Dixon Diversion Project

Martin River Aquatic Resources Meeting

February 12, 2025

ALASKA ENERGY AUTHORITY

Kleinschmidt

WATERSHED GEODYNAMICS

ALASKA DEPARTMENT OF FISH AND GAME

DOWL

Meeting Goals

- **Project Overview**
- **Aquatic Studies Update**
  - Stream Gaging & Hydrology
  - Geomorphology & Sediment Transport
  - Hydraulic Modeling & Habitat Connectivity
  - Water Quality Monitoring
  - Aquatic Habitat Characterization
  - Martin River Fish Use
- **Next Steps**
- **FERC Process Update**

Current Project Overview

Divert glacial meltwater from Dixon Glacier to Bradley Lake May - October to increase energy output at Bradley Lake Project by 50%.

All on State-owned Land

Project Elements:

- Raise Bradley Dam & Lake by 7, 14, or 28 ft
- New diversion dam at Dixon Glacier toe
- New subsurface diversion tunnel to Bradley Lake with a maximum capacity of 1,400 cfs
- New 1-mile-long access road from existing Battle Creek Diversion road to tunnel outlet

Streamflow Gaging

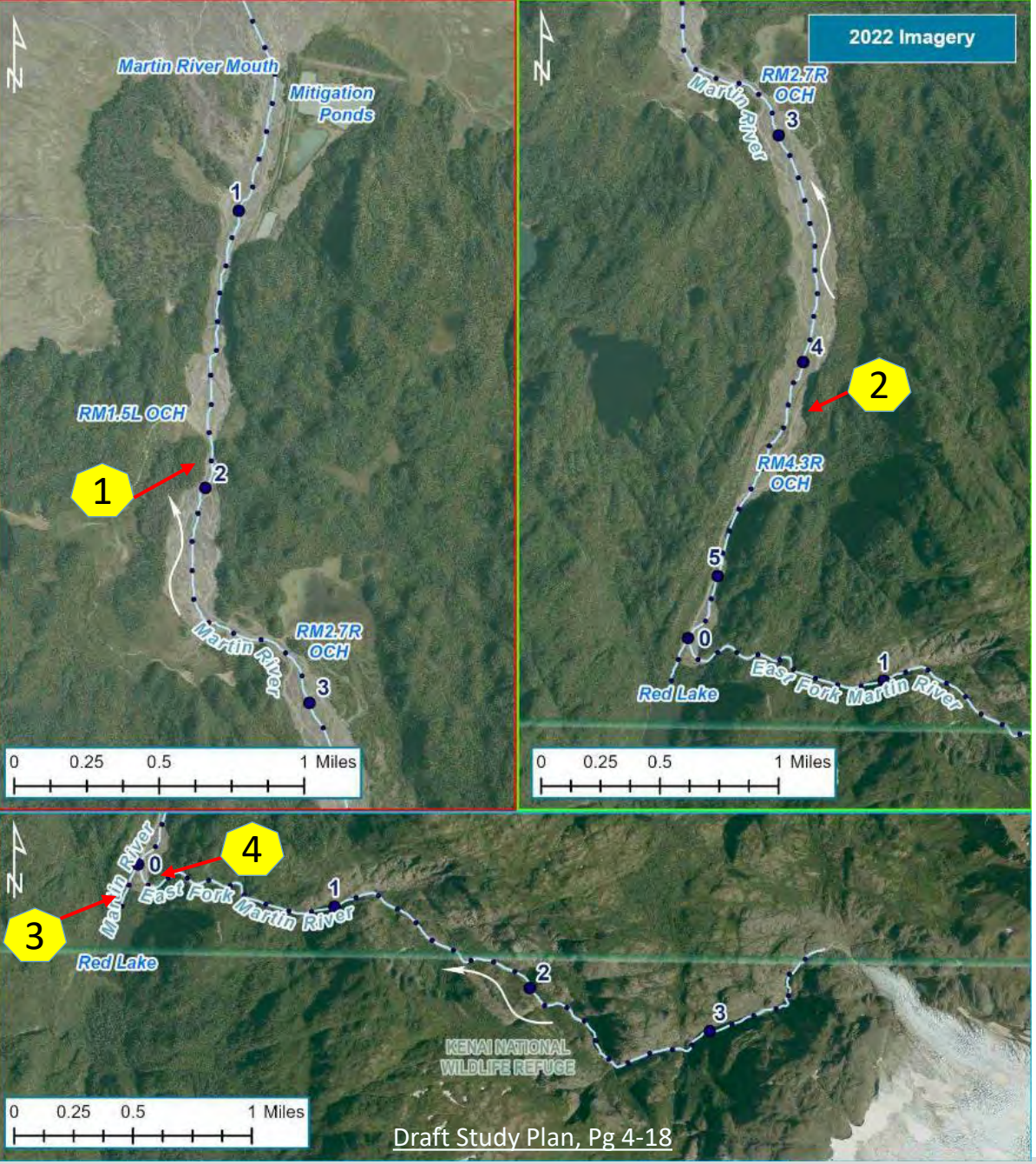
- DOWL:
  - Cameron Brailey

Draft Study Plan, Pg 3-2

Goals and Objectives

- Goal
  - Characterize flow regime of the Martin River and select tributaries
- Objectives
  - Install continuous streamflow gage at
    RM 1.9 (downstream constriction) 1
    OCH4.2R Outlet (Mid-Reach) 2
    West Fork Martin River (Red Lake Outlet) 3
  - Use AEA and USGS data to quantify discharge from Dixon Glacier outflow 4
  - Use data from nearby Upper Bradley Basin to extend the record 5

Measurement Locations



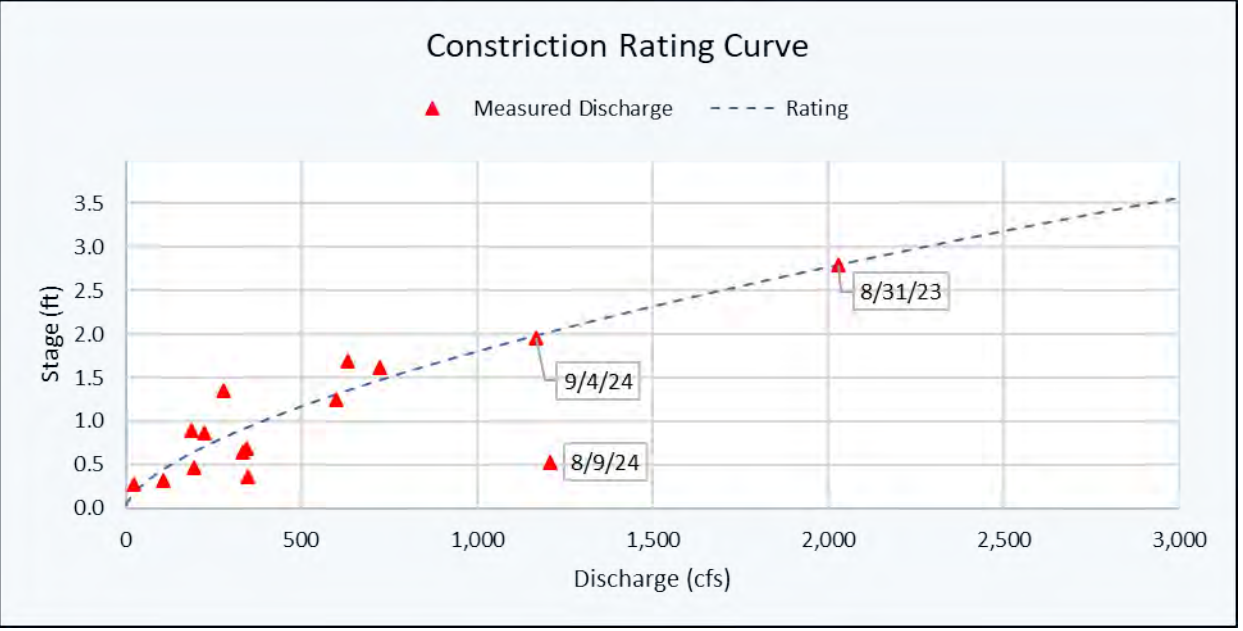
- RM1.9 Constriction Gage 1
  - Lower Martin River, main channel
- RM4.2 OCH (Mid-Reach) Gage 2
  - Tributary, small stream
- WFMR Red Lake Outlet Gage 3
  - Tributary, small channel
- East Fork Martin River USGS Gage 4
  - Dixon Glacier inflow

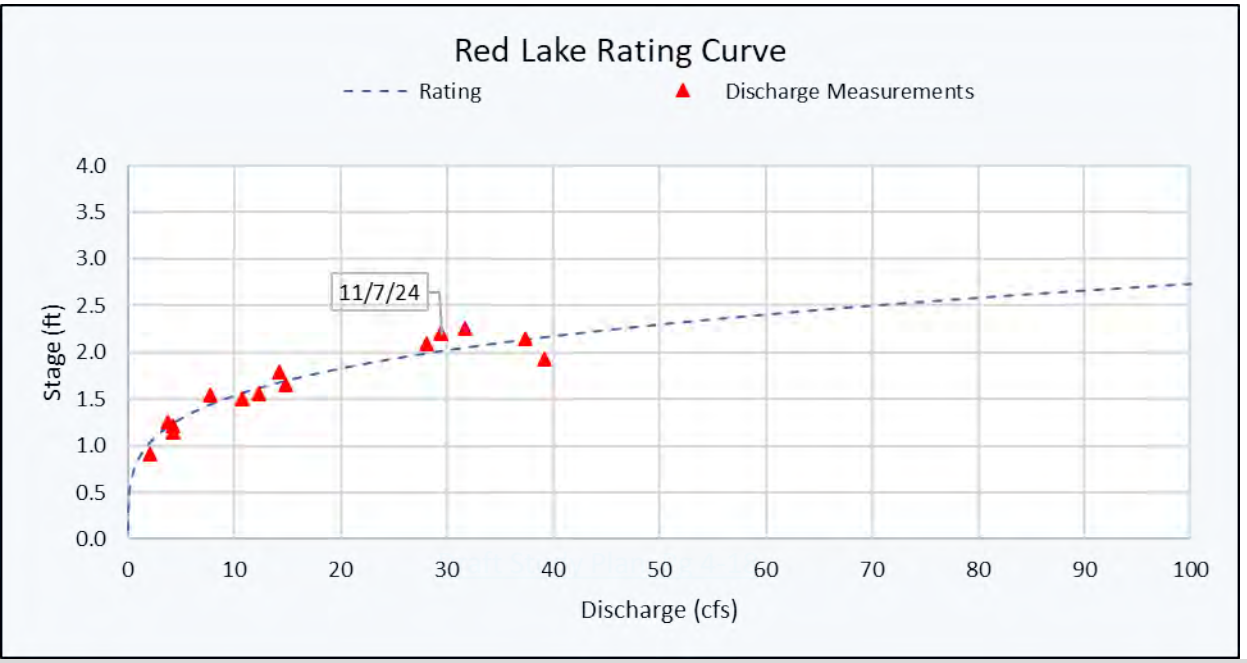
Draft Study Plan, Pg 4-18

Methods and Analysis

- Water Level Loggers
  - 15 min sampling frequency
  - Non-vented PT with barometric sensor and logger on bank
  - In 2024, installed radar sensor at RM 1.9 Constriction to supplement sensors and reduce risk of data loss
- Discharge Measurements
  - April - November
  - In 2024, measurements taken every 2-4 weeks July to October to better capture peak flows
  - Acoustic Doppler Current Profiler

Draft Study Plan, Pg 4-18





Methods and Analysis

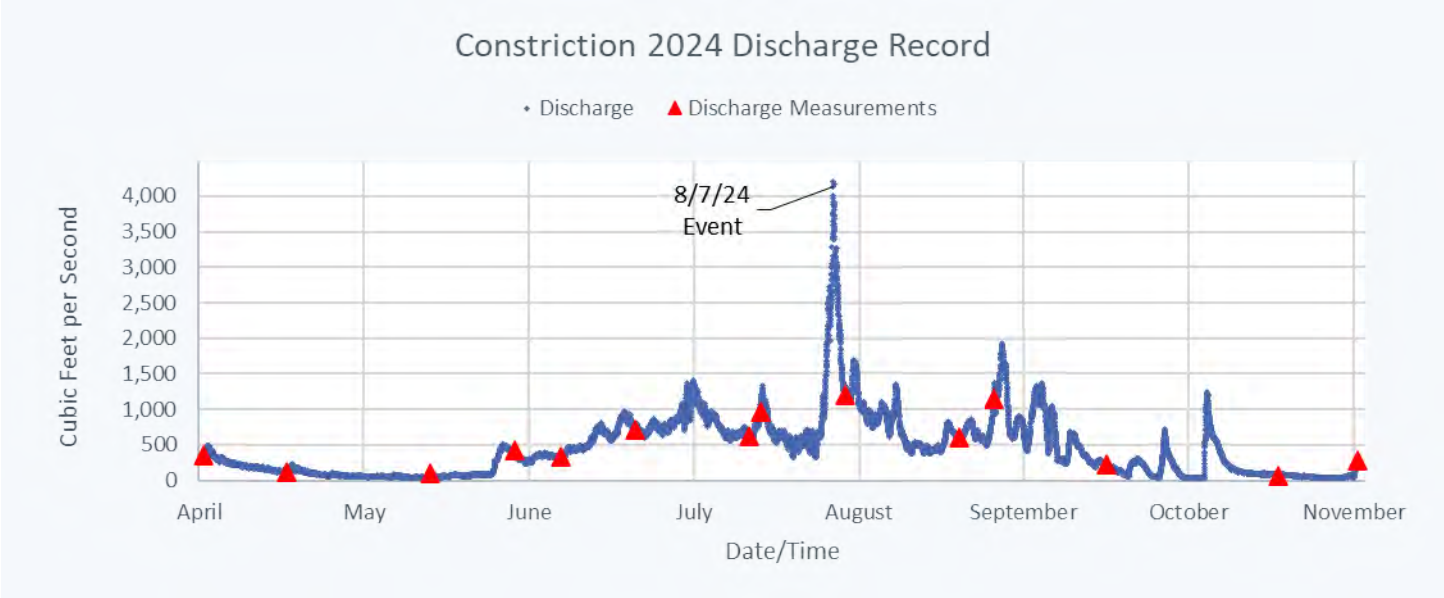
- Rating Curve Development
  - Continue to collect discharge data
  - Complete for each gage location
- Added Timelapse Cameras

2024 Data Collection

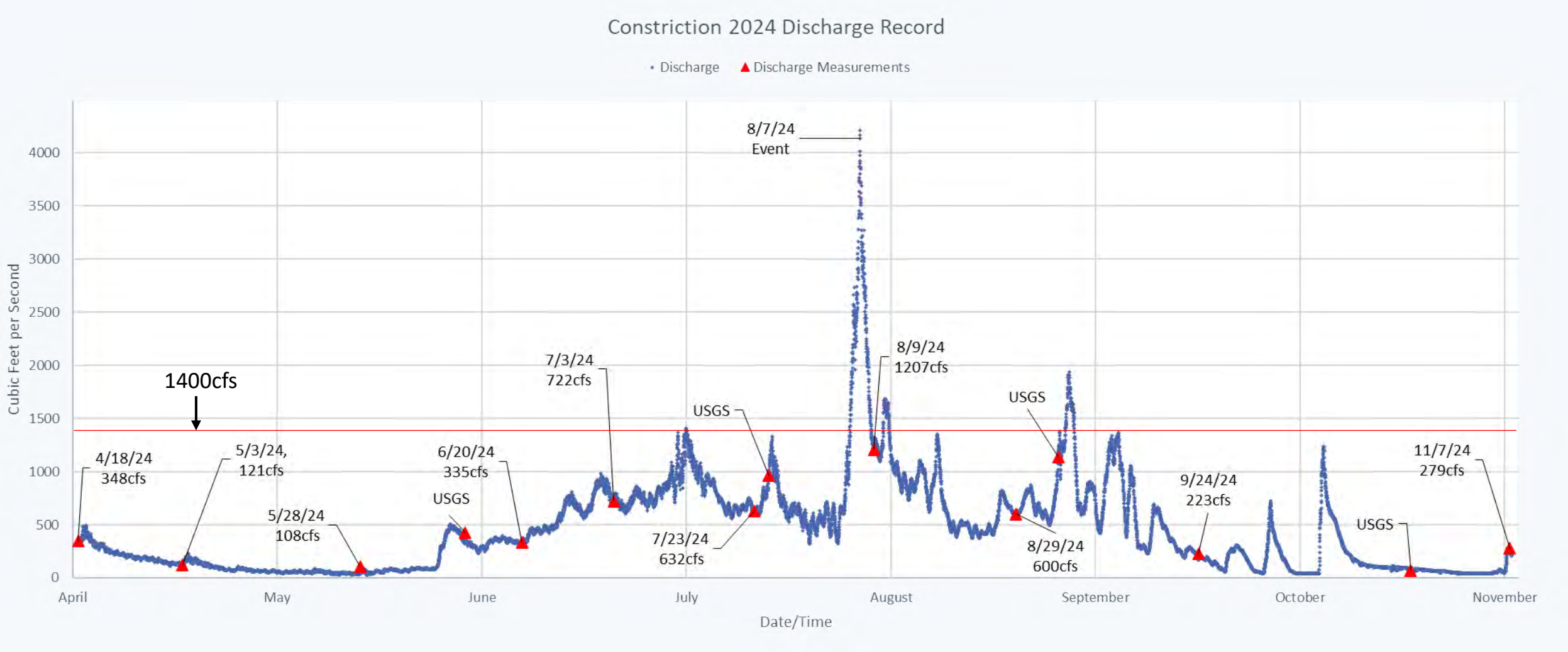
- Field Season: April – November
  - 10 site visits completed
- Peak break-up flows captured (~mid- April) in Red Lake and RM4.2R OCH Outlet
- Observations of mainstem of Martin River
  - Cold
  - High velocity at RM1.9 (max ~14ft/s)
  - Highly mobile bed
  - High turbidity

2024 Data Collection

- 10-year event (8/7/24)
  - Red Lake gage lost; replaced sensor.
  - OCH4.2R Outlet, sensor movement.
  - Constriction gage, stable



Results


Constriction 2024 Discharge Record
Discharge
Discharge Measurements
Cubic Feet per Second
4000
3500
3000
2500
2000
1500
1000
500
0
April
May
June
July
August
September
October
November
Date/Time
1400cfs
4/18/24
348cfs
5/3/24,
121cfs
5/28/24
108cfs
USGS
6/20/24
335cfs
7/3/24
722cfs
USGS
7/23/24
632cfs
8/7/24
Event
8/9/24
1207cfs
USGS
8/29/24
600cfs
9/24/24
223cfs
USGS
11/7/24
279cfs

Proposed Study Plan Modifications

- Continue Measurements at RM 1.9 Constriction and EF Martin River
- Install backup PT at Red Lake Outlet
  - Gage affected by Martin River
- Stop monitoring OCH4.2R Outlet
  - Less than 1% of flow at constriction.
  - Gage affected by Martin River

Schedule

- 2025
  - Data collection during open-water season (April-November)
  - Fill in Data Gaps
  - Field schedule and data acquisition plan to be periodically reassessed and updated based on data quantity and quality

Geomorphology and Sediment Transport Study

- Watershed GeoDynamics: Kathy Vanderwal Dubé

Objectives/Methods

- Delineate geomorphic reaches
- Map channel connectivity, evolution, and braiding through time using historic aerial photographs/LiDAR
- Estimate average annual coarse-sediment input
- Collect pebble counts/sub-surface data
- Use 2-D hydraulic model output to analyze sediment transport/deposition under current and proposed flow and sediment input conditions
- Assess future riparian/aquatic habitat
- Install timelapse cameras to determine flows that initiate channel change/sediment transport (variance from DSP – added task)

