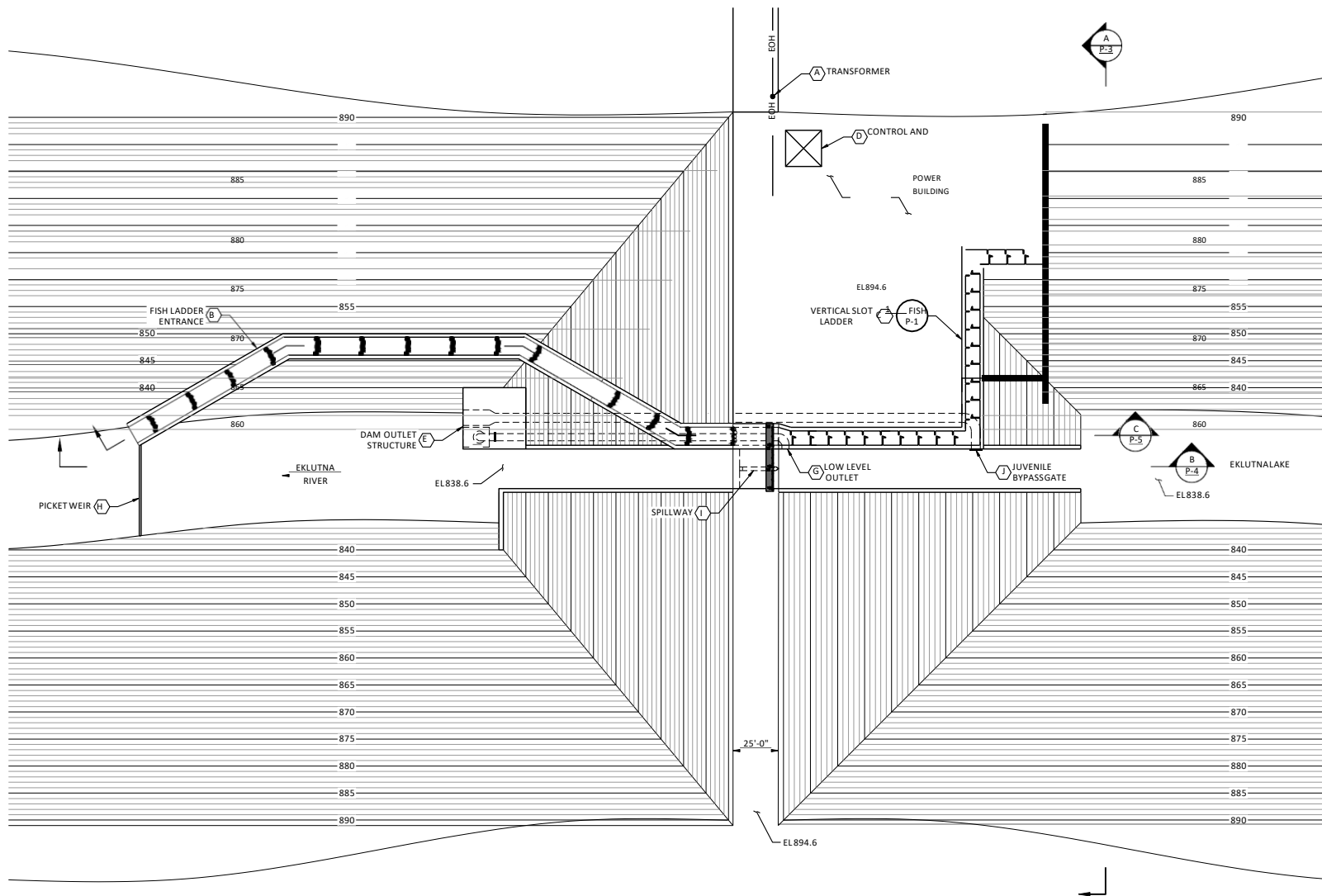


EKLUTNA FISH & WILDLIFE PROJECT
ENGINEERING FEASIBILITY STUDY
PME ALTERNATIVES ANALYSIS - FISH PASSAGE REPLACEMENT DAM ALTERNATIVE
SITE PLAN

DESIGNED <u>S. ELLENSON</u>
DRAWN <u>R. GUERRERO</u>
CHECKED <u>J. BOAG</u>
PROJECT DATE <u>05/12/23</u>

DRAWING
<b>P-1</b>

Path: C:\Users\Chugach\OneDrive\Documents\Feasibility Study\Fish Pass\1.dwg Plot date: May 08, 2023 05:55pm CAD User: guerrerorobert



**SHEET NOTES:**

1. ELEVATIONS SHOWN ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

**SHEET KEY NOTES:**

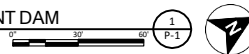
- A. INSTALL 7.2KV - 240/120V TRANSFORMER ON WOOD POWER POLE
- B. CONSTRUCT STEP-POOL ROCK RAMP FISHWAY FOR ENTRANCE TO RESERVOIR.
- C. CONSTRUCT VERTICAL SLOT FISH LADDER WITH VARIABLE POOL GATED EXITS ON UPSTREAM FACE OF DAM.
- D. CONSTRUCT CONTROL AND POWER BUILDING. 20-FT X 20-FT. CONSTRUCT CONTROL AND POWER BUILDING. 20-FT X 20-FT.
- F. INSTALL 5-FT SQUARE CONCRETE CONDUIT THROUGH BASE OF DAM WITH FLOW CONTROL GATE AT INTAKE
- G. INSTALL 48" DIA STEEL PIPE THROUGH BASE OF DAM WITH SCREENED INTAKE.
- H. CONSTRUCT AUTOMATED PICKET WEIR ACROSS RIVER CHANNEL ADJACENT TO FISH LADDER ENTRANCE.
- I. CONSTRUCT TWO BAY OVERFLOW SPILLWAY WITH (2X) 10-FT X 16-FT FIXED WHEEL GATES.

**LEGEND:**

- EOH — OVERHEAD ELECTRICAL/POWER
- EUG — UNDERGROUND ELECTRICAL

**EKLUTNA EMBANKMENT DAM**

SCALE: 1"=30'



REV	DATE	BY	DESCRIPTION
B	05/12/23	SPE	ADDED FISH PASSAGE ALTERNATIVE
A	05/12/23	SPE	CONCEPTUAL DESIGN

**WARNING**  
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



EKLUTNA FISH & WILDLIFE PROJECT  
 ENGINEERING FEASIBILITY STUDY  
 PME ALTERNATIVES ANALYSIS - FISH PASSAGE  
 REPLACEMENT DAM ALTERNATIVE  
 SECTIONS AND DETAILS 1

DESIGNED S. ELLENSON  
 DRAWN R. GUERRERO  
 CHECKED J. BOAG  
 PROJECT DATE 05/12/23

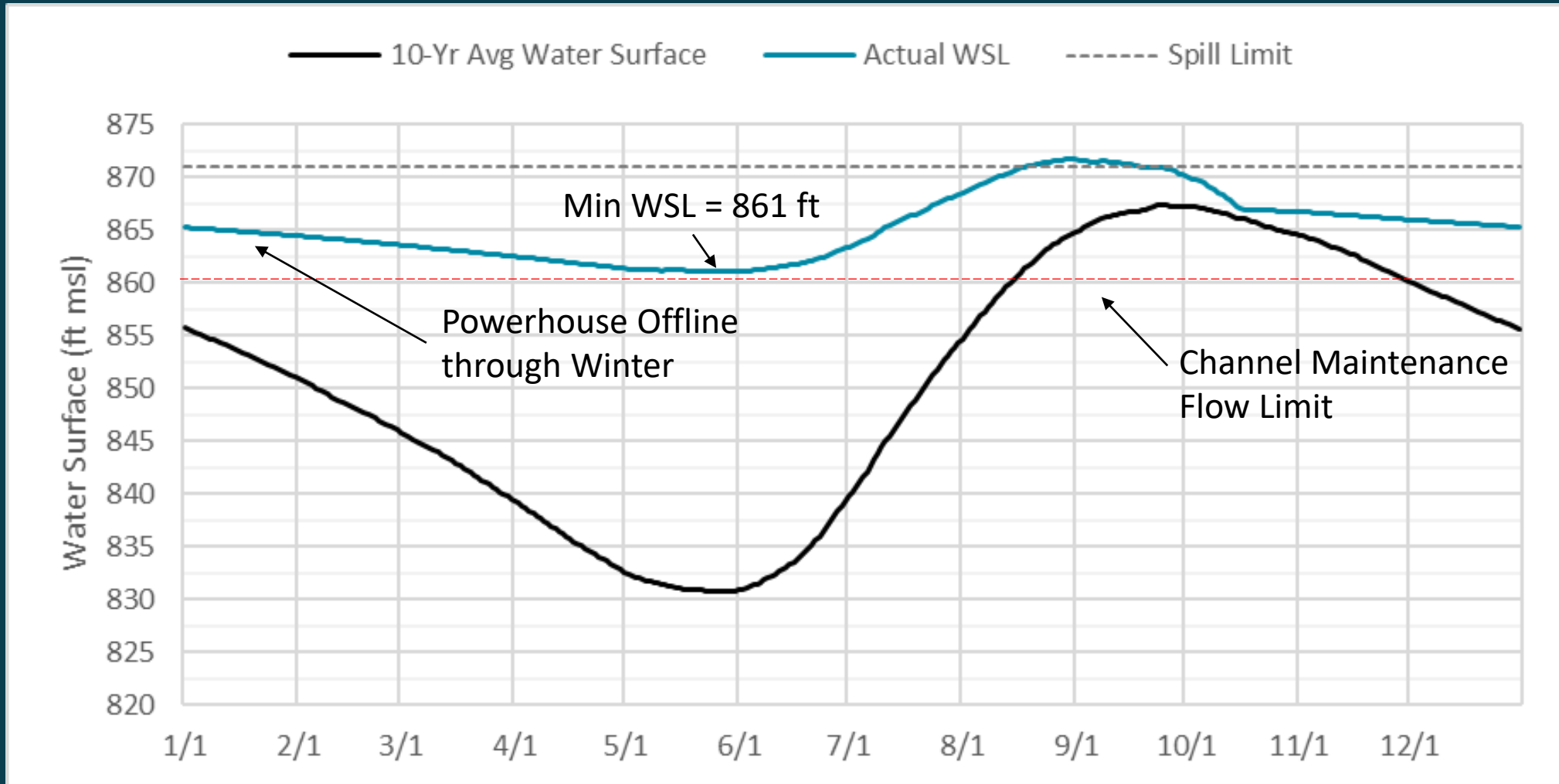
DRAWING  
**P-2**  
 JOB NO: 2008000

Path: C:\Users\Guerrero\OneDrive\Documents\Feasibility Study\Fish Passage\Drawings\2023-05-12\10:00\DWG\051223\_P-2.dwg Plot date: May 08, 2023 05:55pm CAD User: Guerrero

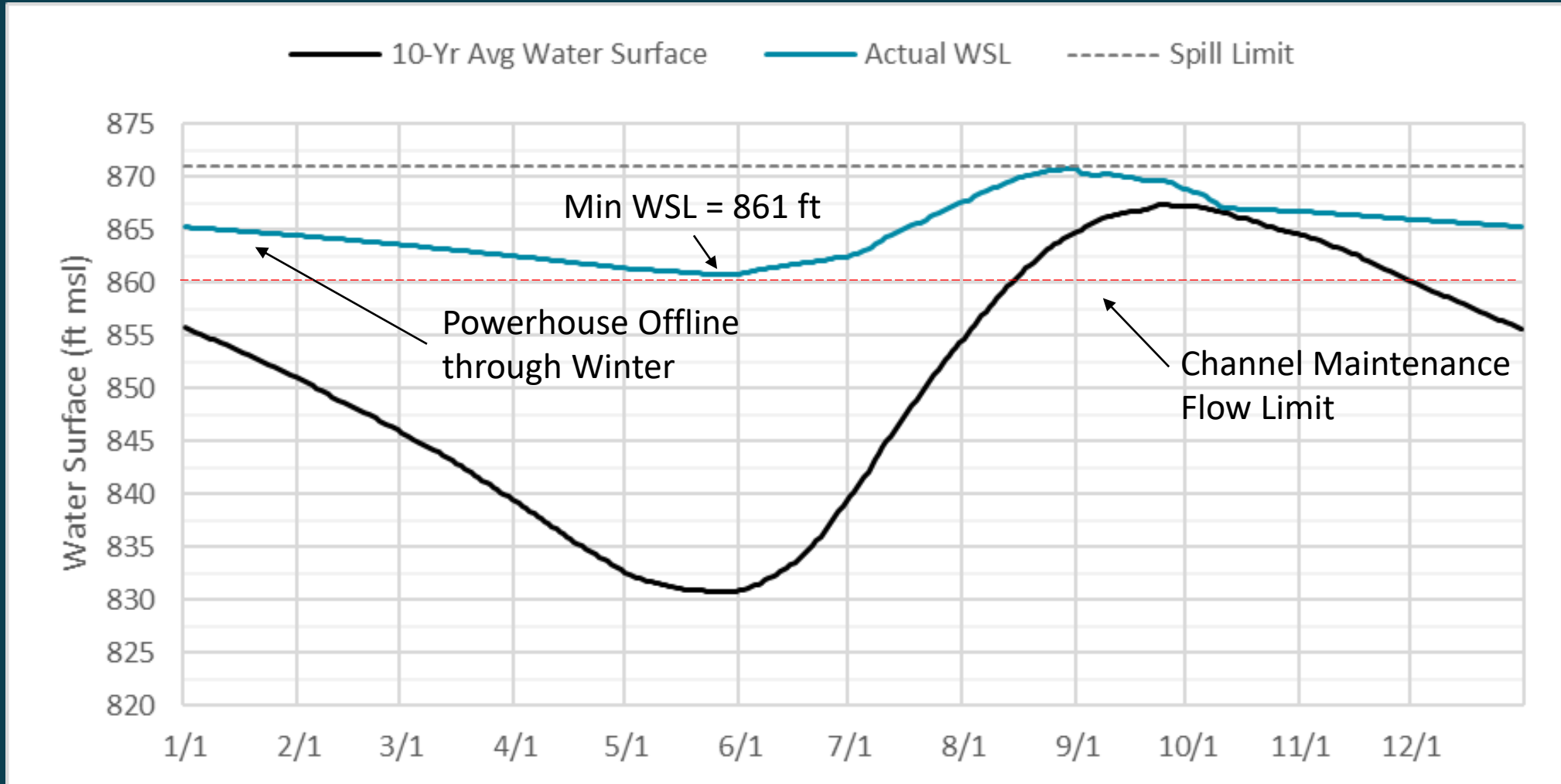
# Class 5 OPCC – Replacement Dam

- Indirect Costs (Mobilization / General Requirements)
  - \$16M
- Site Construction / Access Roads
  - \$1M
- Channel Excavation – Haul
  - \$40M
- Dam Construction w/ Fishway
  - \$20M
- Electrical/Transmission
  - \$3M
- Overhead, Profit, & Bonds
  - \$13M
- Contingency
  - \$23M
- **Construction Price**
  - **\$115M (\$60M - \$227M)**

