Eklutna Fish & Wildlife Program
Alternatives Analysis - Meeting 2

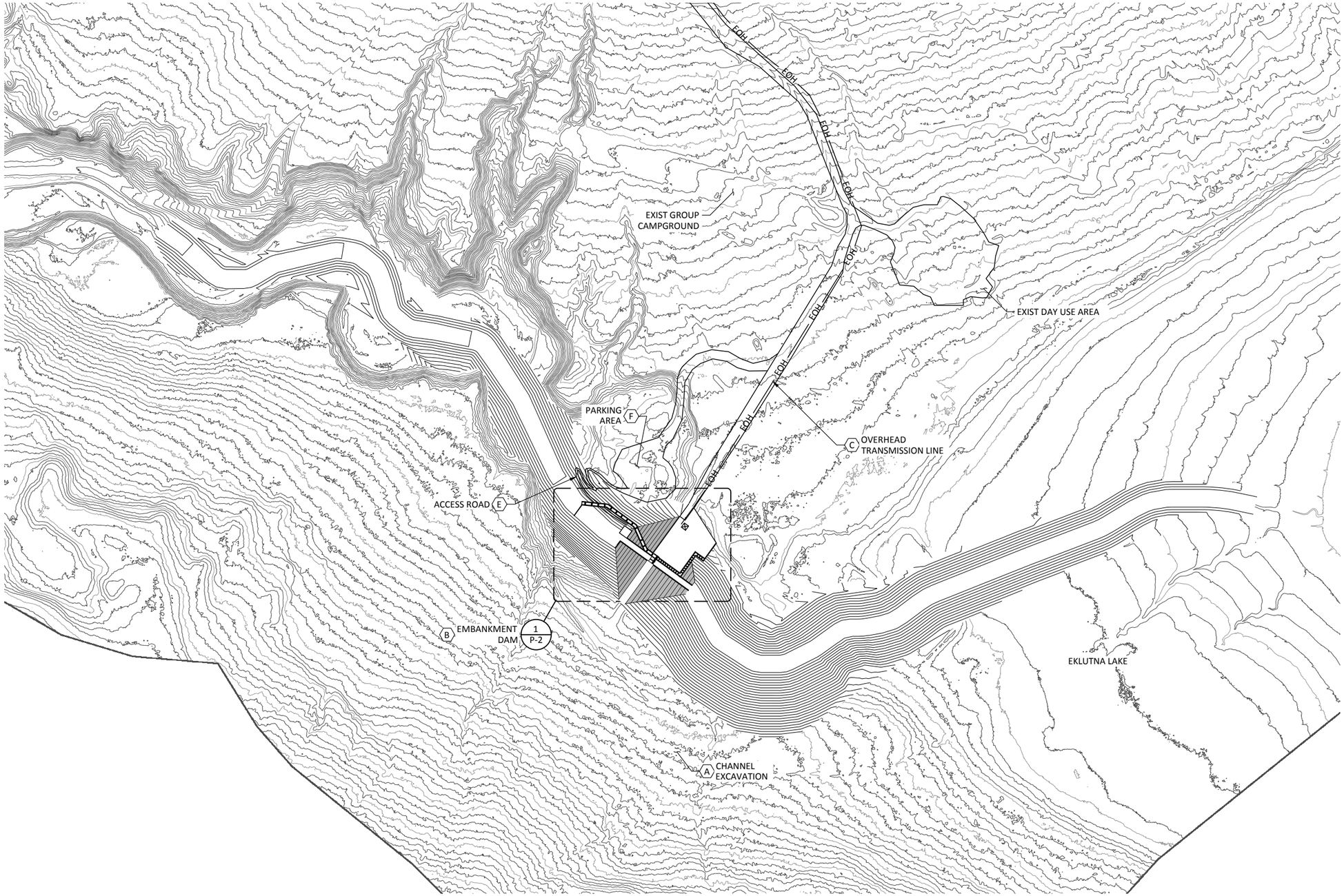
May 17, 2023

McMillen

Agenda

11:00 – 11:15	Introduction
11:15 – 11:45	Ph 1 Engineering – Replacement Dam
11:45 – 12:30	Comprehensive Alternatives
12:30 – 1:00	Lunch
1:00 – 2:45	Modeling Results
2:45 – 3:00	Next Steps
3:00	Adjourn

Phase 1 Engineering: Replacement Dam Alternative



SITE PLAN
SCALE: 1"= 200'

0" 200' 400'

N

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

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

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

McMillen

CHUGACH POWERING ALASKA'S FUTURE

EKLUTNA FISH & WILDLIFE PROJECT
ENGINEERING FEASIBILITY STUDY

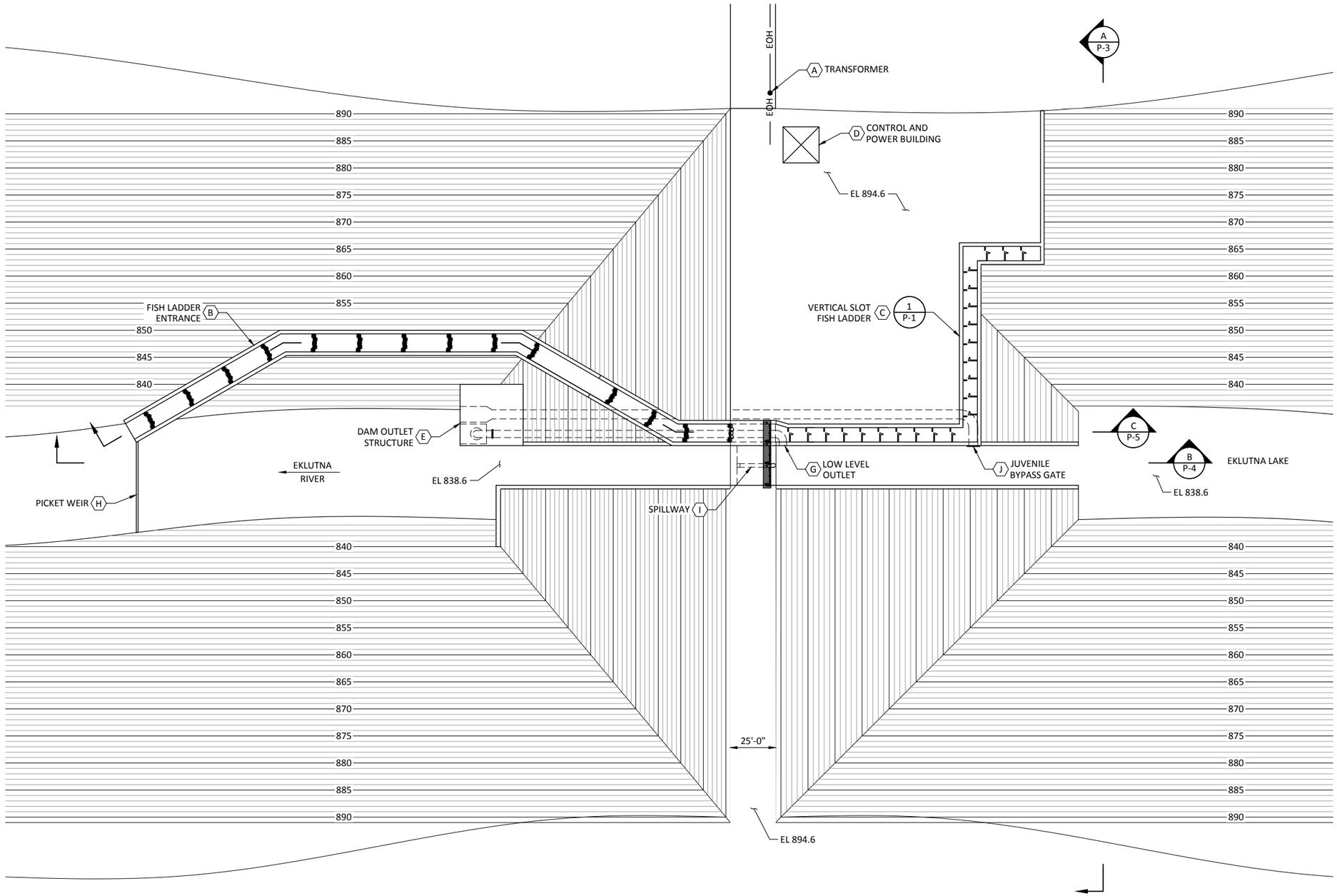
PME ALTERNATIVES ANALYSIS - FISH PASSAGE
REPLACEMENT DAM ALTERNATIVE
SITE PLAN

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

DRAWING
P-1

JOB NO: 000000

Path: C:\Vault\Chugach Electric\Eklutna Feasibility Study\P-1.dwg Plot date: May 08, 2023 05:58pm, CAD User: GuerreroRobert



EKLUTNA EMBANKMENT DAM

SCALE: 1"= 30'

0" 30' 60'

1 P-1

N

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.

E 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

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

WARNING

0 1/2 1

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

McMillen

CHUGACH POWERING ALASKA'S FUTURE

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

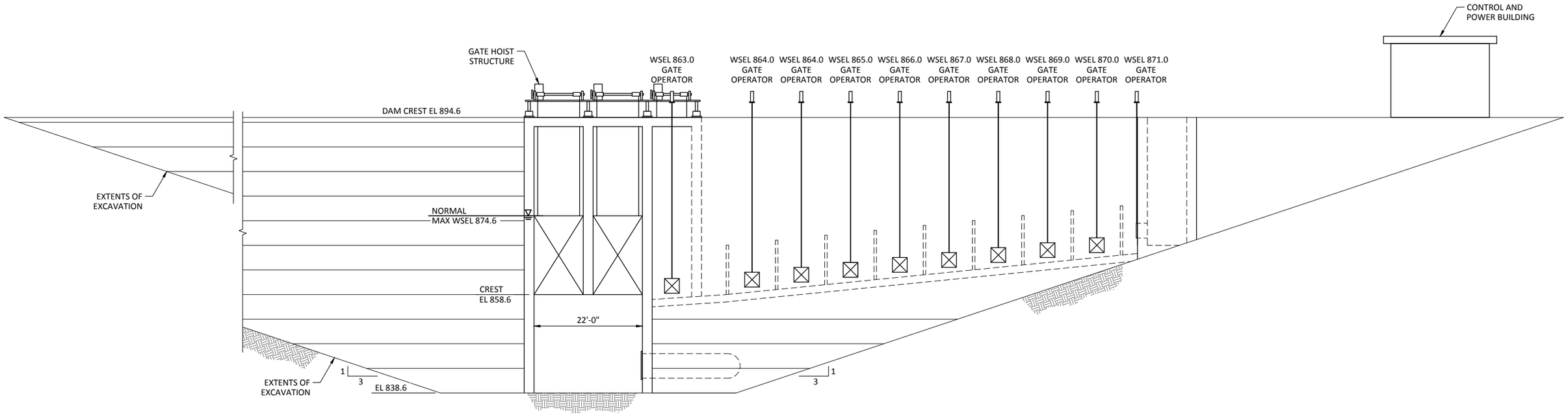
PROJECT DATE 05/12/23

DRAWING

P-2

SHEET NOTES:

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



SECTION
SCALE: 1"= 10'

A
P-2

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

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

McMillen

CHUGACH POWERING ALASKA'S FUTURE

EKLUTNA FISH & WILDLIFE PROJECT
ENGINEERING FEASIBILITY STUDY

PME ALTERNATIVES ANALYSIS - FISH PASSAGE
REPLACEMENT DAM ALTERNATIVE
SECTIONS AND DETAILS 2

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

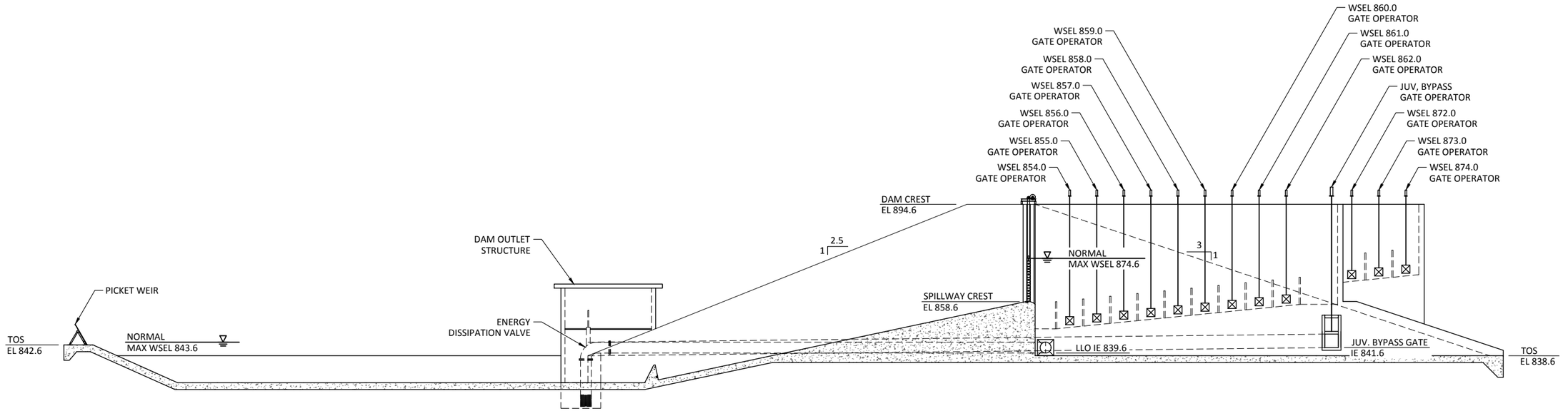
DRAWING
P-3

JOB NO: 000000

Path: C:\Vault\Chugach Electric\Eklutna Feasibility Study\P-3.dwg Plot date: May 08, 2023 05:58pm, CAD User: GuerreroRobert

SHEET NOTES:

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



SECTION
SCALE: 1"= 20'

0" 20' 40'

B
P-2

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

WARNING

0 1/2 1

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

McMillen

CHUGACH
POWERING ALASKA'S FUTURE

EKLUTNA FISH & WILDLIFE PROJECT

ENGINEERING FEASIBILITY STUDY

PME ALTERNATIVES ANALYSIS - FISH PASSAGE
REPLACEMENT DAM ALTERNATIVE
SECTIONS AND DETAILS 3

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

DRAWING

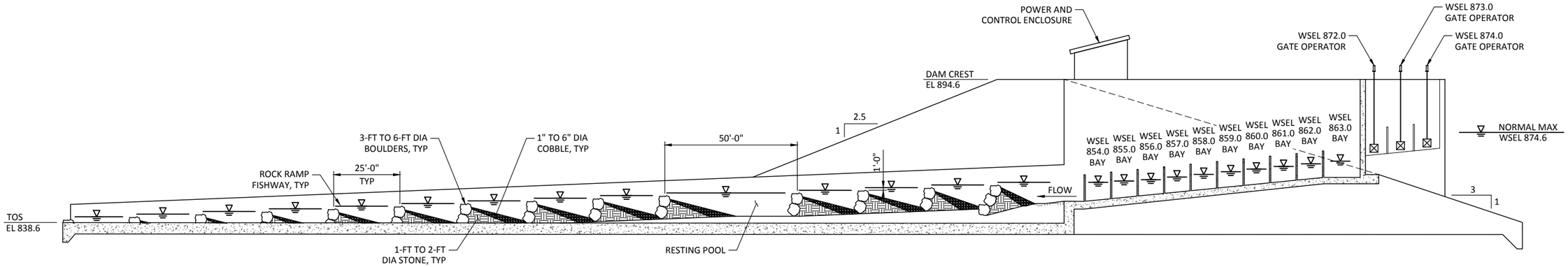
P-4

JOB NO: 000000

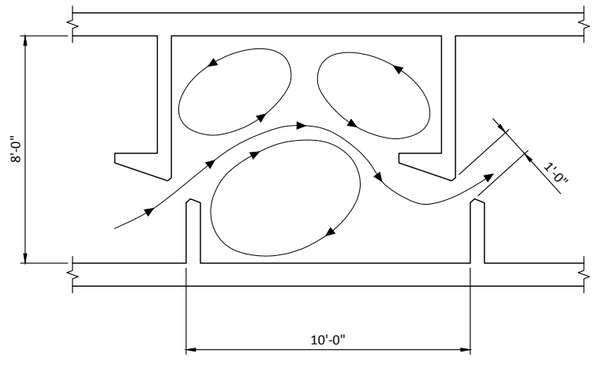
Path: C:\Vault\Chugach Electric\Eklutna Feasibility Study\P-4.dwg Plot date: May 08, 2023 05:58pm, CAD User: GuerreroRobert

SHEET NOTES:

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



SECTION
SCALE: 1"= 20'
0" 20' 40'
C P-2



VERTICAL SLOT POOL DETAIL, TYP
SCALE: 3/8"= 1'-0"
0' 2' 4'
1 P-2

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

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

McMillen

CHUGACH POWERING ALASKA'S FUTURE

EKLUTNA FISH & WILDLIFE PROJECT
ENGINEERING FEASIBILITY STUDY

PME ALTERNATIVES ANALYSIS - FISH PASSAGE
REPLACEMENT DAM ALTERNATIVE
SECTIONS AND DETAILS 5

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

DRAWING
P-5

JOB NO: 000000

Path: C:\Vault\Chugach Electric\Eklutna Feasibility Study\P-5.dwg Plot date: May 08, 2023 05:58pm, CAD User: GuerreroRobert

Class 5 Opinion of Probable Construction Costs

- 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)**

Comprehensive Alternatives

Stakeholder Consultation

- Received ~33 total alternatives from the following entities:
  - Native Village of Eklutna
  - Alaska Department of Fish and Game (ADFG)
  - Chugach State Park (ADNR)
  - National Marine Fisheries Service (NMFS)
  - U.S. Fish & Wildlife Service (USFWS)
  - Trout Unlimited
  - The Conservation Fund
  - Hydro Project Owners

Note:

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

Native Village of Eklutna

Native Village of Eklutna

Proposed PME Measures:

Flow Release Measure

- Replacement Dam w/ Fixed Wheel Gate & Ladder (Measure P)

Upstream Passage

- Naturelike Entrance w/ Variable Exit Ladder

Downstream Passage

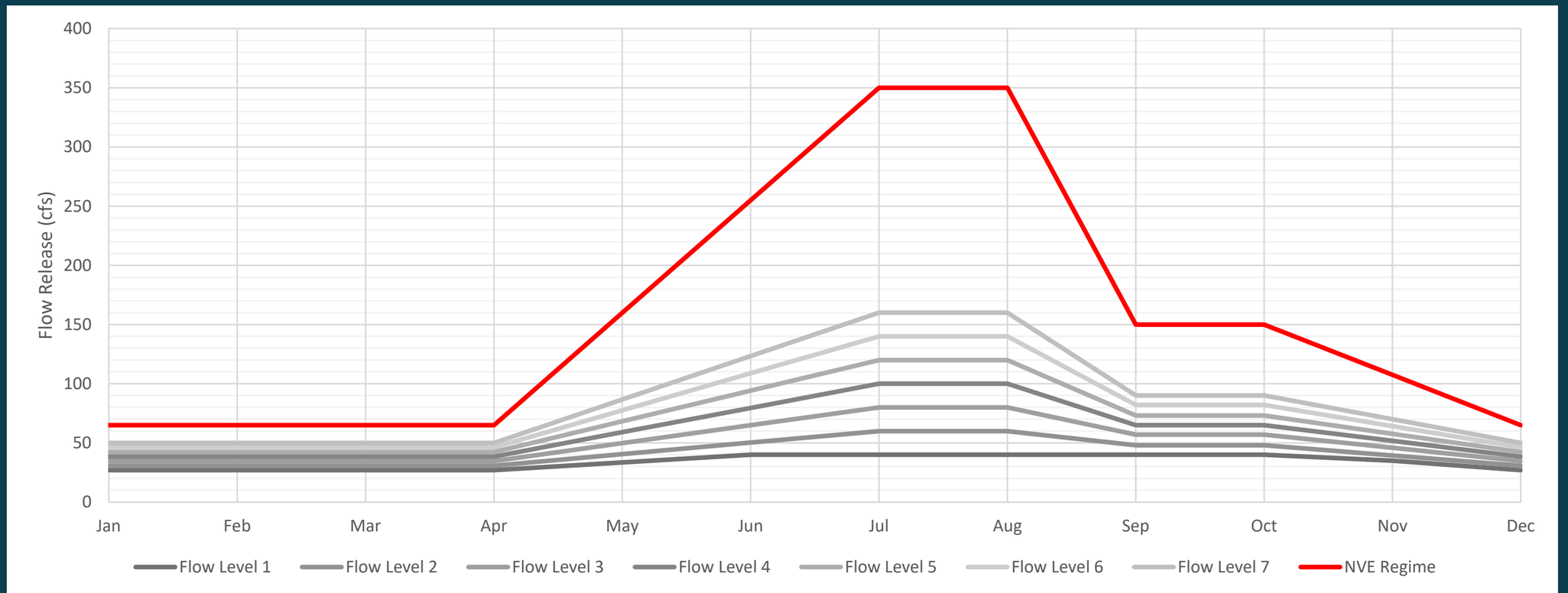
- Spill April / May / June

Other Improvements

- AWWU Bridge Construction
- Physical Habitat Improvements
- Full Lakeside Trail Improvements