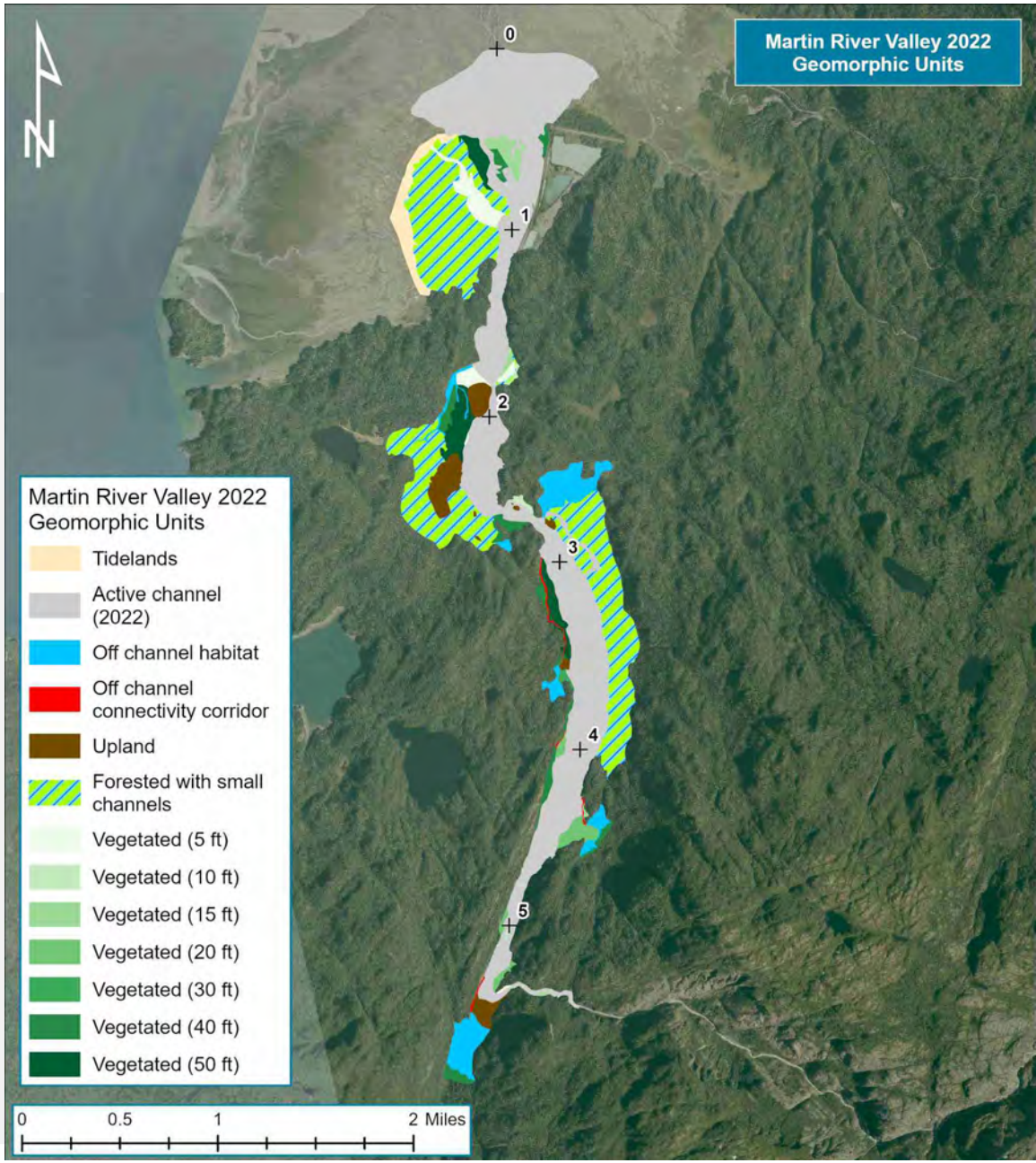
Geomorphic Reaches

- 11 Geomorphic Reaches delineated based primarily on confinement, single/multi-channel characteristics
- Average valley gradient fairly consistent (0.7-0.8 percent) from mouth to Reach 7
- Gradient gradually increases upstream from Reach 7 (1.2-1.5 percent)
- Canyon is higher gradient (6.7 percent)

- 2024 – new reaches due to levee breach

Geomorphic Unit Mapping

- Mapping of similar geomorphic process units in Martin River valley
  - Active channel
  - Off-channel/tributary habitat
  - Off-channel/tributary connectivity corridors
  - Forested with high flow channels
  - Vegetated (varying veg. heights/species – indicate time since river occupied these areas)



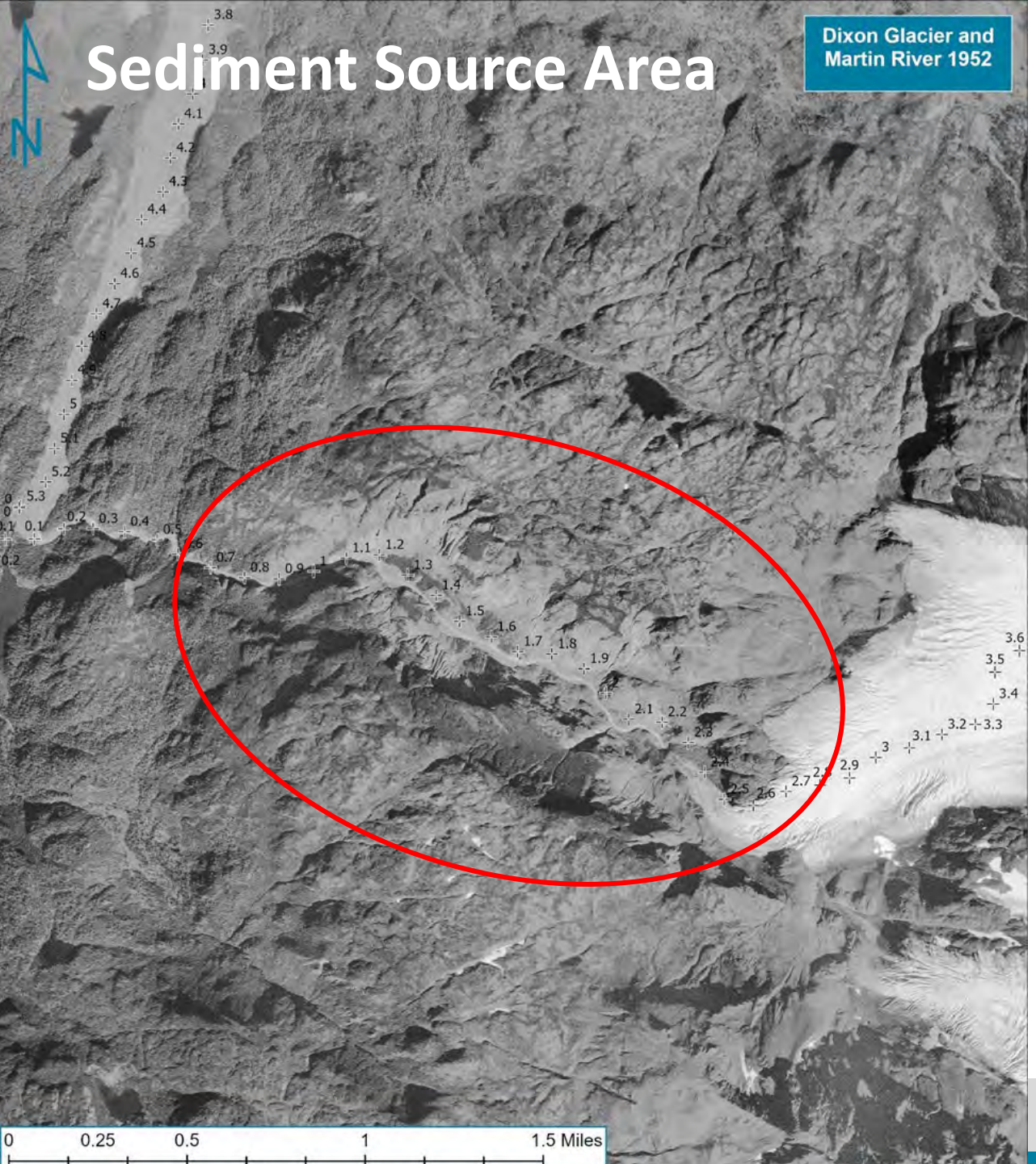
Channel Evolution Through Time (1952-present) - Where is all that sediment coming from?

- Field observations and map analysis: 5-8 feet of aggradation through entire valley
- Equivalent to 460,000 cu yd/yr over last 100 years

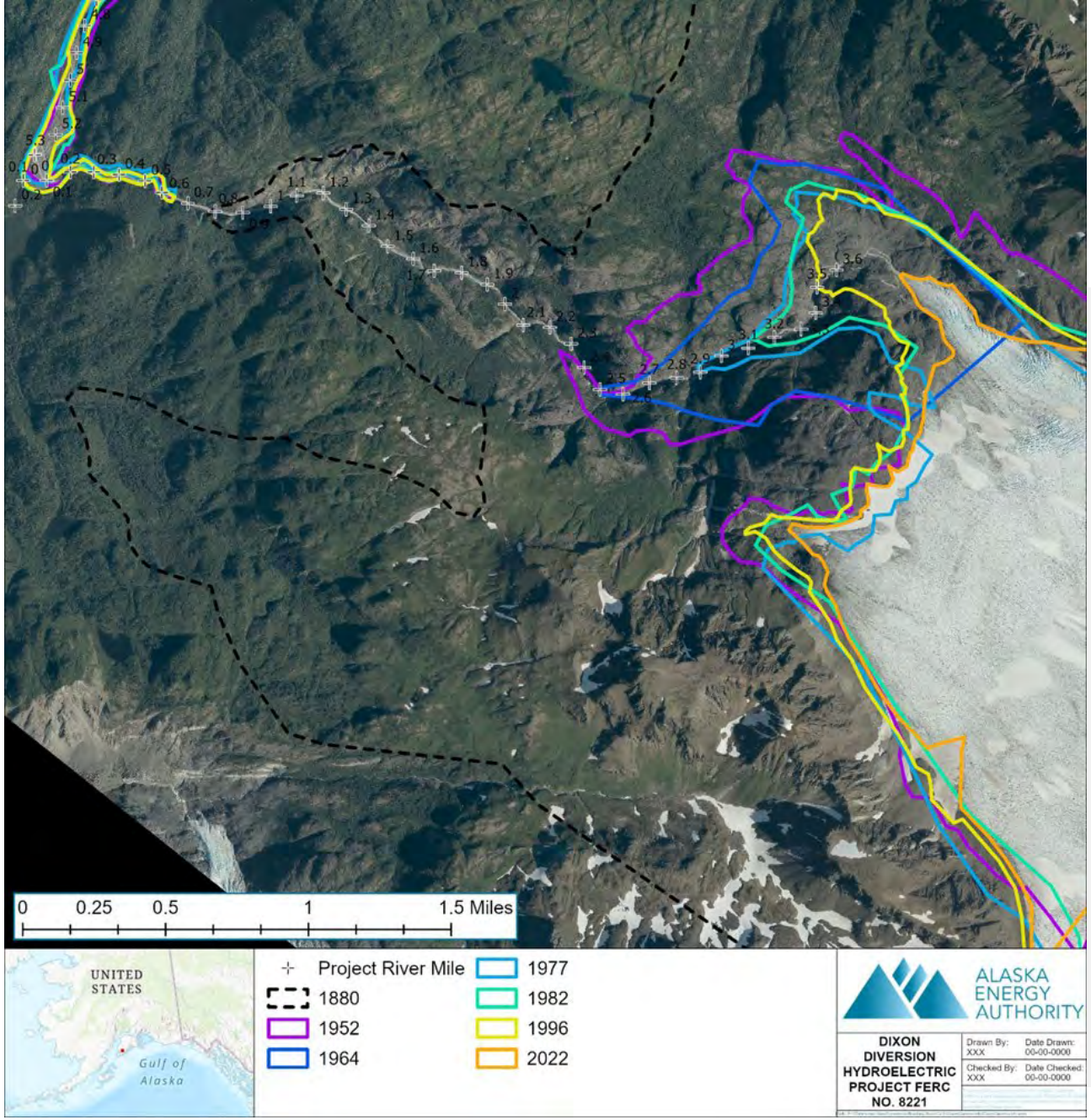
- Dixon Glacier – 3,100 – 31,000 cu yd/yr
- Tributary Streams?
- Landslides?

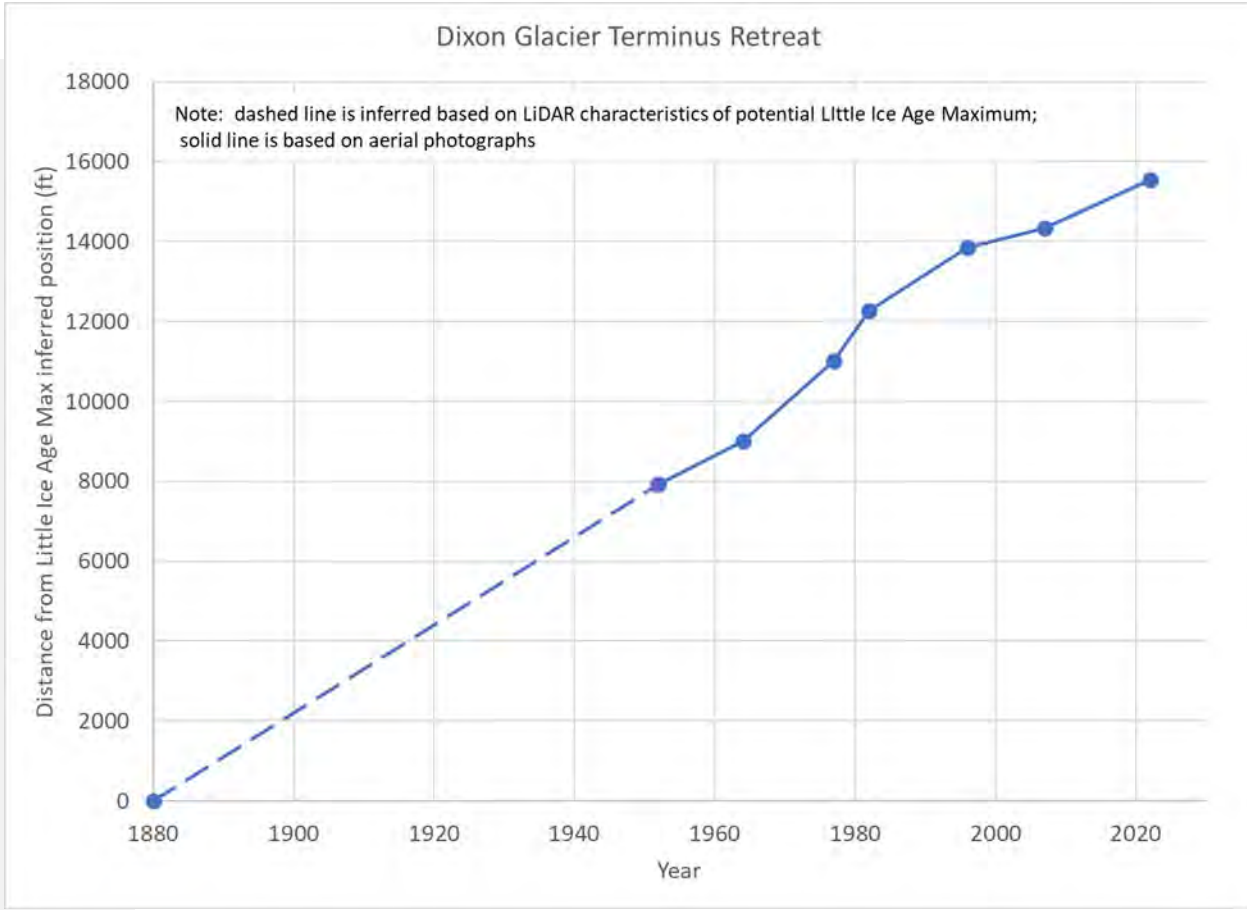
- Mystery!