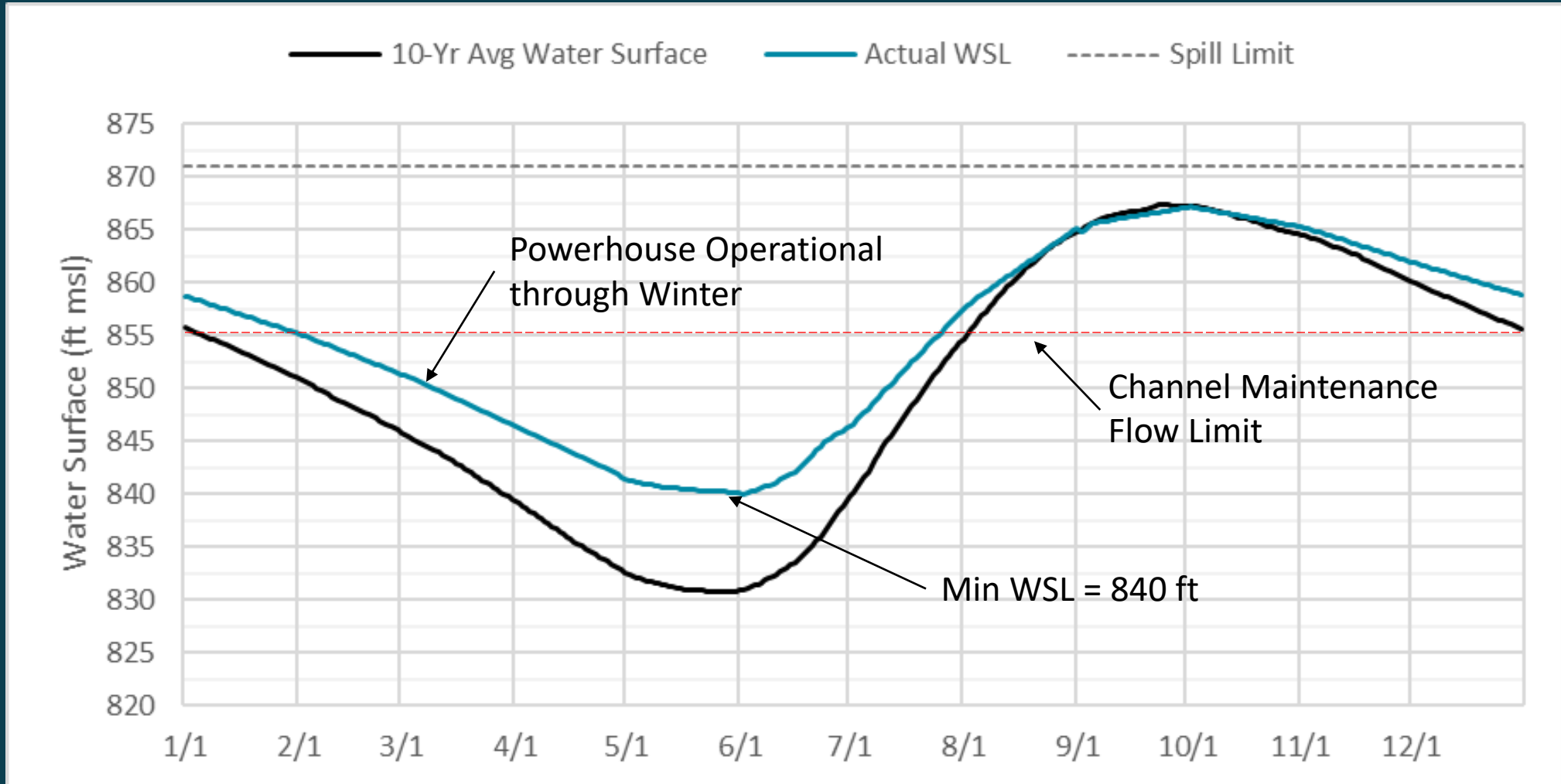
# Existing Dam Release w/ No Fish Passage



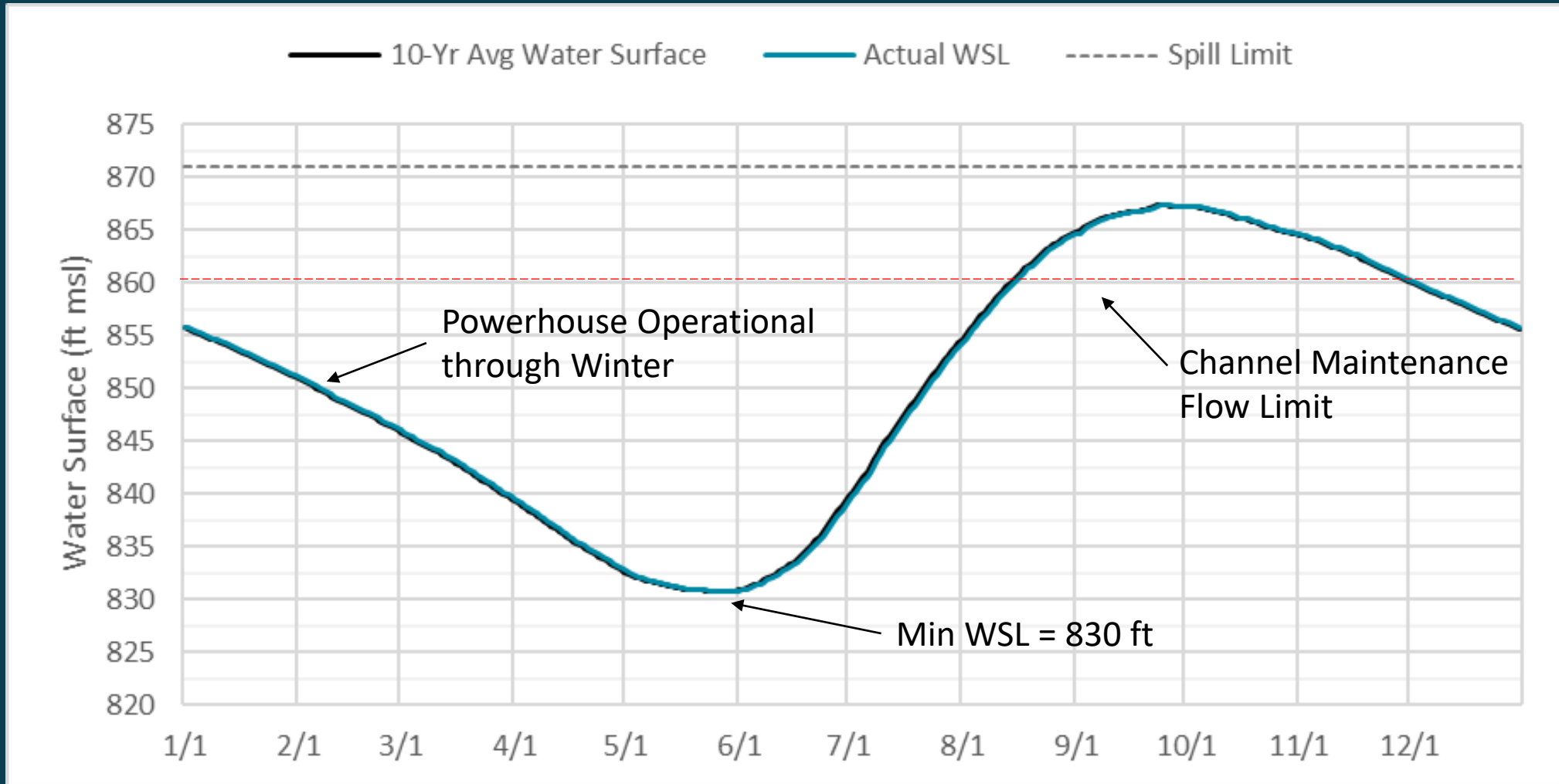
# Existing Dam Release w/ Variable Exit Fishway