Native Village of Eklutna

Eklutna Water Volume (Acre-Ft)								
	Inflows	Powerhouse Water Usage	AWWU Water Usage	Instream Flow Habitat Usage	Peak Water Releases (Gated)	Hydropower	Public Water Supply	Instream Flow
Baseline	262,456	238,444	24,670	0	0	**91%**	**9%**	**0%**
NVE Alt	262,456	120,909	24,670	114,207	2,287	**47%**	**9%**	**44%**



Channel Maintenance Flow = 700 cfs - 72 Hr - Annually

Alaska Department of Fish & Game

ADFG

Proposed PME Measures:

Flow Release Measure

- Replacement Dam w/ Fixed Wheel Gate & Ladder (Measure P);
- AWWU Portal Release (Measure C);
- Bypass Tunnel (Measure E)

Other Improvements

- AWWU Bridge Construction
- Physical Habitat Improvements
- Partial Lakeside Trail Improvements

Upstream Passage

- Naturelike Entrance w/ Variable Exit Ladder (Measure P)
- None (Measure C / E)

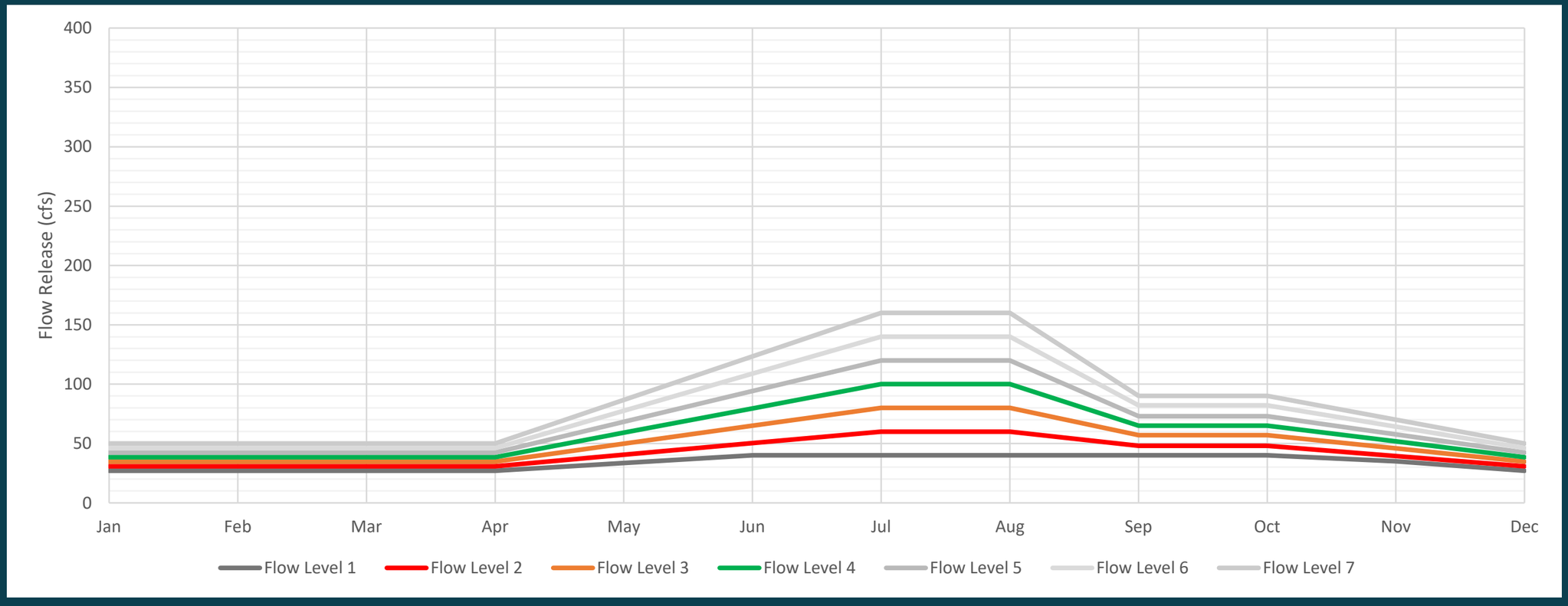
Downstream Passage

- Spill in May (Measure P)
- None (Measure C / E)

ADFG

Eklutna Water Volume (Acre-Ft)								
	Inflows	Powerhouse Water Usage	AWWU Water Usage	Instream Flow Habitat Usage	Peak Water Releases (Gated)	Hydropower	Public Water Supply	Instream Flow
Baseline	262,456	238,444	24,670	0	0	**91%**	**9%**	**0%**
Flow Level 2	262,456	206,962	24,670	31,121	1,051	**79%**	**9%**	**12%**
Flow Level 3	262,456	200,217	24,670	38,048	1,282	**76%**	**9%**	**14%**
Flow Level 4*	262,456	193,691	24,670	44,574	1,443	**74%**	**9%**	**17%**

*FL4 not possible through AWWU Portal Valve Alternative



Channel Maintenance Flow = 325/400/450 cfs - 72 Hr - 3 of 10 years

ADNR – State Parks

ADNR – State Parks

Proposed PME Measures:

Flow Release Measure

- AWWU Portal (Measure C)

Upstream Passage

- None

Downstream Passage

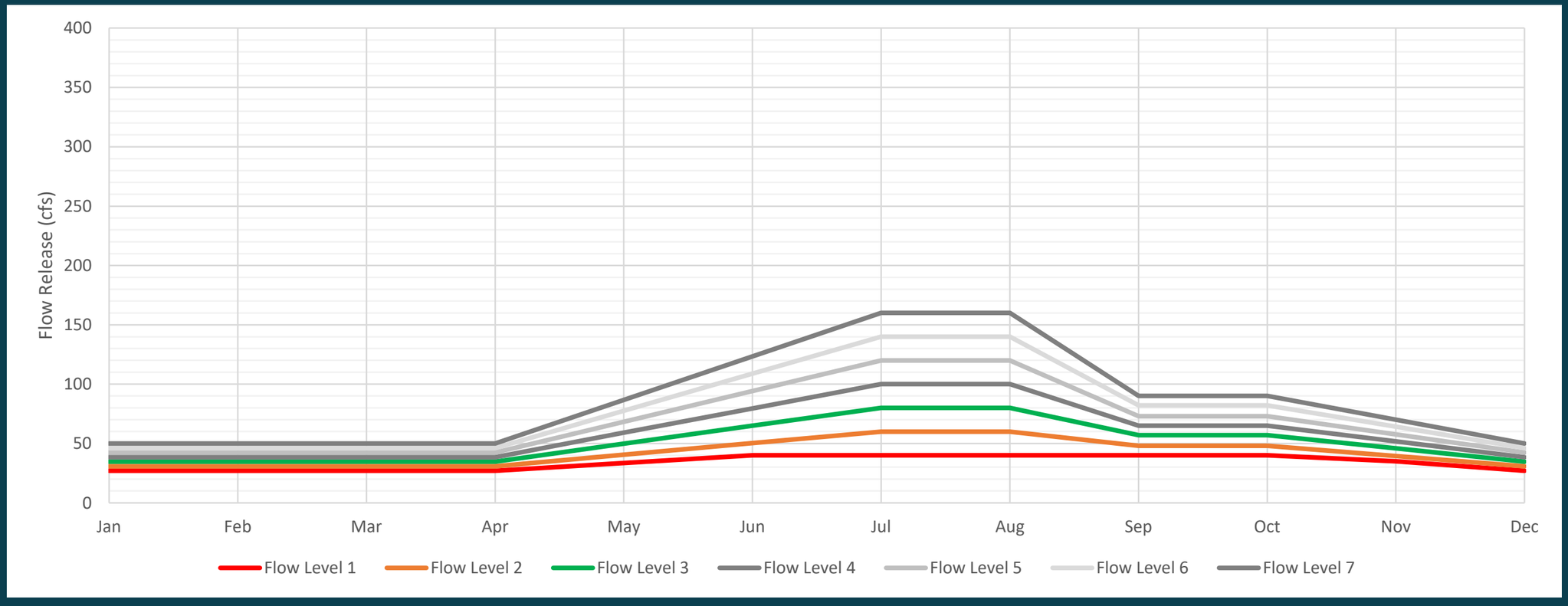
- None

Other Improvements

- AWWU Bridge Construction
- Partial Lakeside Trail Improvements

ADNR

Eklutna Water Volume (Acre-Ft)								
	Inflows	Powerhouse Water Usage	AWWU Water Usage	Instream Flow Habitat Usage	Peak Water Releases (Gated)	Hydropower	Public Water Supply	Instream Flow
Baseline	262,456	238,444	24,670	0	0	**91%**	**9%**	**0%**
Flow Level 1	262,456	212,804	24,670	25,023	654	**81%**	**9%**	**10%**
Flow Level 2	262,456	206,380	24,670	31,303	1,062	**79%**	**9%**	**12%**
Flow Level 3	262,456	199,539	24,670	38,055	1,307	**76%**	**9%**	**15%**



Channel Maintenance Flow = 200/325/400 cfs - 72 Hr - 3 Years

National Marine Fisheries Service

NMFS

Proposed PME Measures:

Flow Release Measure

- Replacement Dam w/ Fixed Wheel Gate & Ladder (Measure P)
- Existing Dam Release w/ Fixed Wheel Gate – No Fish Passage (Measure A)

Upstream Passage

- Naturelike Entrance w/ Variable Exit Ladder (Measure P)
- None (Measure A)

Downstream Passage

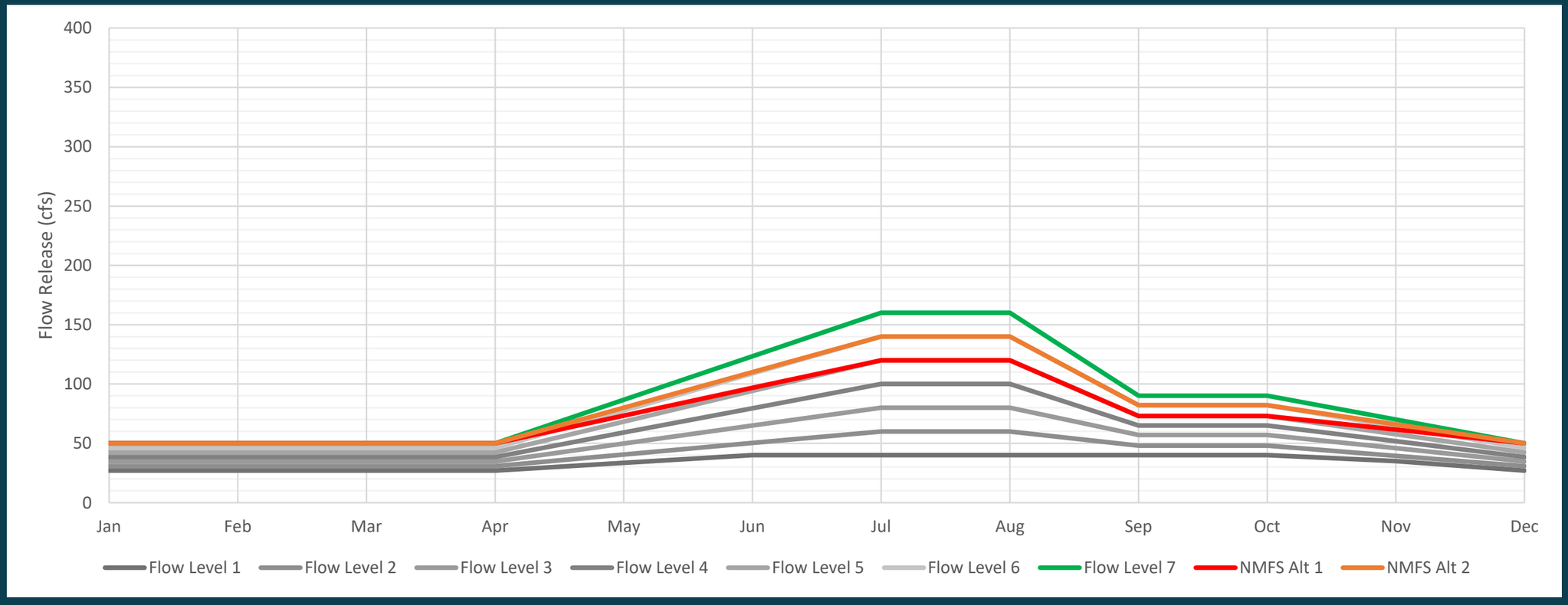
- Floating Surface Collector (Measure P)
- None (Measure C / E)

Other Improvements

- AWWU Bridge Construction
- Partial Lakeside Trail Improvements
- Physical Habitat Improvements

NMFS

Eklutna Water Volume (Acre-Ft)								
	Inflows	Powerhouse Water Usage	AWWU Water Usage	Instream Flow Habitat Usage	Peak Water Releases (Gated)	Hydropower	Public Water Supply	Instream Flow
Baseline	262,456	238,444	24,670	0	0	**91%**	**9%**	**0%**
FL 5 Modified	262,456	183,064	24,670	54,084	1,634	**70%**	**9%**	**21%**
FL 6 Modified	262,456	177,836	24,670	59,258	1,797	**68%**	**9%**	**23%**
FL 7	262,456	172,758	24,670	64,281	1,961	**66%**	**9%**	**25%**



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

U.S. Fish & Wildlife Service

USFWS

Proposed PME Measures:

Flow Release Measure

- Replacement Dam w/ Fixed Wheel Gate & Ladder (Measure P)
- Existing Dam with Fixed Wheel Gate and Variable Fish Ladder (Measure K)

Upstream Passage

- Naturelike Entrance w/ Variable Exit Ladder (Measure P)
- Variable Exit Fishway (Measure K)

Downstream Passage

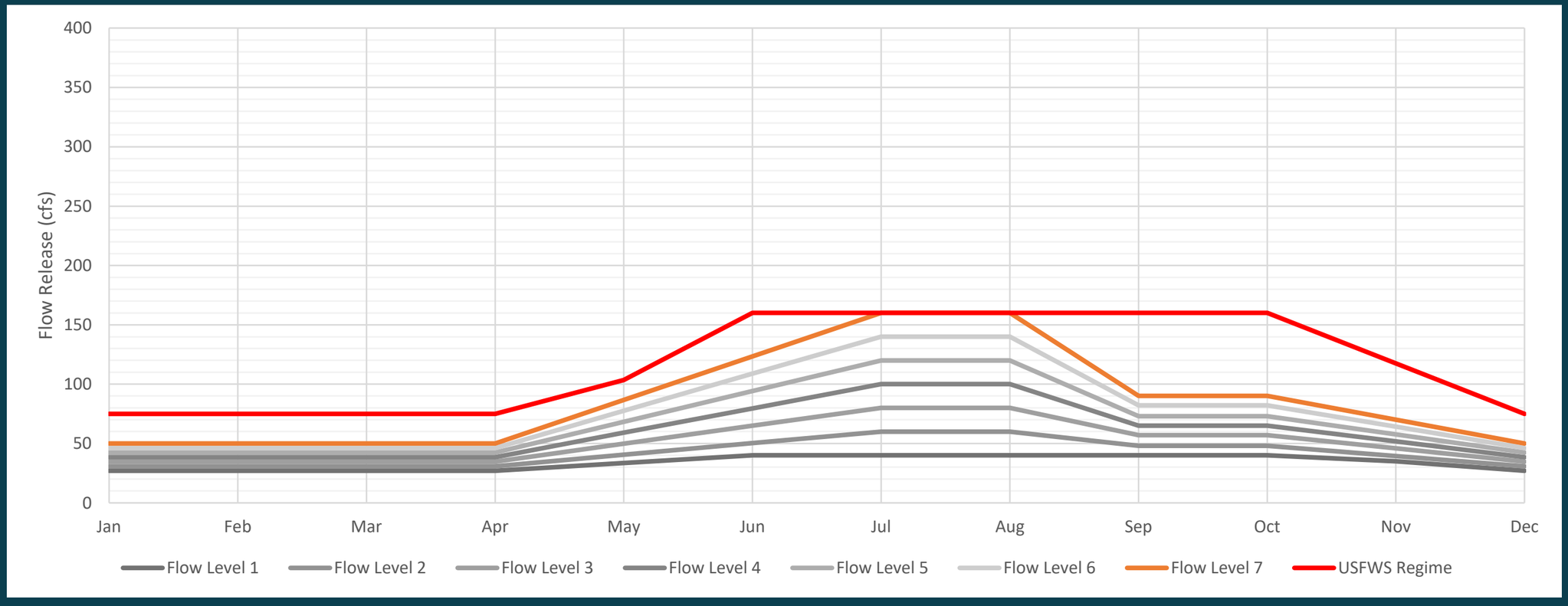
- Floating Surface Collector
- Spill (April/May/June)

Other Improvements

- AWWU Bridge Construction
- Partial Lakeside Trail Improvements
- Physical Habitat Improvements

USFWS

Eklutna Water Volume (Acre-Ft)								
	Inflows	Powerhouse Water Usage	AWWU Water Usage	Instream Flow Habitat Usage	Peak Water Releases (Gated)	Hydropower	Public Water Supply	Instream Flow
Baseline	262,456	238,444	24,670	0	0	**91%**	**9%**	**0%**
FL7 - FSC	262,456	171,191	24,670	64,281	1,961	**66%**	**9%**	**25%**
FL7 - Spill	262,456	156,269	24,670	79,204	1,961	**60%**	**9%**	**30%**
Alt 1 - FSC	262,456	149,085	24,670	86,338	1,961	**57%**	**9%**	**33%**
Alt 1 - Spill	262,456	136,772	24,670	98,651	1,961	**53%**	**9%**	**38%**



Channel Maintenance Flow = 600 cfs - 72 Hr - Annually

Trout Unlimited

Trout Unlimited

Proposed PME Measures:

Flow Release Measure

- Replacement Dam w/ Fixed Wheel Gate & Ladder (Measure P)
- Existing Dam with Fixed Wheel Gate and Variable Fish Ladder (Measure K)

Upstream Passage

- Naturelike Entrance w/ Variable Exit Ladder (Measure P)
- Variable Exit Fishway (Measure K)

Downstream Passage

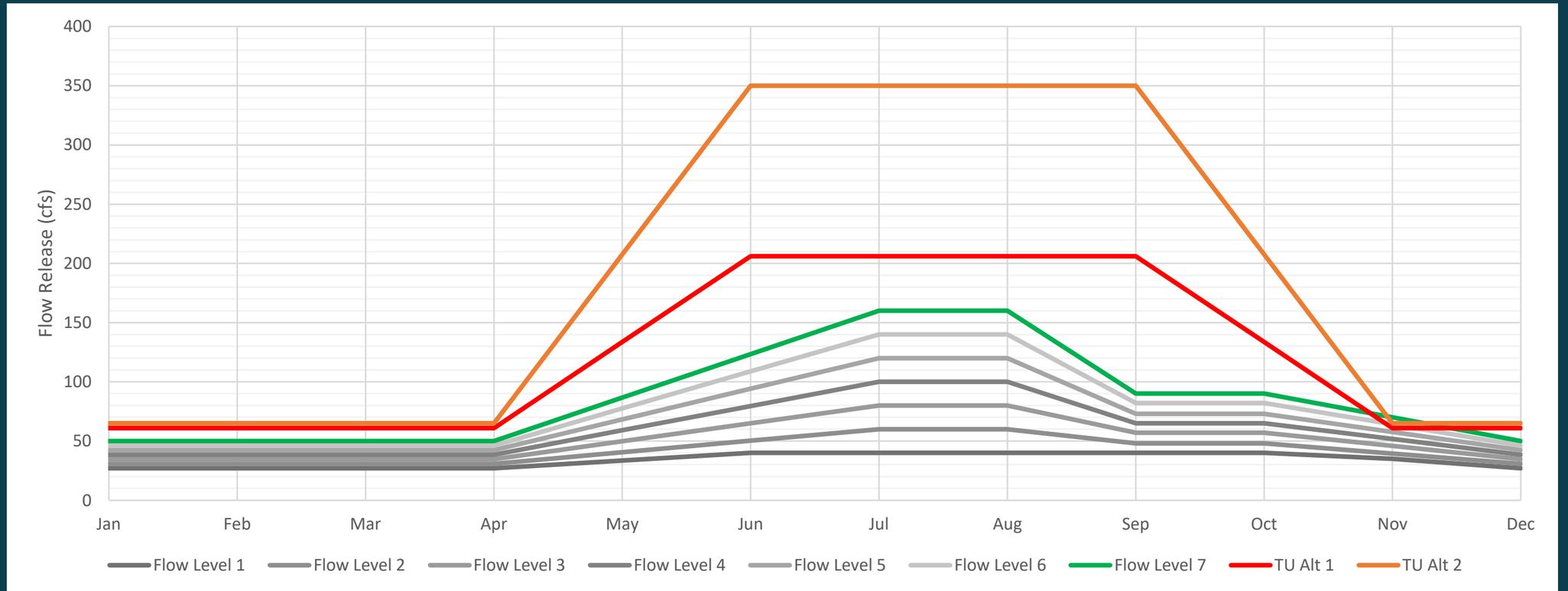
- Spill (April/May/June) *TBD on Timing

Other Improvements

- AWWU Bridge Construction
- Partial Lakeside Trail Improvements
- Physical Habitat Improvements