Sediment Source Area

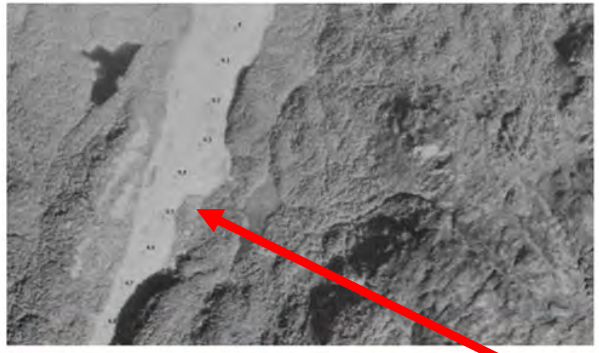


Dixon Glacier

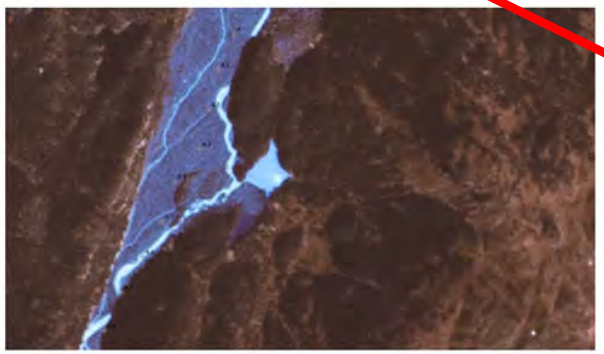




RM 4.3
Right OCH

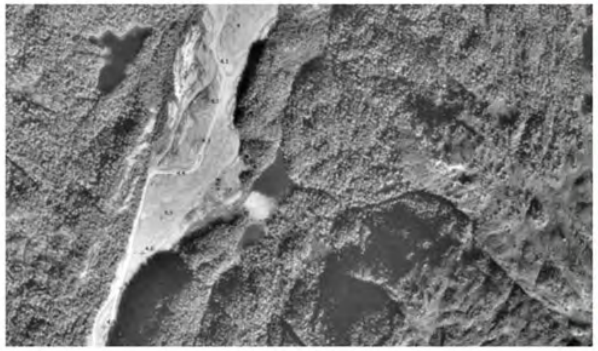


1952

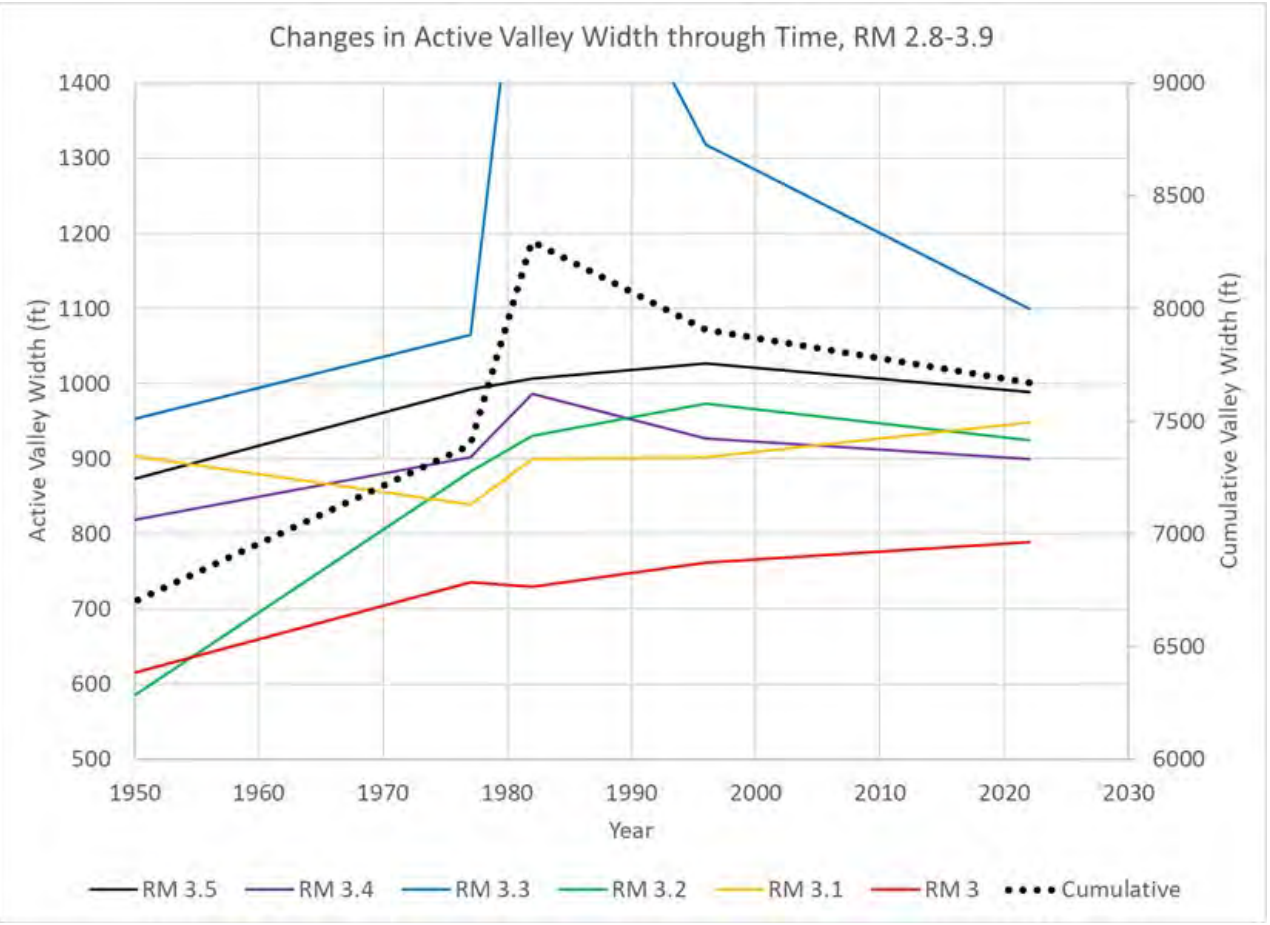


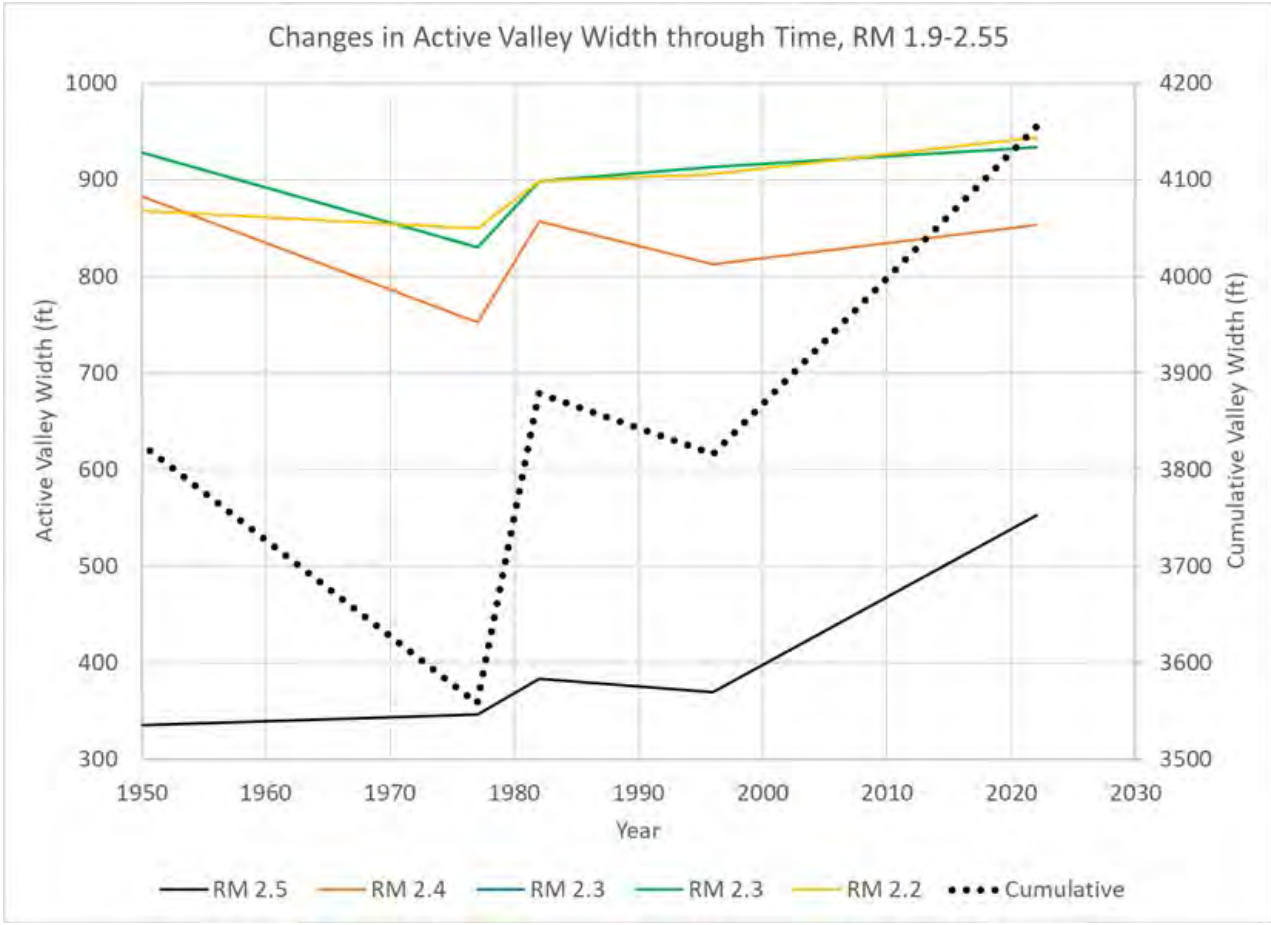
1977

1982



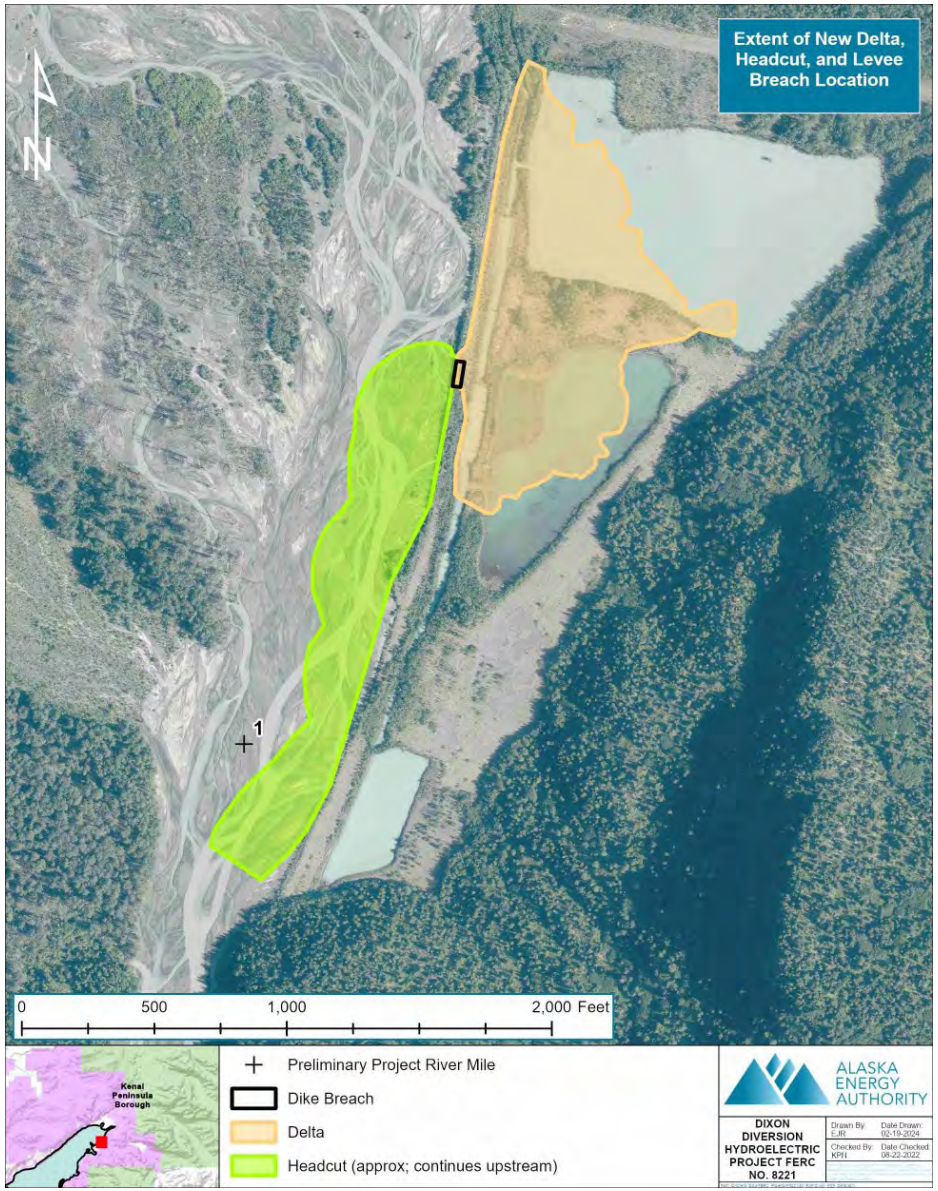
Aggradation Progresses Down-valley





August 2023 Levee Breach at Mouth of Martin River

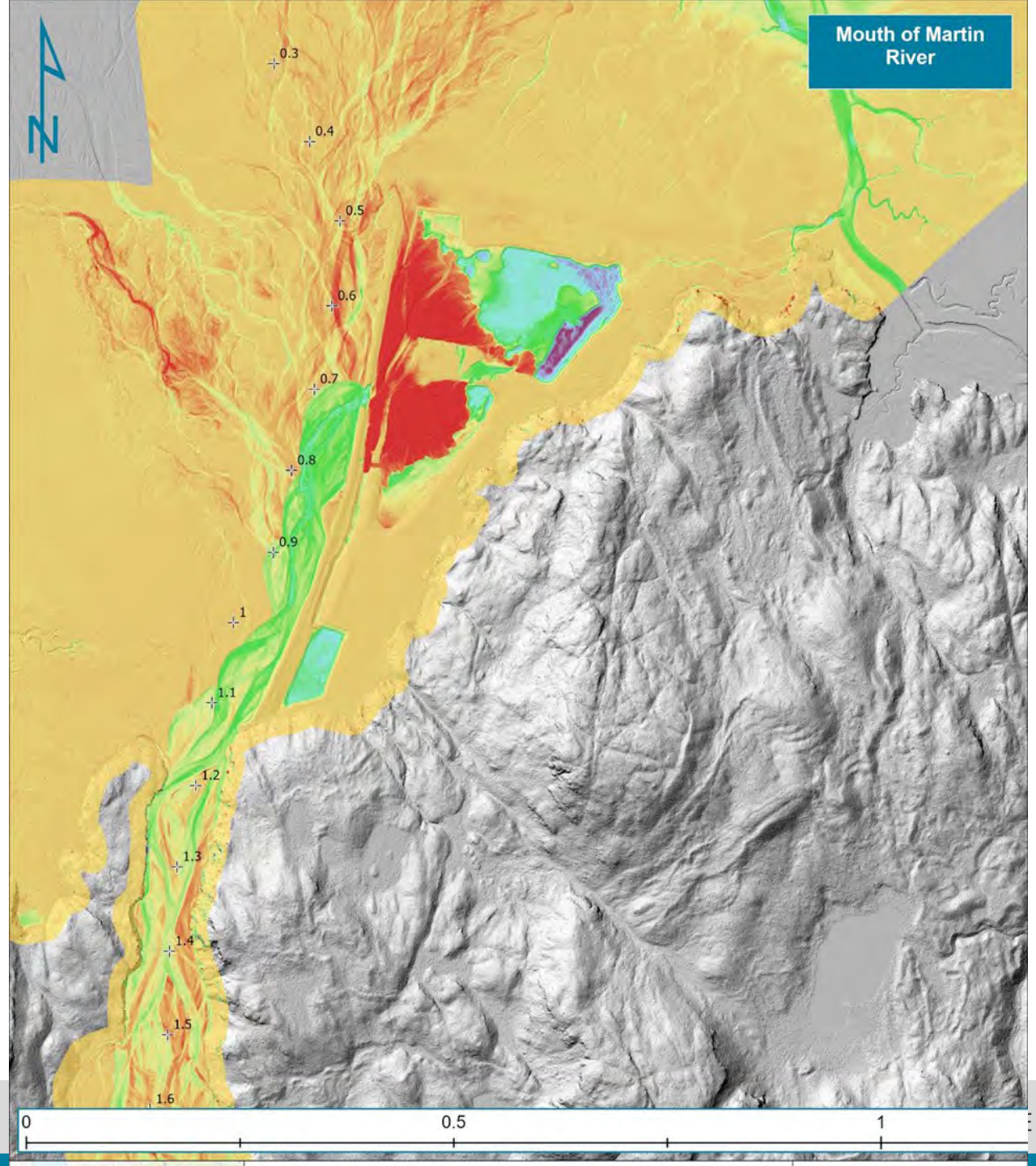
- River aggraded 5 feet since levee constructed (1991-2023)
- River breached levee at beginning of August 2023
- All flow now into former ponds/out northeast corner
- Progressive formation of new delta in ponds, headcutting in Martin River upstream from breach