# Replacement Dam



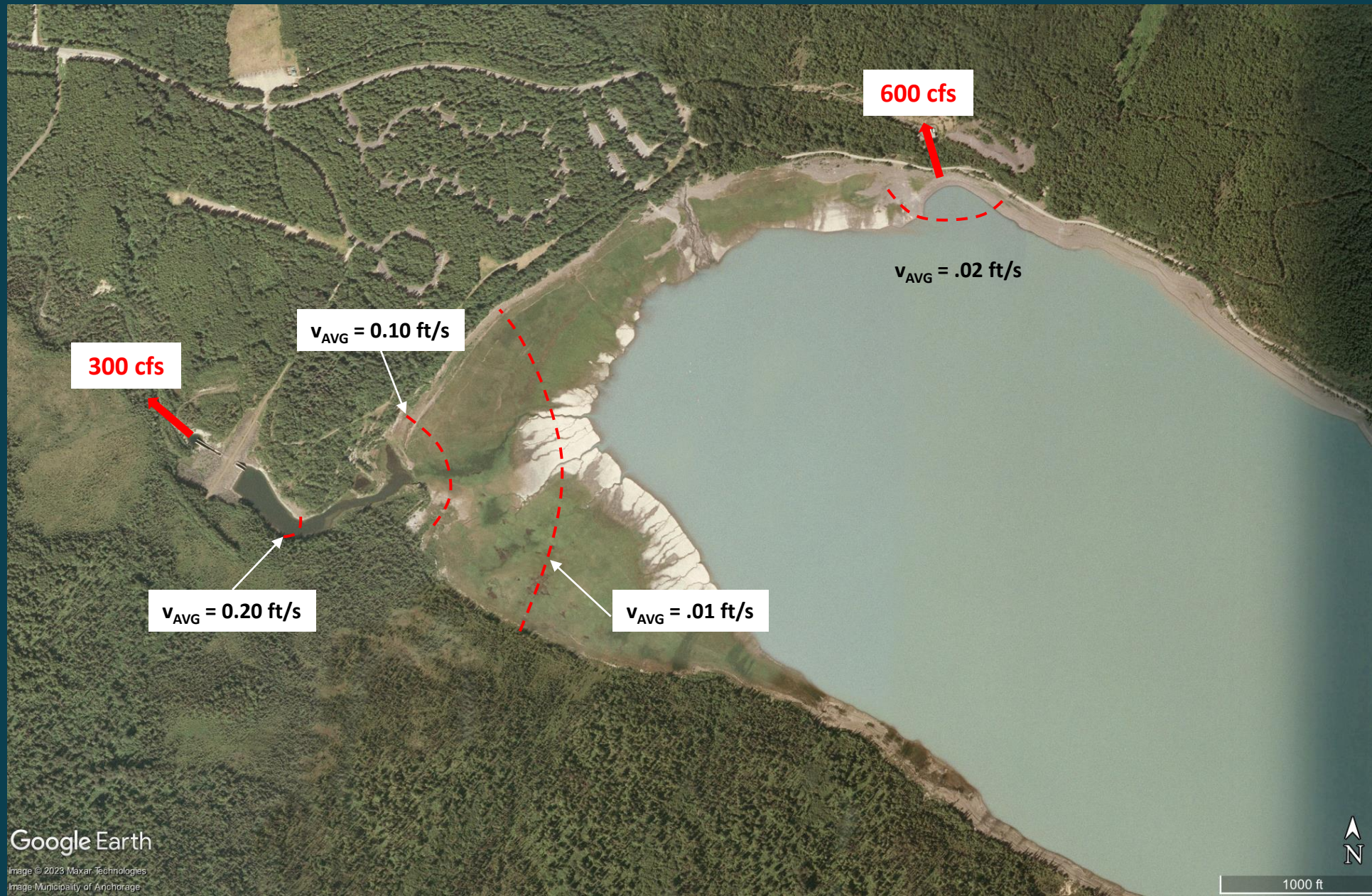
# AWWU Portal/Pipeline & Bypass Tunnel



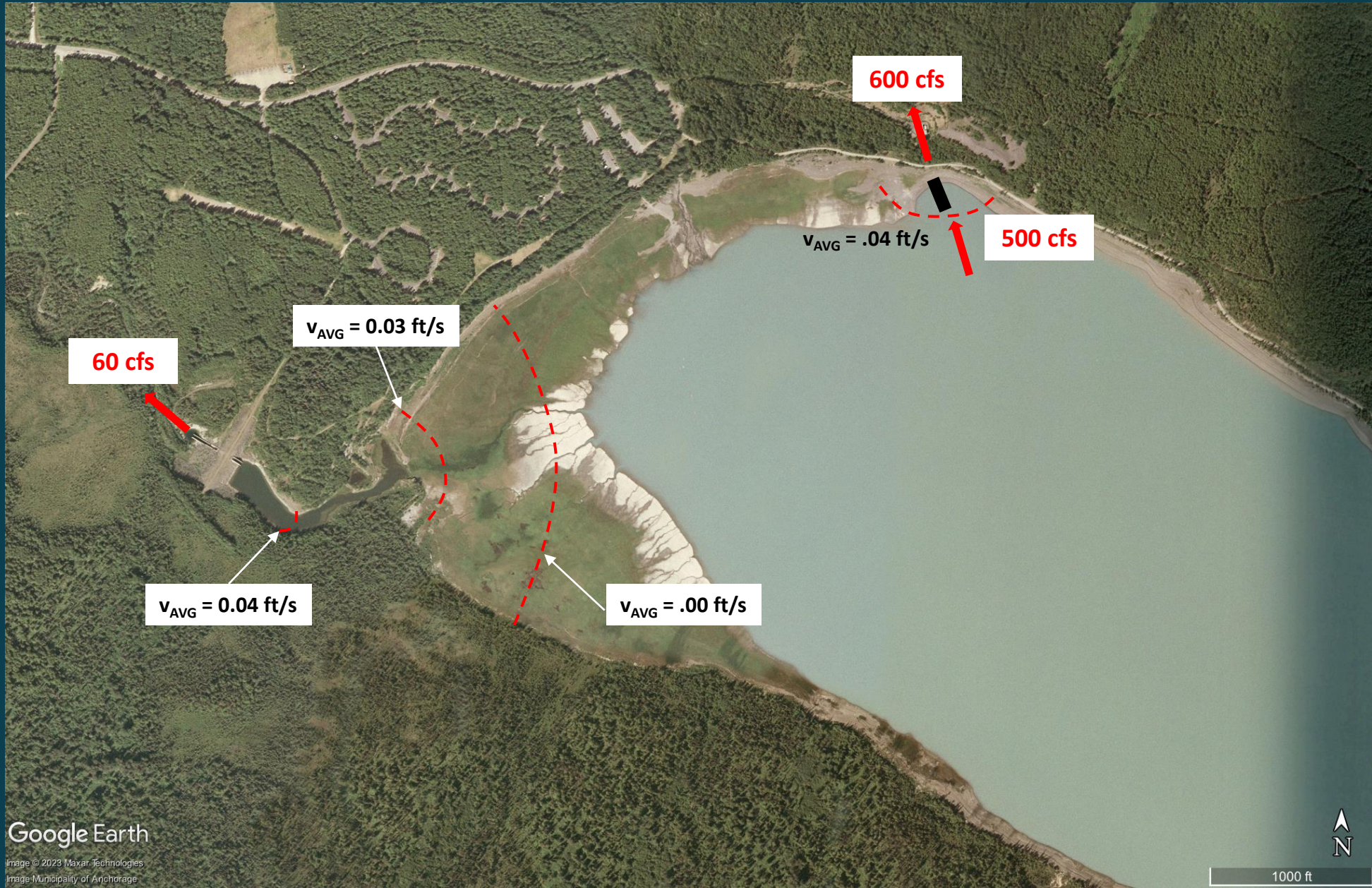




# Downstream Fish Passage – Dam Release



# Downstream Fish Passage – Floating Surface Collector



Google Earth

Image © 2023 Maxar Technologies  
Image Municipality of Anchorage



1000 ft

# Winter Flow Analysis

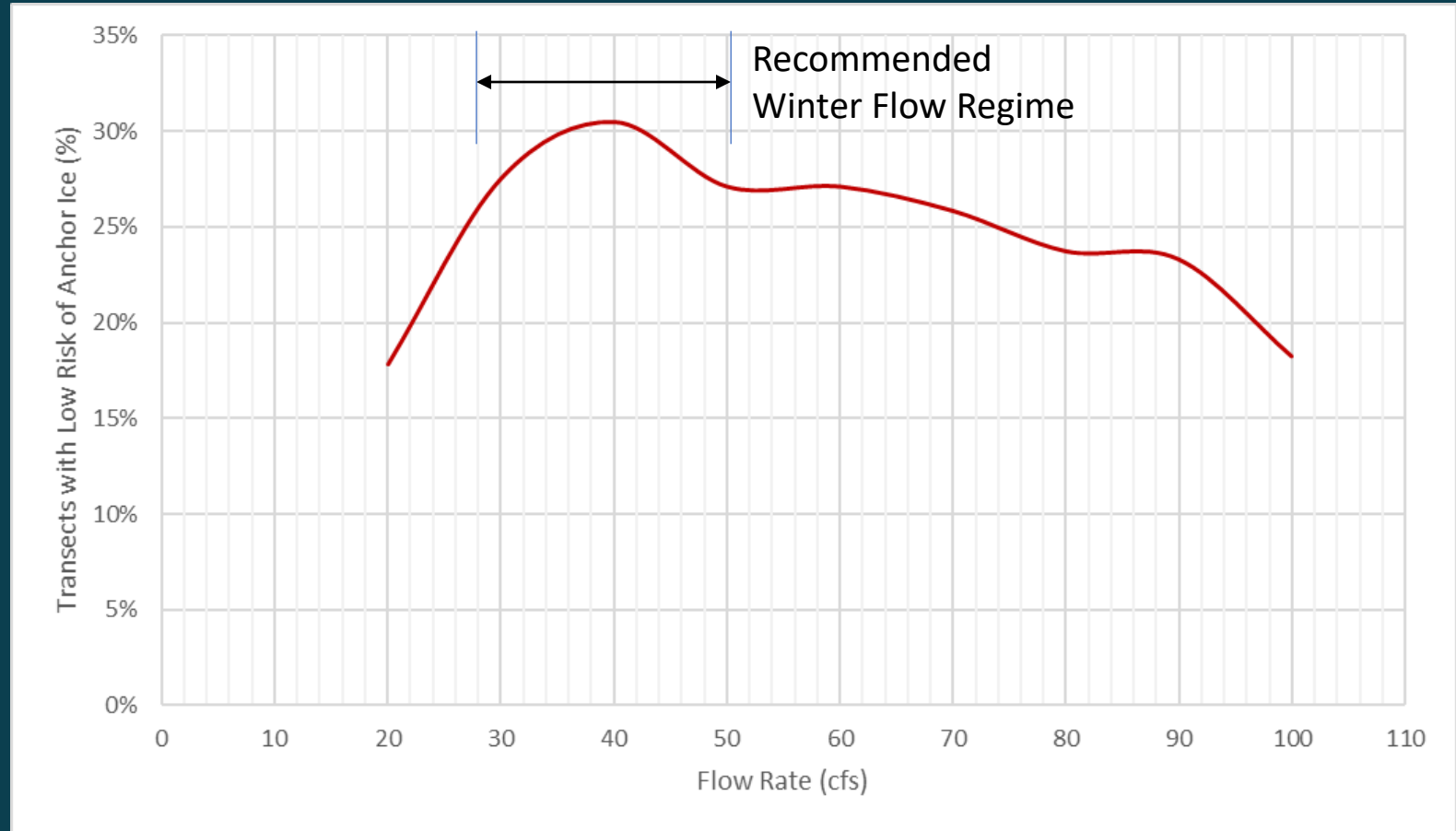
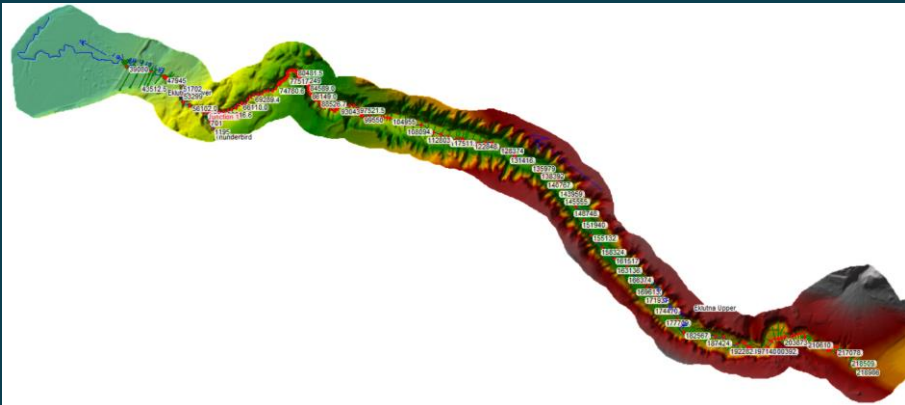
## Criteria

Using 1D River Model (236 Transects):

Determine Number of Transects with:

$$v < 2.0 \text{ ft/s}$$

$$d \geq 15''$$

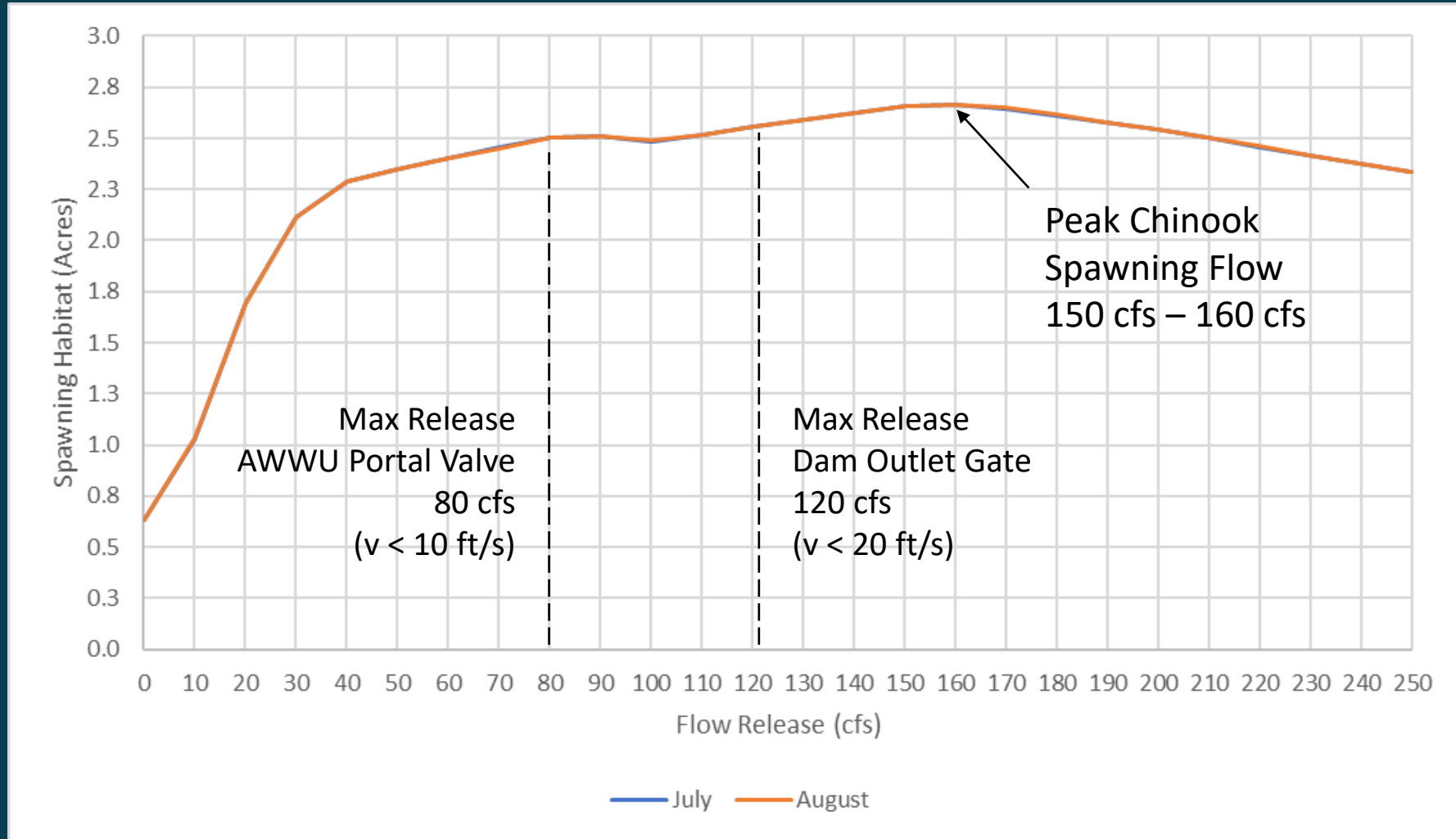


# Passage Barrier Analysis

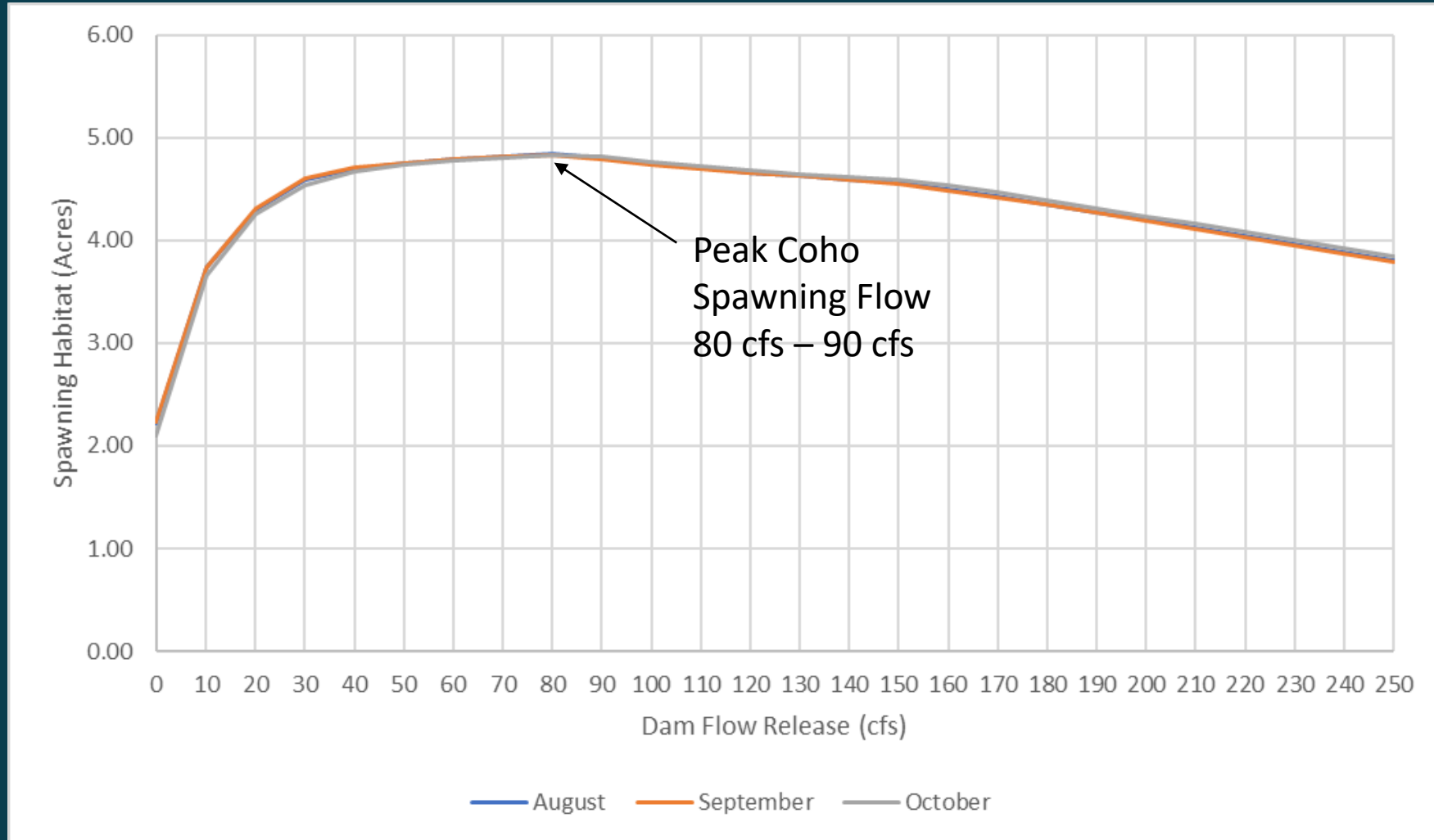
	Site A	Site B	Site C	Site D	Site E
Minimum passage Q (cfs)	40.0	50.0	8.8	40.0	40.0
Velocity at critical transect (ft/s)	8.35	6.25	4.71	4.340	3.76
Depth at critical transect (ft)	0.62	0.57	0.69	0.600	0.43
Froude at critical transect	1.90	1.50	1.00	0.990	1.01
Potential barrier average slope (ft/ft)	0.16	0.14	0.087	0.068	0.12
Passage barrier type	Depth	Depth	Depth	Depth	Depth