Trout Unlimited

Eklutna Water Volume (Acre-Ft)								
	Inflows	Powerhouse Water Usage	AWWU Water Usage	Instream Flow Habitat Usage	Peak Water Releases (Gated)	Hydropower	Public Water Supply	Instream Flow
Baseline	262,456	238,444	24,670	0	0	**91%**	**9%**	**0%**
TU FL7	262,456	156,529	24,670	79,204	1,961	**60%**	**9%**	**30%**
TU Alt 1	262,456	136,817	24,670	98,307	2,287	**53%**	**9%**	**38%**
TU Alt 2	262,456	99,282	24,670	135,835	2,287	**38%**	**9%**	**52%**



Channel Maintenance Flow = 600/700 cfs - 72 Hr - Annually

Hydro Project Owners
CEA/MEA/MOA

Hydro Project Owners

Proposed PME Measures:

Flow Release Measure

- AWWU Portal (Measure C)
- AWWU Pipeline (Measure D)

Upstream Passage

- None

Downstream Passage

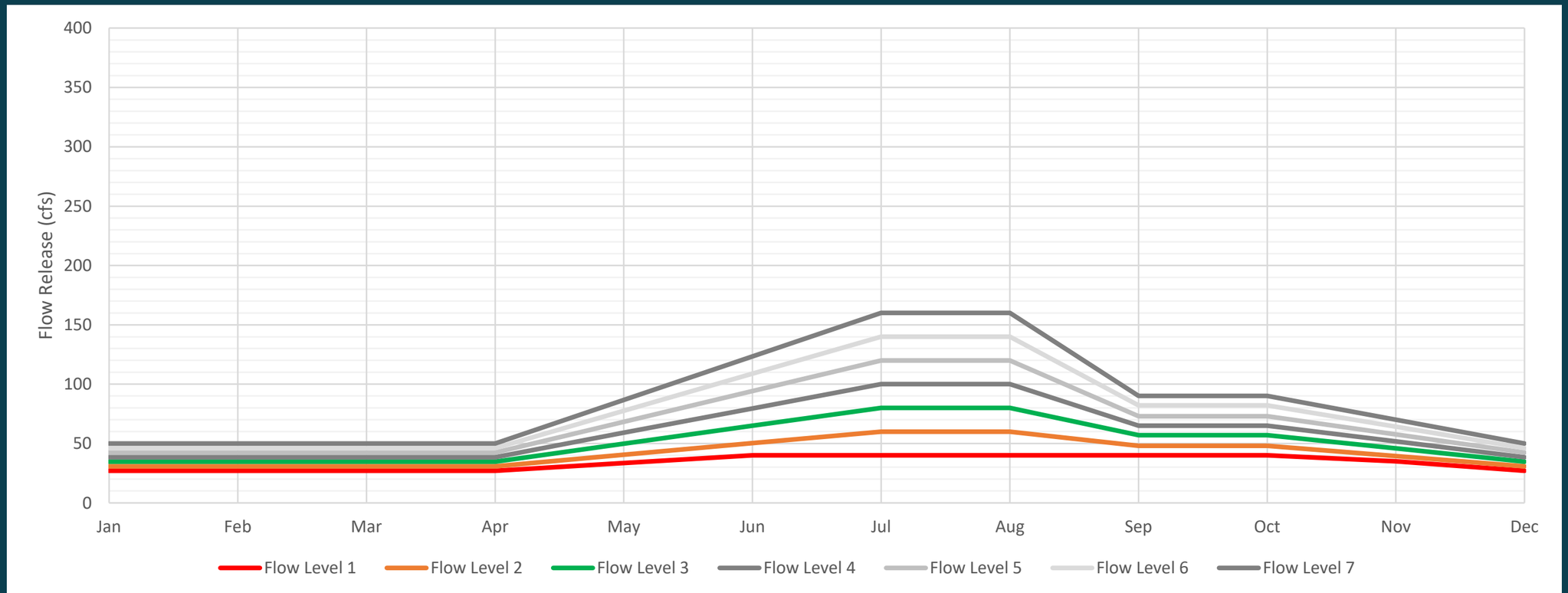
- None

Other Improvements

- AWWU Bridge Construction
- Partial Lakeside Trail Improvements

CEA
MEA
MOA

Eklutna Water Volume (Acre-Ft)								
	Inflows	Powerhouse Water Usage	AWWU Water Usage	Instream Flow Habitat Usage	Peak Water Releases (Gated)	Hydropower	Public Water Supply	Instream Flow
Baseline	262,456	238,444	24,670	0	0	**91%**	**9%**	**0%**
Flow Level 1	262,456	212,804	24,670	25,023	654	**81%**	**9%**	**10%**
Flow Level 2	262,456	206,380	24,670	31,303	1,062	**79%**	**9%**	**12%**
Flow Level 3	262,456	199,539	24,670	38,055	1,307	**76%**	**9%**	**15%**



Channel Maintenance Flow = 200/325/400 cfs - 72 Hr - 3 of 10 Years

The Conservation Fund

The Conservation Fund

Proposed PME Measures:

Flow Release Measure

- Replacement Dam w/ Fixed Wheel Gate & Ladder (Measure P)

Upstream Passage

- Naturelike Entrance w/ Variable Exit Ladder (Measure P)

Downstream Passage

- Spill (April/May/June) *TBD on Timing

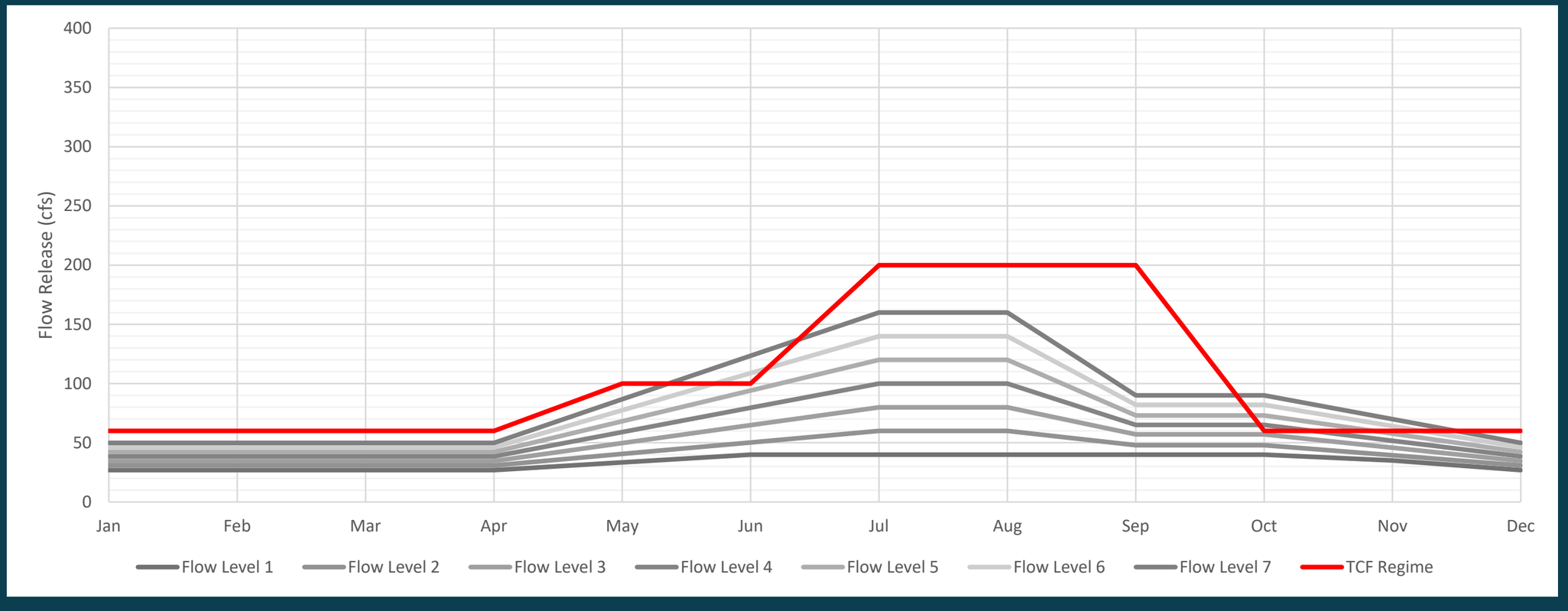
Other Improvements

- None*

*Other infrastructural improvement cost should fall outside the scope of this project

TCF

Eklutna Water Volume (Acre-Ft)								
	Inflows	Powerhouse Water Usage	AWWU Water Usage	Instream Flow Habitat Usage	Peak Water Releases (Gated)	Powerhouse	AWWU	Instream Flow
Baseline	262,456	238,444	24,670	0	0	**91%**	**9%**	**0%**
TCF Alt	262,456	142,850	24,670	91,589	2,975	**55%**	**10%**	**35%**



Channel Maintenance Flow = 1500 cfs - 24 Hr - Annually

PME Measures Not Considered

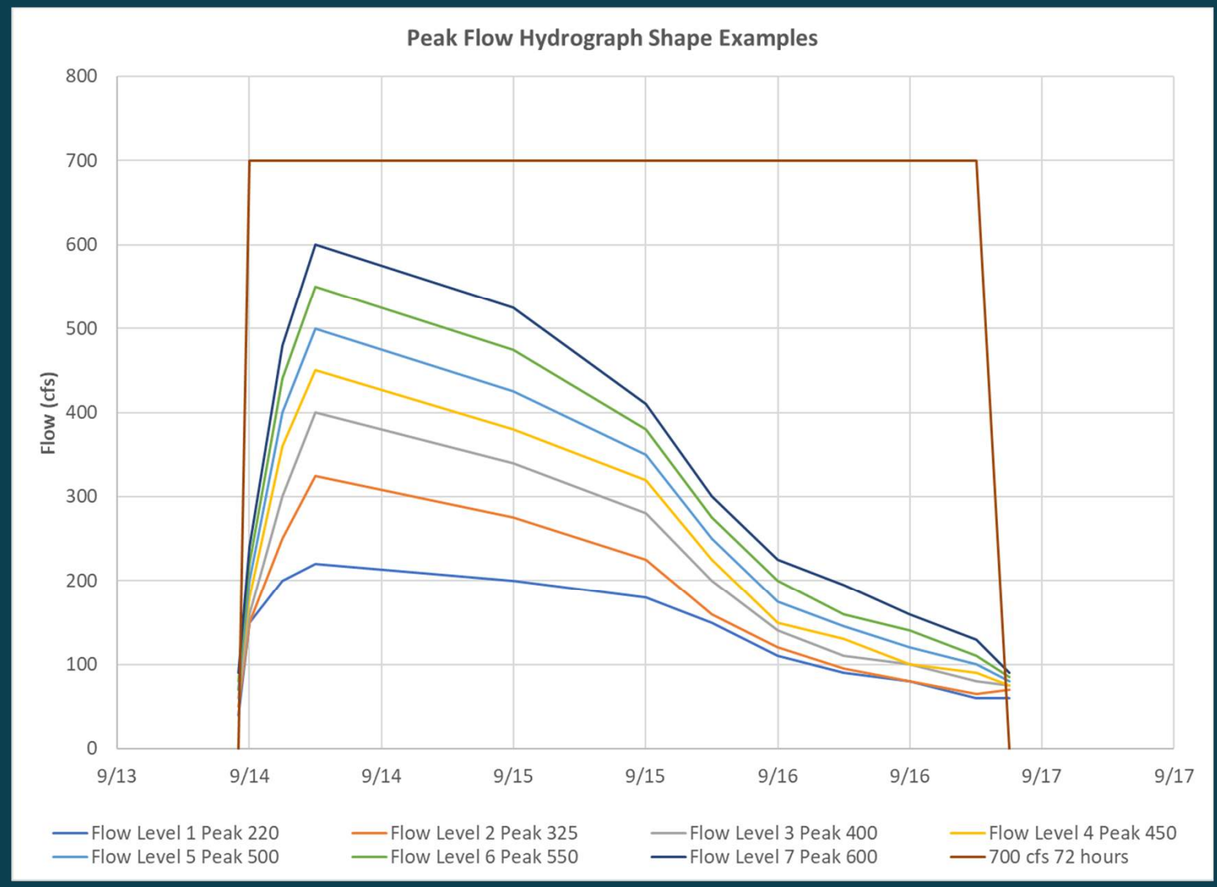
- Lach Q’Atnu Re-route
- Siphon Bypass
- Pumped Supply & Slide Fish Ladder
- Gravity Flow Fish Ladder
- Trap and Haul
- Tainter Gate (El. 871)

Geomorphic Considerations

Geomorphic Considerations

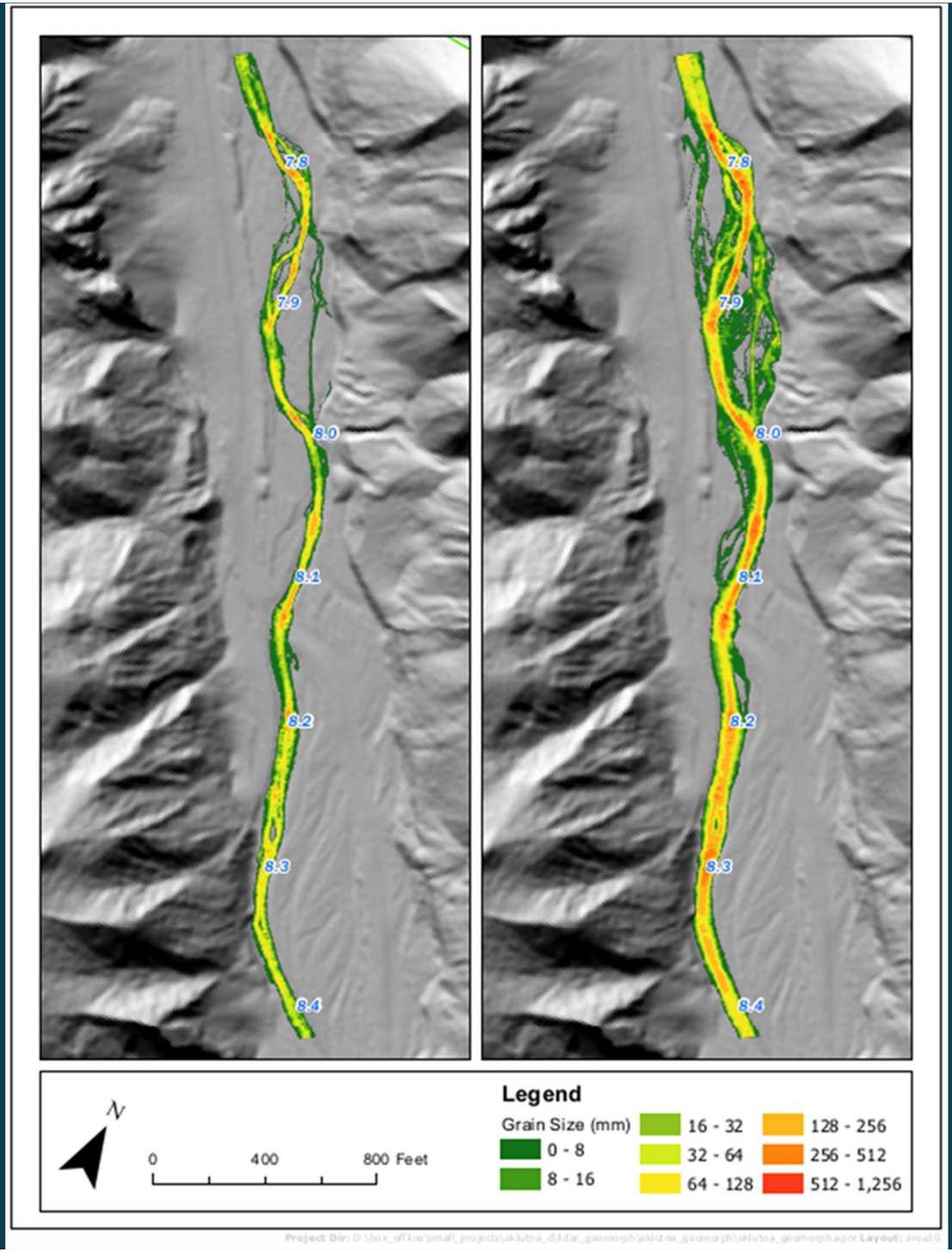
- Effects of flow regime on substrate, channel maintenance
- HEC-RAS 1-D model results (substrate, cross section/profile changes)
  - 35 years
  - Shape of peak flow hydrograph
    (72 hours full peak vs. shaped peak)