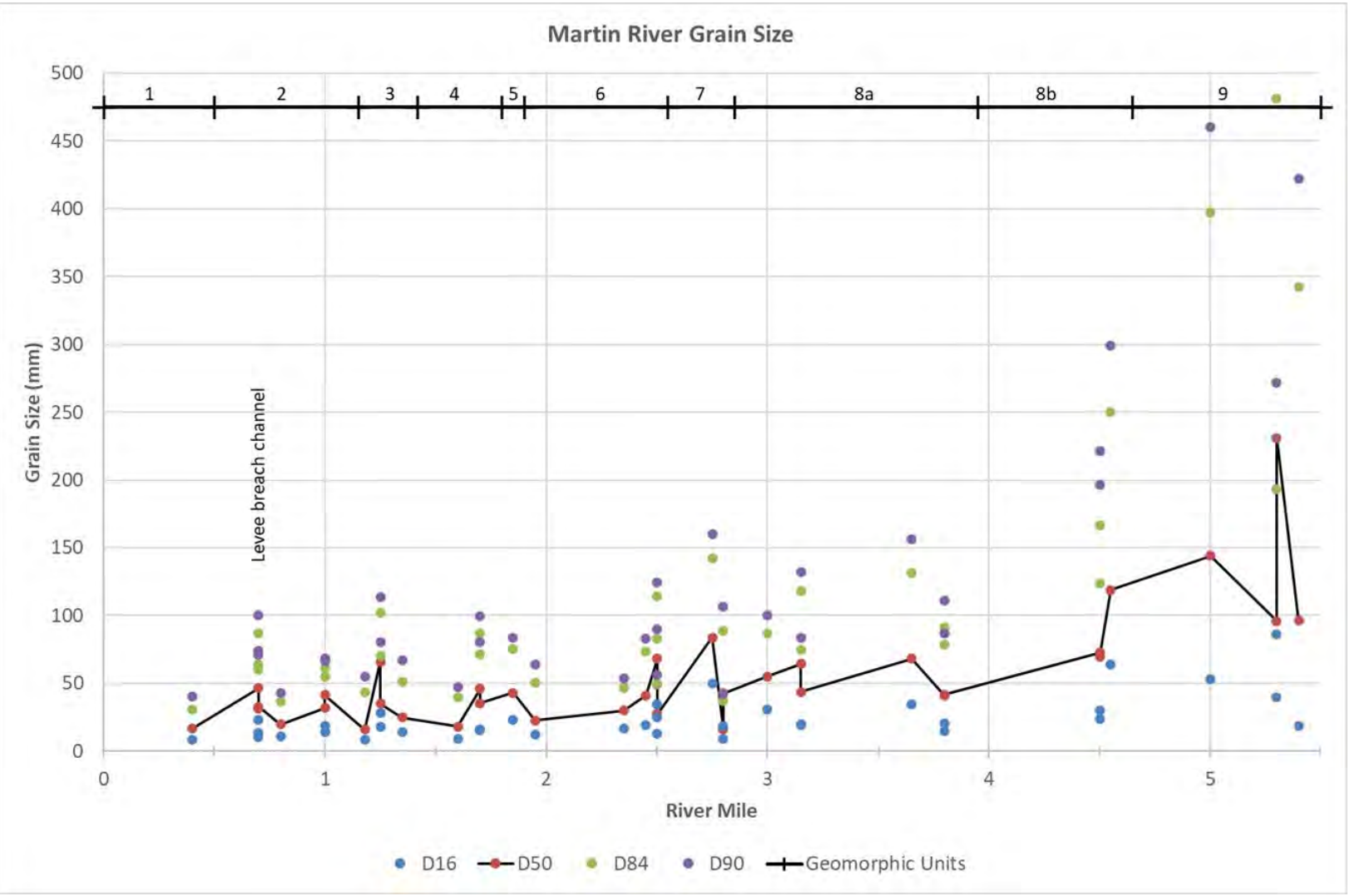
November 2023

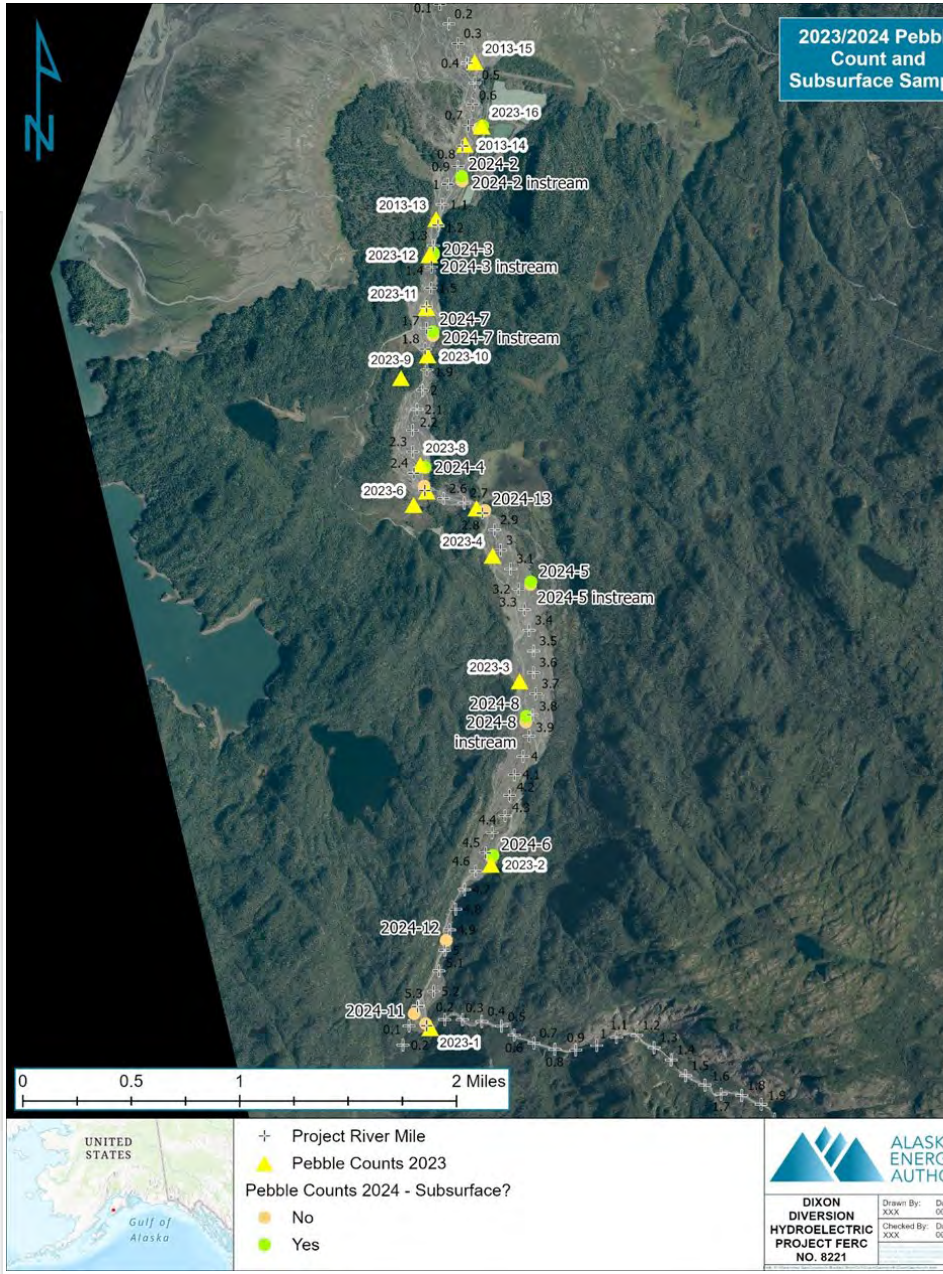
October 2024

Elevation Change – 2024 minus 2022 LiDAR at Mouth of Martin River

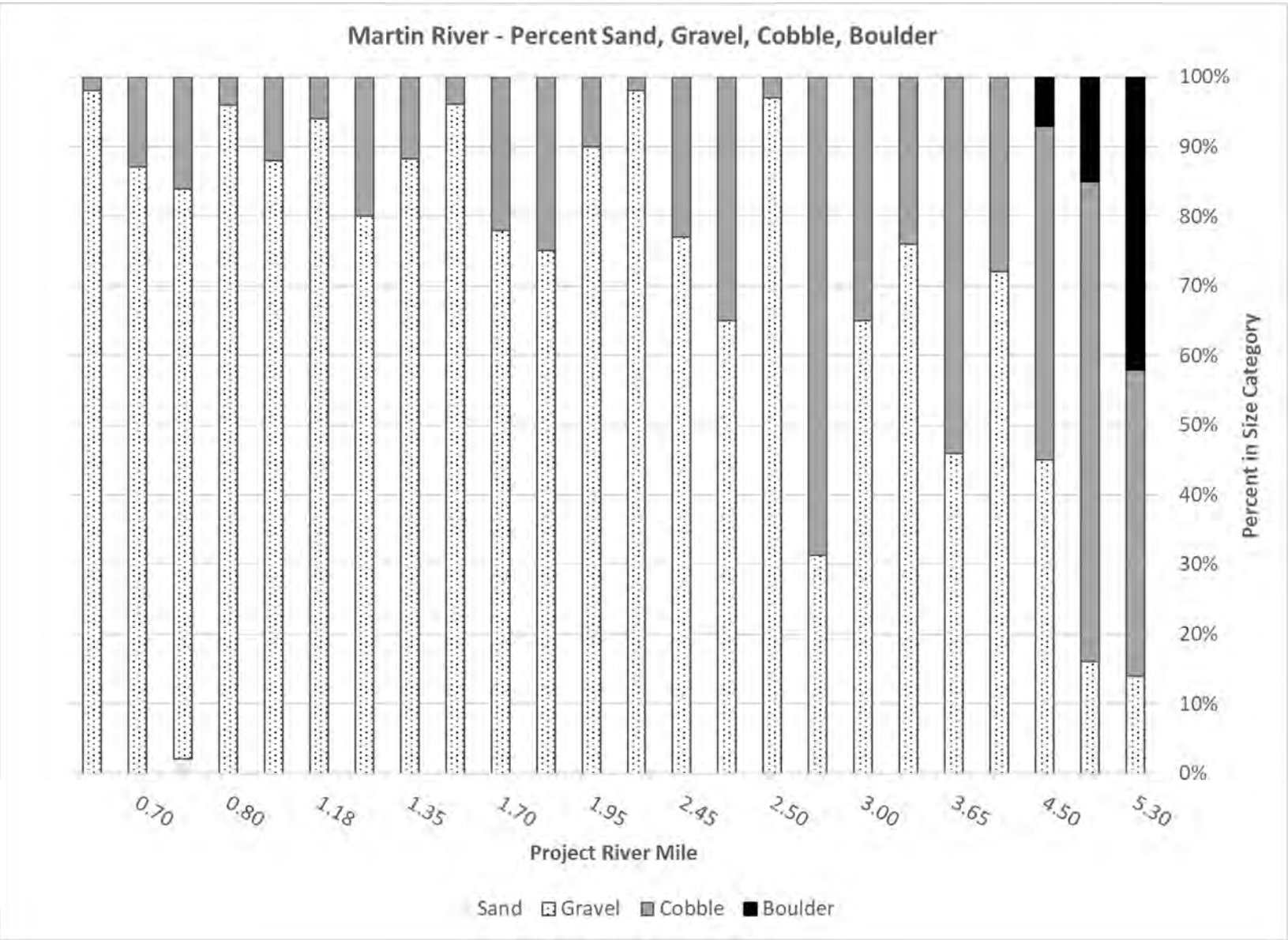


Pebble Counts

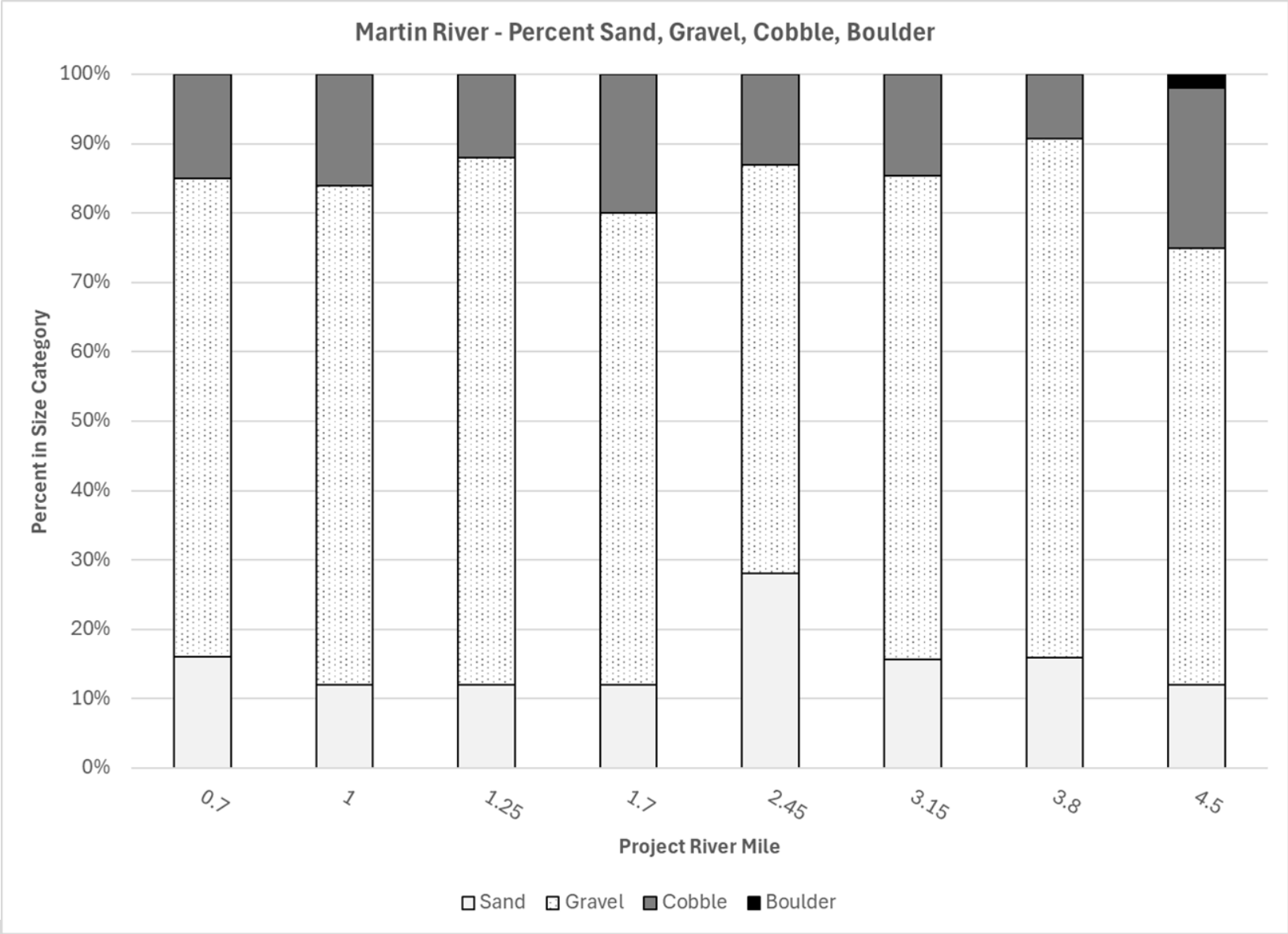




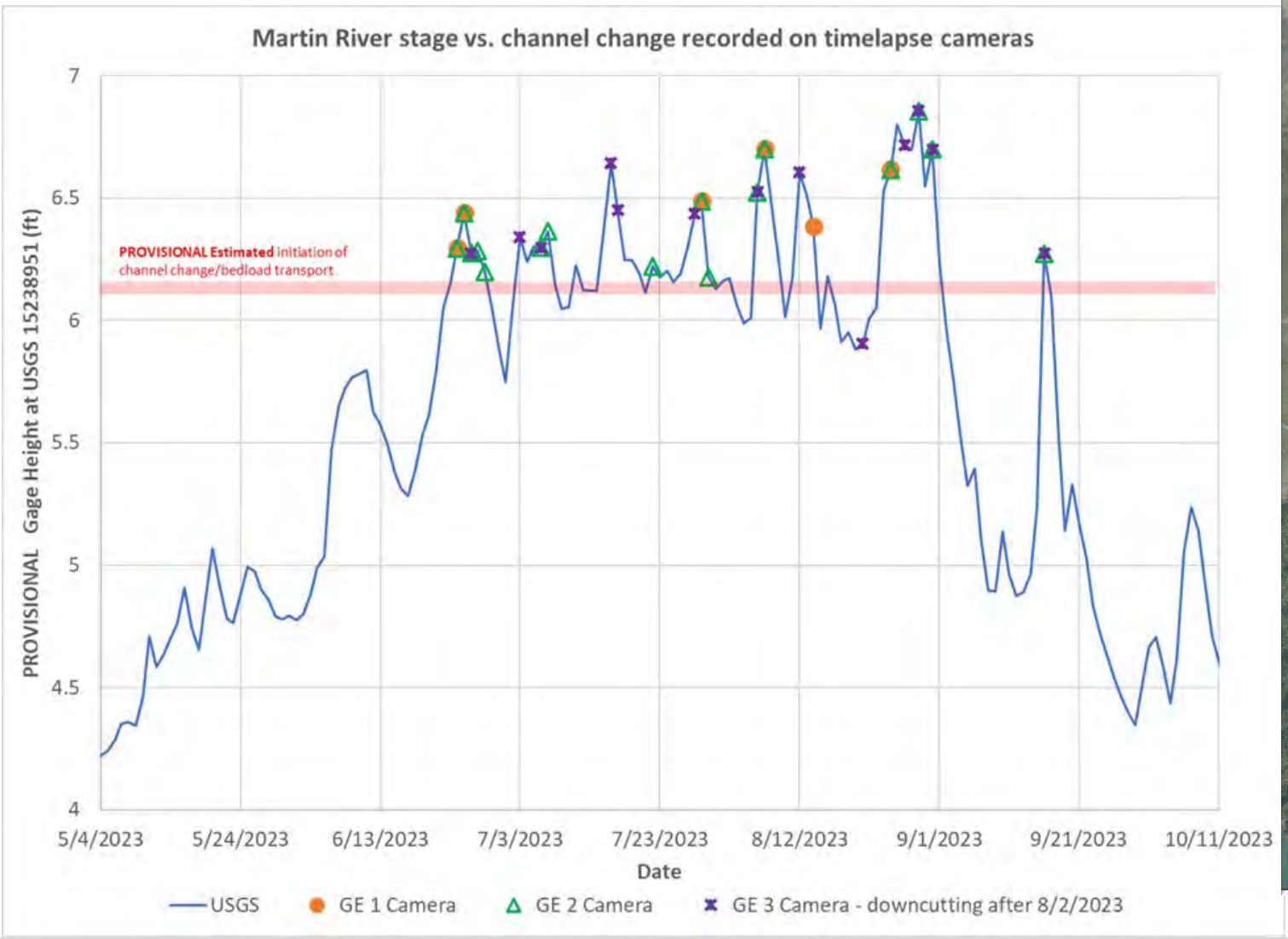
Pebble Counts



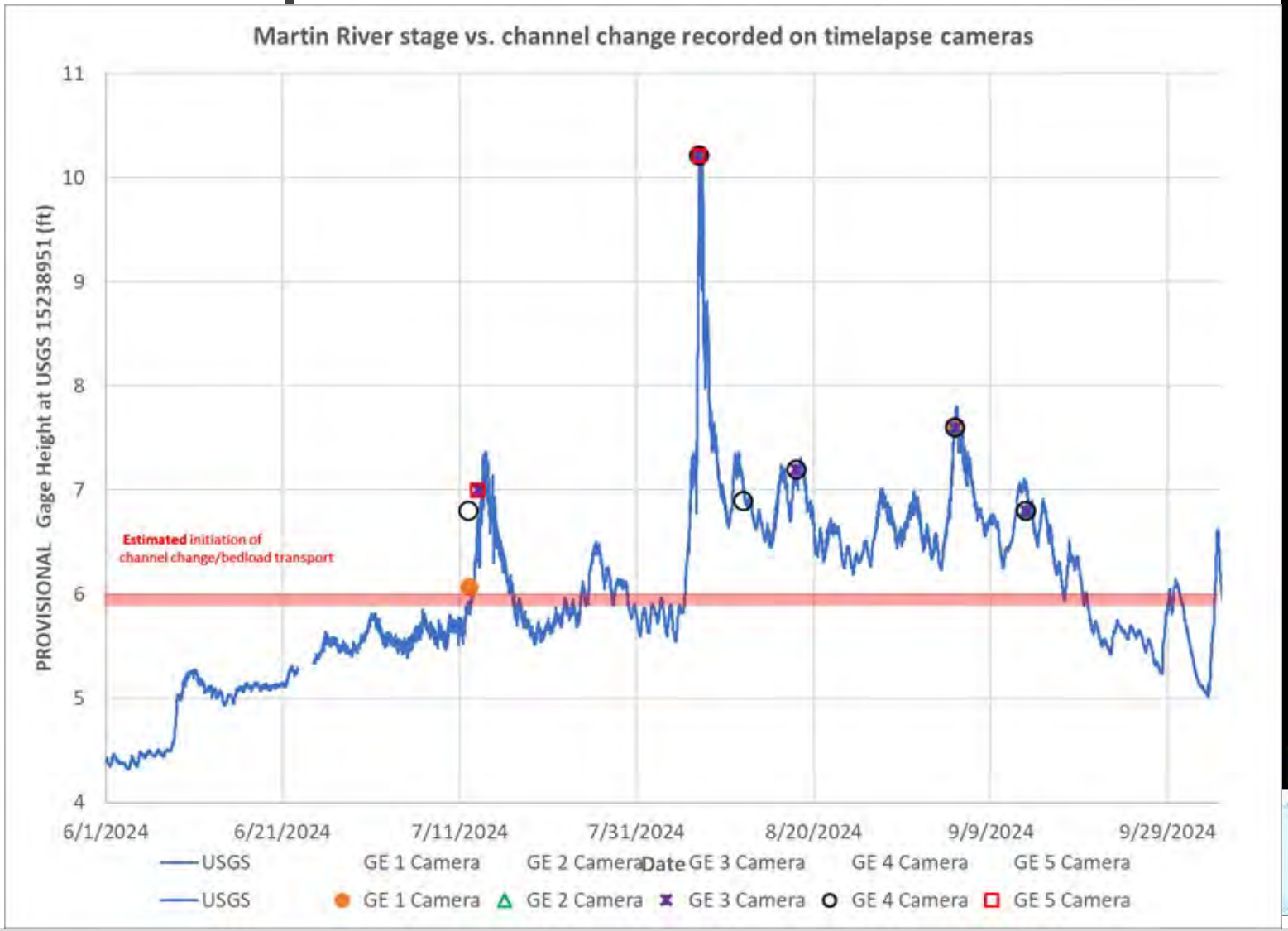
Sub-surface Grain Size

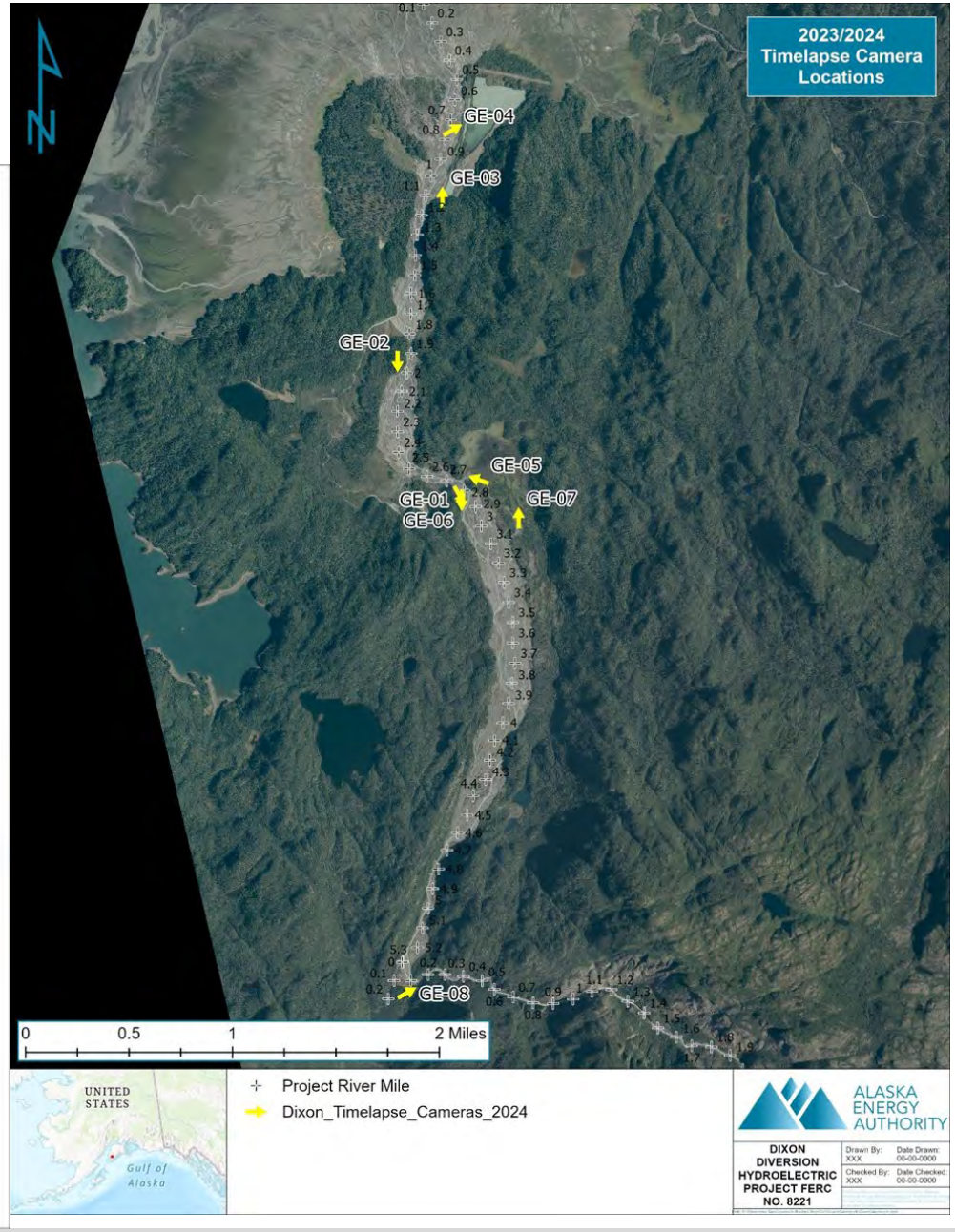


Timelapse Cameras 2023



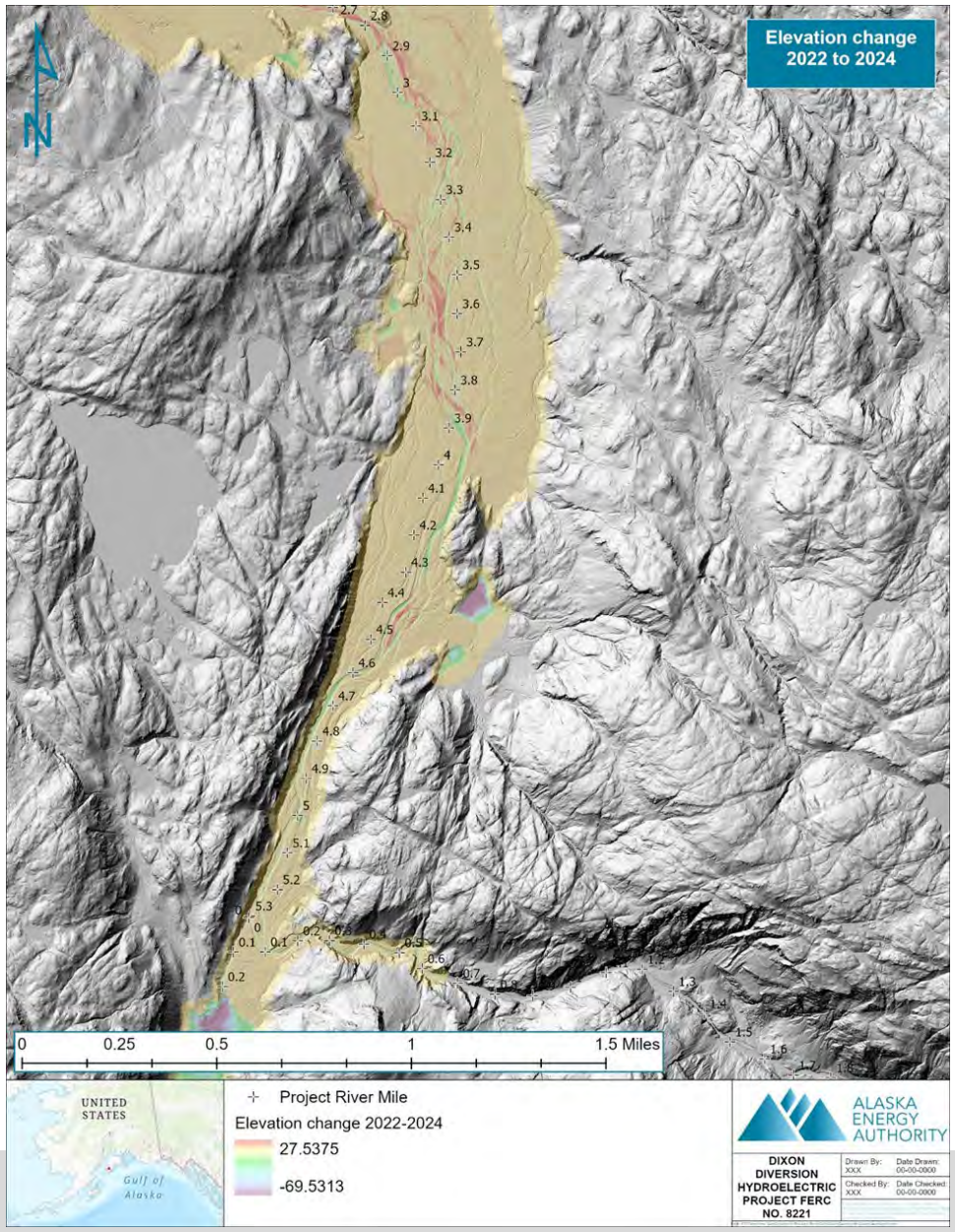
Timelapse Cameras 2024

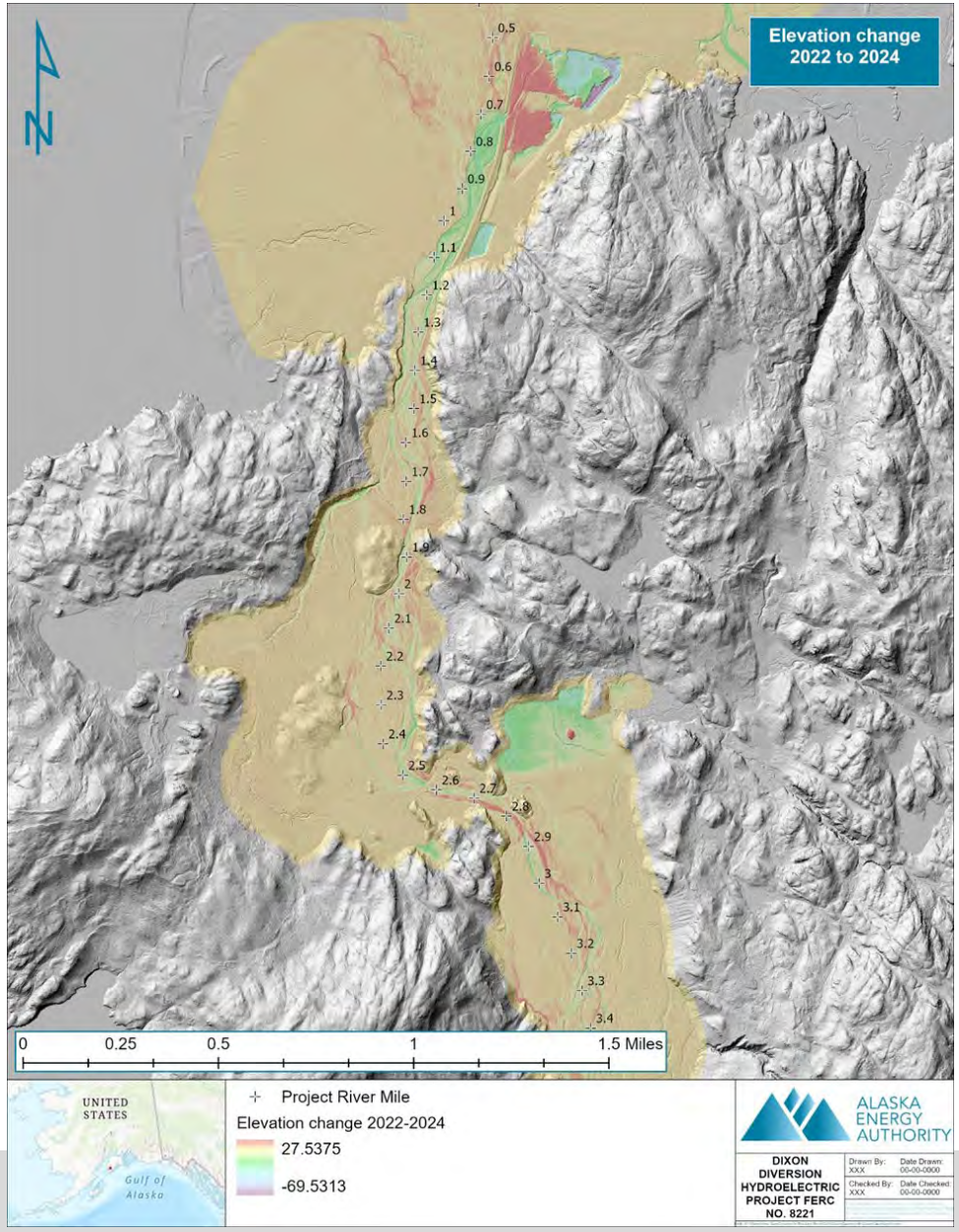




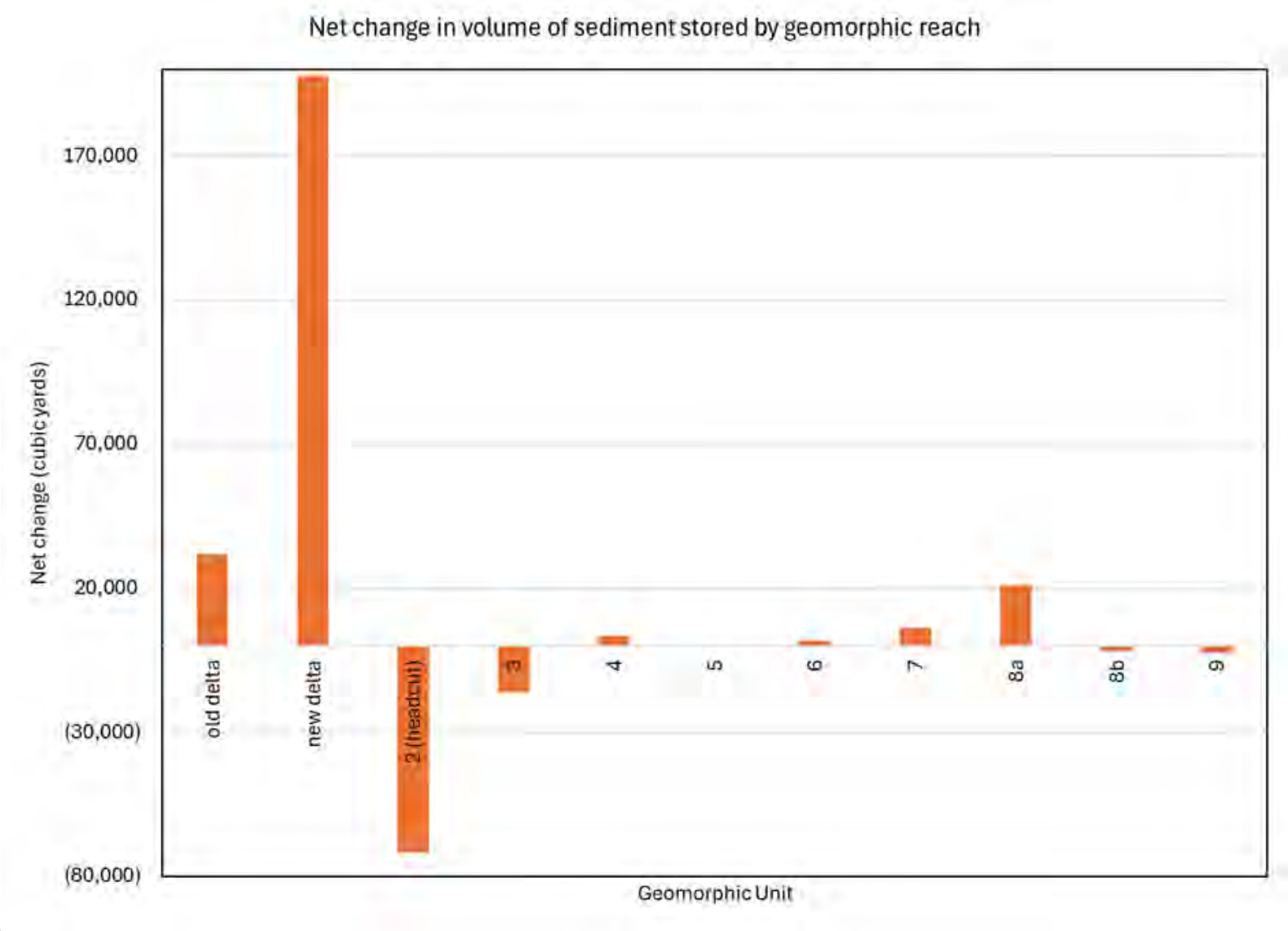
Sediment Transport – Topographic Change

Oct. 2022 - May 2024

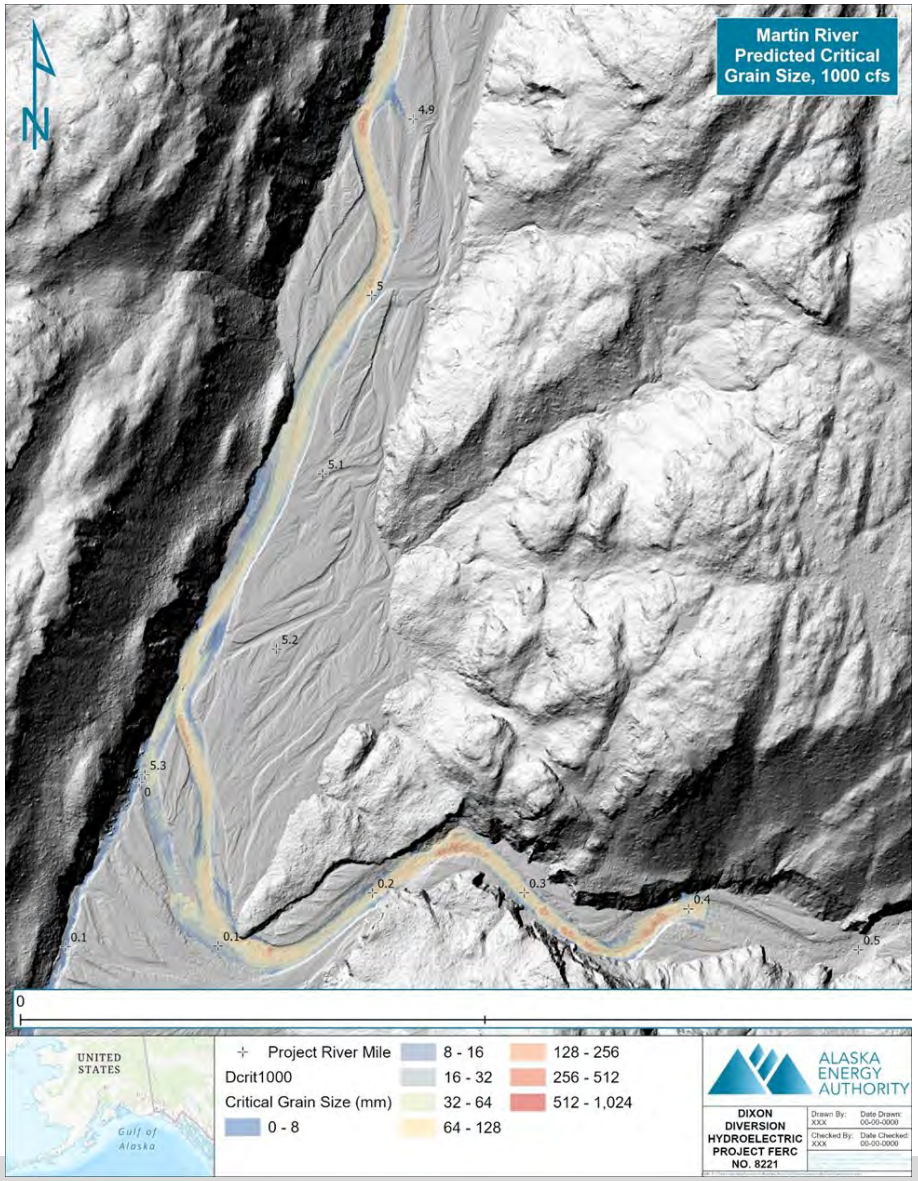


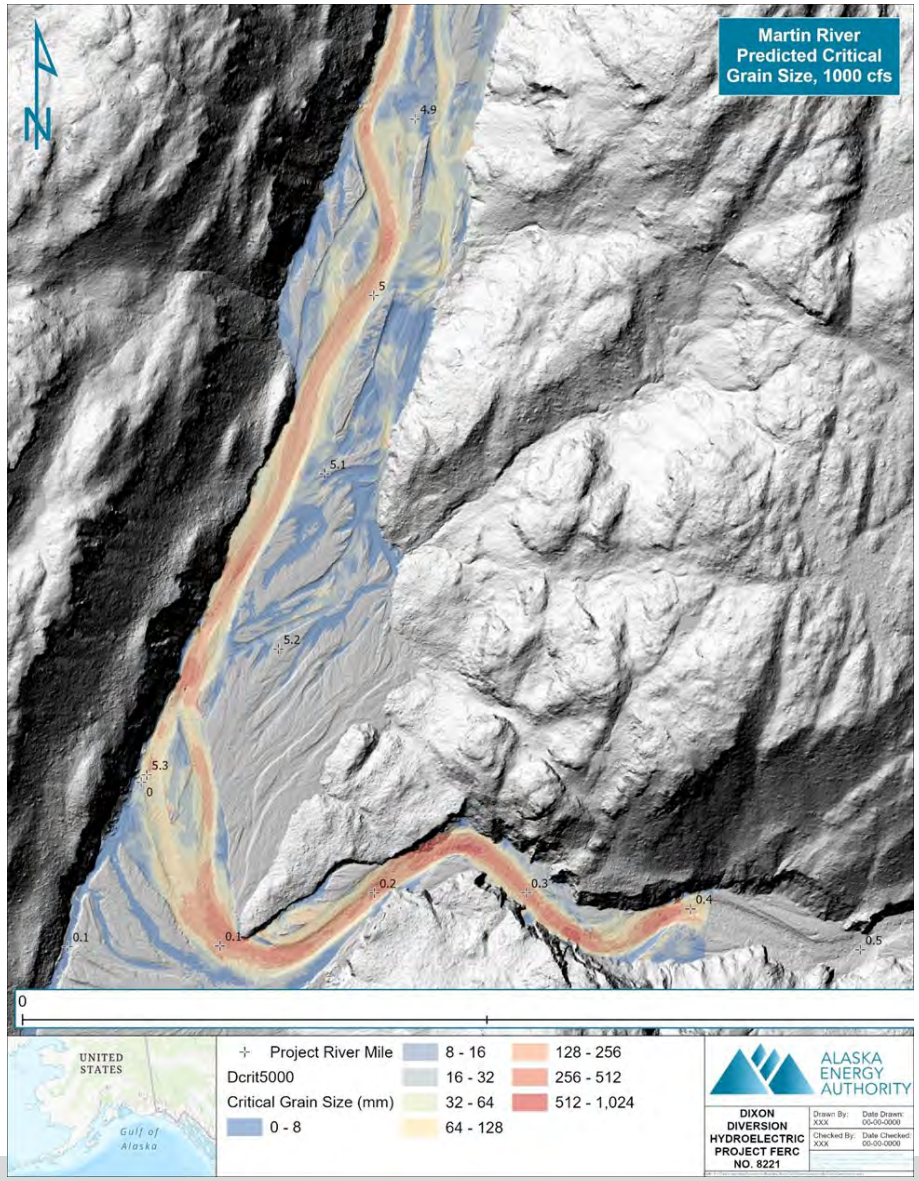


Sediment Transport – Net Volume Change 2022-2024



Initiation of Bedload Transport – 2-D HEC RAS Model Analysis





Summary

- Martin River is a braided glacial river; high sediment load; very dynamic system
- Substrate primarily gravel/cobble with boulder upstream from RM 4 (moderate sub-surface sand content)
- Braided channels migrate multiple times/year
- Estimated bedload transport threshold ~ 1,000 cfs