# Instream Flow Study – Chinook Spawning Habitat



# Instream Flow Study – Coho Spawning Habitat



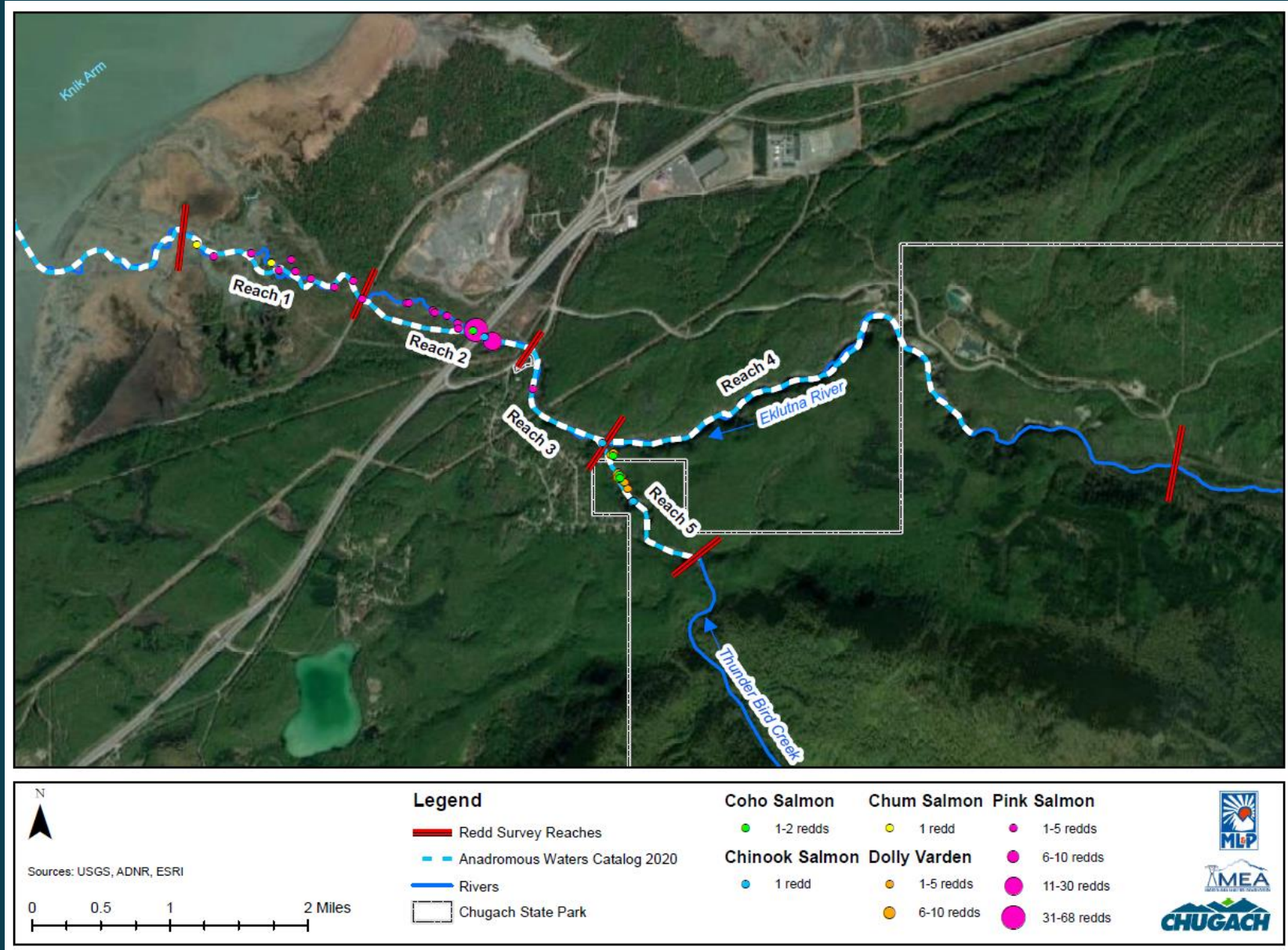


# Adult Salmon Counts

2021					2022				
Date	Chinook	Coho	Chum	Pink	Date	Chinook	Coho	Chum	Pink
7/9/2021	0	0	0	0	7/8/2022	0	0	0	0
7/16/2021	0	0	0	0	7/16/2022	1	0	0	0
7/22/2021	7	0	0	0	7/25/2022	0	0	0	0
7/31/2021	9	0	0	17	8/1/2022	0	0	0	27
8/6/2021	2	0	0	61	8/8/2022	0	0	0	0
8/11/2021	0	0	0	65	8/15/2022	1	0	0	19
8/20/2021	0	0	3	120	8/22/2022	4	2	0	16
8/26/2021	0	0	1	13	8/29/2022 <sup>B</sup>		-	-	-
9/3/2021	1	3	1	1	9/6/2022	0	4	4	0
9/11/2021	0	4	0	-	9/13/2022	0	3	2	0
9/18/2021 <sup>A</sup>	0	3	0	-	9/19/2022 <sup>B</sup>	-	-	-	-
9/23/2021 <sup>A</sup>	0	0	0	0	9/26/2022	0	1	0	0
9/29/2021	0	2	0	0	10/3/2022	0	0	0	0
10/5/2021	0	0	0	0	10/11/2022 <sup>B</sup>	-	-	-	-
10/14/2021	0	2	0	0	10/17/2022	0	6	0	0
10/22/2028	0	0	0	0	10/24/2022	0	2	0	0
<b>Total Fish</b>	<b>19</b>	<b>14</b>	<b>5</b>	<b>277</b>	<b>Total Fish</b>	<b>6</b>	<b>18</b>	<b>6</b>	<b>62</b>

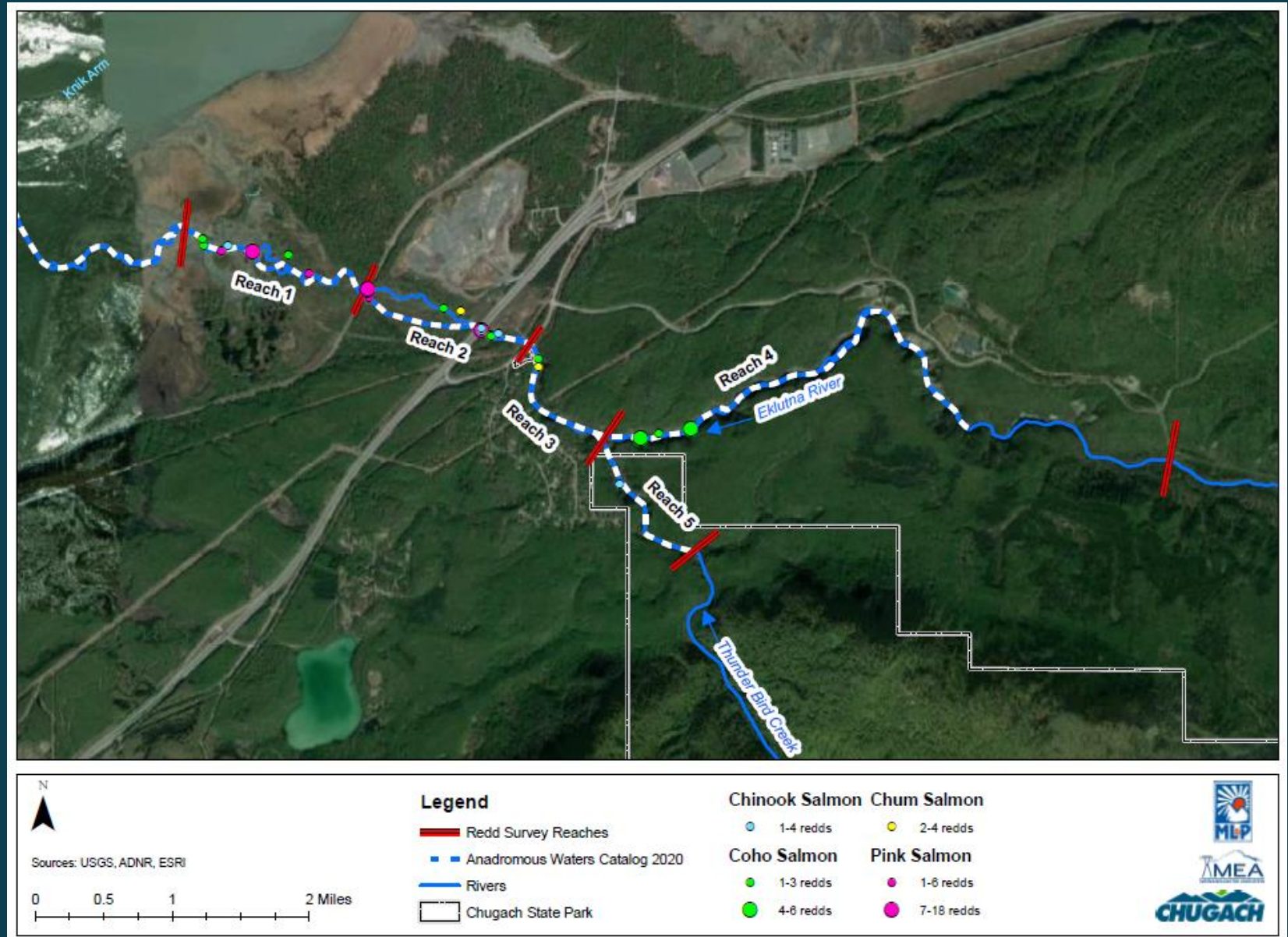
*Notes: A) Only Thunderbird surveyed due to study flow releases; B) Dangerous conditions due to rainfall/flooding*