- Initial results – can be used to help tweak peak flow proposals

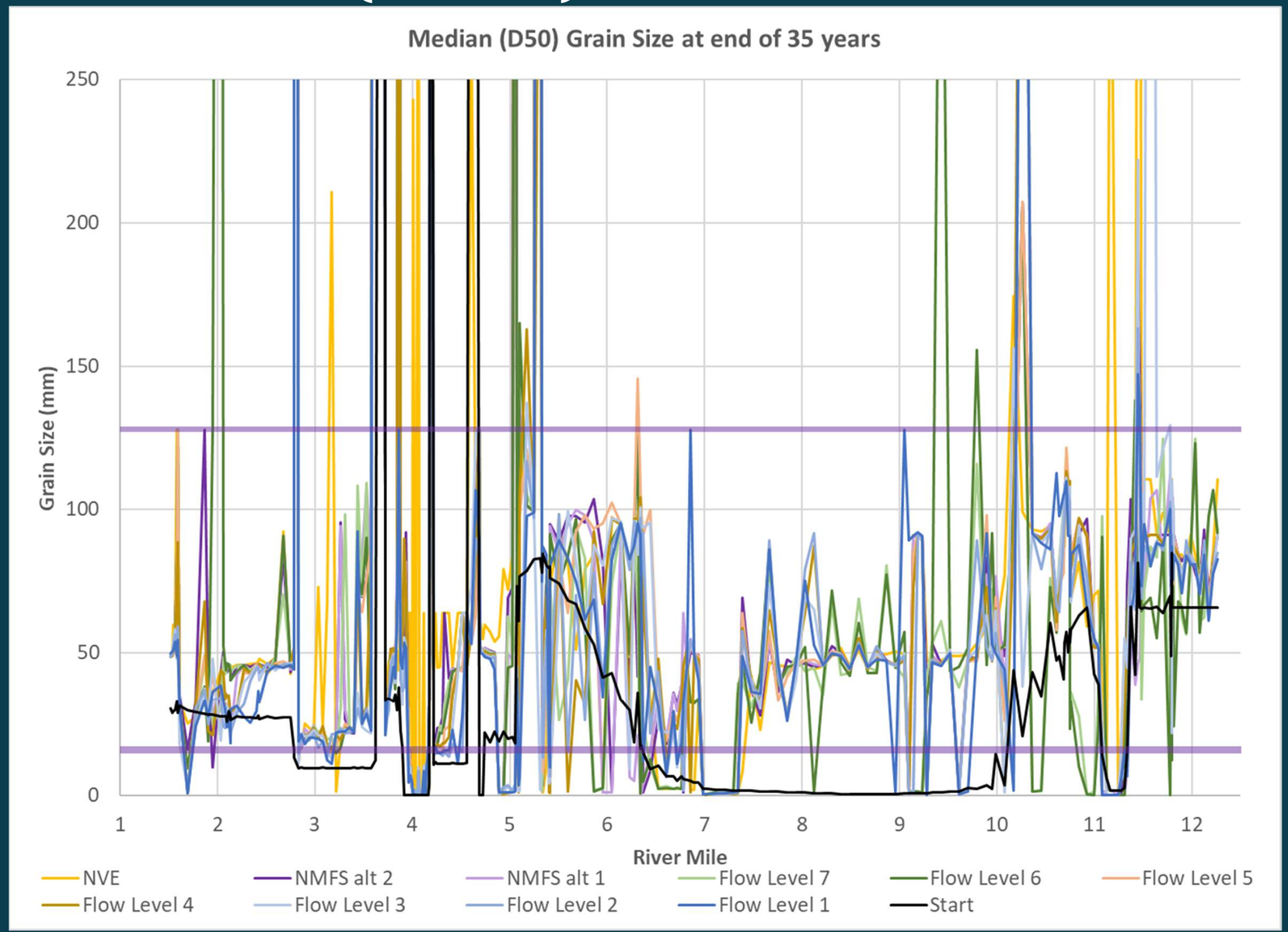


2-D Model Output Example

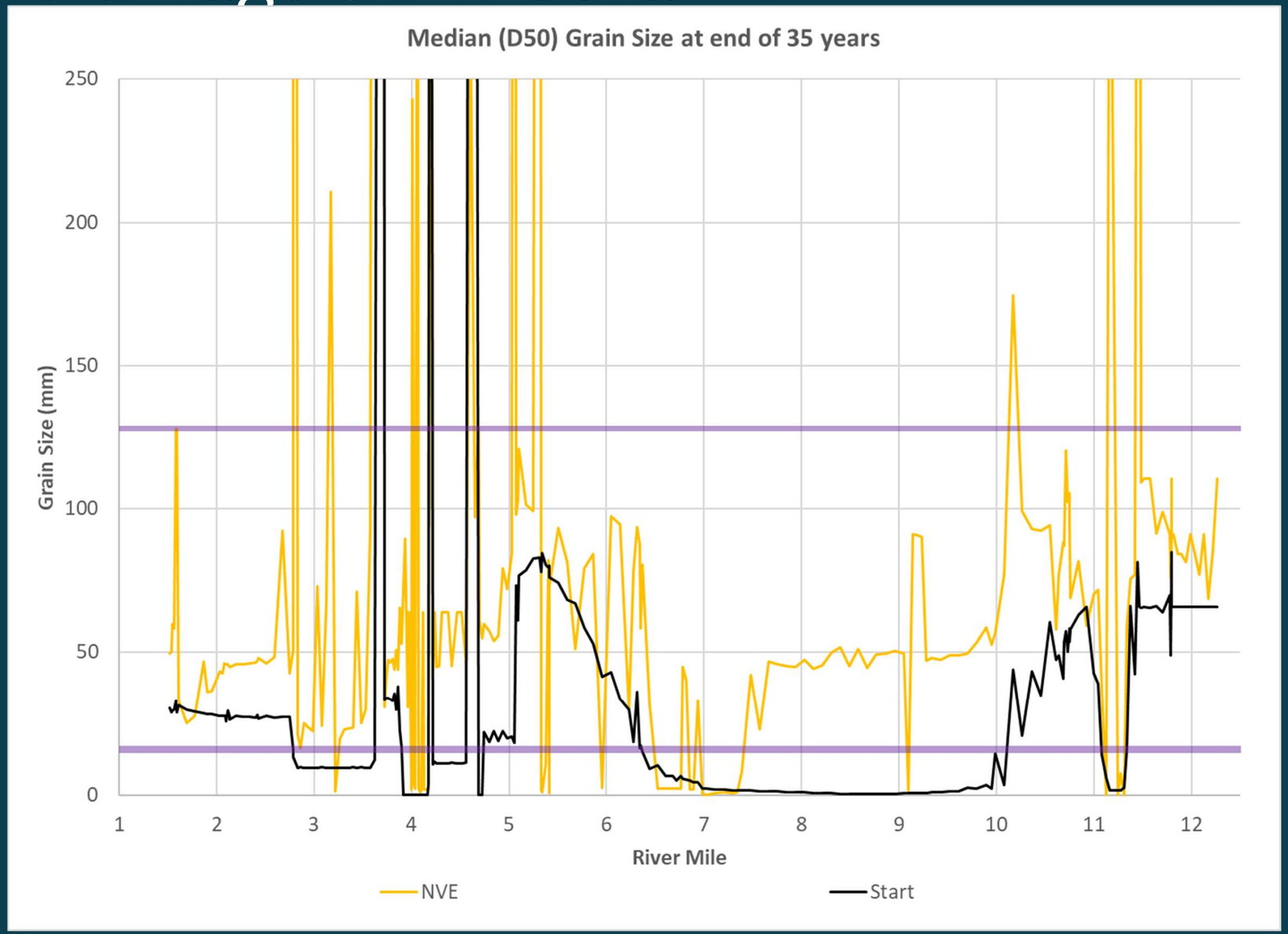
- 2-D model at 4 locations
- Can show more detail of sediment transport capacity across channel area



All Alternatives (so far)

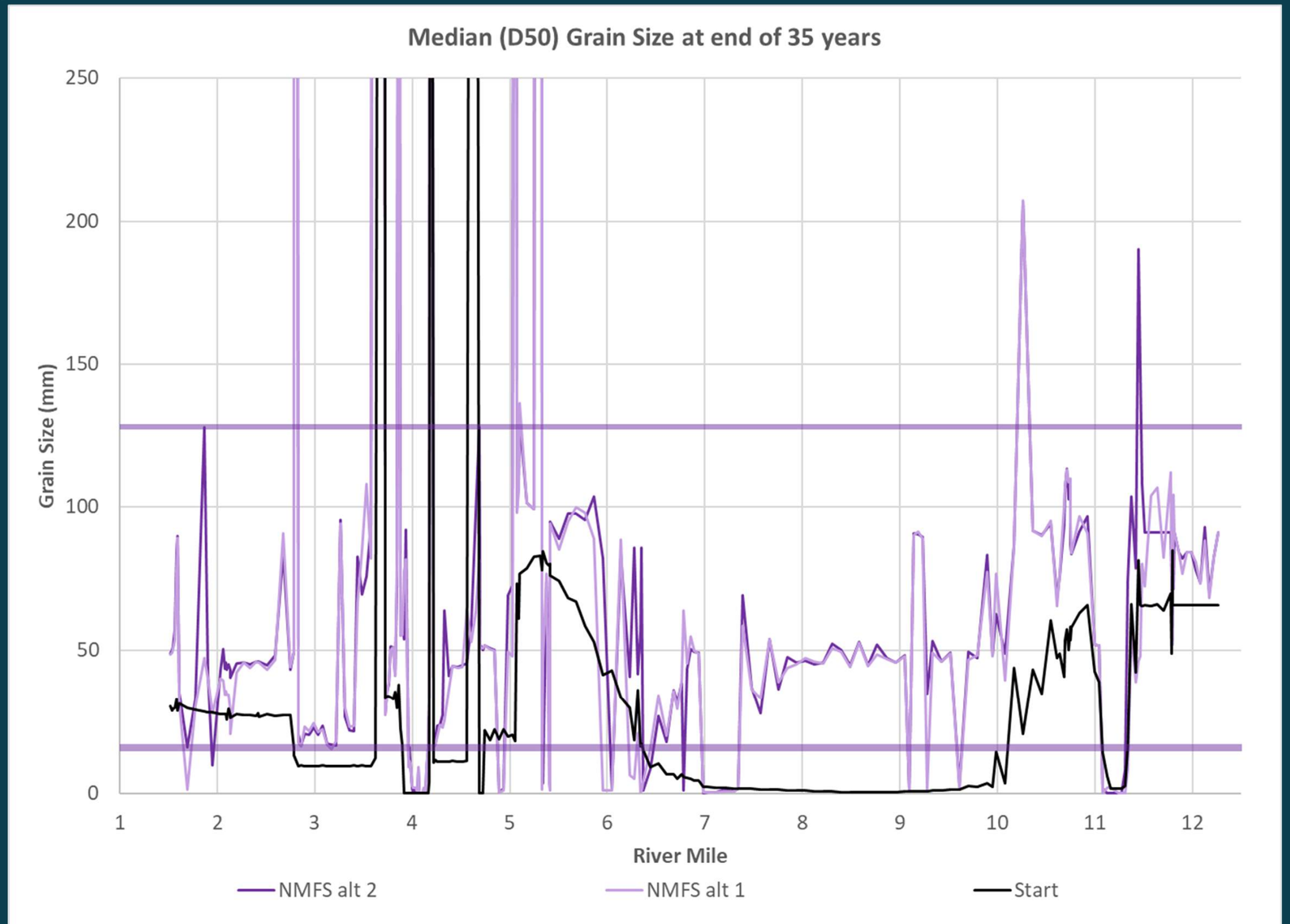


Native Village of Eklutna



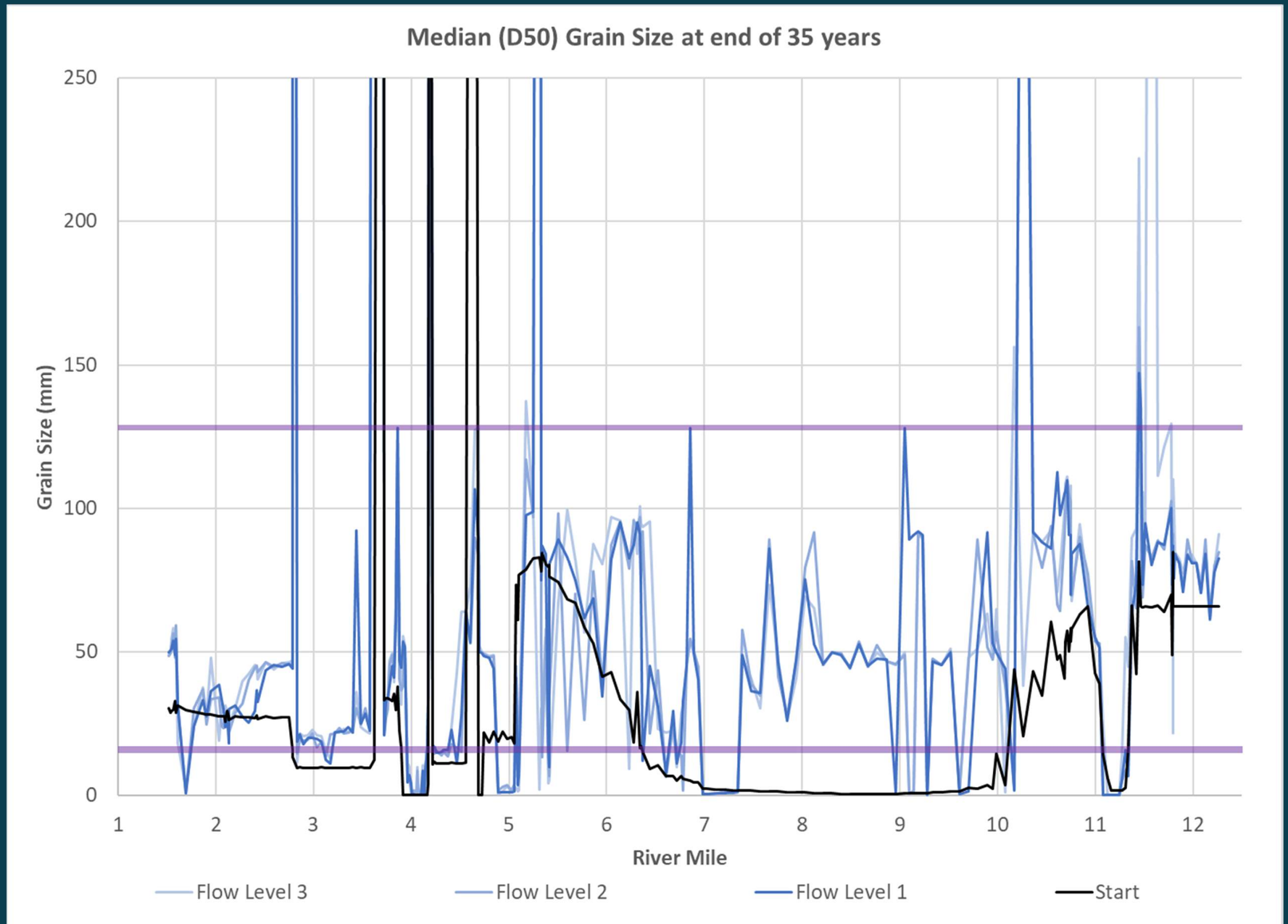
Channel Maintenance Flow = 700 cfs - 72 Hr - Annually

NMFS



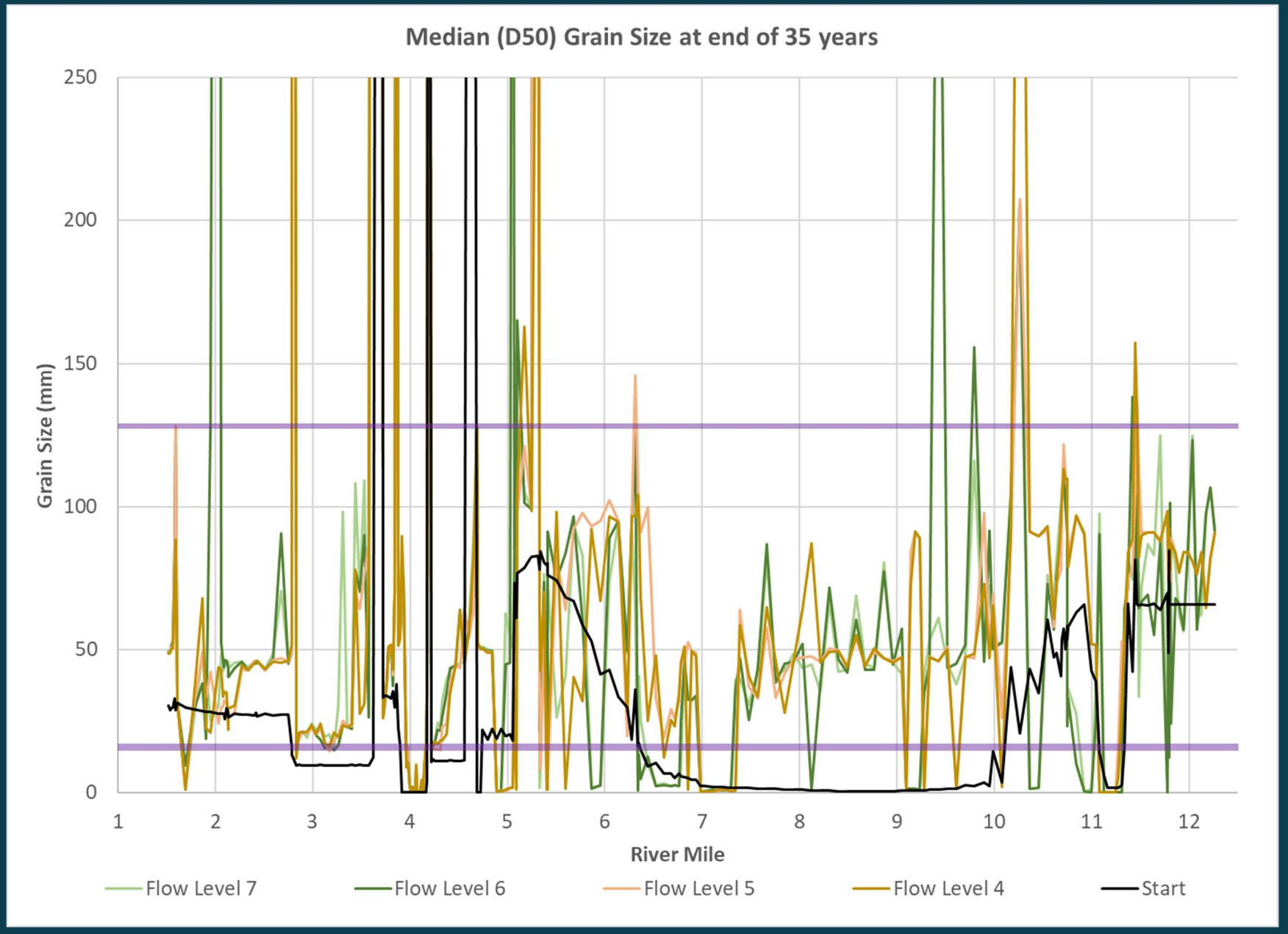
Channel Maintenance Flow = 500/550 - 72 Hr not shaped - every 3 Years