- Current off-channel habitat areas were part of the active channel in past, will be again in future
- Channel adjustment to upstream sediment slug and levee breach will continue for decades
- We have understanding of river dynamics/sediment sources and we have tools to assess changes to sediment transport due to potential future changes to flow regime

Schedule and Next Steps

- Compare sediment input and transport potential under potential future flow regimes (mid-2025)
- Synthesize hydraulic, geomorphic, riparian, and aquatic analyses (mid-2025)
- Potential fieldwork: re-deploy timelapse cameras to further refine sediment transport/channel change analysis (May-October 2025)
- Final report (late 2025)

QUESTIONS?

Timelapse Cameras

Martin River during 8/7/2024 peak flow

GE-08 Mouth of EFMR Canyon

GE-01 RM 2.9

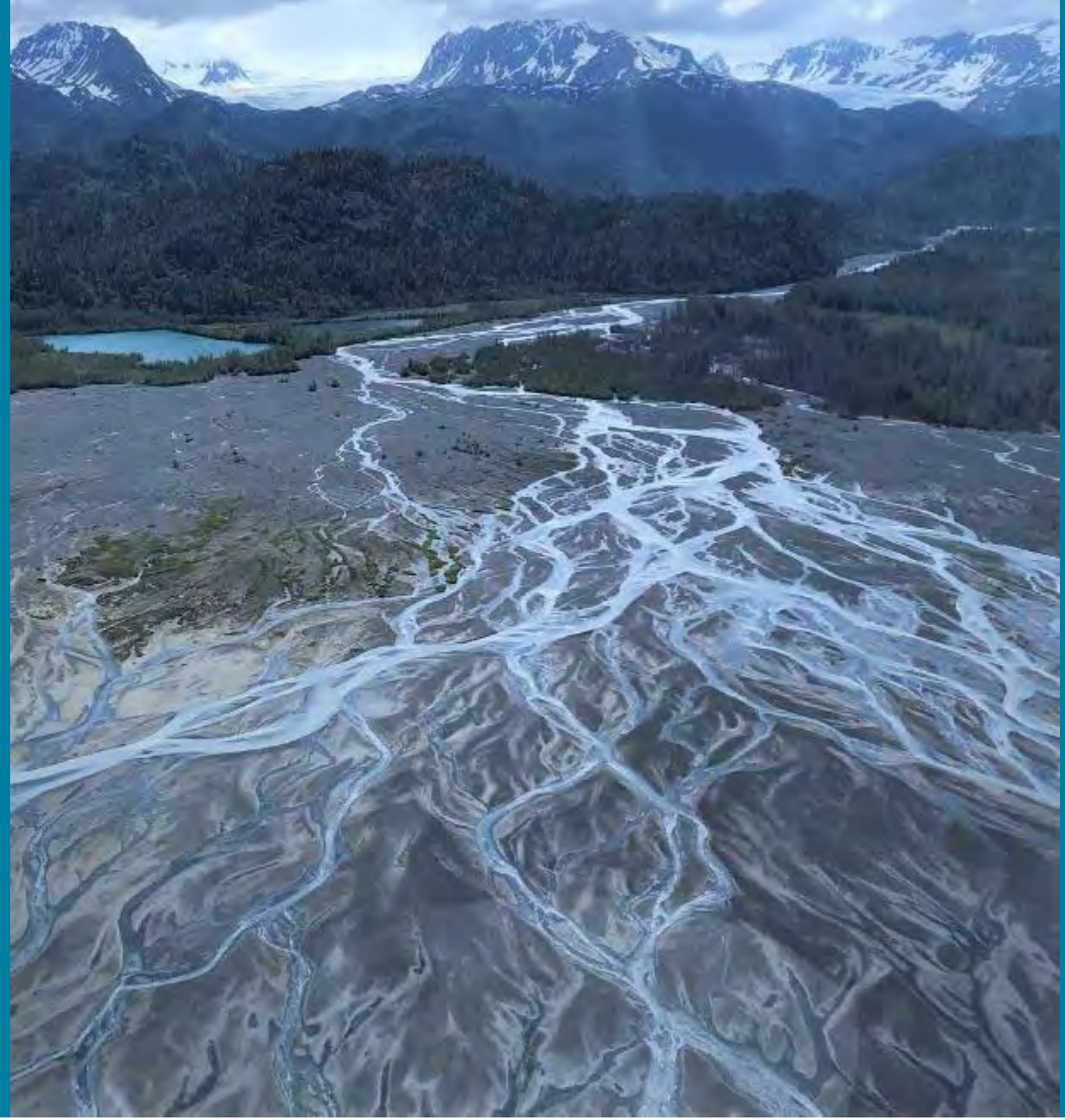
GE-05 – RM 2.75 Right Bank Off Channel

GE-04 RM2 Levee Breach

Hydraulic and Habitat Connectivity Modeling

Kleinschmidt Associates:
Mike Gagner
Chiming Huang

Kleinschmidt



Goals and Objectives

Goal:

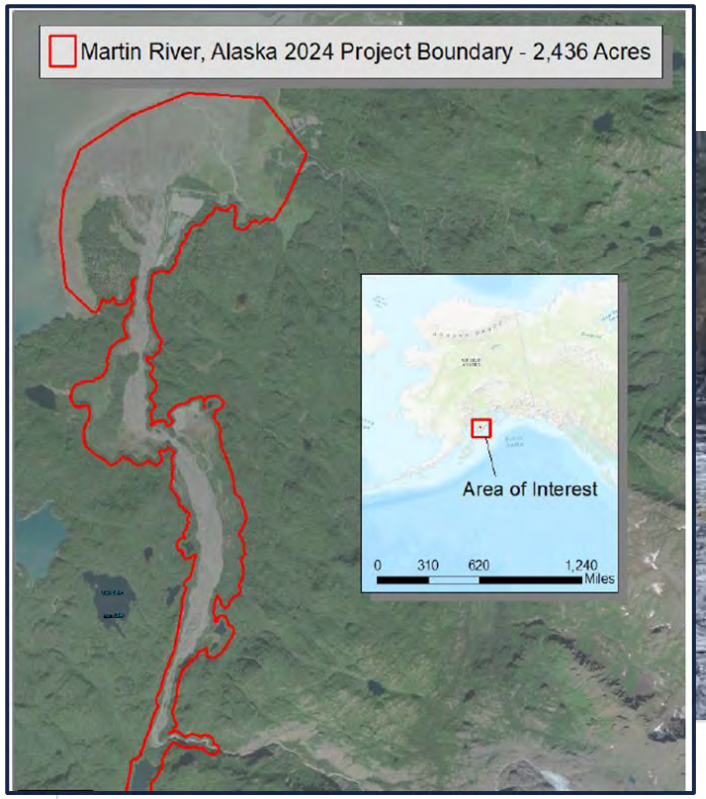
- Evaluate potential changes in aquatic habitat connectivity

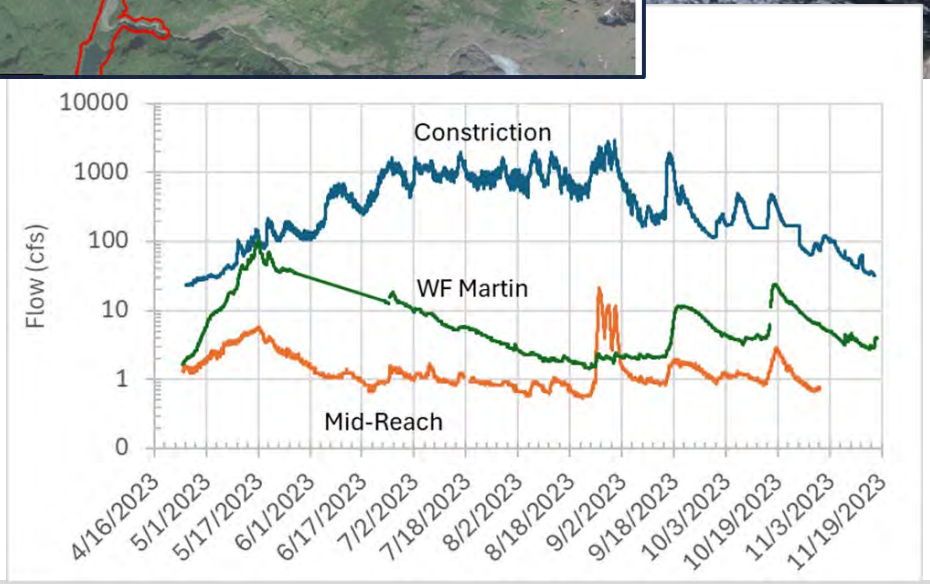
Objectives:

- Develop hydraulic model
- Estimate water depth at different flows based on May 2024 channel
- Predict potential changes to habitat connectivity under operational scenarios

Methods

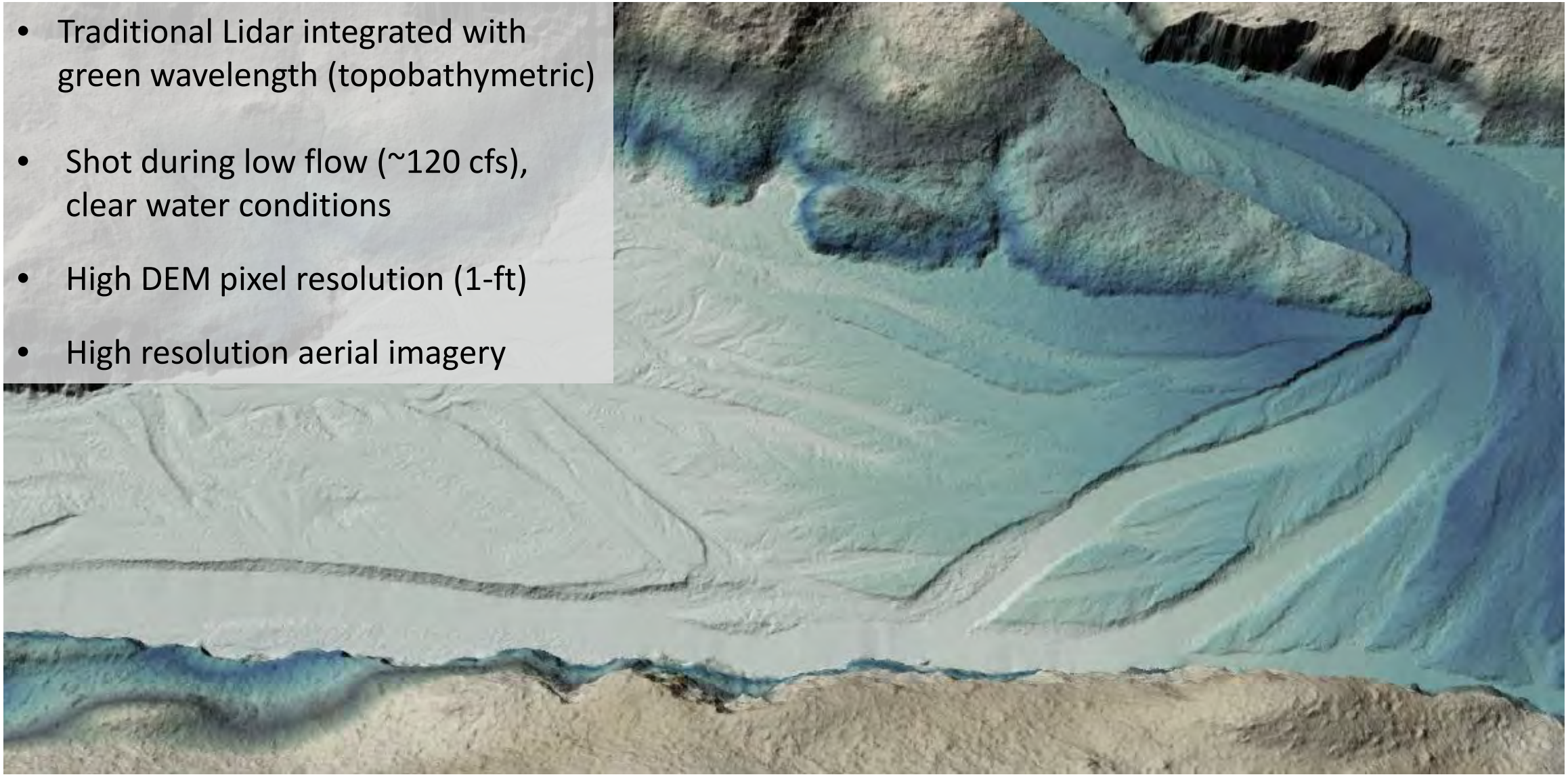
- Acquired topobathymetric DEM (NV5)
- Collected supplemental transect data
- Developed hydraulic model
  - HEC-RAS 2D
  - Model Calibration
- Selected focus species and life stages
- Defined life stage periodicity
- Defined fish passage criteria
- Obtained daily flow values (DOWL)
- Evaluated habitat connectivity





Digital Elevation Model – NV5

- Traditional Lidar integrated with green wavelength (topobathymetric)
- Shot during low flow (~120 cfs), clear water conditions
- High DEM pixel resolution (1-ft)
- High resolution aerial imagery

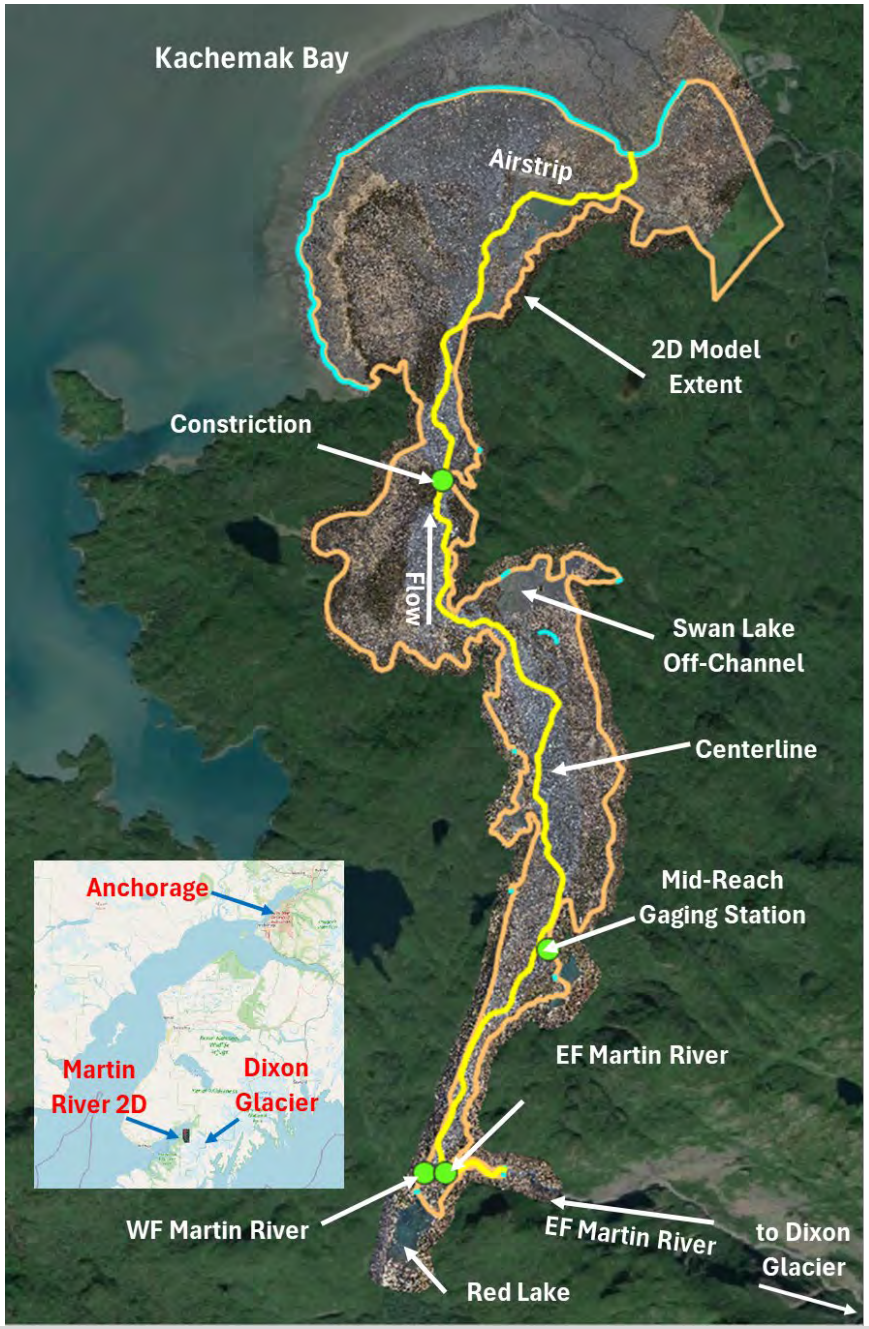


Confirm NV5 DEM

- Surveys conducted by Kleinschmidt & DOWL
- Combined 2,100 points
- In-channel, tributary connectivity, adjacent floodplain
- Generally, within ¼ foot of DTM

Hydraulic Modeling

1. Obtain and Confirm DEM (NV5)
2. HEC-RAS 2D
3. Boundary Conditions
4. Surface Roughness (Watershed GeoDynamics)
   - Landcover Polygons
   - Pebble Counts
5. Discharges
   - EF MR, WF MR, Mid-Reach, Constriction (DOWL)
   - Tributaries (Kleinschmidt)
6. Model Simulations
   - Multiple flow scenarios – 100, 150 and 200 cfs



Hydraulic Model Calibration

Flow Transect Location	Measured Flow (cfs)	Date of Flow Measurement	Measured WSE (ft)	Modeled WSE (ft)	Calibration Difference (ft)
Constriction	121	5/3/2024	65.37	65.37	0.00
WF Martin River	37	5/3/2024	276.99	277.01	0.02
EF Martin River	57	5/3/2024	283.28	283.29	0.01

- Measured flows provided by DOWL
- Tributary flows between RM 1.9 Constriction and WF/EF Martin River confluence (~27 cfs)
- Channel surface roughness (i.e., Manning's n values)
  - Constriction: n = 0.057
  - WF Martin River: n = 0.066
  - EF Martin River: n = 0.08

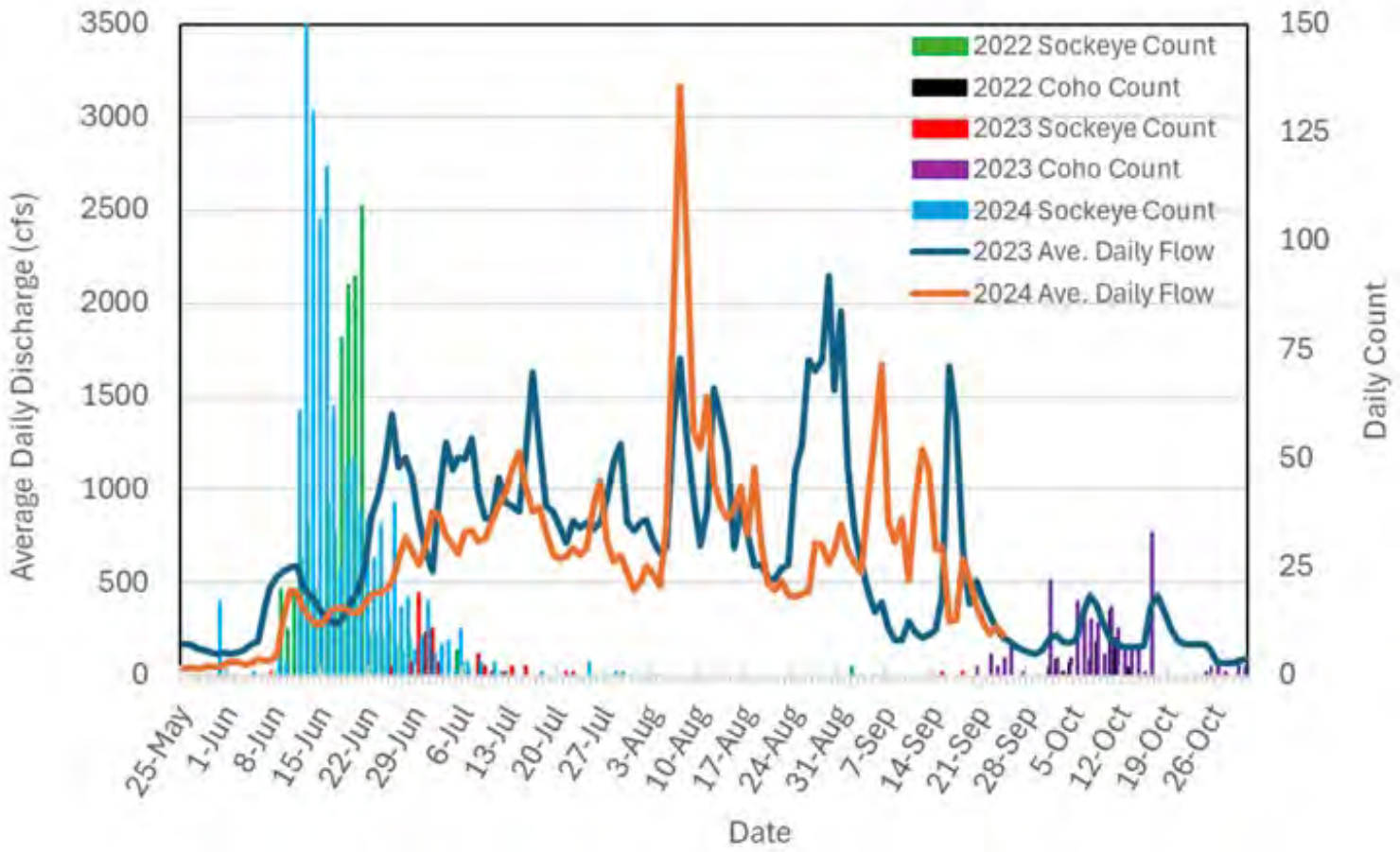
Target Species and Periodicity

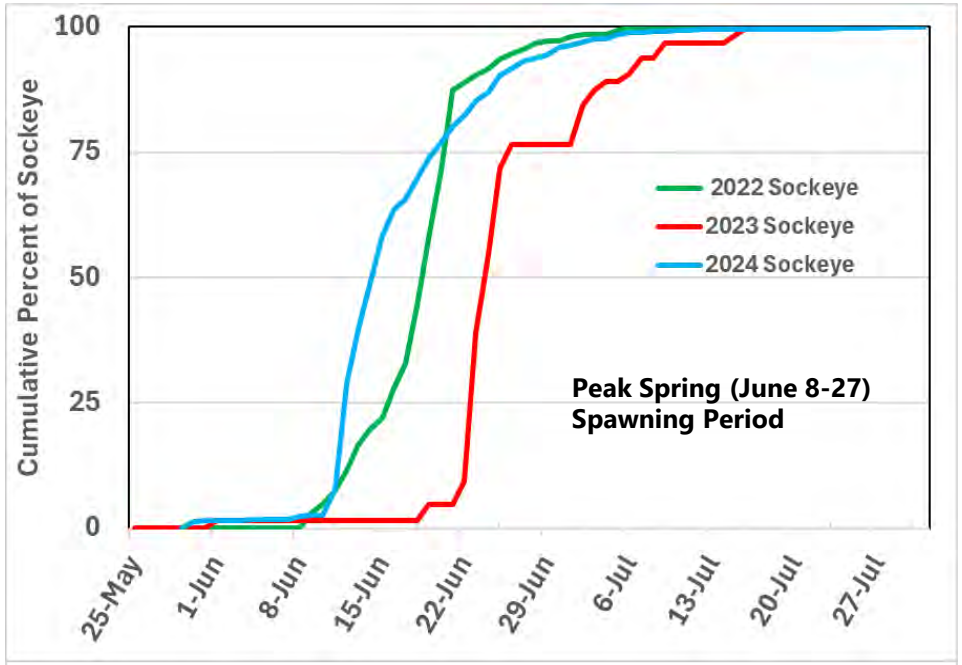
Based on:

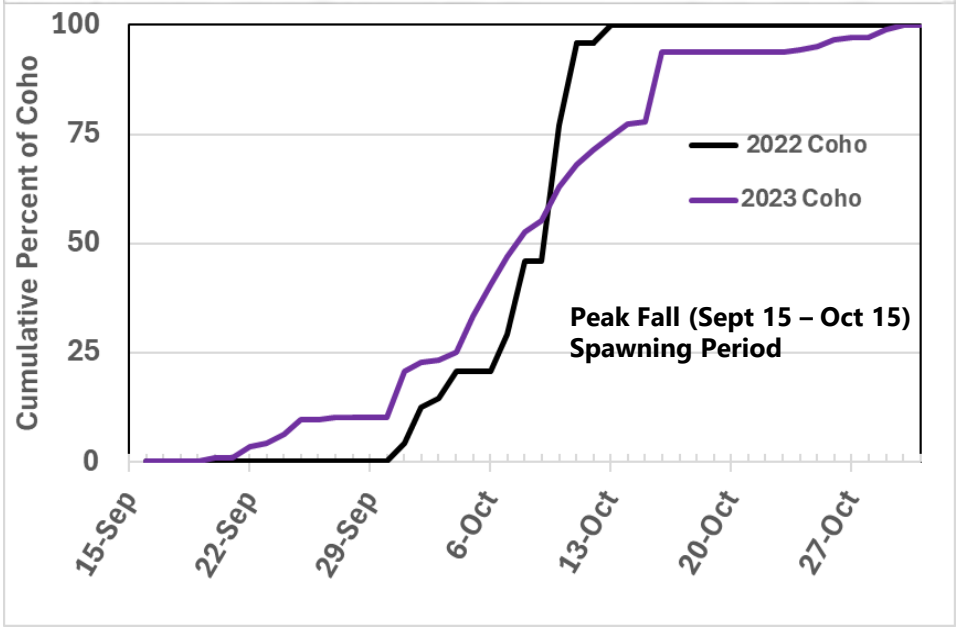
- 2020 Anadromous Waters Catalog (ADF&G)
- 2022 Initial Consultation Document (AEA)
- 2022-2024 Red Lake Fish Counts (ADF&G)
- 2024 Fish Use Surveys (Kleinschmidt)

Life Stage	Species	Month											
		J	F	M	A	May	June	July	August	September	October	N	D
Adult Migration	Coho												
	Sockeye												
Adult Spawning	Coho												
	Sockeye												
	Dolly Varden												
Rearing (Fry, parr, adult)	Coho												
	Sockeye												
	Dolly Varden												

Migration Timing







Passage Criteria

1. Each transect is 80-ft wide with 40 feet on each side of channel centerline. Water depth is sampled at every one foot along the transect.

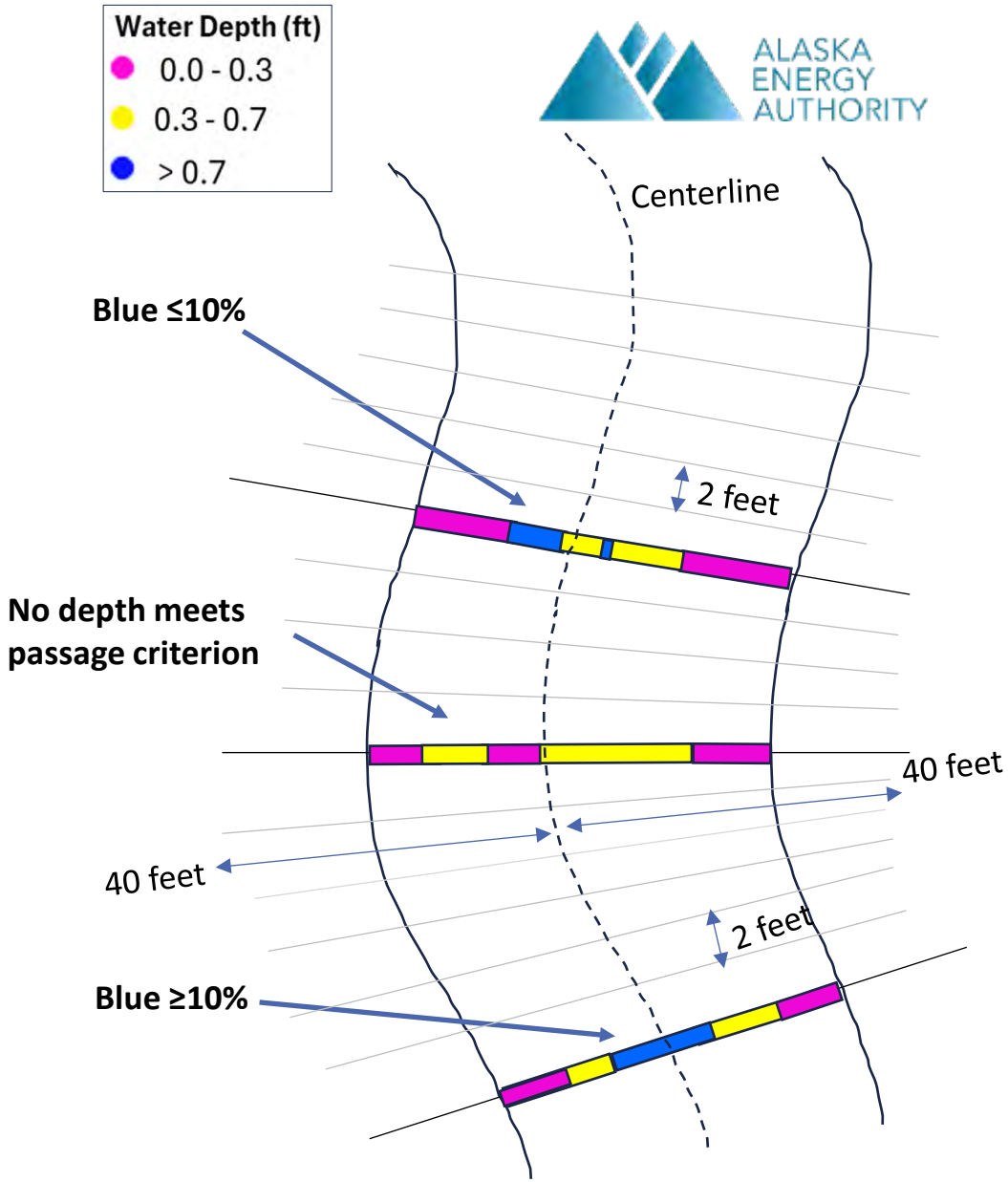
2. Determine wetted width of each transect