# Spawning Distribution in 2021

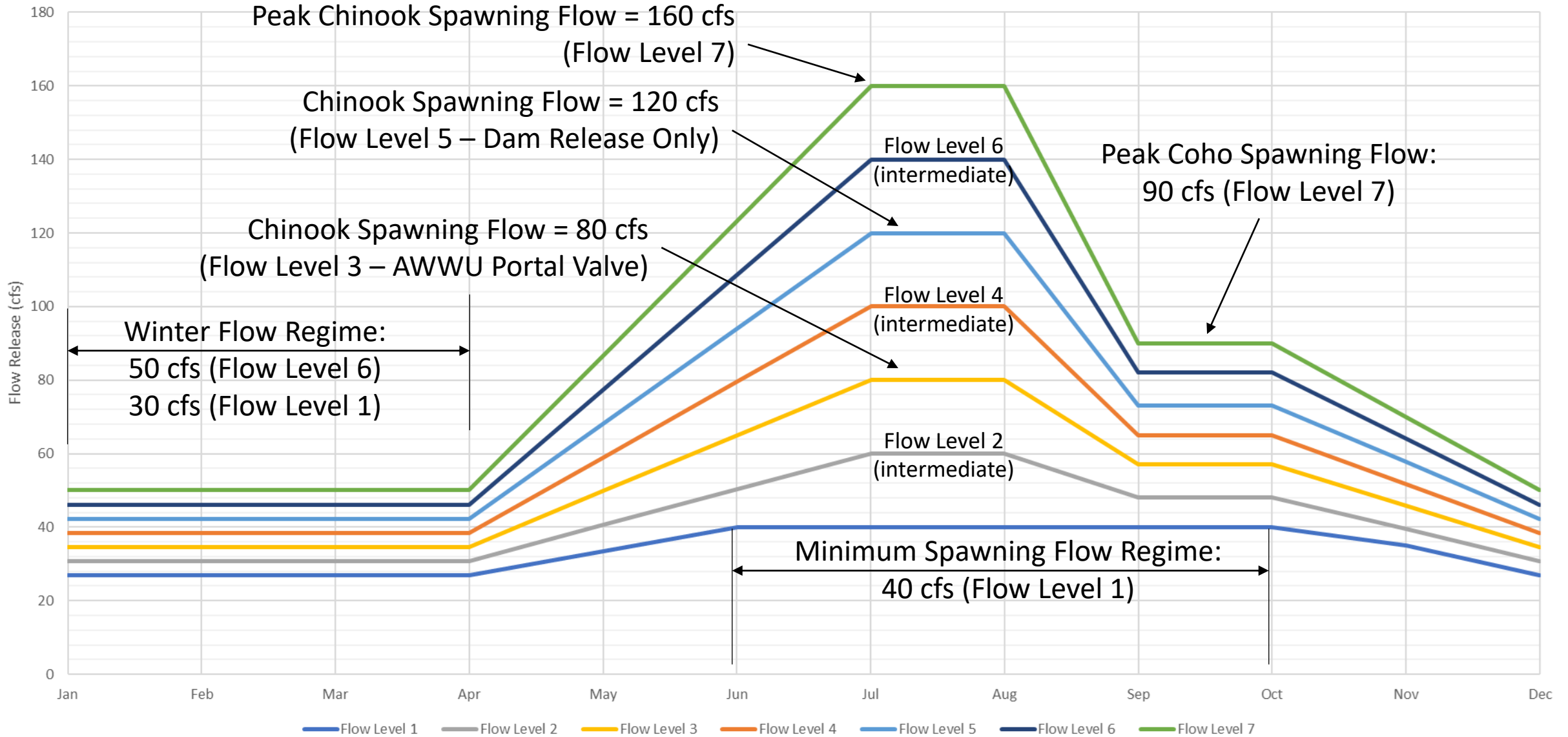




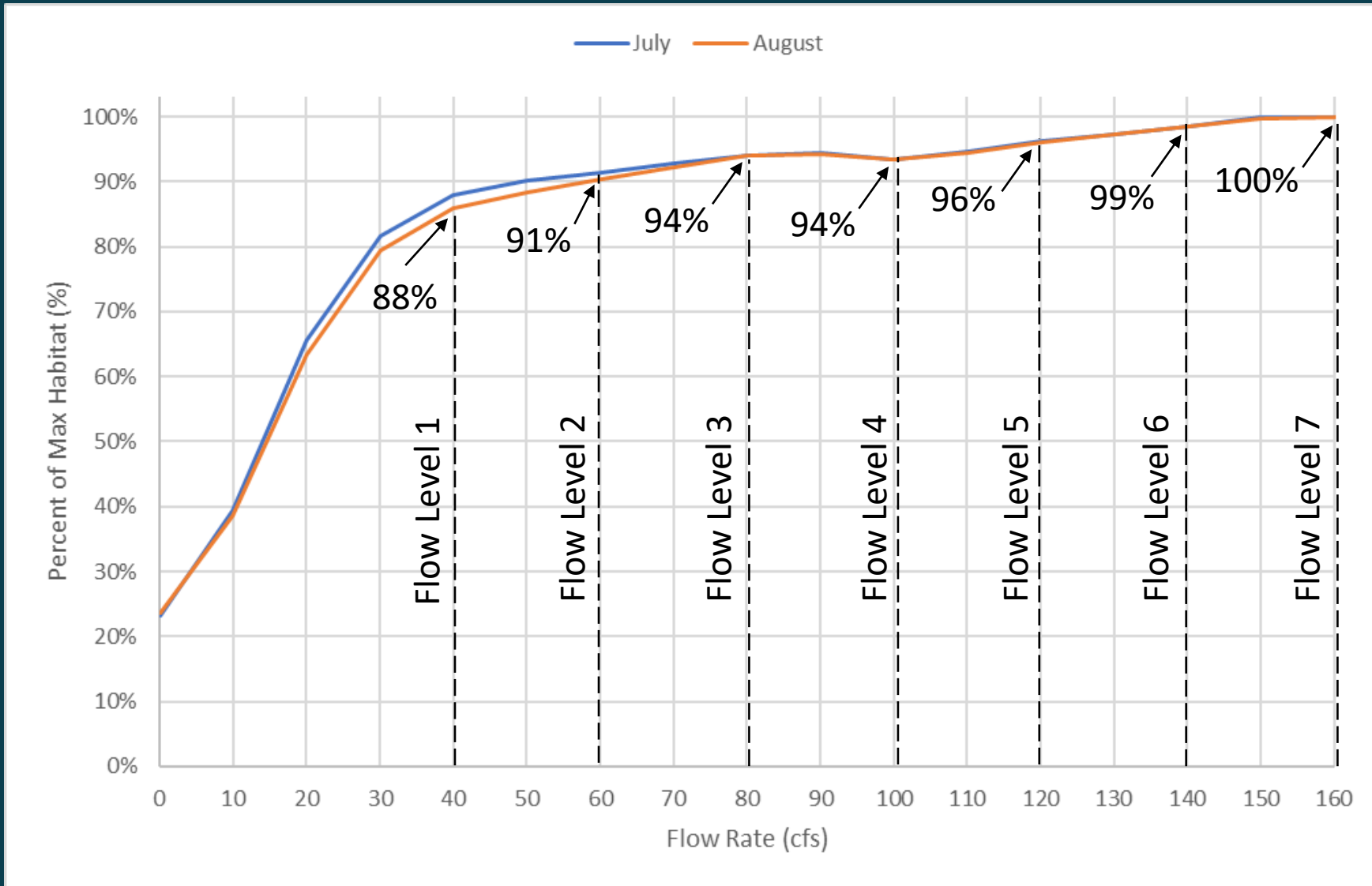
# Spawning Distribution in 2022



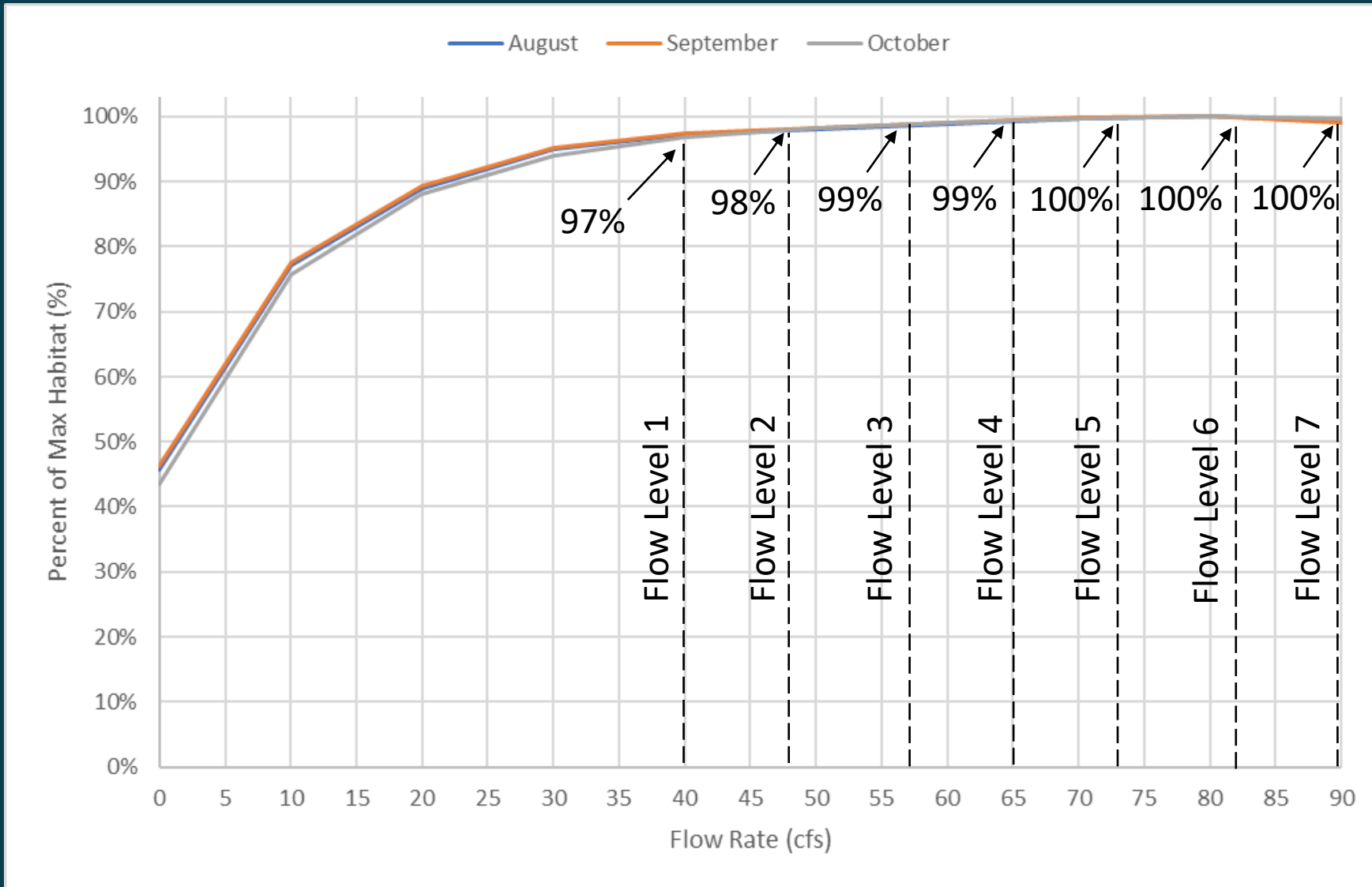
# Potential Flow Regimes



# Chinook Spawning Flows



# Coho Spawning Flows

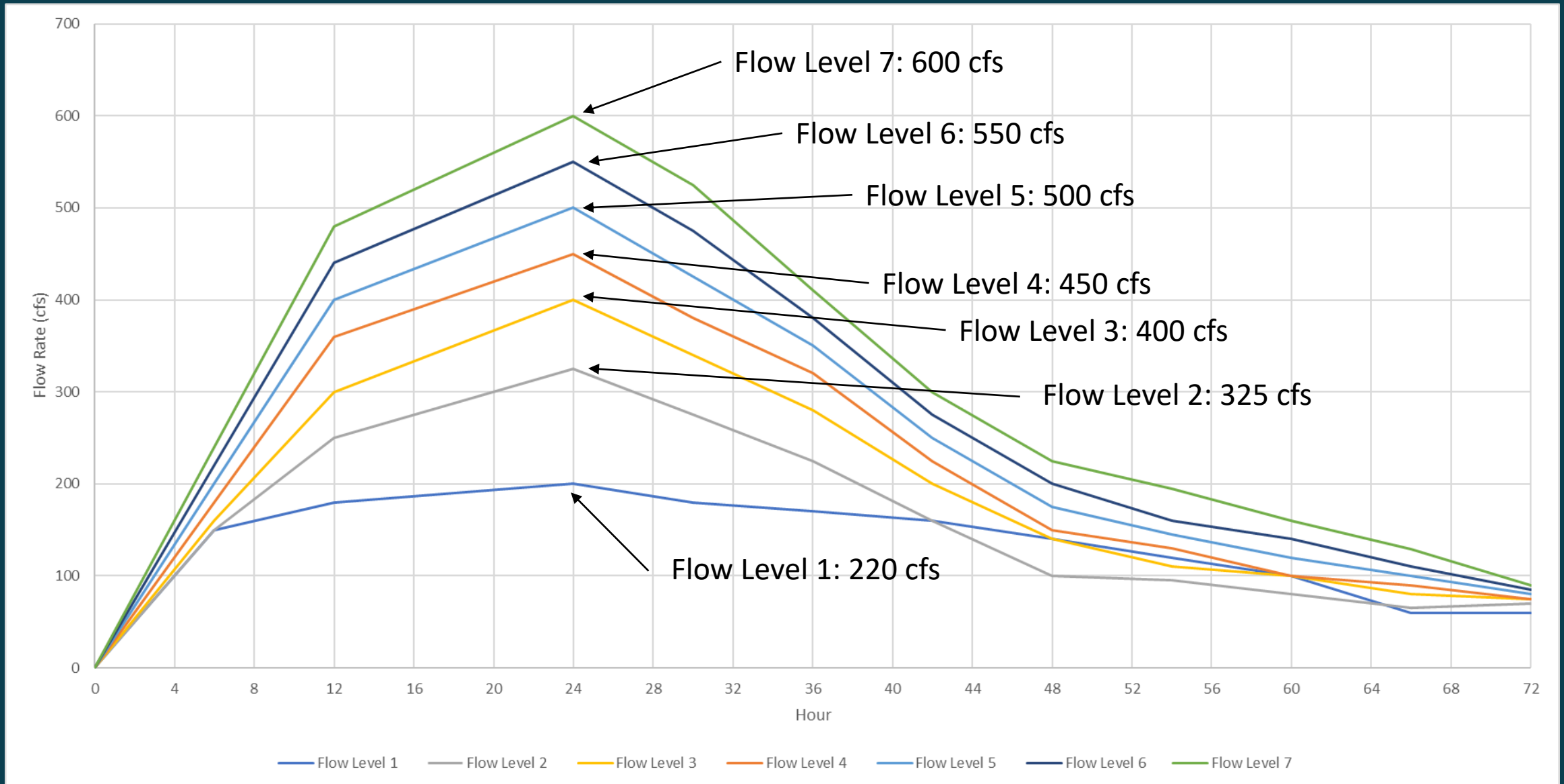




# Eklutna River Habitat Gains

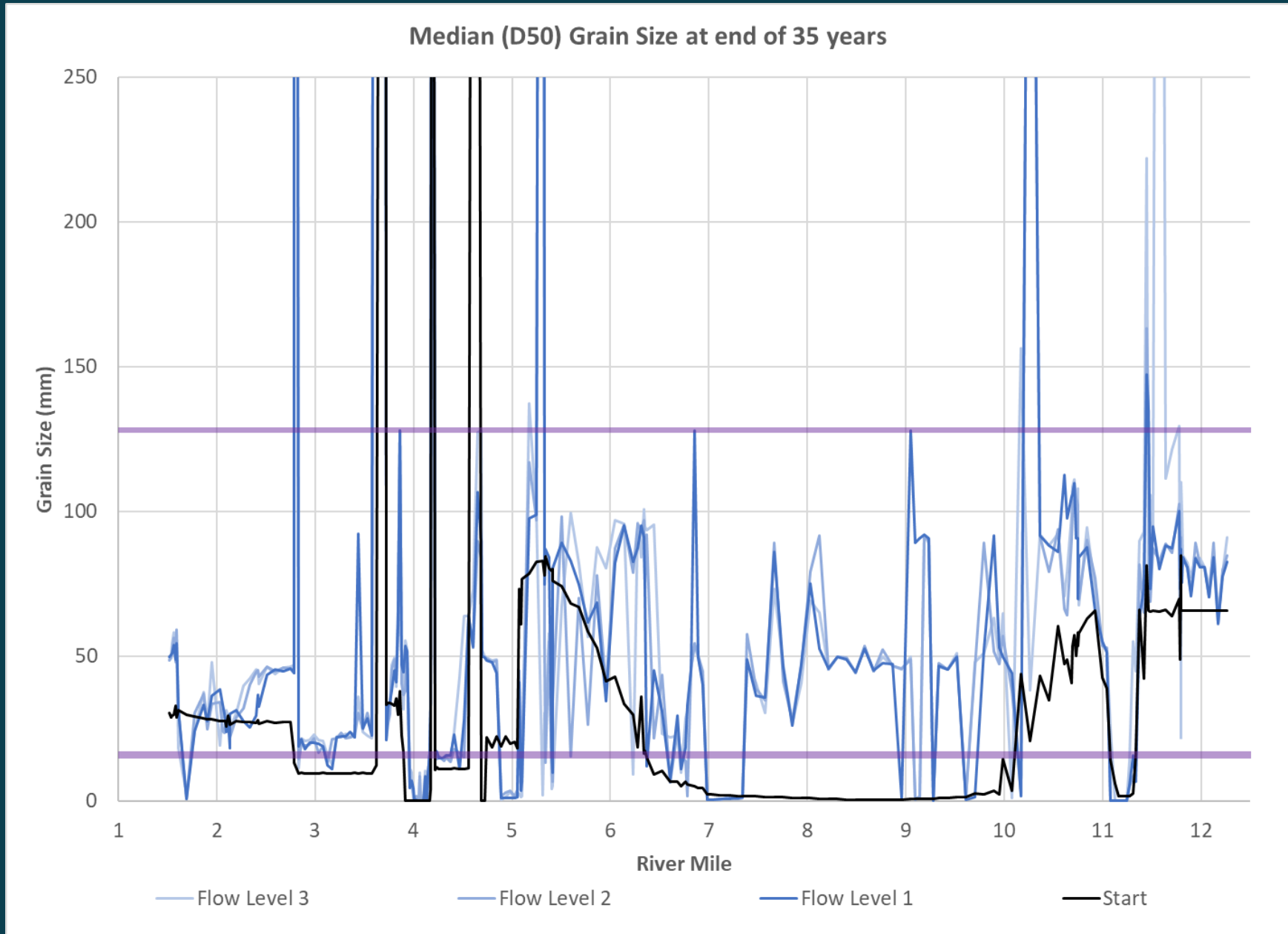
Scenario		Time-Averaged Habitat (%)					
		Chinook		Coho		Sockeye	
		Spawning	Juvenile Rearing	Spawning	Juvenile Rearing	Spawning	
Habitat Improvement (%)	Dam Release	Flow Level 1	227%	75%	89%	90%	75%
		Flow Level 2	240%	84%	92%	99%	78%
		Flow Level 3	254%	92%	94%	108%	77%
		Flow Level 4	254%	99%	94%	115%	74%
		Flow Level 5	265%	104%	93%	122%	71%