CEA
MEA
MOA
Alts 1-3



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

Alts 4-7

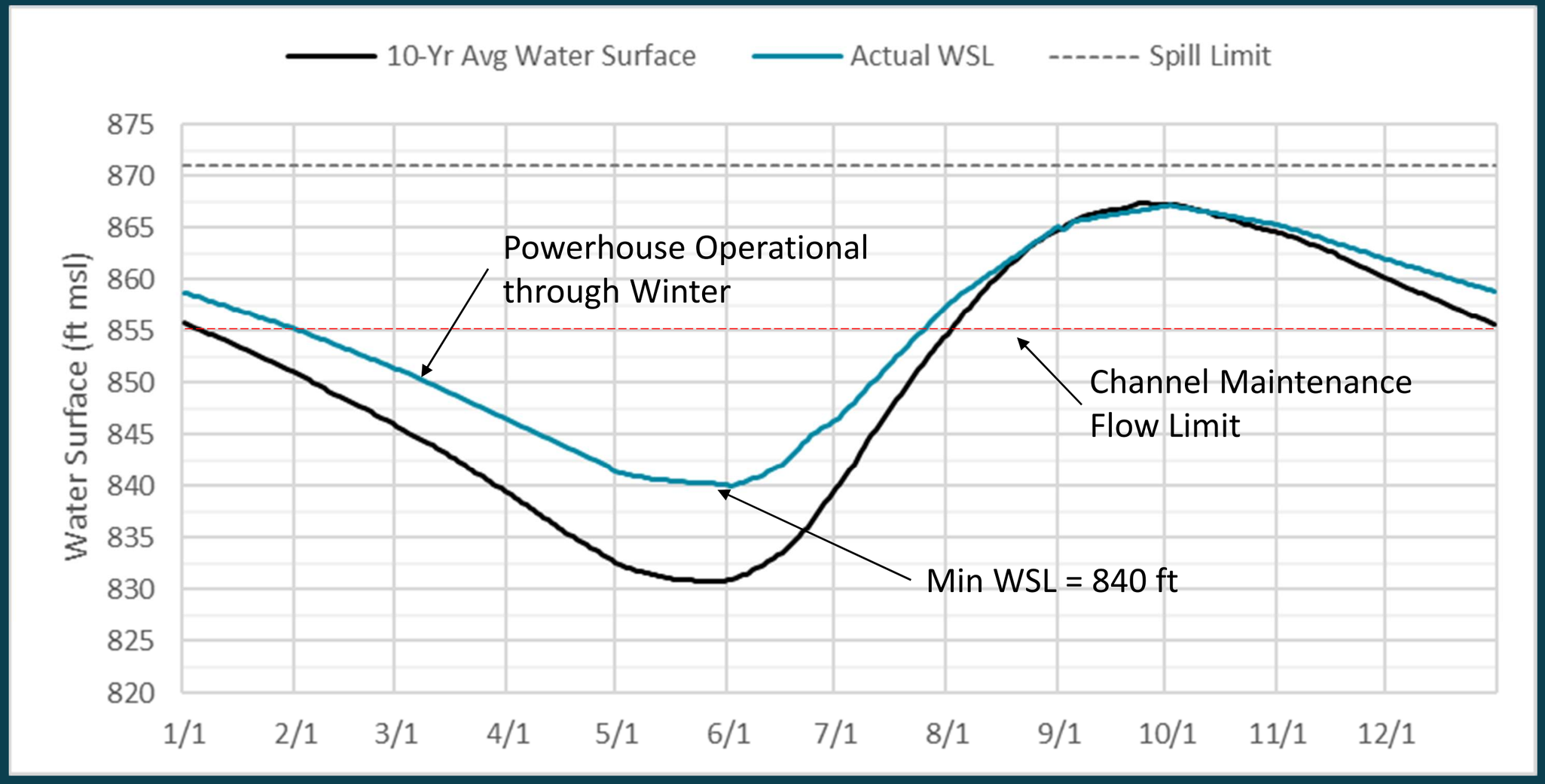


Channel Maintenance Flow = 450/500/550/600 cfs - 72 Hr Shaped - Every 3 Years

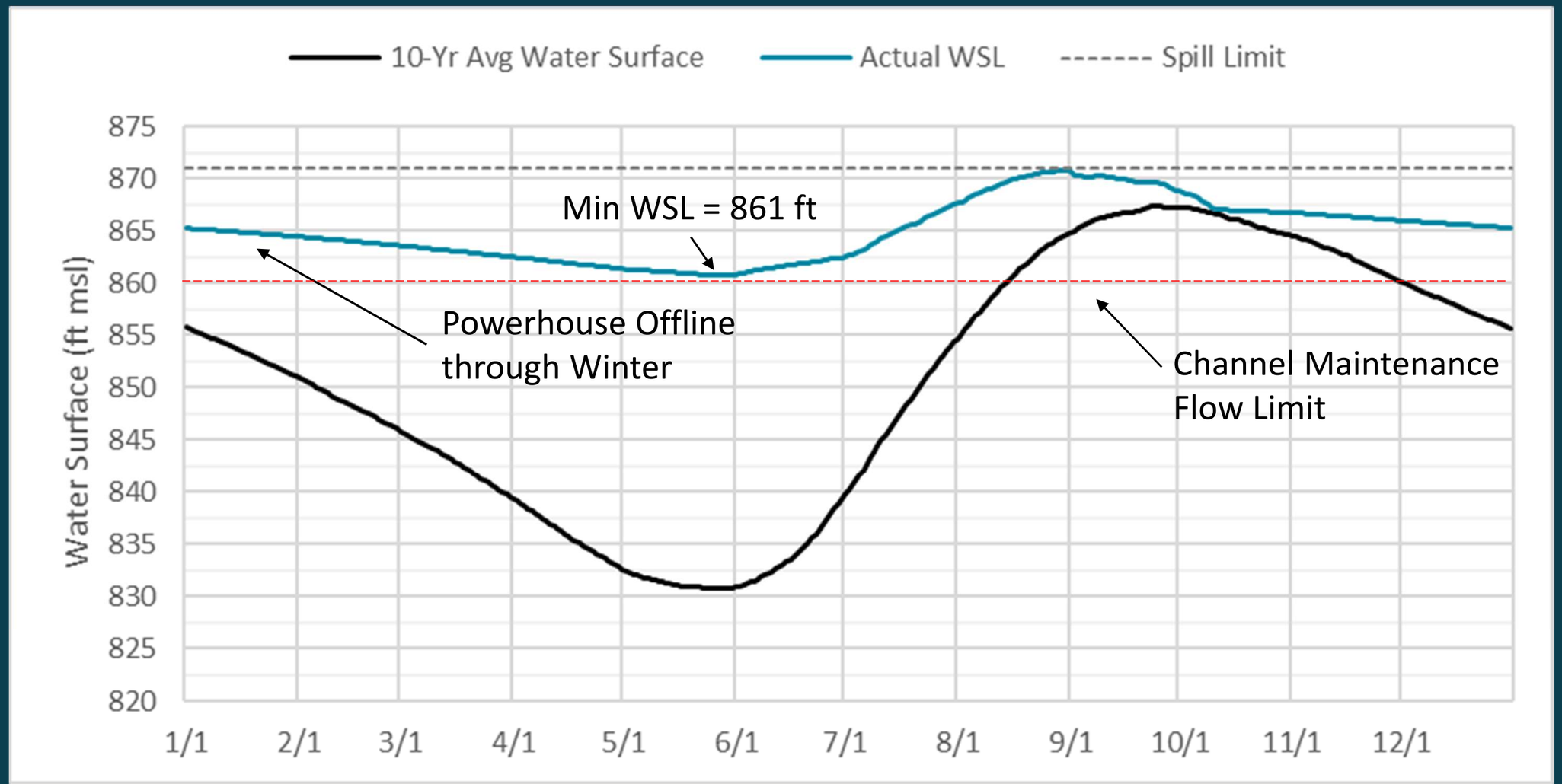
Lunch

Reservoir Operations

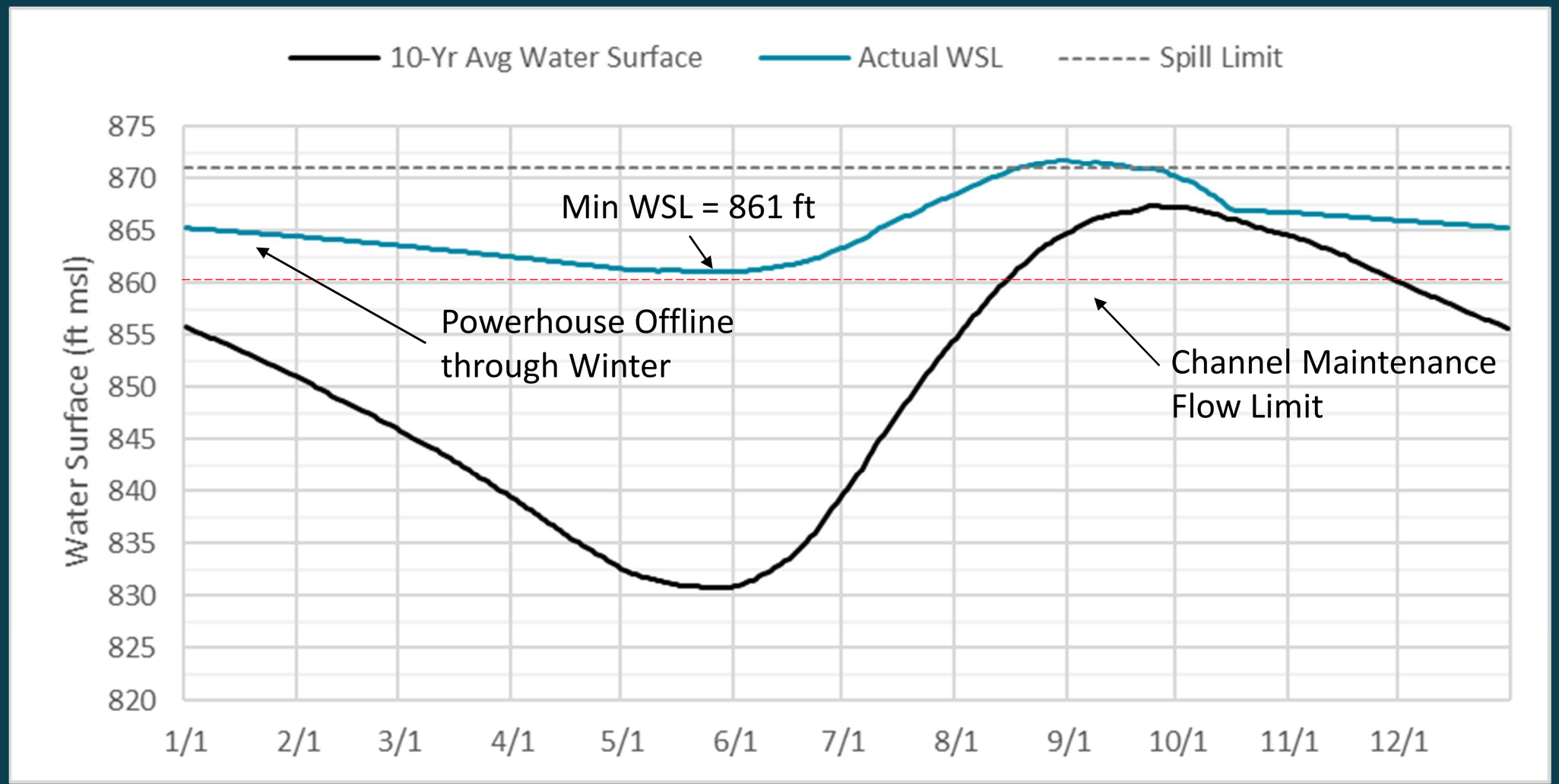
Replacement Dam (Measure P)



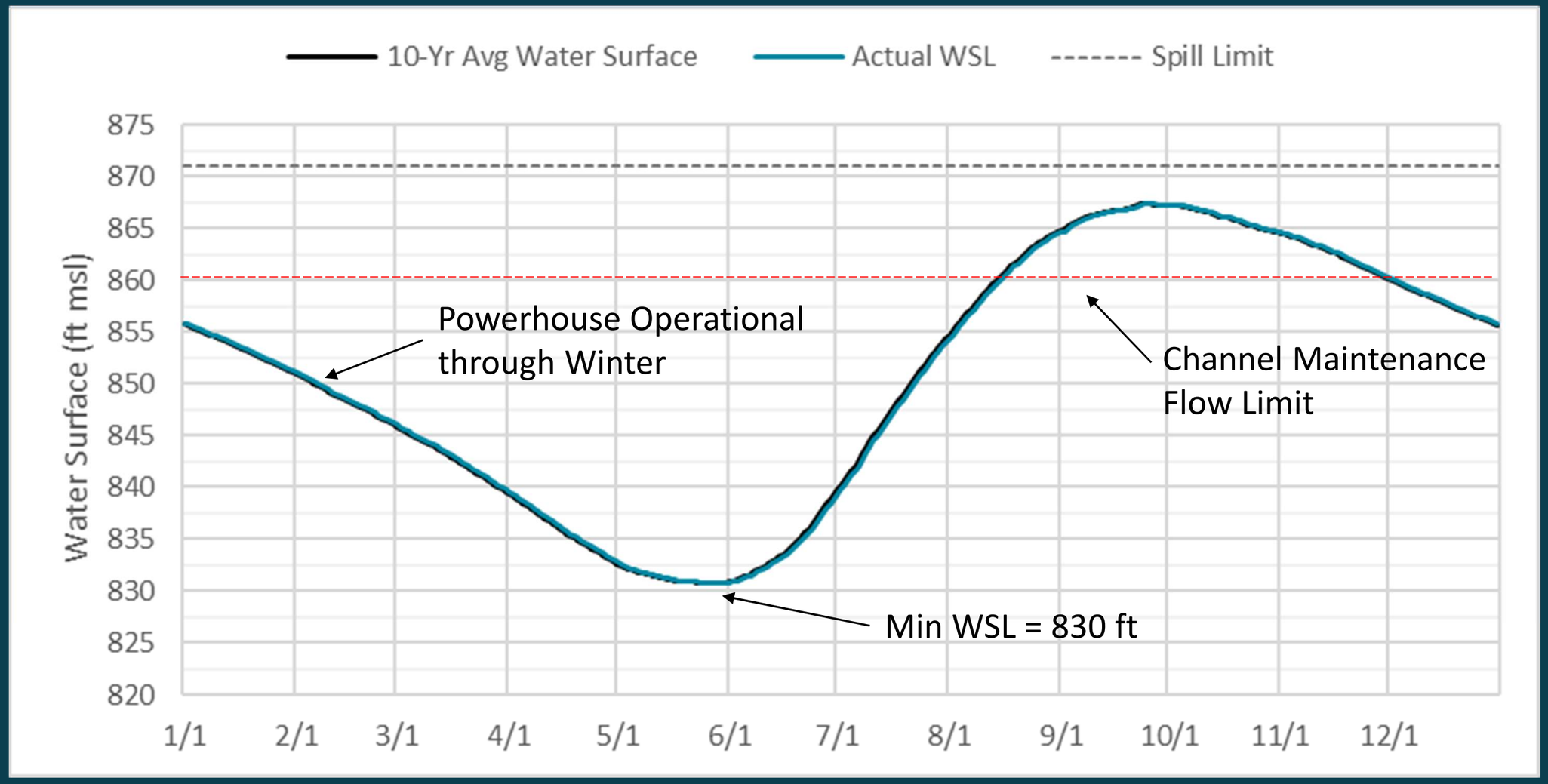
Existing Dam w/ Variable Exit Fishway (Measure K)



Existing Dam Release – No Fish Passage (Measure A)



AWWU Portal/Pipeline & Bypass Tunnel



Cost Effectiveness Inputs

Cost Effectiveness

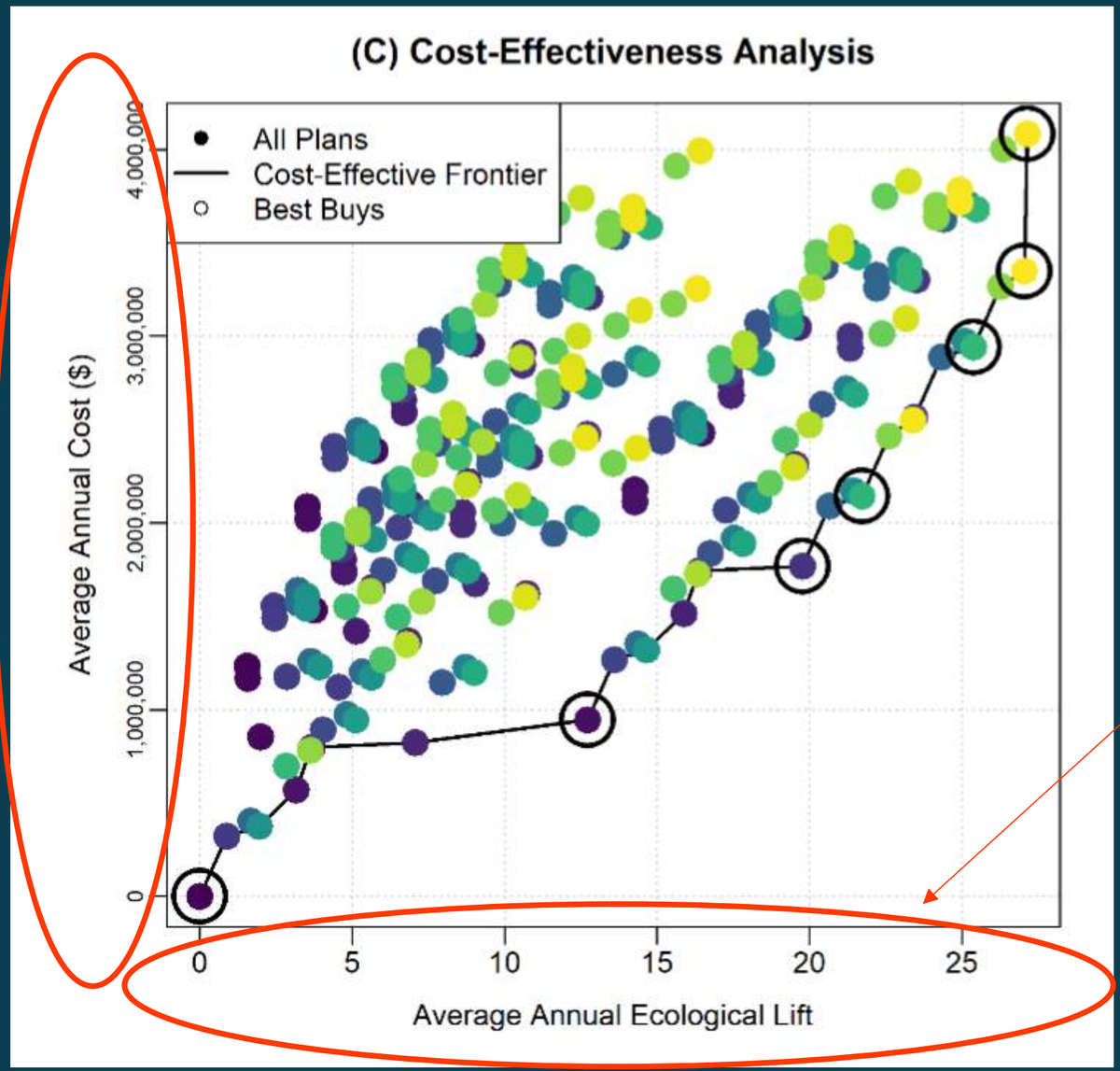
Total CAPEX

Annual O&M

Energy Losses

Carbon Costs

= Average Annual Costs over 35 Years



Habitat Improvement

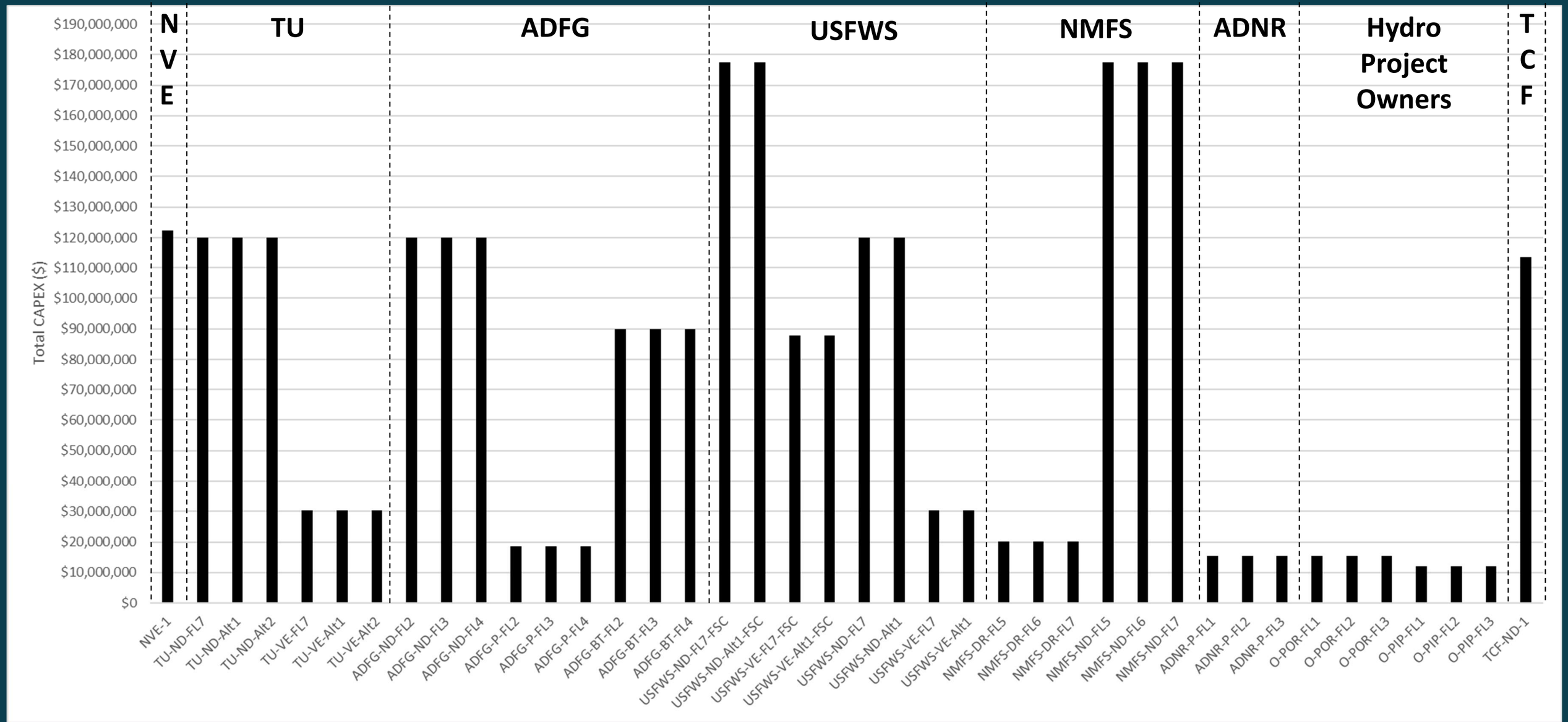
New Rearing Habitat (Acres)

New Spawning Habitat (Acres)

Total CAPEX*

*Excludes costs associated with upgrades at MEA EGS plant for winter shutdown of powerhouse

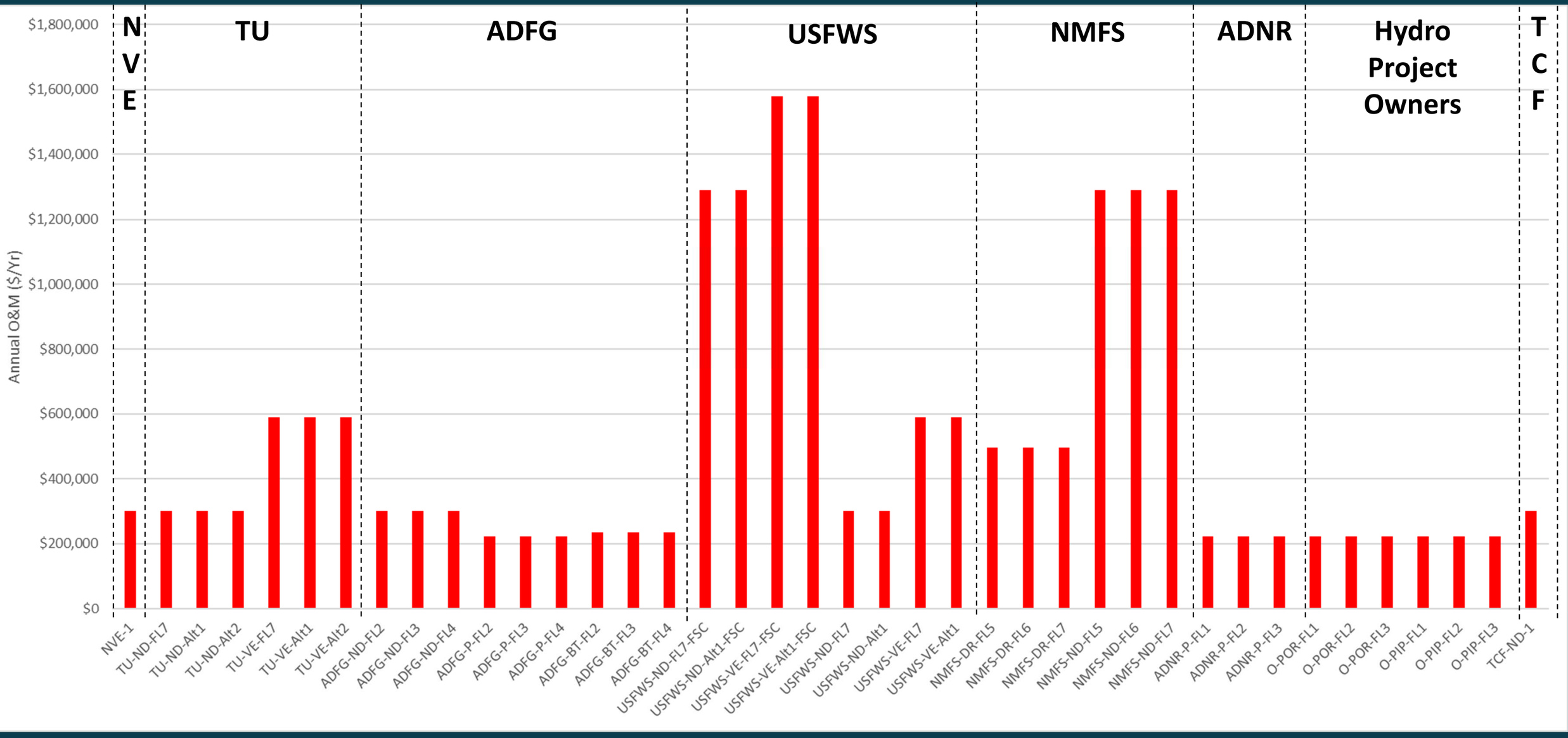
Total CAPEX


NVE
TU
ADFG
USFWS
NMFS
ADNR
Hydro Project Owners
TCF
Total CAPEX ($)
$190,000,000
$180,000,000
$170,000,000
$160,000,000
$150,000,000
$140,000,000
$130,000,000
$120,000,000
$110,000,000
$100,000,000
$90,000,000
$80,000,000
$70,000,000
$60,000,000
$50,000,000
$40,000,000
$30,000,000
$20,000,000
$10,000,000
$0
NVE-1
TU-ND-FL7
TU-ND-Alt1
TU-ND-Alt2
TU-VE-FL7
TU-VE-Alt1
TU-VE-Alt2
ADFG-ND-FL2
ADFG-ND-FL3
ADFG-ND-FL4
ADFG-P-FL2
ADFG-P-FL3
ADFG-P-FL4
ADFG-BT-FL2
ADFG-BT-FL3
ADFG-BT-FL4
USFWS-ND-FL7-FSC
USFWS-ND-Alt1-FSC
USFWS-VE-FL7-FSC
USFWS-VE-Alt1-FSC
USFWS-ND-FL7
USFWS-ND-Alt1
USFWS-VE-FL7
USFWS-VE-Alt1
NMFS-DR-FL5
NMFS-DR-FL6
NMFS-DR-FL7
NMFS-ND-FL5
NMFS-ND-FL6
NMFS-ND-FL7
ADNR-P-FL1
ADNR-P-FL2
ADNR-P-FL3
O-POR-FL1
O-POR-FL2
O-POR-FL3
O-PIP-FL1
O-PIP-FL2
O-PIP-FL3
TCF-ND-1