3. Determine passable width of each transect
   - Adult Coho, Sockeye, DV – 0.70 ft
   - Juvenile – 0.3 ft

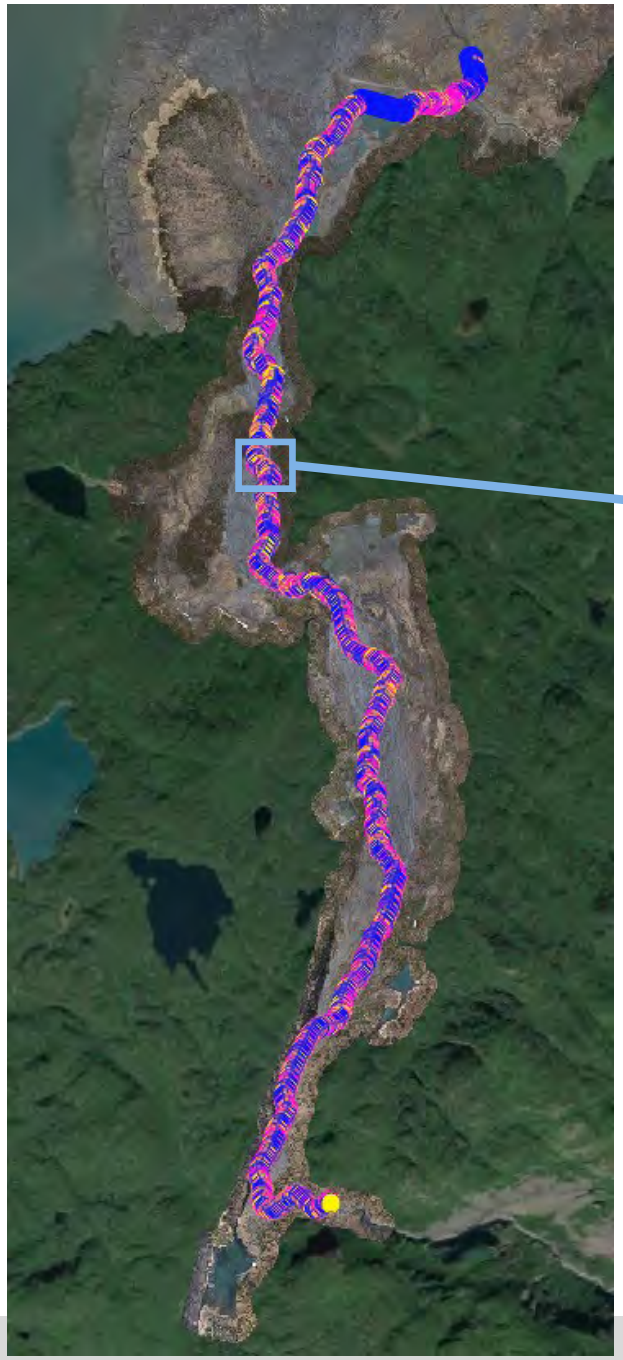
4. Identify transects considered not passable
   - contiguous passable width <10% of wetted width

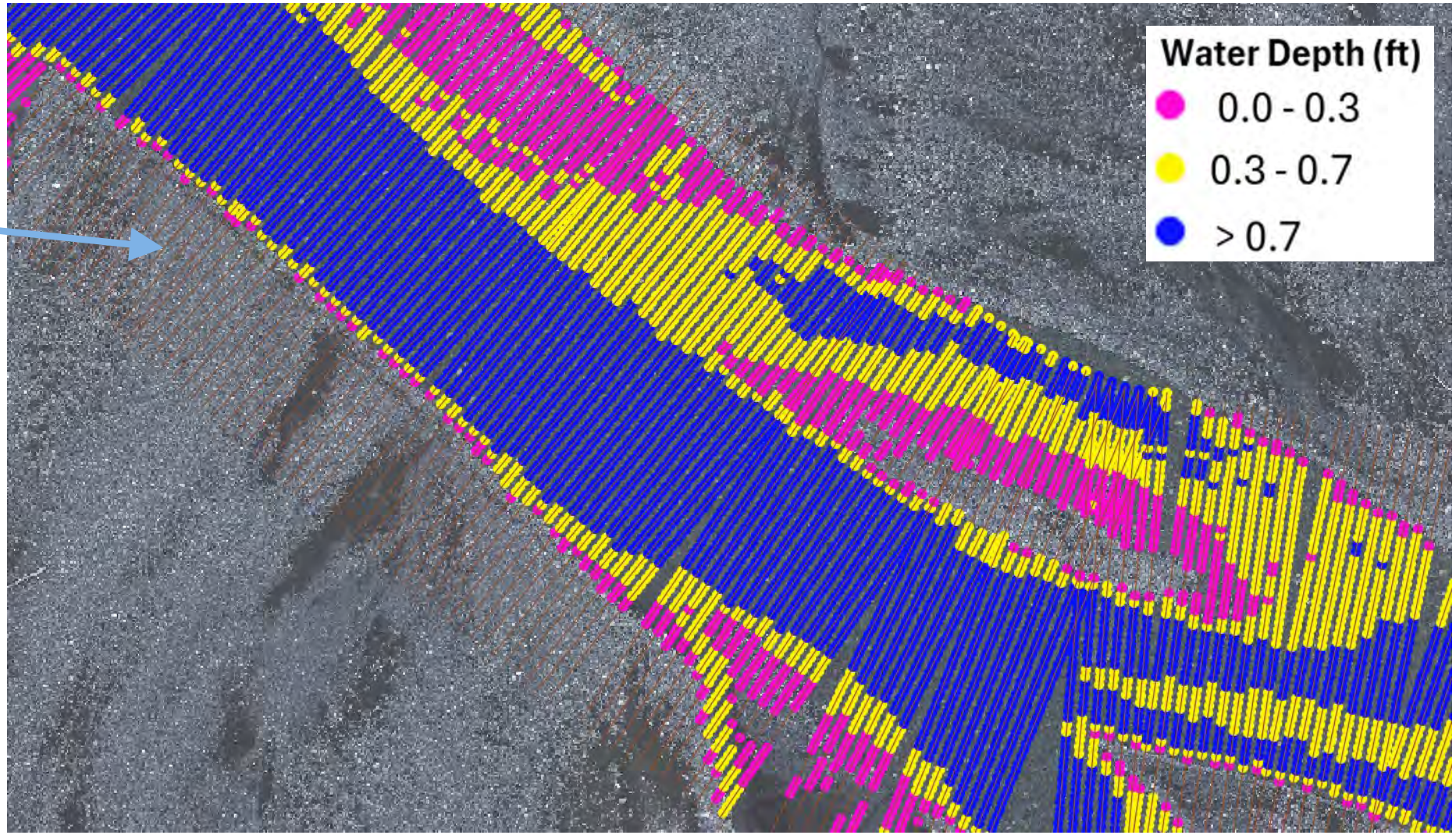
5. Determine the length of the channel section with contiguous transects that are not passable

6. The channel section is not passable if the length is >10 times of fish body length or 20 ft.
   - Ave. length Sockeye 2’ x 10 times body length

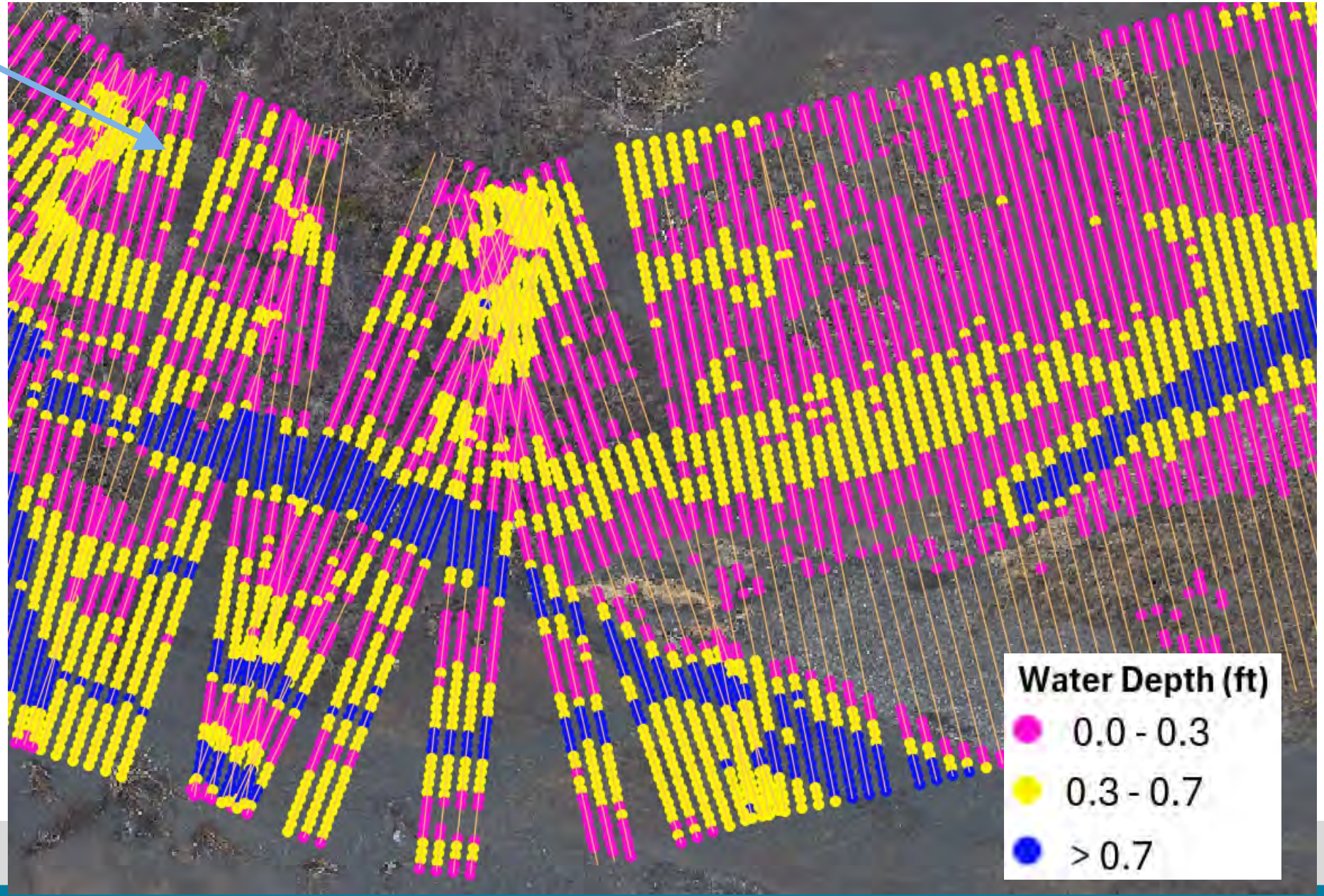


Results – Mainstem Habitat (100 cfs)

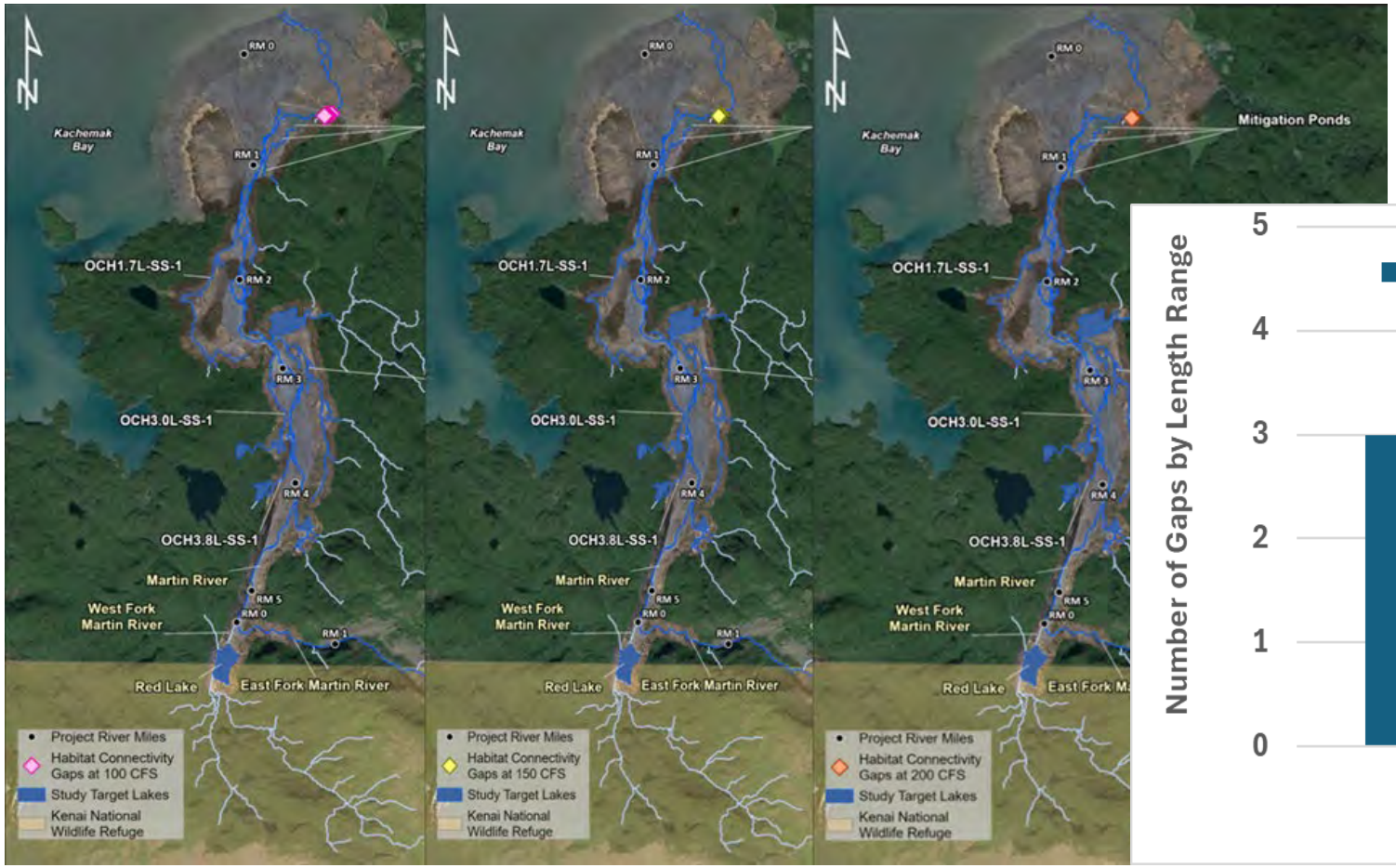


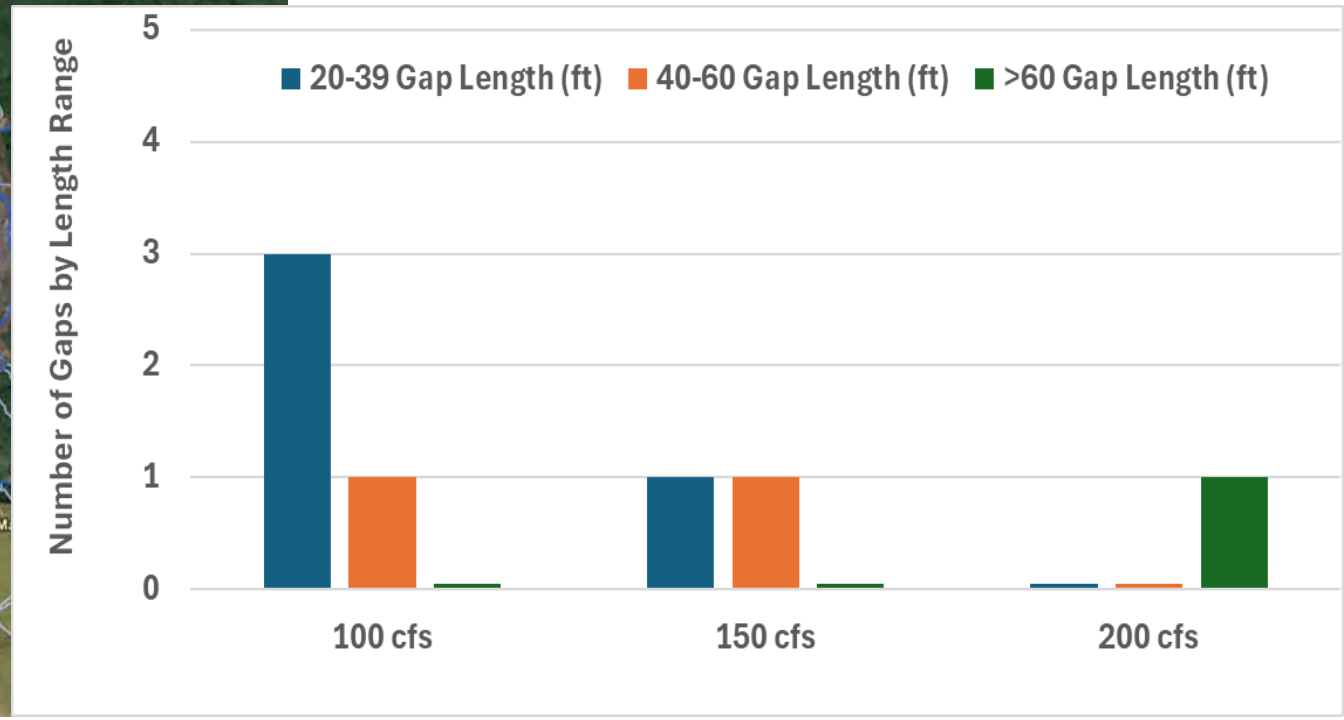


Fish Passage Analysis Algorithm

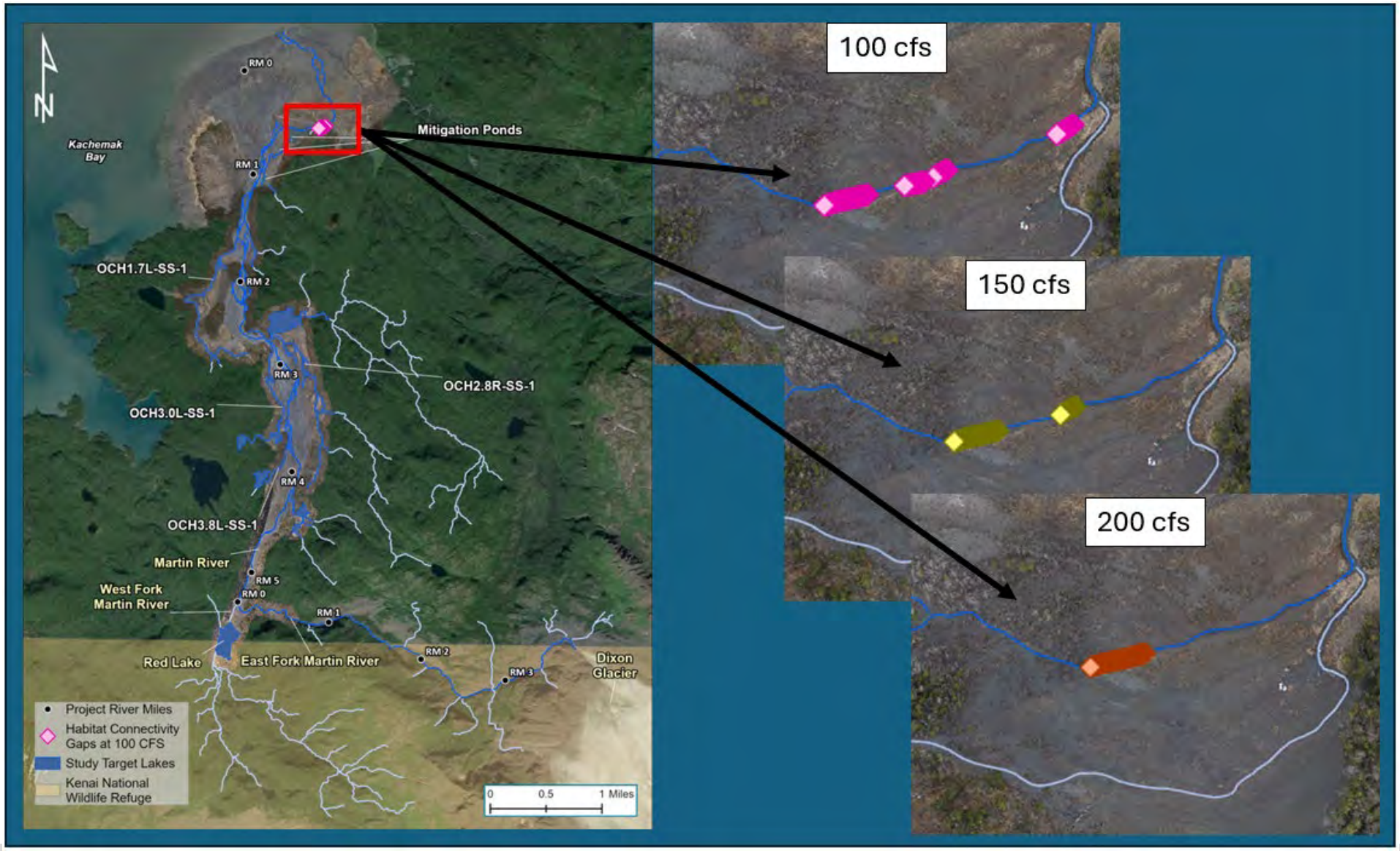


Results – Mainstem Habitat Connectivity





Results – Mainstem Habitat Connectivity



Results – OCH Connectivity

Habitat Connectivity	Fish Use		Minimum Flow Release Scenario					
			100 cfs		150 cfs		200 cfs	
			Connected at Minimum Depth					
	Juvenile	Spawning	0.3 feet	0.7 feet	0.3 feet	0.7 feet	0.3 feet	0.7 feet
OCH1.7L-SS-1	DV, CO	None	Yes	Yes	Yes	Yes	Yes	Yes
OCH2.8R-SS-1	**DV, CO, SO**	**DV, CO, SO**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
OCH3.0L-SS-1	**DV, CO**	**DV**	**Yes**	**No**	**Yes**	**No**	**Yes**	**Yes**
OCH3.8L-SS-1	DV	None	No	No	No	No	Yes	Yes
OCH4.2R-SS-1	DV, CO	None	No	No	No	No	Yes	Yes
WF Martin River	**DV, CO, SO**	**DV, CO, SO**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