		Flow Level 6	274%	110%	93%	128%	67%
		Flow Level 7	280%	116%	91%	136%	62%
	Portal Release	Flow Level 1	209%	53%	65%	67%	58%
		Flow Level 2	215%	61%	65%	75%	57%
		Flow Level 3	221%	69%	65%	83%	54%
Pipeline Release	Flow Level 1	48%	28%	32%	32%	35%	
	Flow Level 2	44%	35%	31%	39%	33%	
	Flow Level 3	42%	42%	29%	45%	30%	

# Channel Maintenance Flows





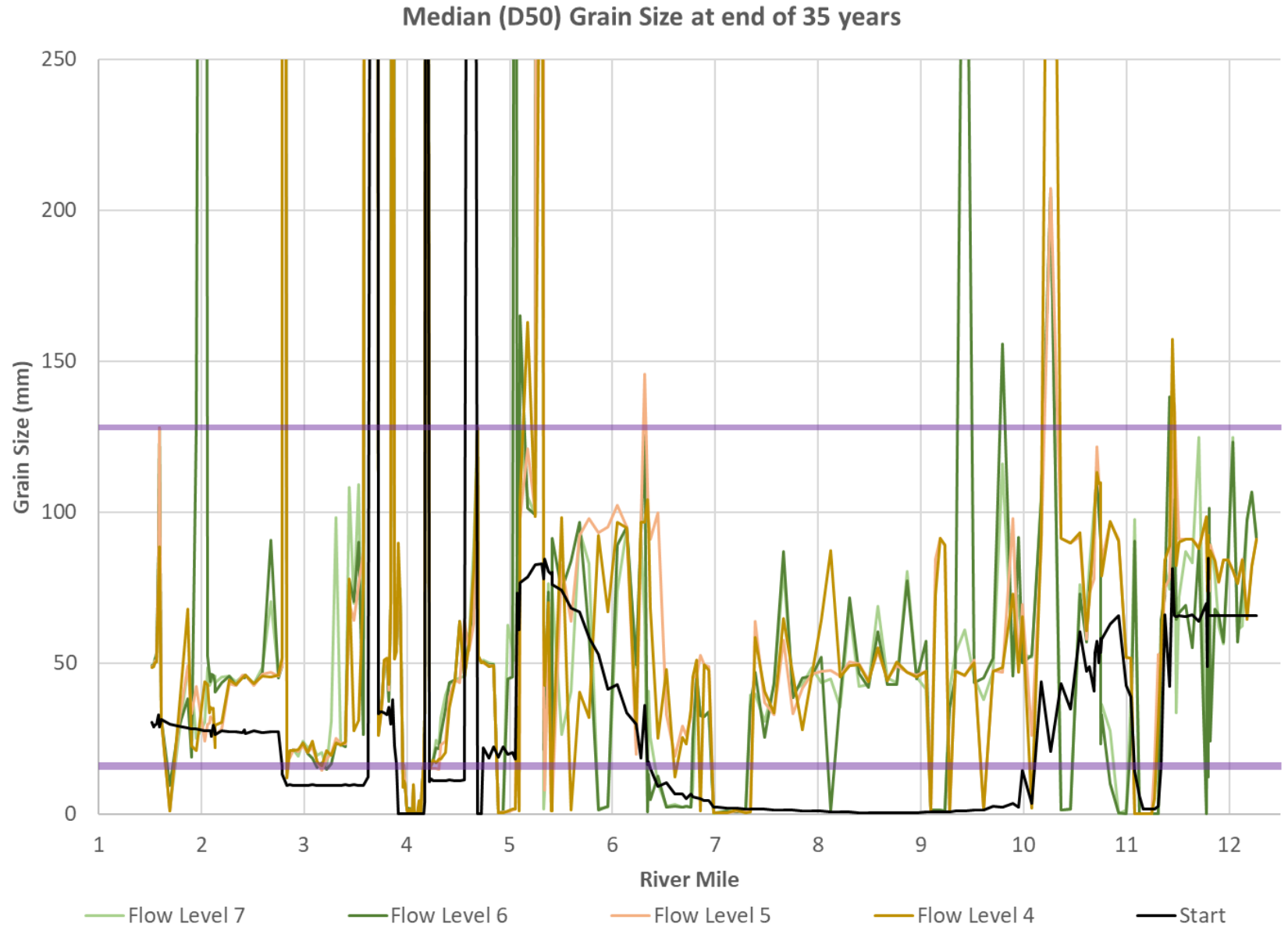
# Flow Levels 1-3



Channel Maintenance Flow = 220/325/400 cfs - 72 Hr Shaped - Every 3 Years



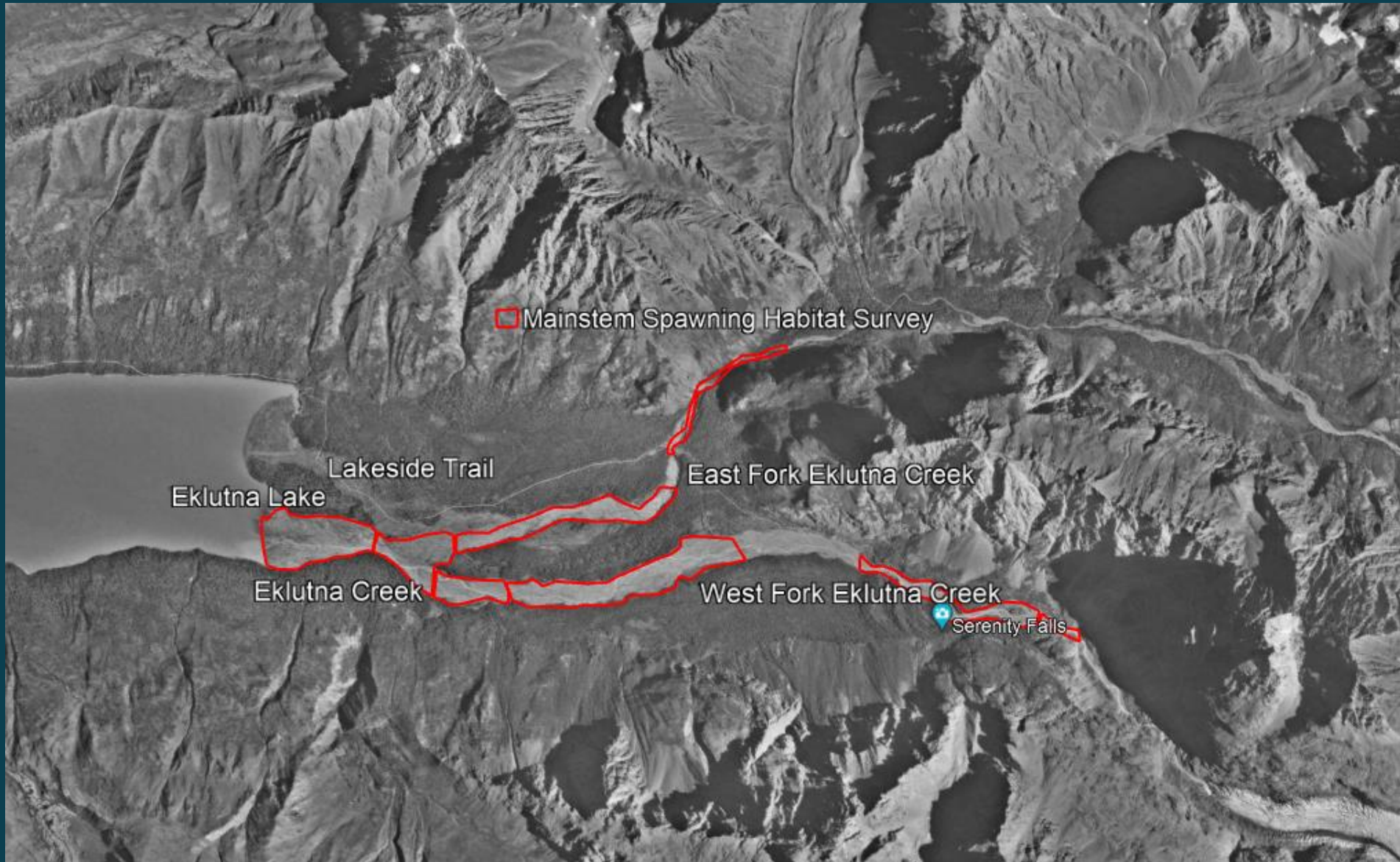
# Flow Levels 4-7



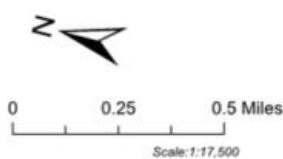
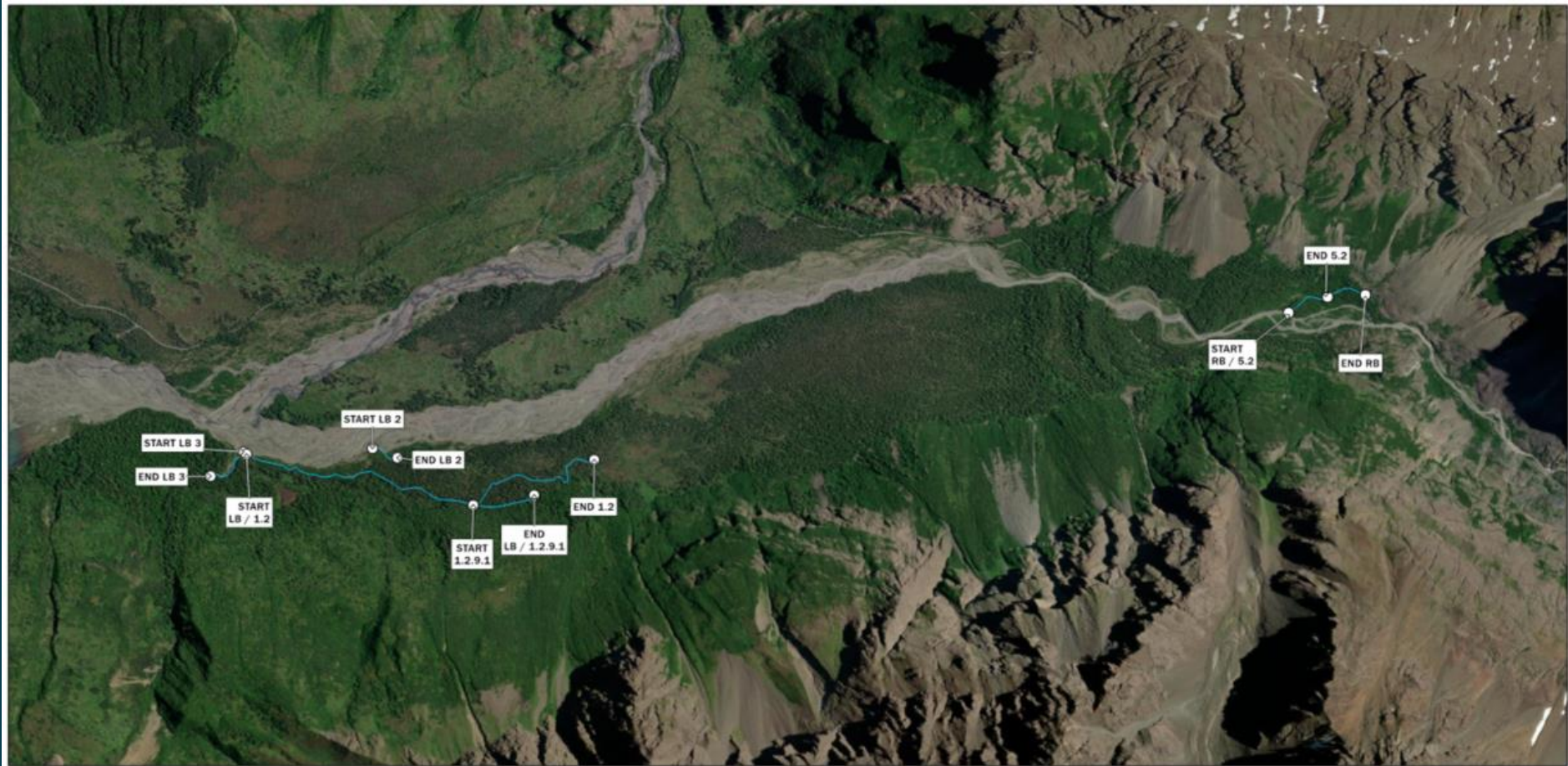
Channel Maintenance Flow = 450/500/550/600 cfs - 72 Hr Shaped - Every 3 Years