Annual O&M Costs*

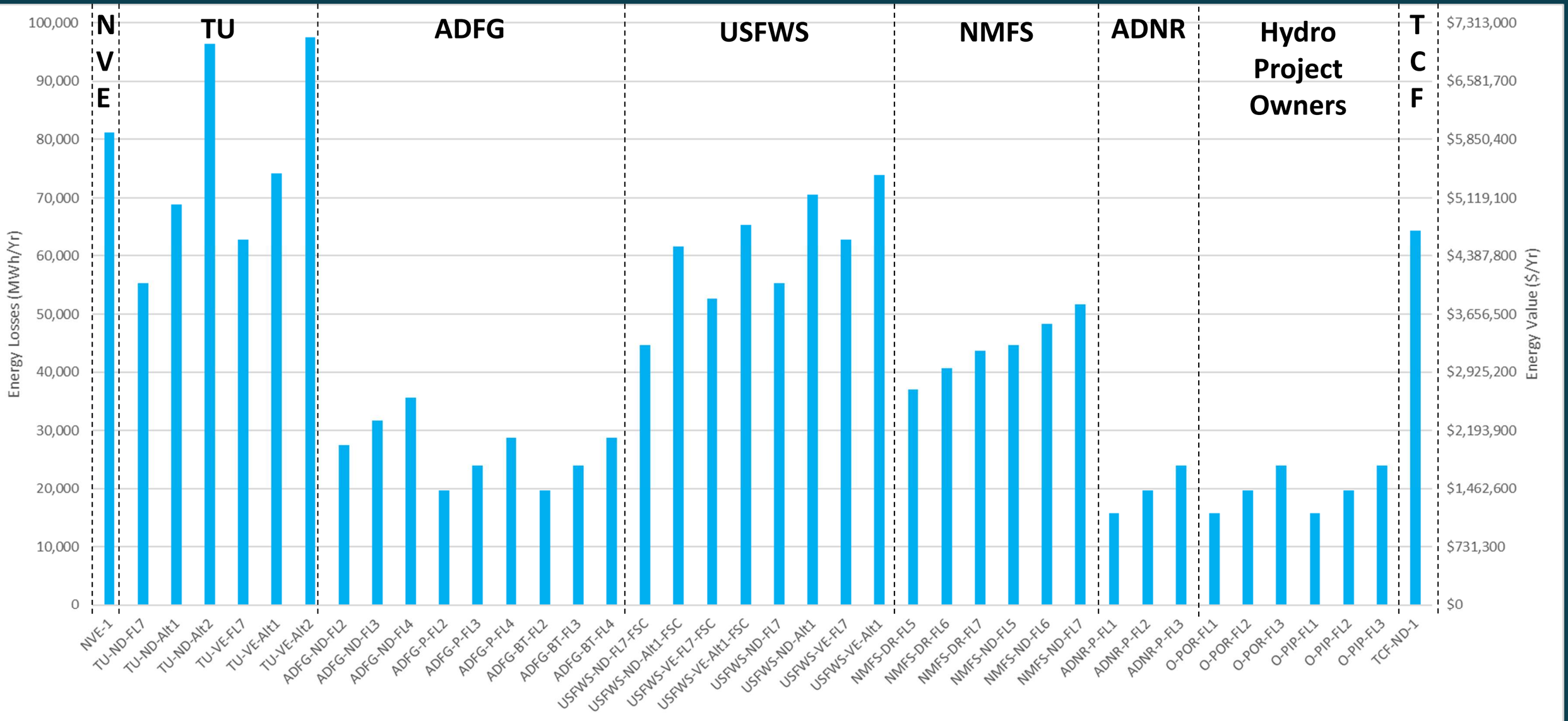
*Excludes costs associated with Adaptive Management

Annual O&M Costs



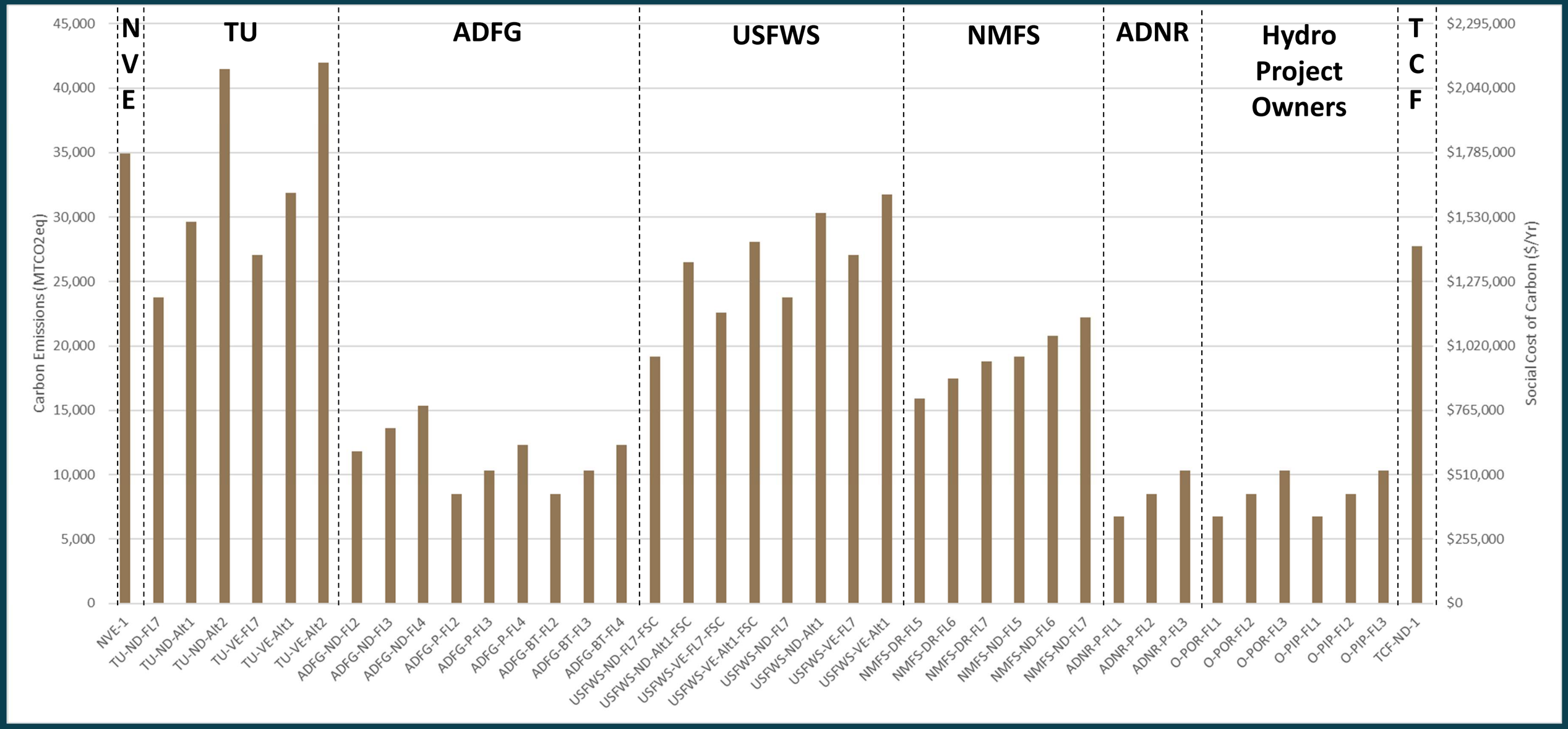
Energy Losses

Energy Losses (MWh/Yr)



Carbon Costs

Carbon Emissions



Total Annualized Costs

35-Years

35-Yr Annualized Costs

Input Parameters

- Discount Rate – 5%
- Annual Increase in O&M Costs – 3%
- Annual Increase in Energy Costs – 1%
- Carbon Emissions – 0.43 $MTCO_2eq/MWh$

Utility Pricing

- CEA: $64.61/MWh
- MEA: $88.48/MWh

Input Pricing

- $73.13/MWh *Based on 64.29%/35.71% CEA/MEA Split
- $51/MTCO2eq *Carbon Costs

Ratepayer Impacts:

Matanuska Electric:

1.12% Energy Rate Increase /$1M

Chugach Electric:

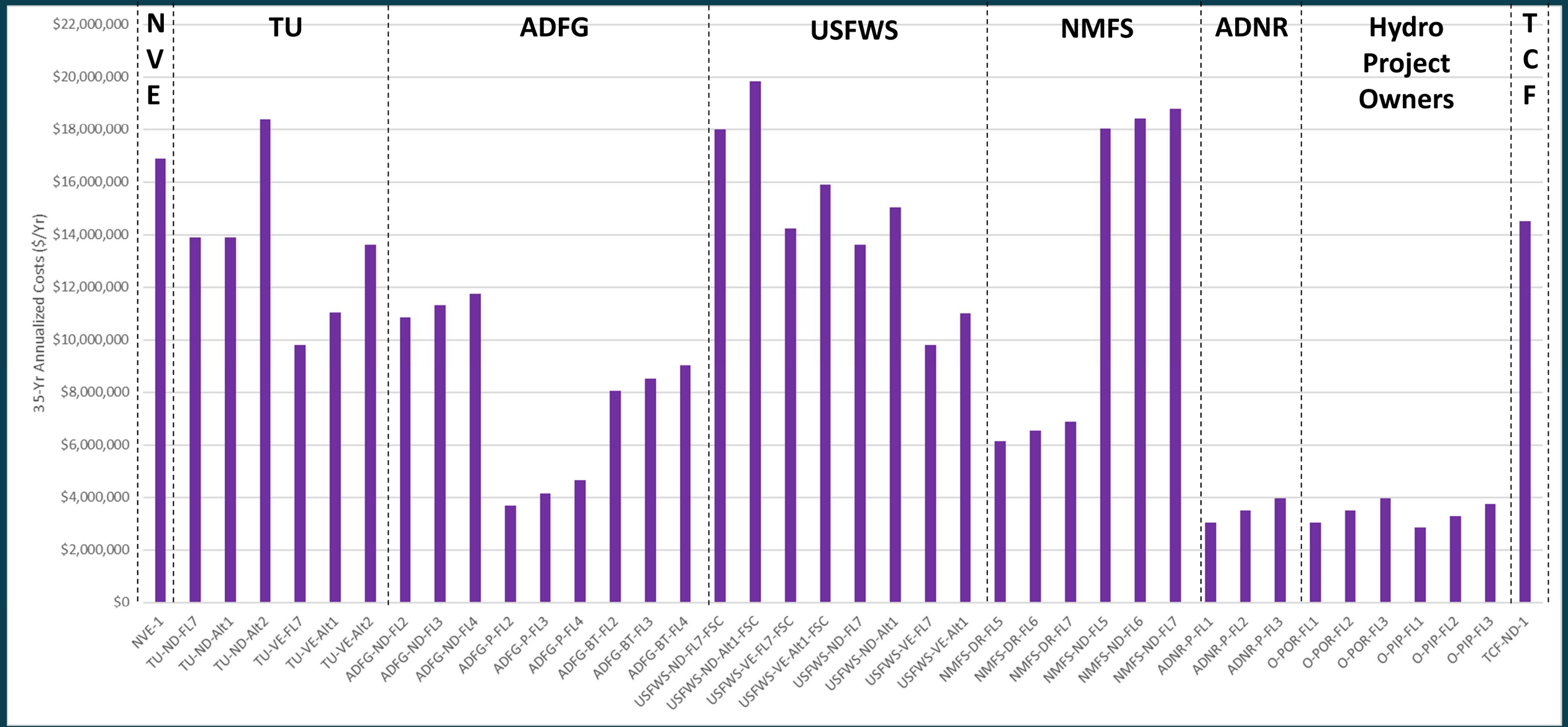
1% Energy Rate Increase /$1M

Municipality of Anchorage:

.03 mils / $1M

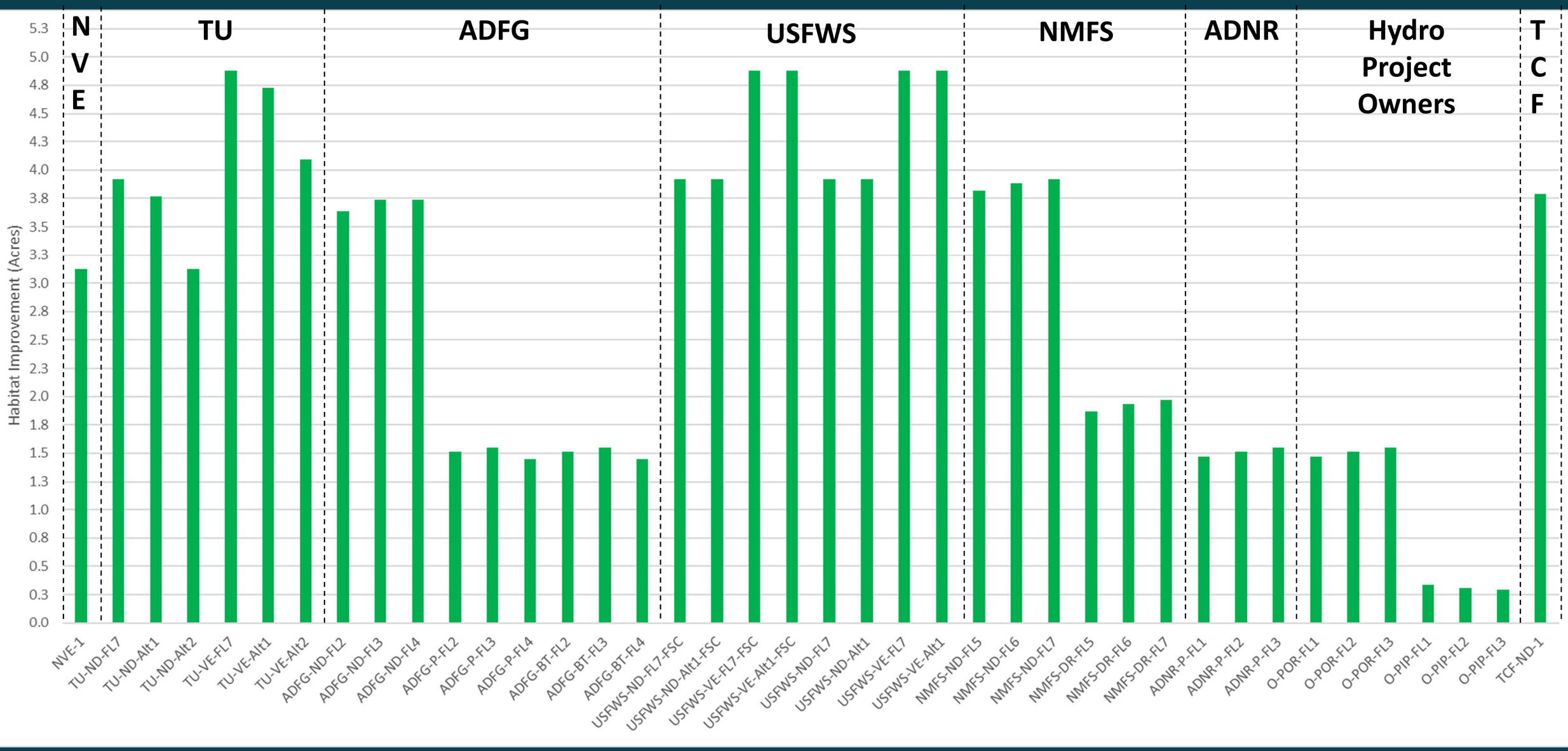
($3 Increased Property Tax per $/100k Property Value)

35-Yr Annualized Costs

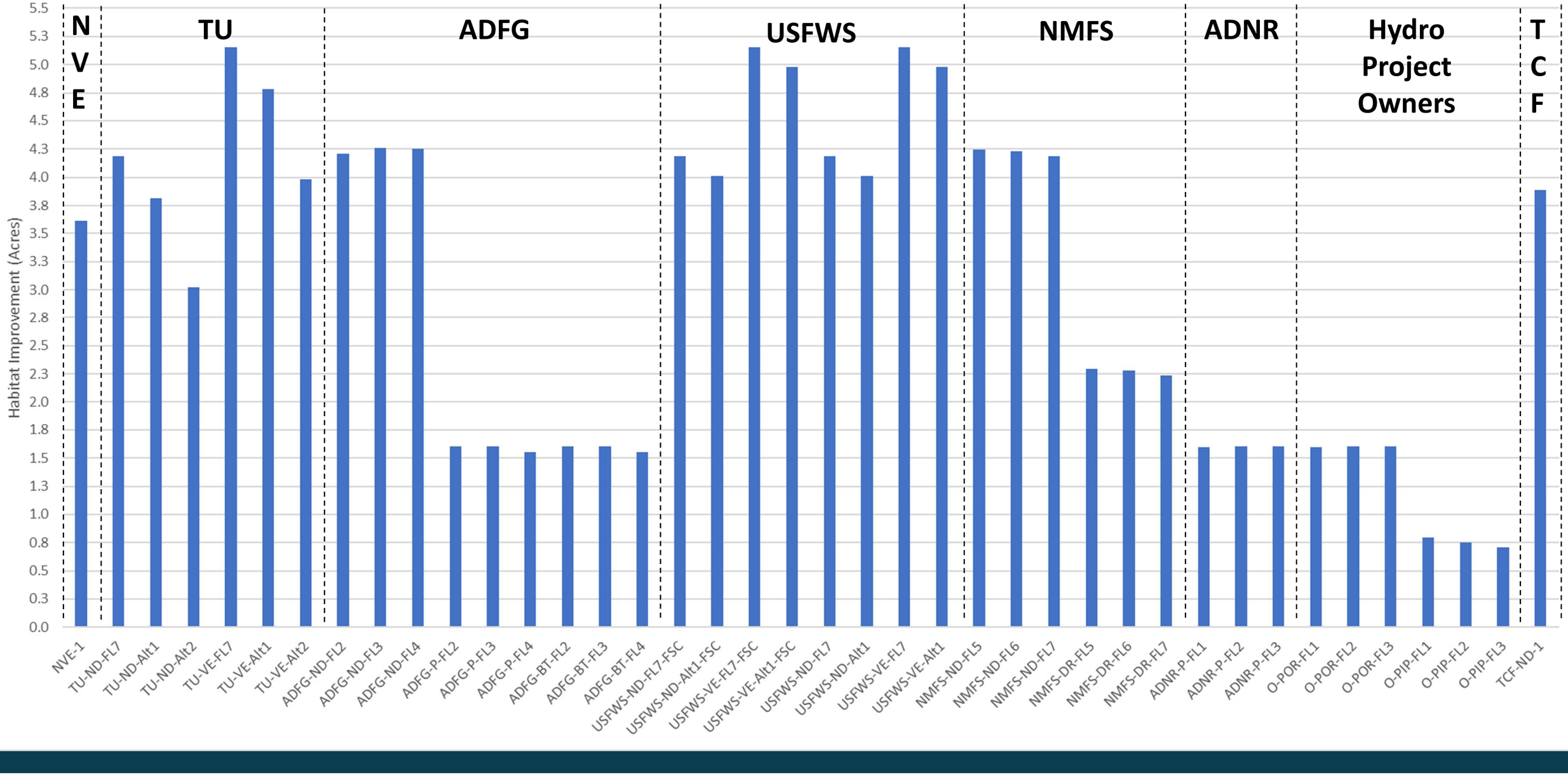


Habitat Improvements

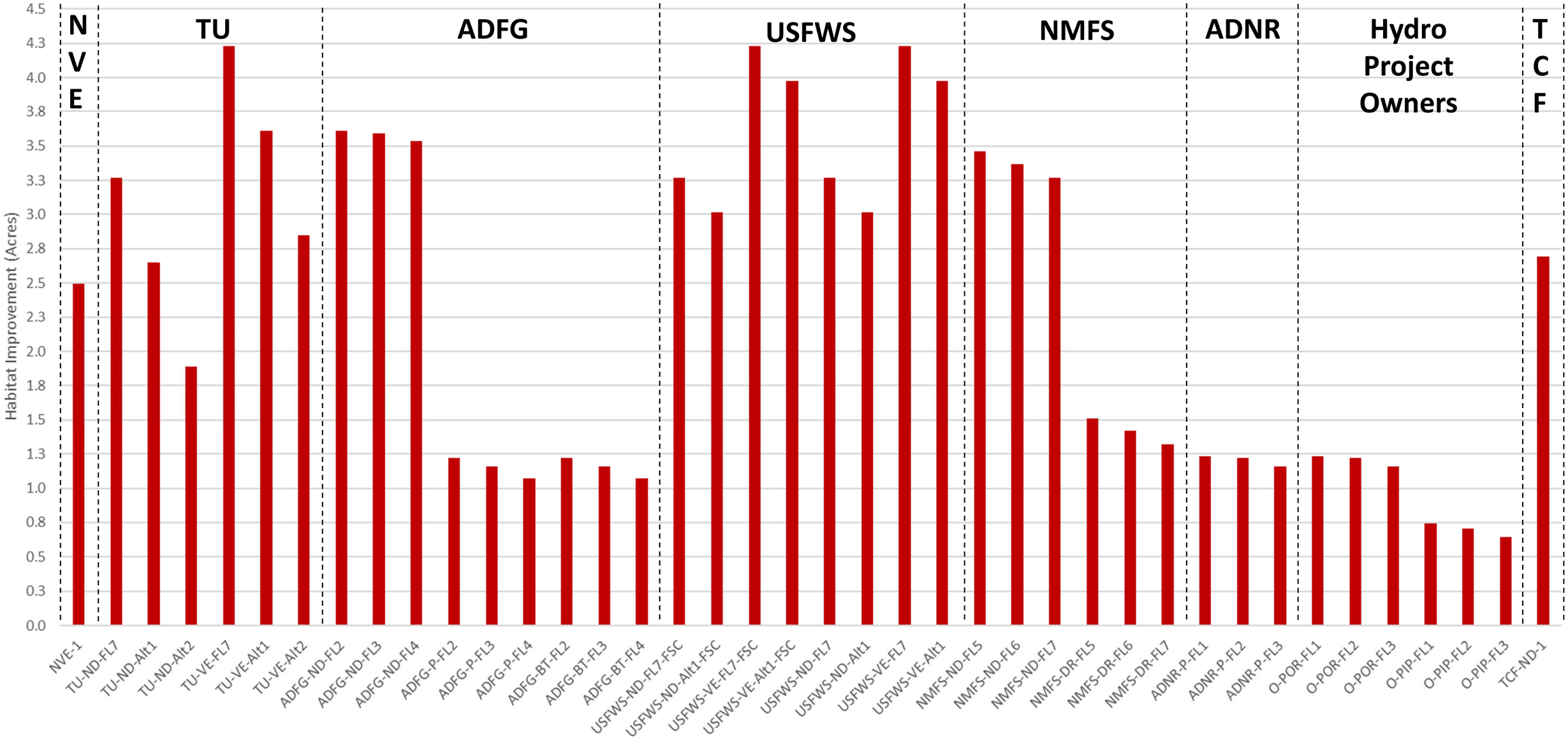
Chinook Spawning Habitat Gains



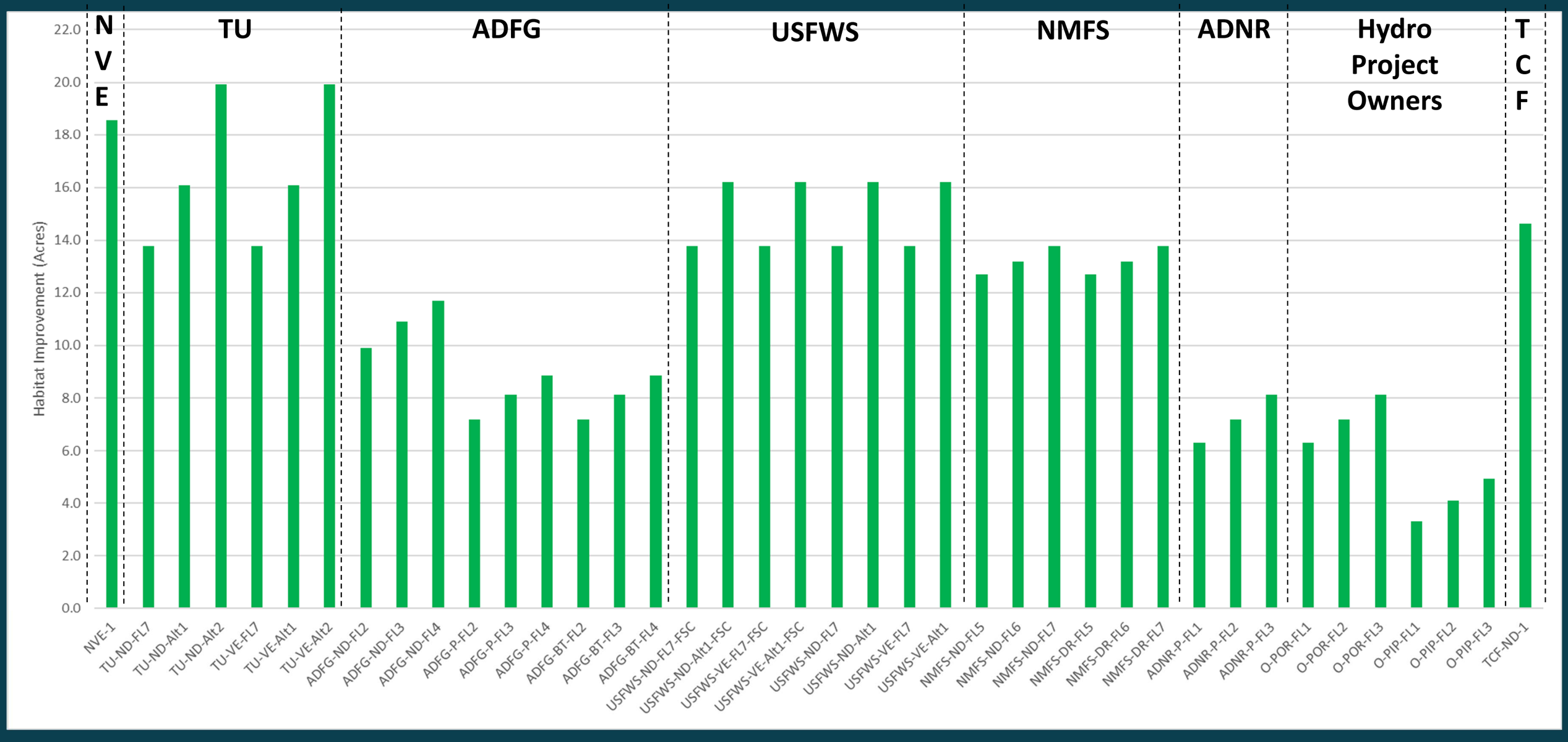
Coho Spawning Habitat Gains



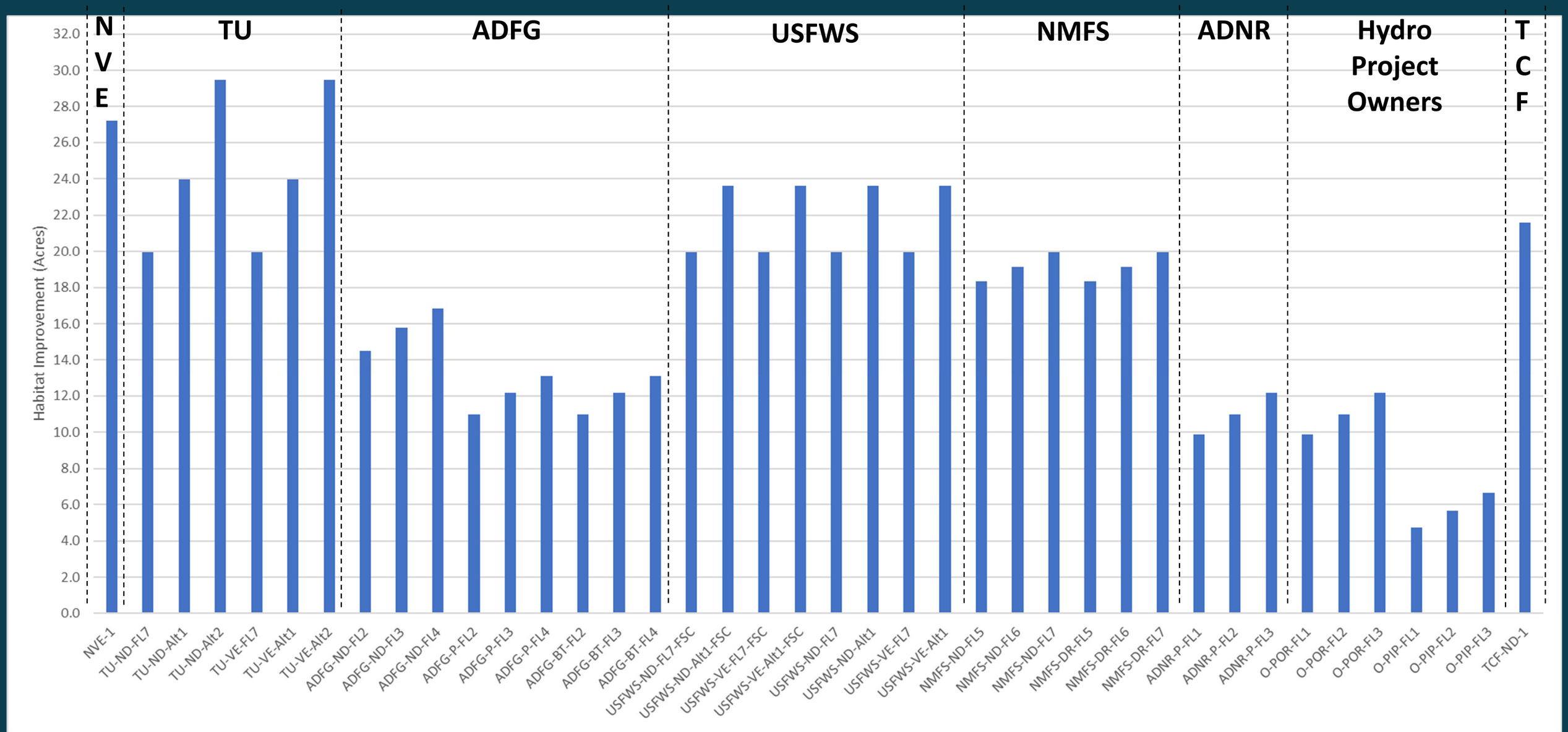
Sockeye Spawning Habitat Gains



Chinook Rearing Habitat Gains

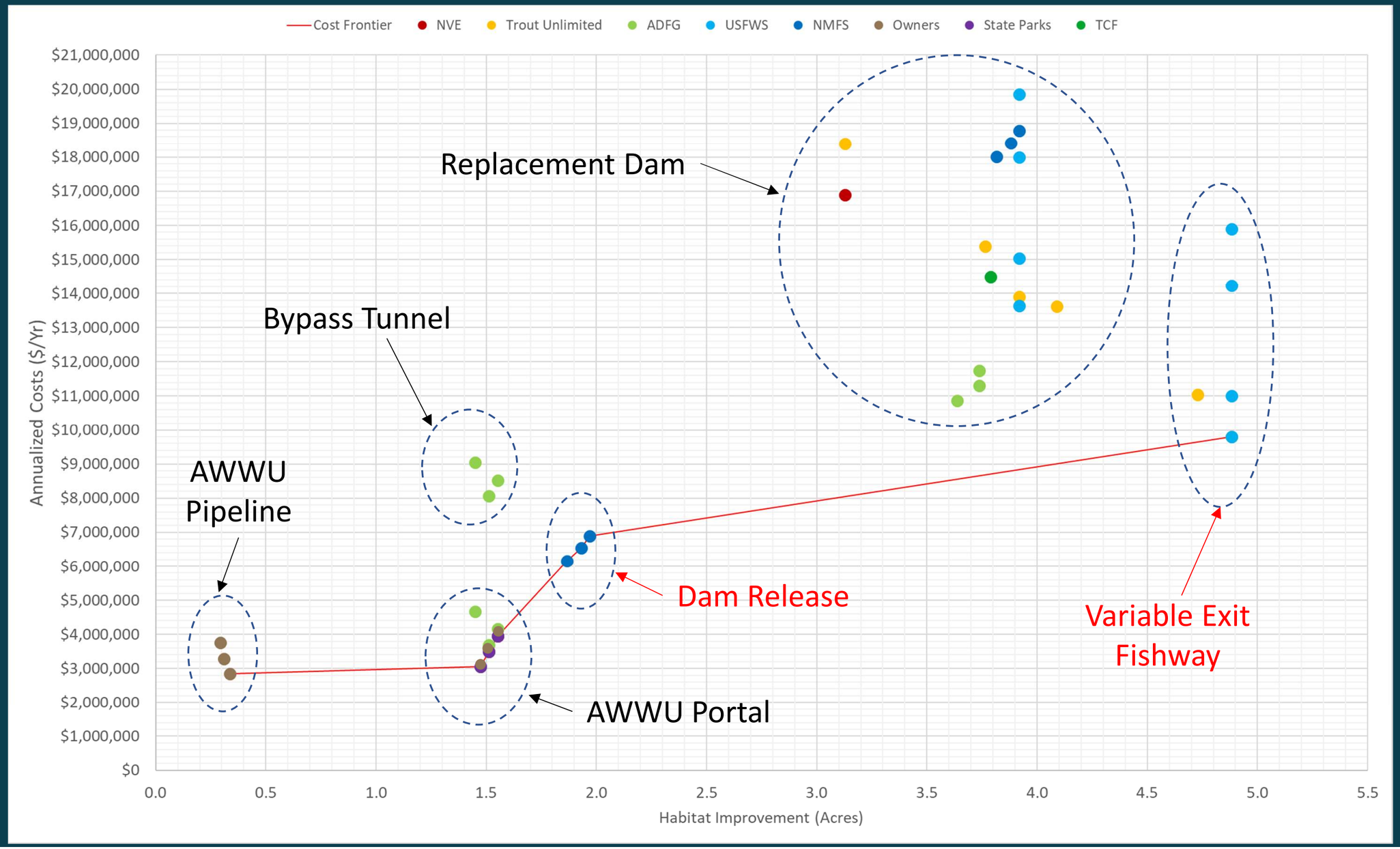


Coho Rearing Habitat Gains



Cost Effectiveness Model Results

Cost Effectiveness – Chinook Spawning Habitat

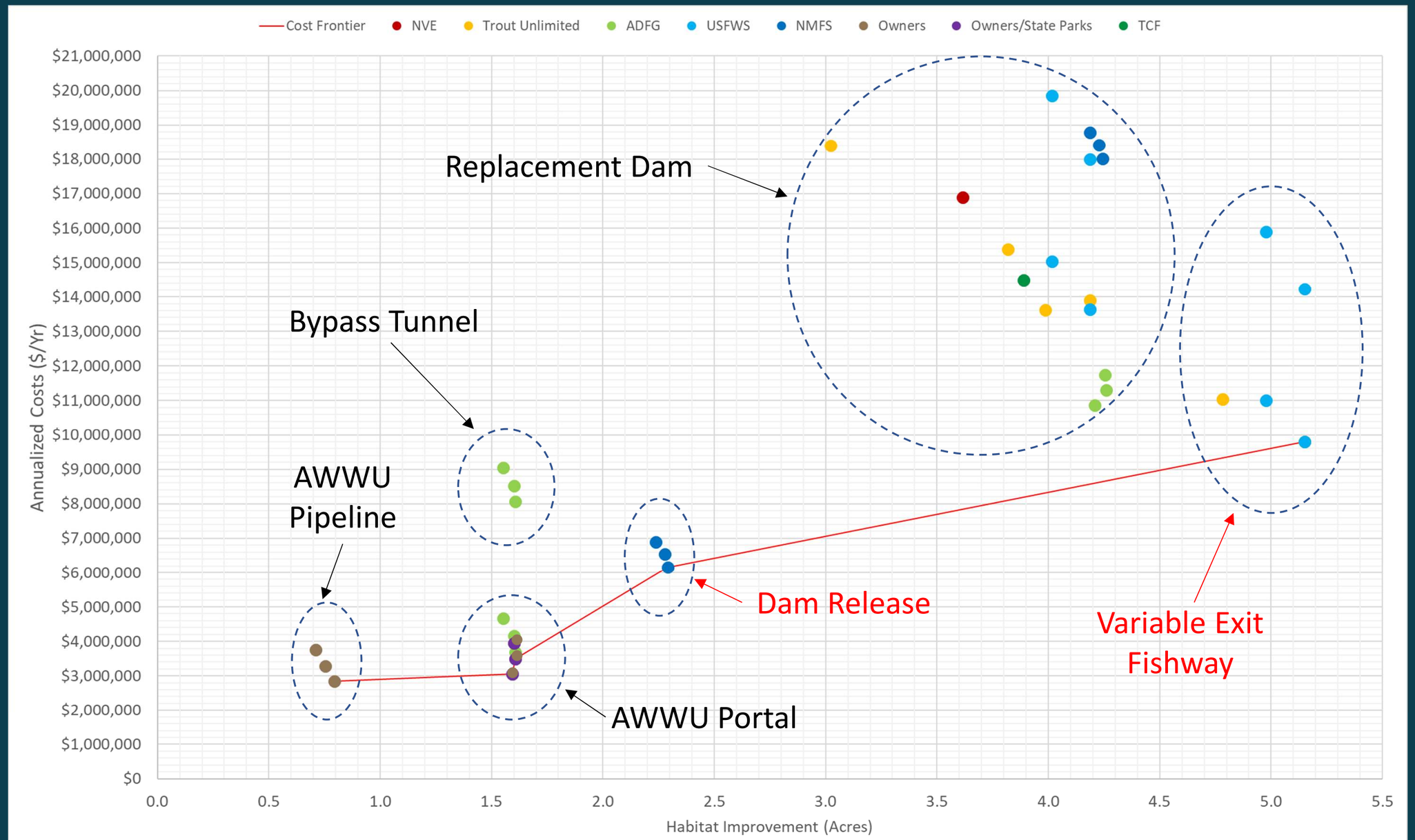


Cost Effectiveness – Chinook Spawning Habitat

Cost Effective Alternatives for Habitat Gains

- AWWU Pipeline – Flow Level 1
  - Owner Alternative
  - Annual Costs - $2.9M
  - Habitat Gains – 0.3 Acres
  - **$8.5M/Acre**
- AWWU Portal – Flow Level 1
  - Owner/ADNR Alternative
  - Annual Costs - $3.0M
  - Habitat Gains – 1.5 Acres
  - **$2.0M/Acre**
- AWWU Portal – Flow Level 2
  - Owner/ADNR Alternative
  - Annual Costs - $3.5M
  - Habitat Gains – 1.5 Acres
  - **$2.4M/Acre**
- AWWU Portal – Flow Level 3
  - Owner/ADNR Alternative
  - Annual Costs - $4.0M
  - Habitat Gains – 1.6 Acres
  - **$2.6M/Acre**
- Dam Release – Flow Level 5 Modified
  - NMFS Alternative
  - Annual Costs - $6.1M
  - Habitat Gains – 1.9 Acres
  - **$3.2M/Acre**
- Dam Release – Flow Level 6 Modified
  - NMFS Alternative
  - Annual Costs - $6.6M
  - Habitat Gains – 1.9 Acres
  - **$3.4M/Acre**
- Dam Release – Flow Level 7
  - NMFS Alternative
  - Annual Costs - $6.9M
  - Habitat Gains – 2.0 Acres
  - **$3.5M/Acre**
- Variable Exit Fishway – Flow Level 7
  - Trout Unlimited Alternative
  - Annual Costs - $10.0M
  - Habitat Gains – 4.9 Acres
  - **$2.0M/Acre**