# || Mainstem Spawning Habitat Survey Area



# West Fork Eklutna Creek Survey



- Legend**
- Consolidated Survey Start/End Location
  - ~ Streams

Eklutna  
**Overview:**  
West Fork Eklutna Tributaries  
April 2023



# || Lake Shoreline Habitat



# Lake Productivity

Sample Source	Chlorophyll <i>a</i> (ug/l)	Total Phosphorus (mg/l)	Secchi Depth (m)	TSI Value*
Eklutna Lake (2021)	0.29	<0.04	0.85	18.5
Eklutna Pond (2021)	0.47	<0.04	2.04	23.2
Eklutna Lake (2022)	0.13	<i>not collected</i>	<i>not collected</i>	10.6
Eklutna Pond (2022)	0.12	<i>not collected</i>	<i>not collected</i>	9.8

\* Calculation Equation:  $TSI = 9.81 * \ln(CHL\ a) + 30.6$

- All Trophic Status Index (TSI) values are low (<30) which indicates low primary productivity (oligotrophic status)
- Most likely due to nutrient deficiency and/or turbidity from glacial flour limiting light penetration
- Low primary productivity (phytoplankton) indicates limited secondary production (zooplankton)

# Kokanee



*A hooked-jawed, 13-inch male kokanee in spawning color.*



*Typical 5-inch kokanee from Eklutna Lake*

# ||| Eklutna Lake Habitat Gains

## Fish Passage:

### (E. & W. Forks Eklutna Creek)

Spawning Habitat: 1.145 Acres (50% Suitability)  
Rearing Habitat: Unknown

### (Eklutna Lake Shoreline )

Spawning Habitat: 2.6 Acres (w/o Fluctuation)  
Spawning Habitat: 0.03 Acres (w Existing Fluctuation)  
Rearing Habitat: Low Productivity



# — Alternatives Analysis

# Stakeholder Engagement

Received ~36 total comprehensive alternatives from the following entities:

- Native Village of Eklutna (NVE)
- Alaska Department of Fish and Game (ADFG)
- Chugach State Park (ADNR)
- National Marine Fisheries Service (NMFS)
- U.S. Fish & Wildlife Service (USFWS)
- Trout Unlimited (TU)
- The Conservation Fund (TCF)
- Hydro Project Owners (CEA/MEA/MOA)

Note: ADNR Dam Safety has no comments on flow regime but will have input on any modifications to the dam and appurtenant structures.





# Stakeholder Preferred Alternatives

## Native Village of Eklutna

- Replacement Dam / US Passage / DS Passage Spill 3 Months / Infrastructure Improvements

## USFWS

- Plan A – Replacement Dam / US Passage / DS Passage FSC / Infrastructure Improvements
- Plan B – Existing Dam / FWG / US Passage / DS Passage FSC / Infrastructure Improvements
- Plan C – Existing Dam / FWG / No Passage / Infrastructure Improvements
- Plan D – AWWU Portal / FWG / No Passage / Infrastructure Improvements

## The Conservation Fund

- Plan A – Replacement Dam / US Passage / DS Passage Spill 3 Months / Infrastructure Improvements
- Plan B – Existing Dam / FWG / US Passage / DS Passage FSC / Infrastructure Improvements

## NMFS

- Plan A – Replacement Dam / US Passage / DS Passage FSC / Infrastructure Improvements
- Plan B – AWWU Portal / FWG / No Passage / Infrastructure Improvements