Cost Effectiveness – Coho Spawning Habitat

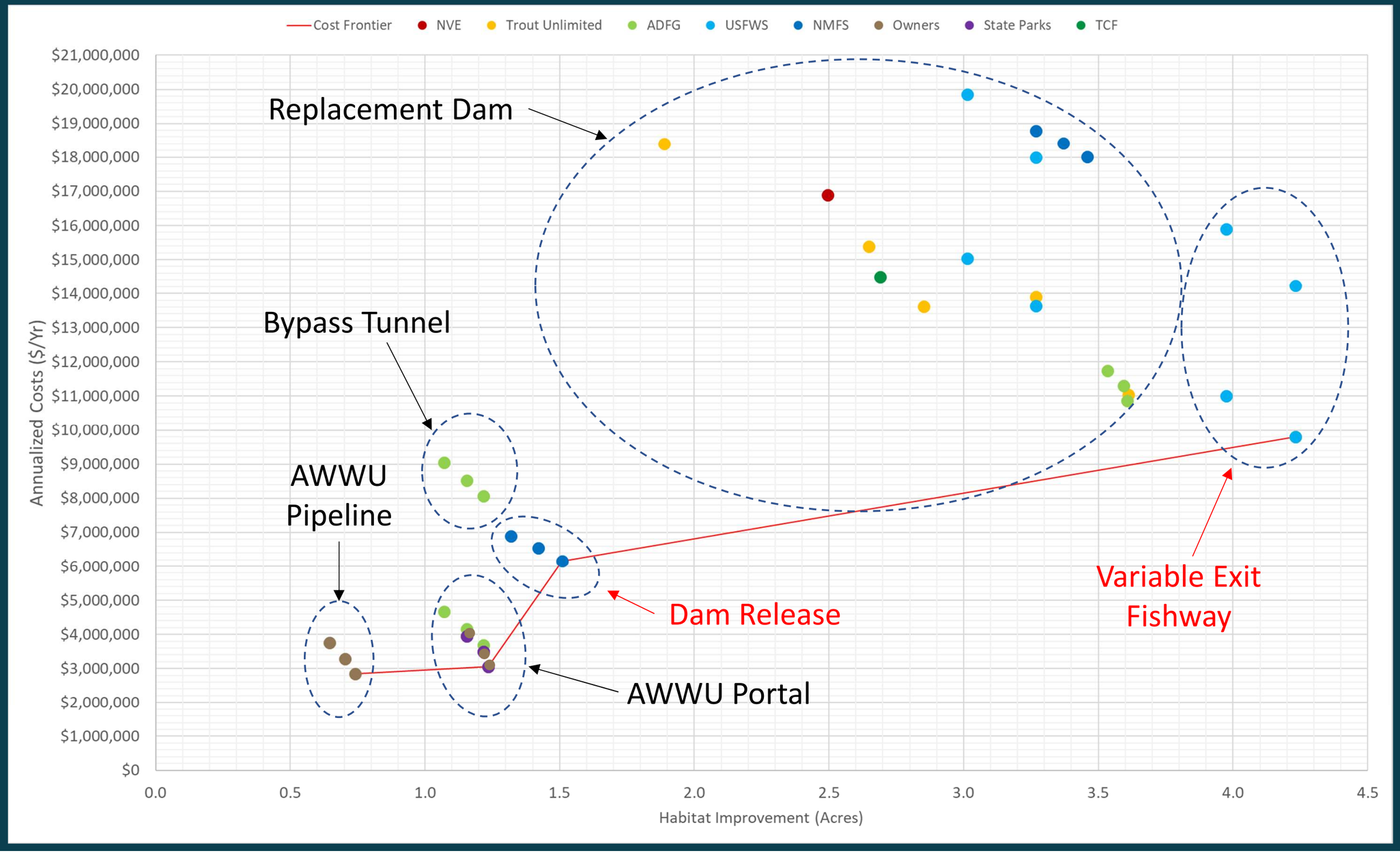


Cost Effectiveness – Coho Spawning Habitat

Cost Effective Alternatives for Habitat Gains

- AWWU Pipeline – Flow Level 1
  - Owner Alternative
  - Annual Costs - $2.9M
  - Habitat Gains – 0.8 Acres
  - **$4.0M/Acre**
- AWWU Portal – Flow Level 1
  - Owner Alternative
  - Annual Costs - $3.0M
  - Habitat Gains – 1.6 Acres
  - **$1.9M/Acre**
- AWWU Portal – Flow Level 2
  - Owner Alternative
  - Annual Costs - $3.5M
  - Habitat Gains – 1.6 Acres
  - **$2.1M/Acre**
- Dam Release – Flow Level 5 Modified
  - NMFS Alternative
  - Annual Costs - $6.1M
  - Habitat Gains – 2.3 Acres
  - **$2.7M/Acre**
- Variable Exit Fishway – Flow Level 7
  - Trout Unlimited Alternative
  - Annual Costs - $10.0M
  - Habitat Gains – 4.9 Acres
  - **$2.0M/Acre**

Cost Effectiveness – Sockeye Spawning Habitat

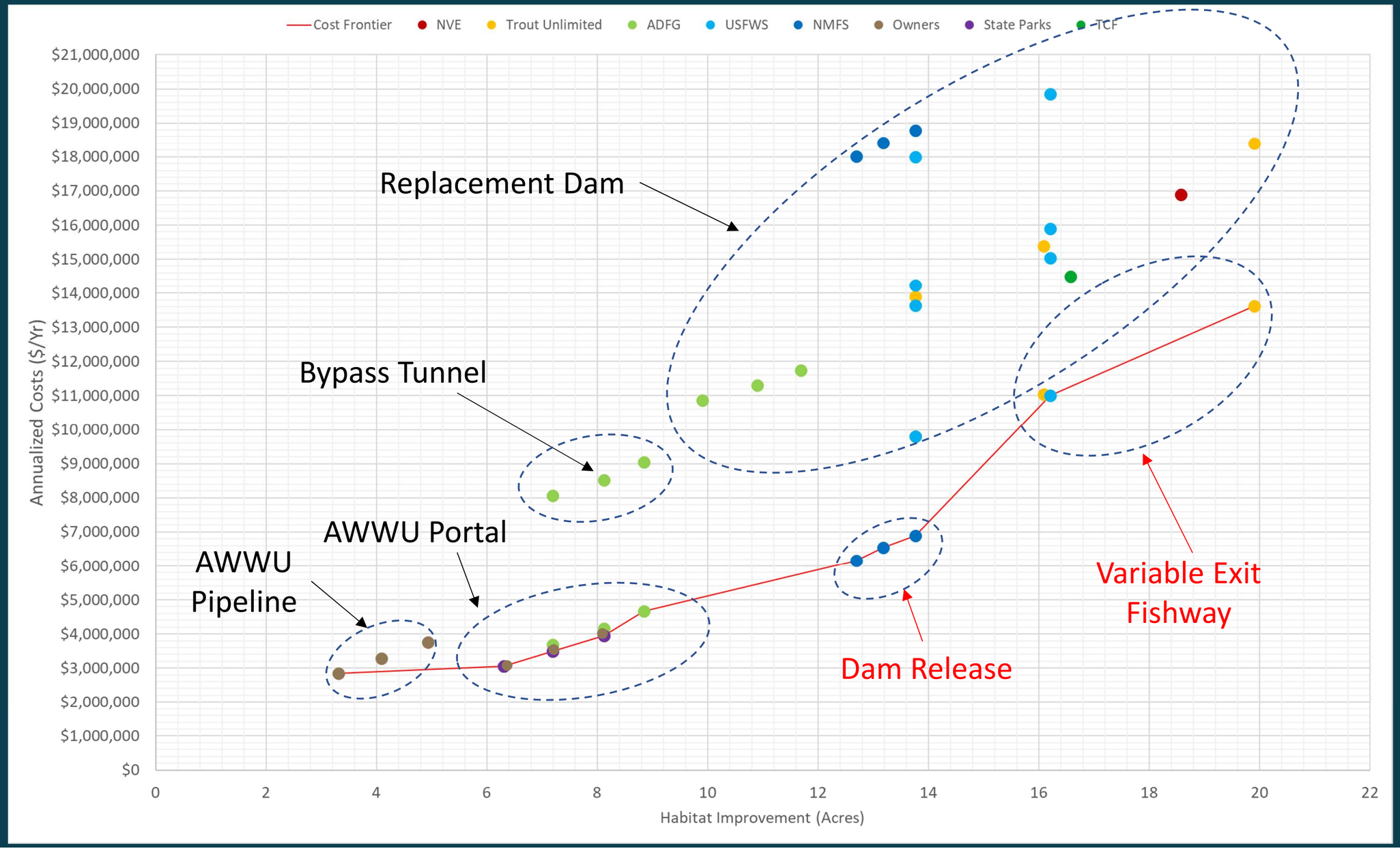


Cost Effectiveness – Sockeye Spawning Habitat

Cost Effective Alternatives for Habitat Gains

- AWWU Pipeline – Flow Level 1
  - Owner Alternative
  - Annual Costs - $2.9M
  - Habitat Gains – 0.7 Acres
  - **$4.0M/Acre**
- AWWU Portal – Flow Level 1
  - Owner Alternative
  - Annual Costs - $3.0M
  - Habitat Gains – 1.2 Acres
  - **$2.5M/Acre**
- Dam Release – Flow Level 5 Modified
  - NMFS Alternative
  - Annual Costs - $6.1M
  - Habitat Gains – 2.3 Acres
  - **$4.0M/Acre**
- Variable Exit Fishway – Flow Level 7
  - Trout Unlimited Alternative
  - Annual Costs - $10.0M
  - Habitat Gains – 4.2 Acres
  - **$2.3M/Acre**

Cost Effectiveness – Chinook Rearing Habitat

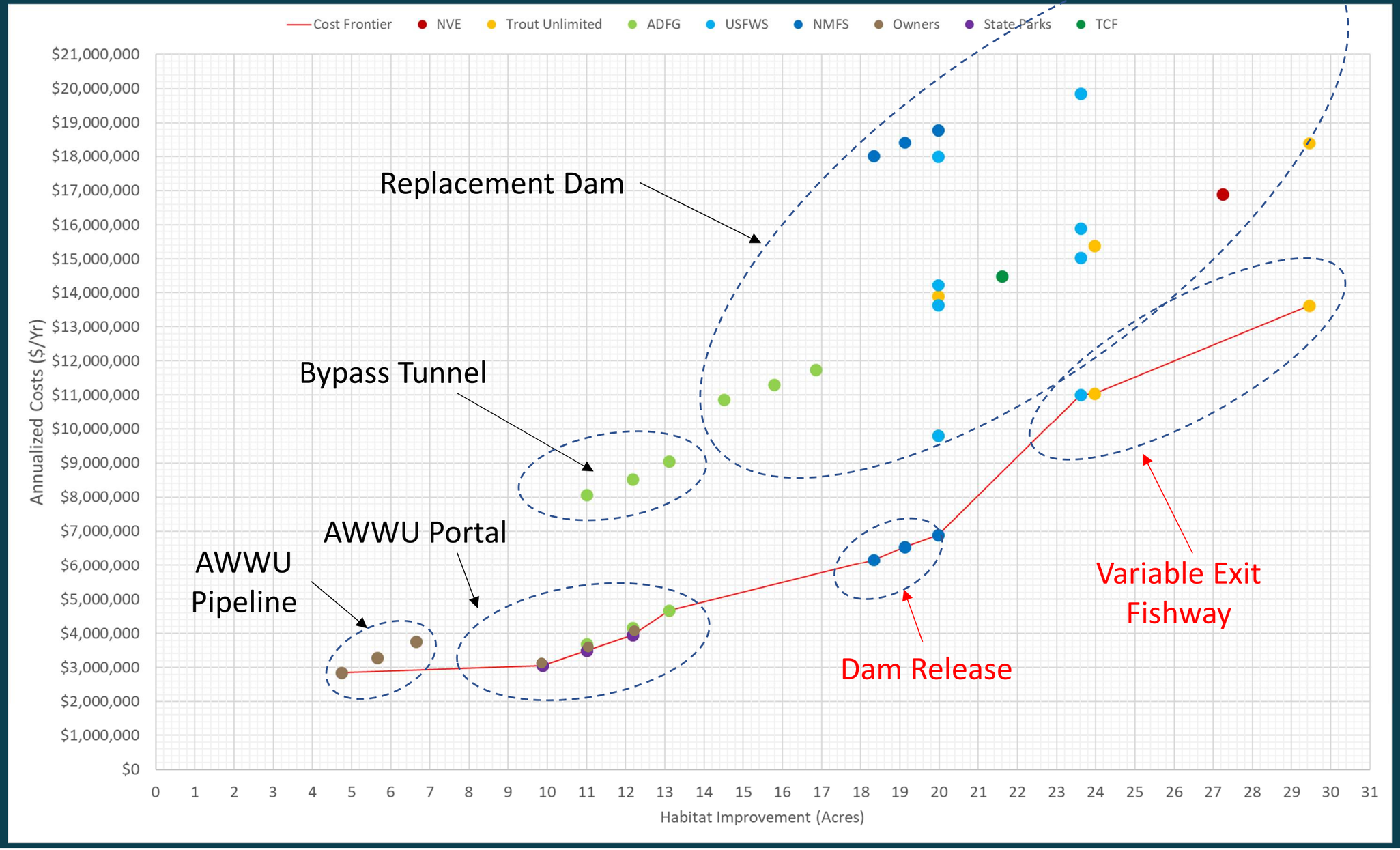


Cost Effectiveness – Chinook Rearing Habitat

Cost Effective Alternatives for Habitat Gains

- AWWU Pipeline – Flow Level 1
  - Owner Alternative
  - Annual Costs - $2.9M
  - Habitat Gains – 3.3 Acres
  - **$480k/Acre**
- AWWU Portal – Flow Level 1 / 2 / 3
  - Owner/ADNR Alternative
  - Annual Costs - $3.0/$3.5M/$4.0M
  - Habitat Gains – 6.3 / 7.2 / 8.1 Acres
  - **$480k – 490k/Acre**
- AWWU Portal – Flow Level 4
  - ADFG Alternative
  - Annual Costs - $4.7M
  - Habitat Gains – 8.8 Acres
  - **$530k/Acre**
- Dam Release – Flow Level 5 / 6 Modified
  - NMFS Alternative
  - Annual Costs - $6.1M / $6.6M
  - Habitat Gains – 12.7 / 13.2 Acres
  - **$480k – $490k/Acre**
- Variable Exit Fishway – Alt 1
  - Trout Unlimited Alternative
  - Annual Costs - $11.0M
  - Habitat Gains – 16.2 Acres
  - **$680k/Acre**
- Variable Exit Fishway – Alt 2
  - Trout Unlimited Alternative
  - Annual Costs - $13.6M
  - Habitat Gains – 19.9 Acres
  - **$680k/Acre**

Cost Effectiveness – Coho Rearing Habitat



Cost Effectiveness – Coho Rearing Habitat

Cost Effective Alternatives for Habitat Gains

- AWWU Pipeline – Flow Level 1
  - Owner Alternative
  - Annual Costs - $2.9M
  - Habitat Gains – 4.7 Acres
  - **$600k/Acre**
- AWWU Portal – Flow Level 1 / 2 / 3
  - Owner/ADNR Alternative
  - Annual Costs - $3.0/$3.5M/$4.0M
  - Habitat Gains – 9.9 / 11.0 / 12.2 Acres
  - **$310k – $320k/Acre**
- AWWU Portal – Flow Level 4
  - ADFG Alternative
  - Annual Costs - $4.7M
  - Habitat Gains – 13.1 Acres
  - **$360k/Acre**
- Dam Release – Flow Level 5 / 6 / 7 Modified
  - NMFS Alternative
  - Annual Costs - $6.1M / $6.6M / $6.9M
  - Habitat Gains – 18.3 / 19.1 / 20.0 Acres
  - **$340k/Acre**
- Variable Exit Fishway – Alt 1
  - Trout Unlimited Alternative
  - Annual Costs - $11.0M
  - Habitat Gains – 24.0 Acres
  - **$460k/Acre**
- Variable Exit Fishway – Alt 2
  - Trout Unlimited Alternative
  - Annual Costs - $13.6M
  - Habitat Gains – 29.5 Acres
  - **$460k/Acre**

Key Takeaways

- Increasing flows beyond Flow Level 7 have negative effects to spawning habitat for Chinook and Coho in Eklutna River

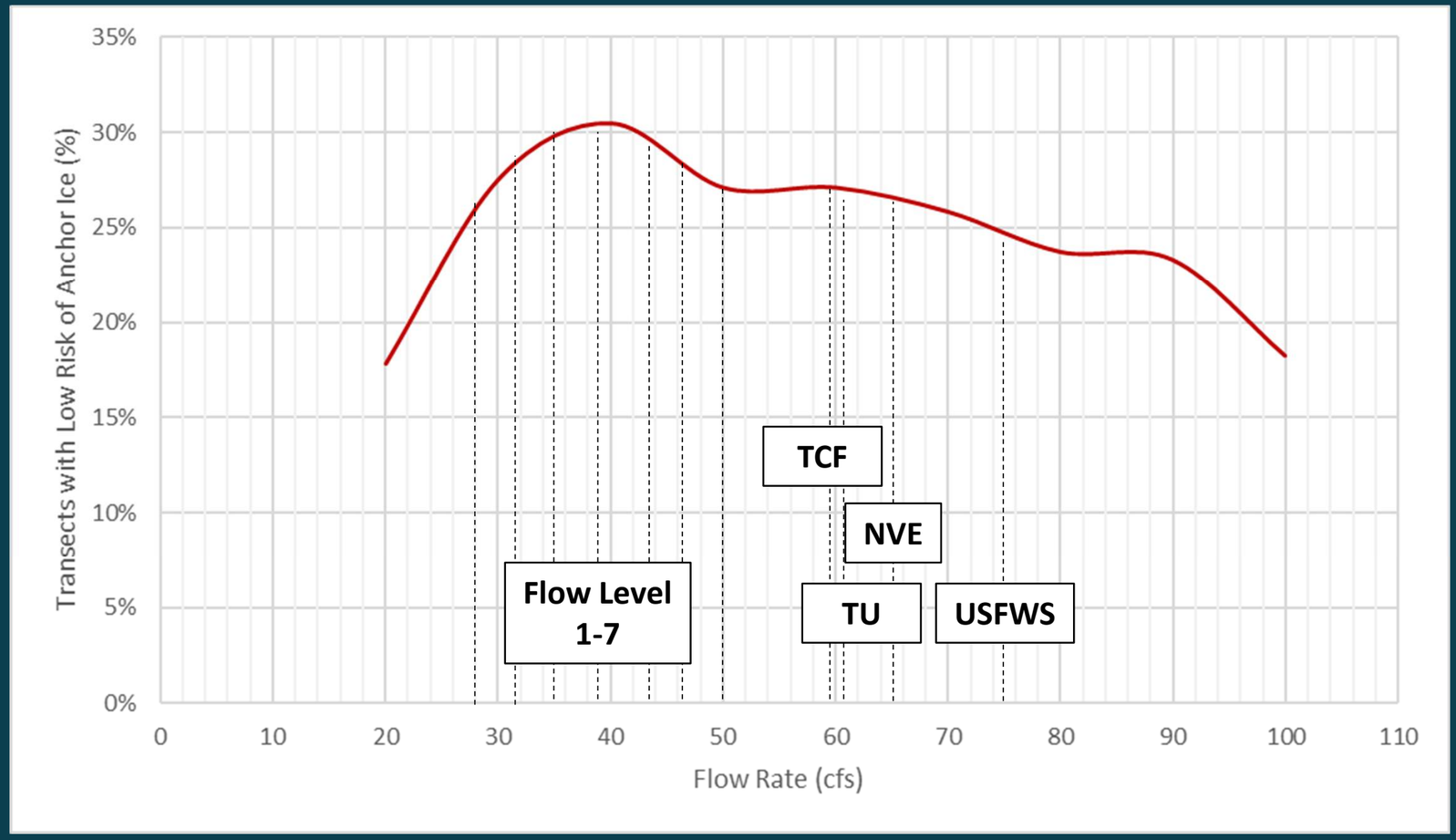
- Replacement dam, bypass tunnel, floating surface collector, and high flow alternatives have significant annualized costs and associated ratepayer impacts

- AWWU pipeline and bypass tunnel alternative are not cost-effective for the habitat gained

- The cost-effective alternatives that provide the most habitat gains for spawning/rearing require winter shutdown of powerhouse

Key Takeaways

- Winter flows > 50 cfs may result in increased anchor ice and less surficial ice



Next Steps

- After Meeting 2 (May)
  - Provide revised alternatives by May 31
  - Present revised results at next meeting on June 14
- Meeting 3 (June)
  - Share and discuss second round of CE/ICA results (narrow down potential alternatives)
  - Reintroduce information matrix (incorporates potential impacts to public water supply, recreation, dam safety, etc.)
- Meeting 4 (July)
  - Share and discuss completed information matrix (narrow down potential alternatives)
  - Discuss appropriate monitoring program and potential adaptive management
- Meeting 5 (August)
  - Continue discussing appropriate monitoring program and potential adaptive management
  - Outline Draft Fish and Wildlife Program

McMillen