## ADFG

- AWWU Portal / No Passage / Infrastructure Improvements

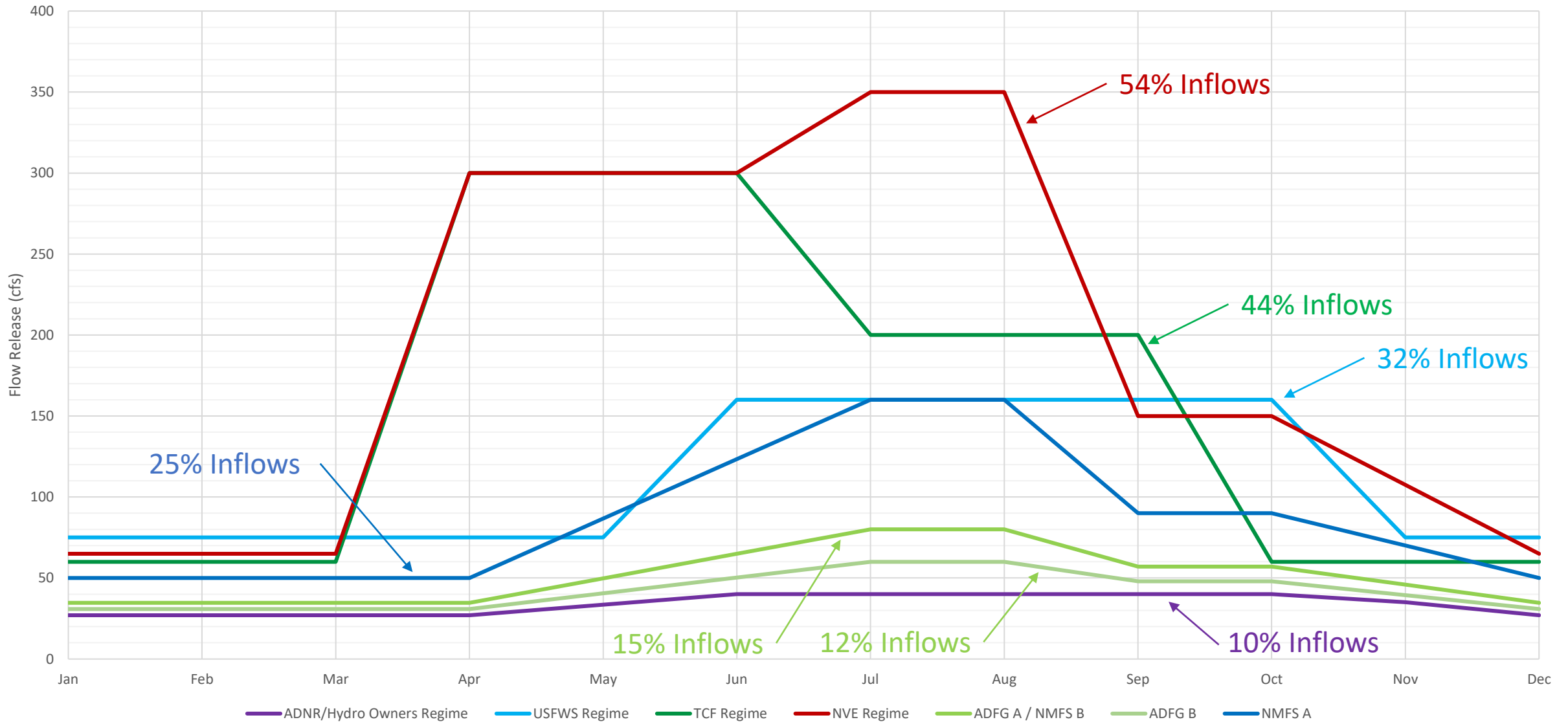
## Hydro Project Owners

- AWWU Portal / No Passage / Infrastructure Improvements

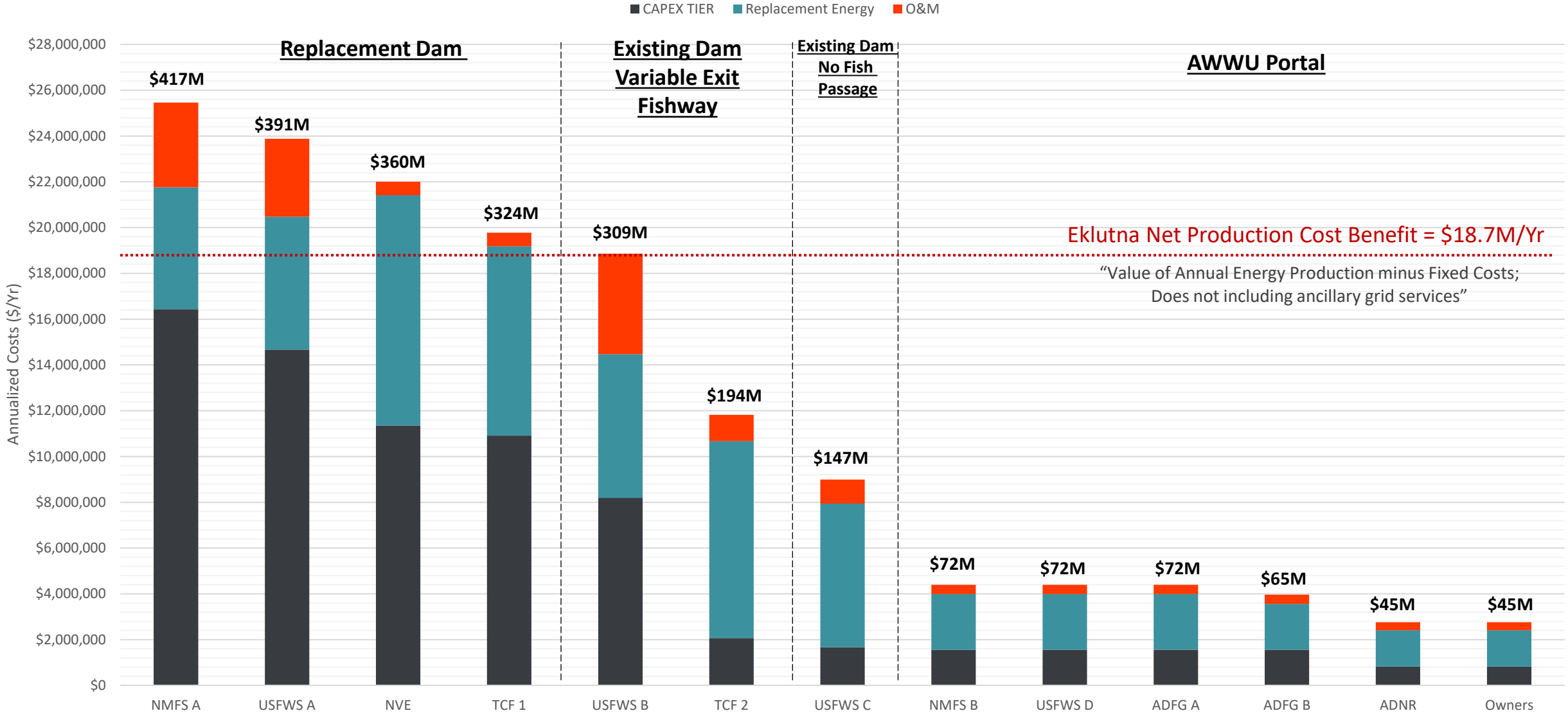
## ADNR – State Parks

- AWWU Portal / No Passage / Infrastructure Improvements

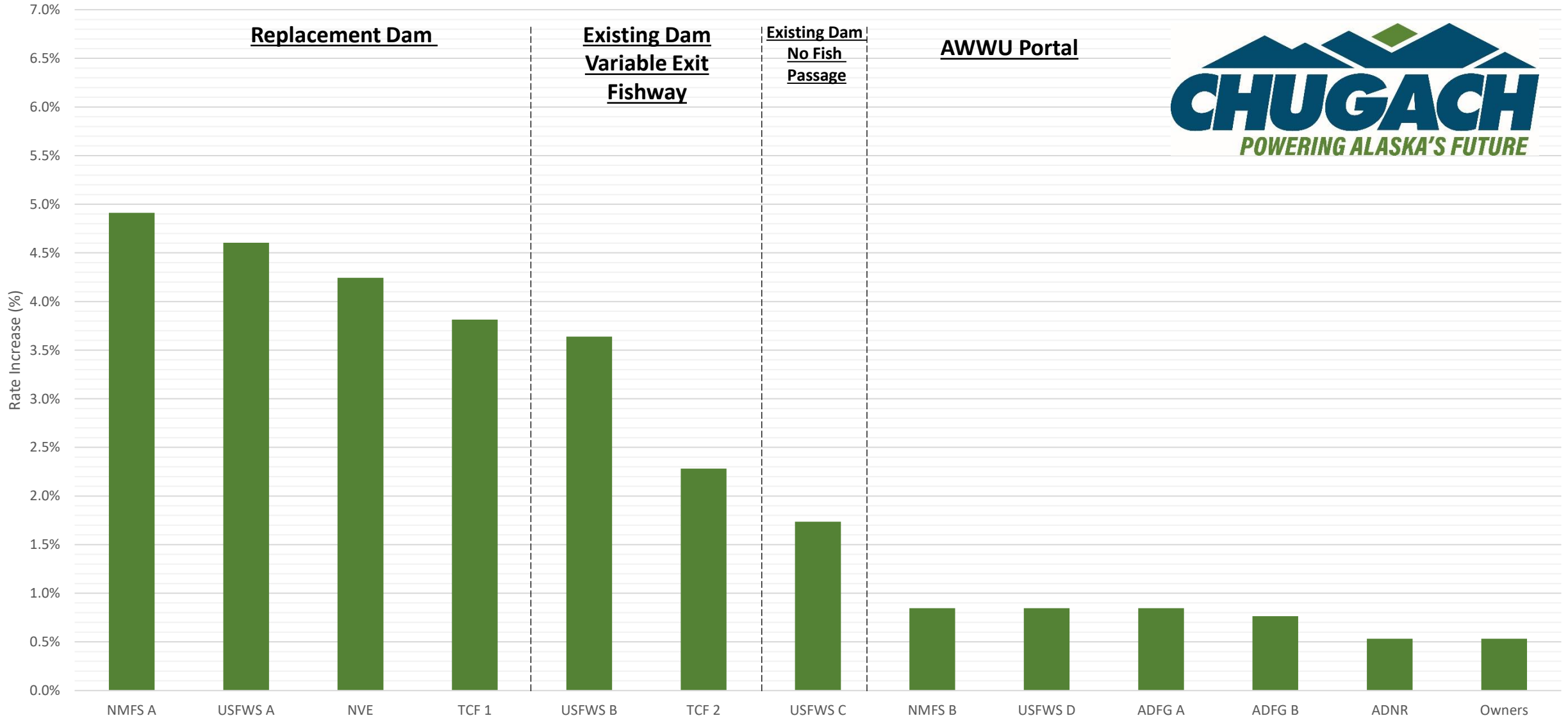
# Preferred Flow Regimes



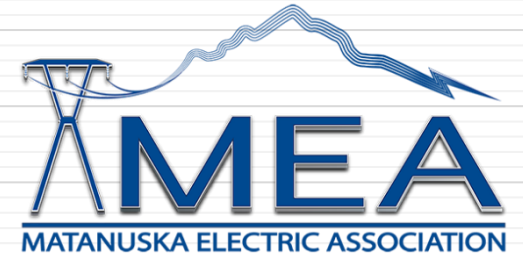
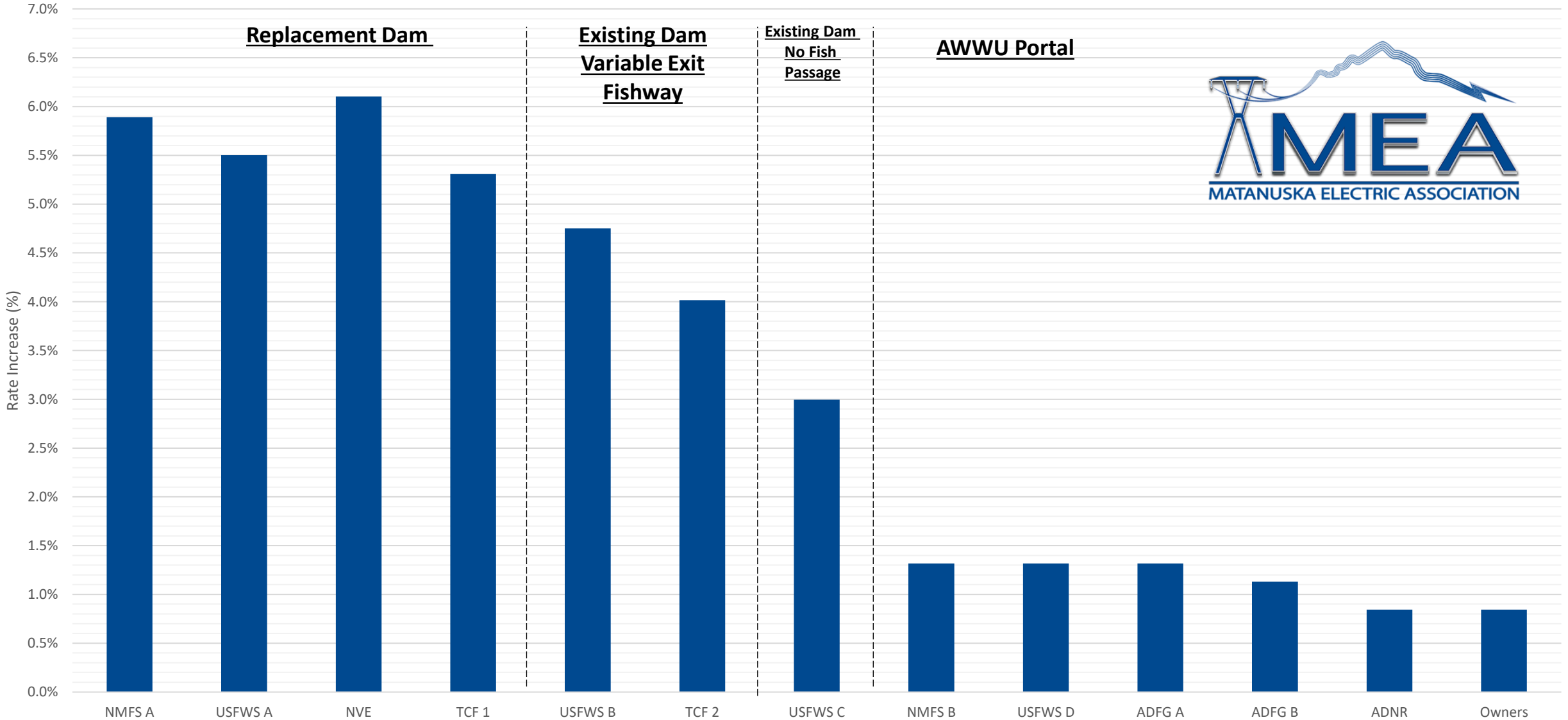
# Annualized Costs / Present Value



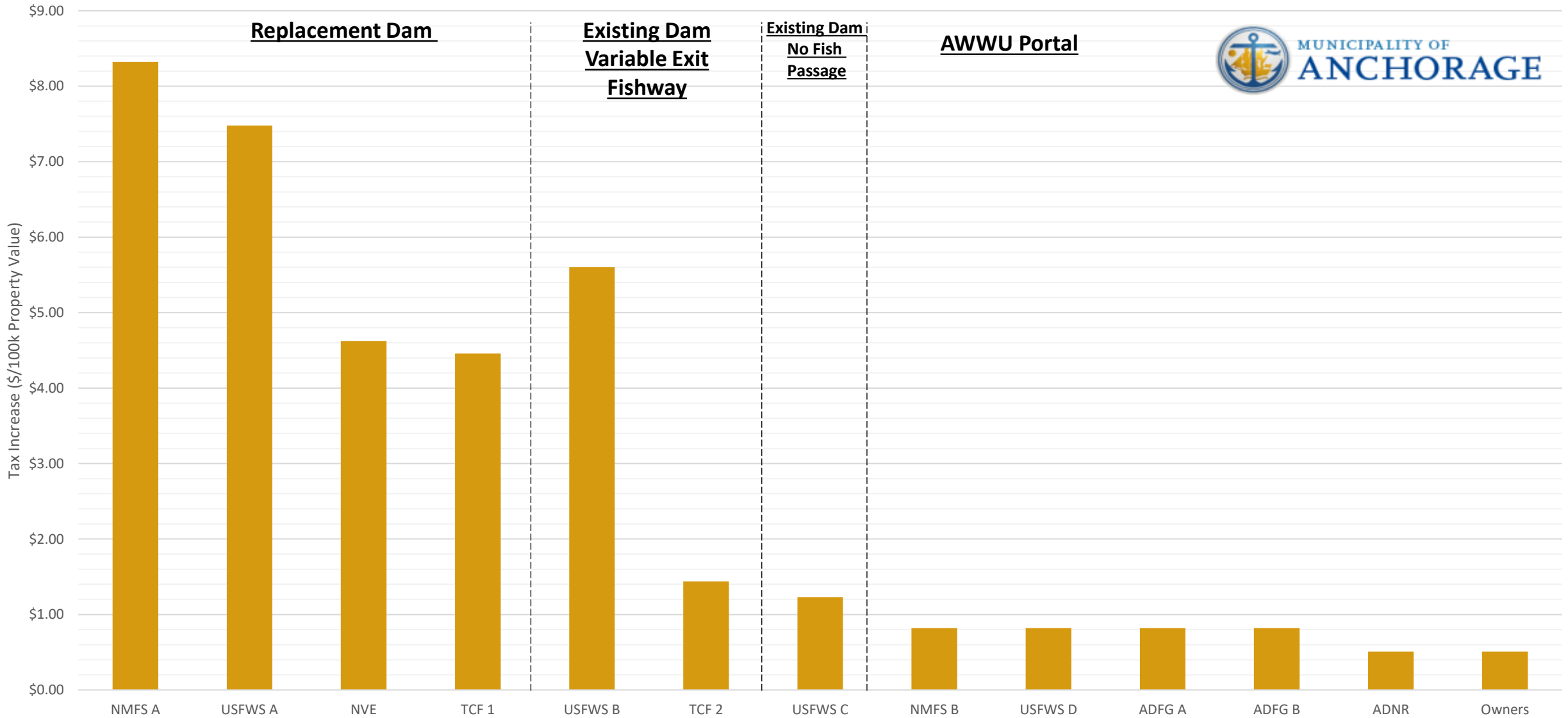
# Chugach Electric Ratepayer Impacts



# Matanuska Electric Ratepayer Impacts

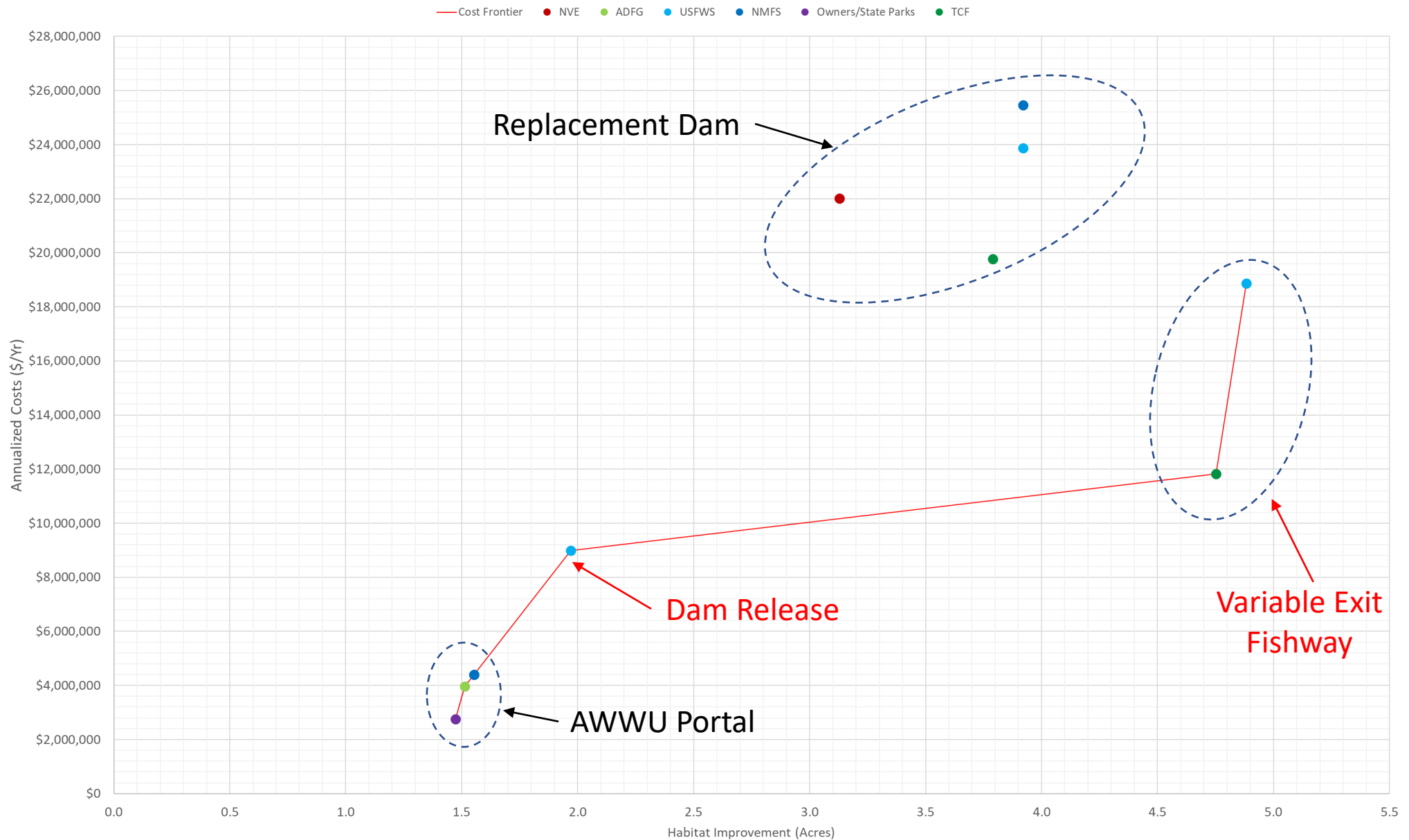


# MOA Property Tax Impacts





# Cost Effectiveness – Chinook Spawning Habitat





# Cost Effectiveness – Chinook Spawning Habitat

## Cost Effective Alternatives for Habitat Gains

- AWWU Portal – Flow Level 1
  - Owner/ADNR Alternative
  - Annual Costs - \$2.8M
  - Habitat Gains – 1.5 Acres
  - **\$1.9M/Acre**
- AWWU Portal – Flow Level 2
  - ADFG Alternative
  - Annual Costs - \$4.0M
  - Habitat Gains – 1.5 Acres
  - **\$2.6M/Acre**
- AWWU Portal – Flow Level 3
  - ADFG/NMFS Alternative
  - Annual Costs - \$4.4M
  - Habitat Gains – 1.6 Acres
  - **\$2.8M/Acre**
- Dam Release – USFWS Alt 1 Regime
  - USFWS Alternative
  - Annual Costs - \$9.0M
  - Habitat Gains – 2.0 Acres
  - **\$4.6M/Acre**
- Variable Exit Fishway – TCF Regime
  - TCF Alternative
  - Annual Costs - \$11.8M
  - Habitat Gains – 4.8 Acres
  - **\$2.5M/Acre**
- Variable Exit Fishway – USFWS Alt 1 Regime
  - USFWS Alternative
  - Annual Costs - \$18.9M
  - Habitat Gains – 4.9 Acres
  - **\$3.8M/Acre**



# Alternatives Analysis Meeting 4

- Presented everyone's preferred alternative(s)
- Presented results for potential velocity barriers in the canyon reach
- Discussed potential positive and negative impacts to:
  - Wetlands and Wildlife Habitat
  - Public Water Supply
  - Recreational Facilities and Uses



# Next Steps



# Next Steps

- **August 2023** – Alternatives Analysis Meeting 5
  - Discuss cultural resources
  - Discuss an appropriate monitoring program and adaptive management approach
- **October 2023** – Distribute Draft Fish and Wildlife Program
  - 30 days for review and comment
  - Attempt to resolve differences
- **January 2024** – Public Meetings (Anchorage and Mat-Su Valley)
- **April 2024** – Submit Proposed Final Fish and Wildlife Program
  - 60 days for parties to review and comment
  - 30 days for project owners to respond
  - Allows 2 months for Governor to consider
- **October 2024** – Governor issues Final Fish and Wildlife Program