DV=Dolly Varden Trout, CO=Coho Salmon, SO=Sockeye Salmon

Schedule

- Respond to Study Report Comments - March 2025
- Agency Consultation – Spring thru Fall 2025
  - Flow Monitoring Plan
    - Seasonal minimum flows
    - Channel maintenance flows
  - Fish Access Monitoring
- Development of PMEs – Fall/Winter 2025
- Draft Amendment Application – Jan 2026

ALASKA ENERGY AUTHORITY

QUESTIONS

BREAK

Water Quality Monitoring

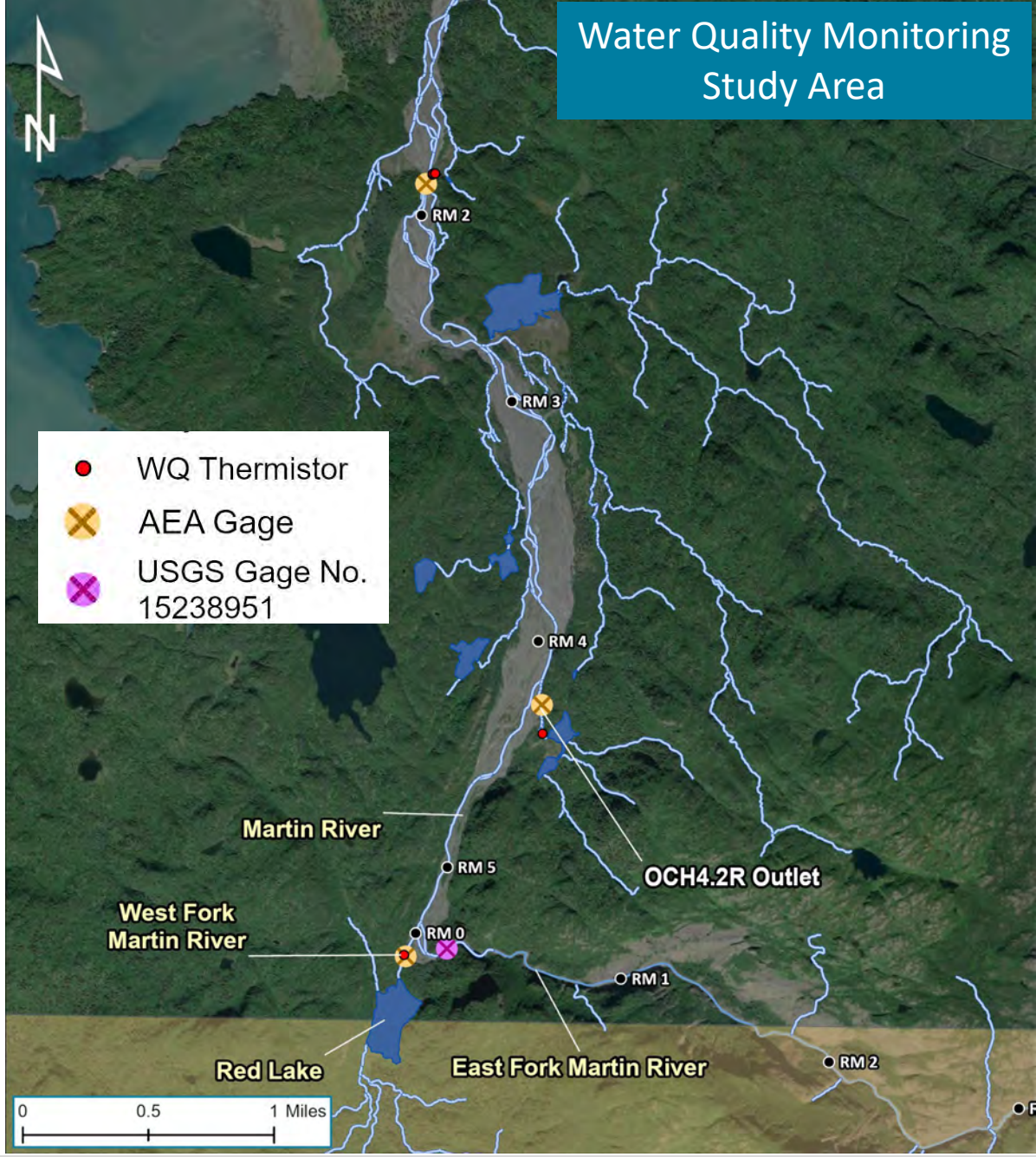
- Kleinschmidt Associates: Betsy McGregor

Goals and Objectives

- Goal
  - Characterize water quality in the Martin River relative to ADEC water quality standards for the growth and propagation of fish, shellfish, other aquatic life, and wildlife.
- Objectives
  - Collect water temperature, dissolved oxygen, turbidity, conductivity and pH data at 4 stream gaging sites

Study Area

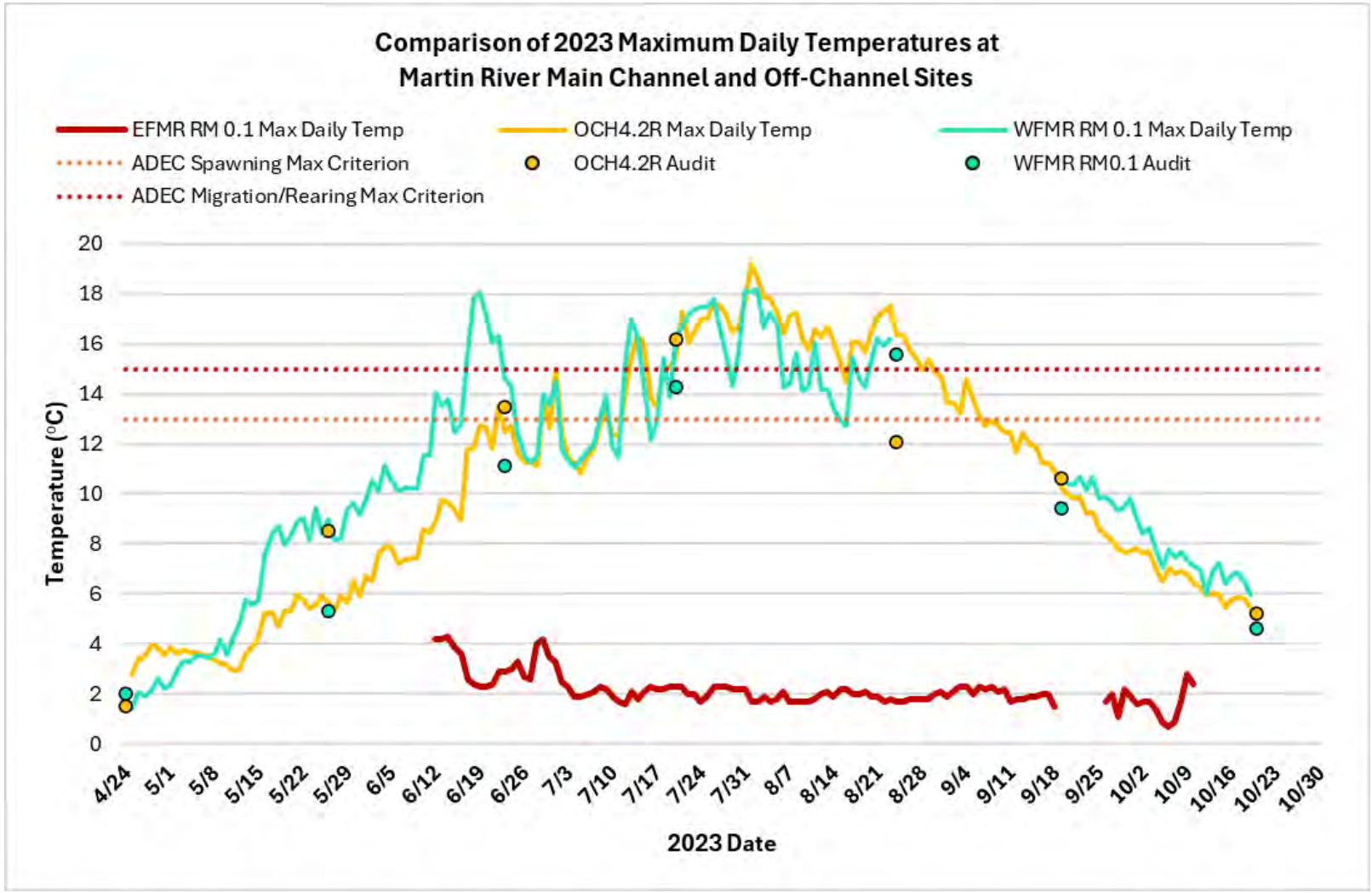
- East Fork Martin River RM 0.1 (Canyon mouth)
- West Fork Martin River RM 0.1 (Red Lake outlet stream)
- Off-channel Outlet RM4.3R OCH
- Martin River RM 1.9



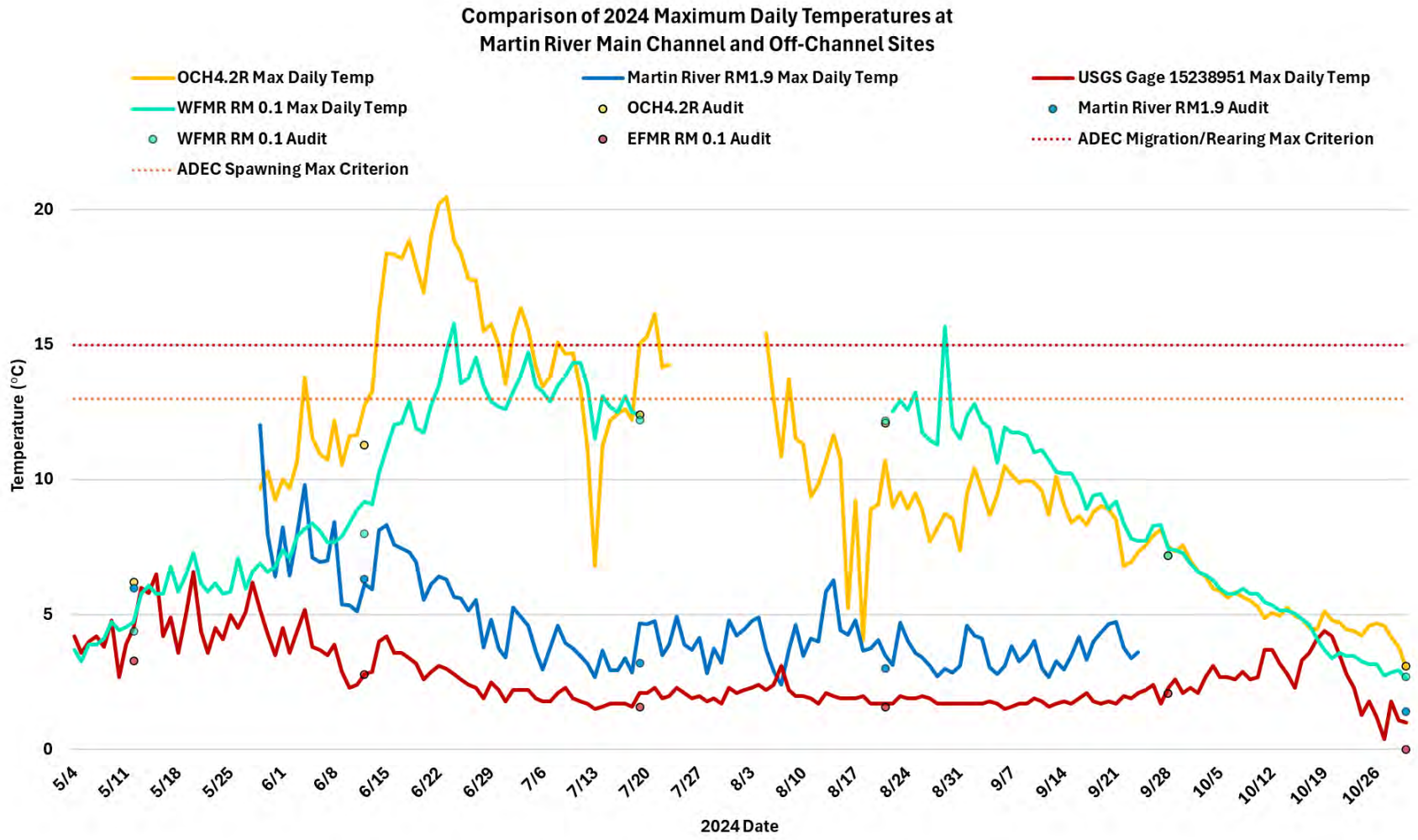
Methods

- May-October data collection 2023-2024
- Monthly in-situ measurements of DO, turbidity, conductivity, pH, and temperature
- Continuous temperature monitoring to produce daily min/max/mean summaries

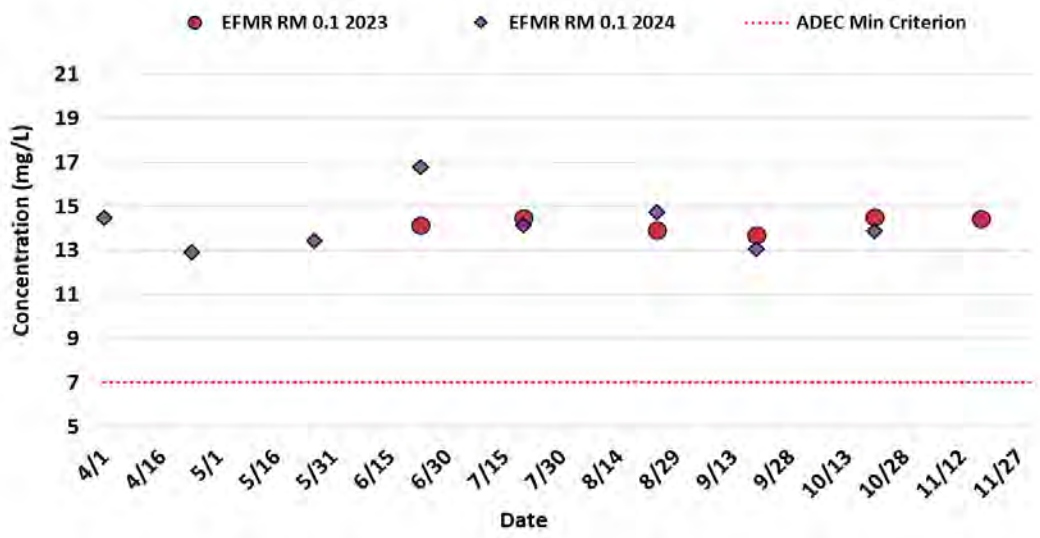
2023 Results: Temperature

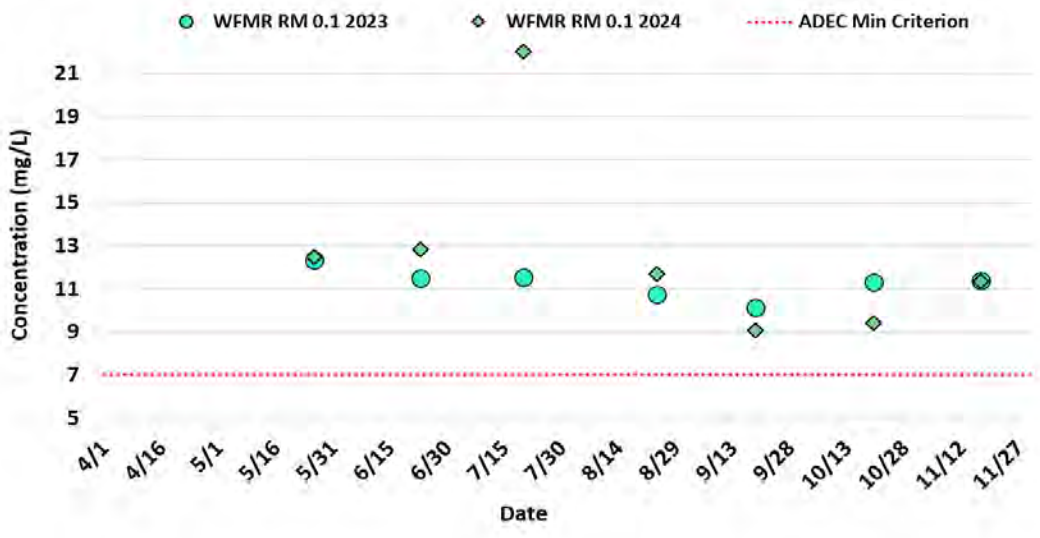


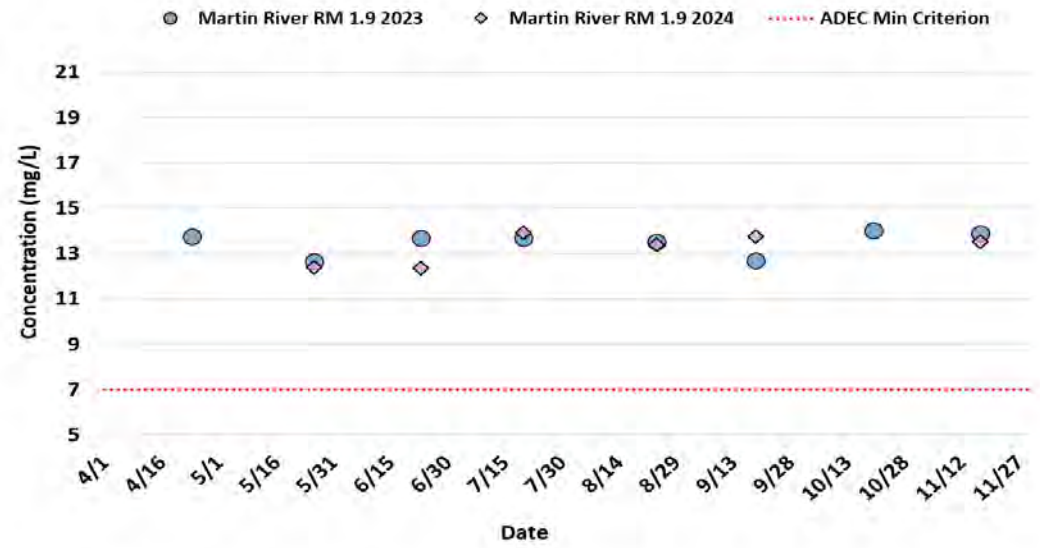
2024 Results: Temperature

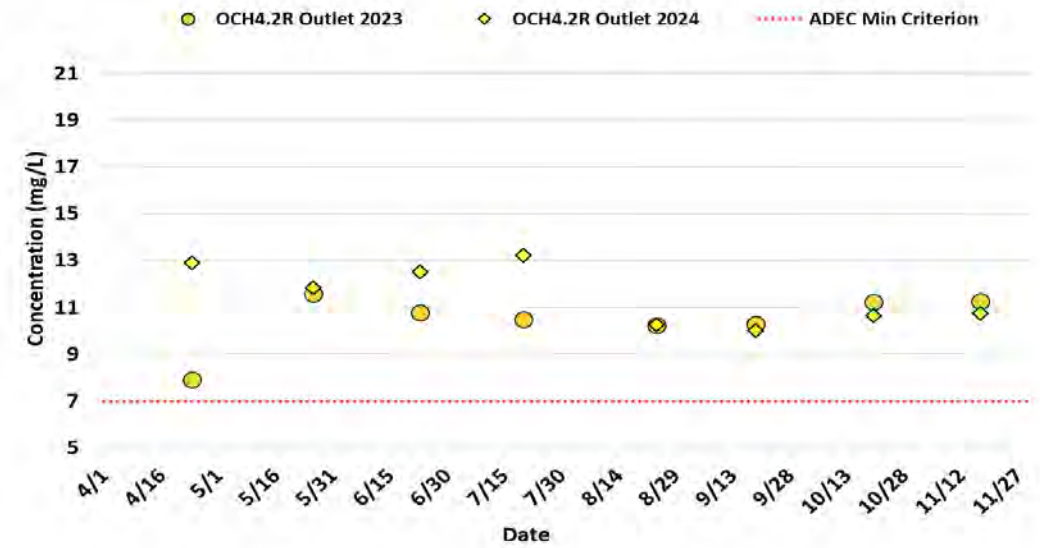


Results: Dissolve Oxygen

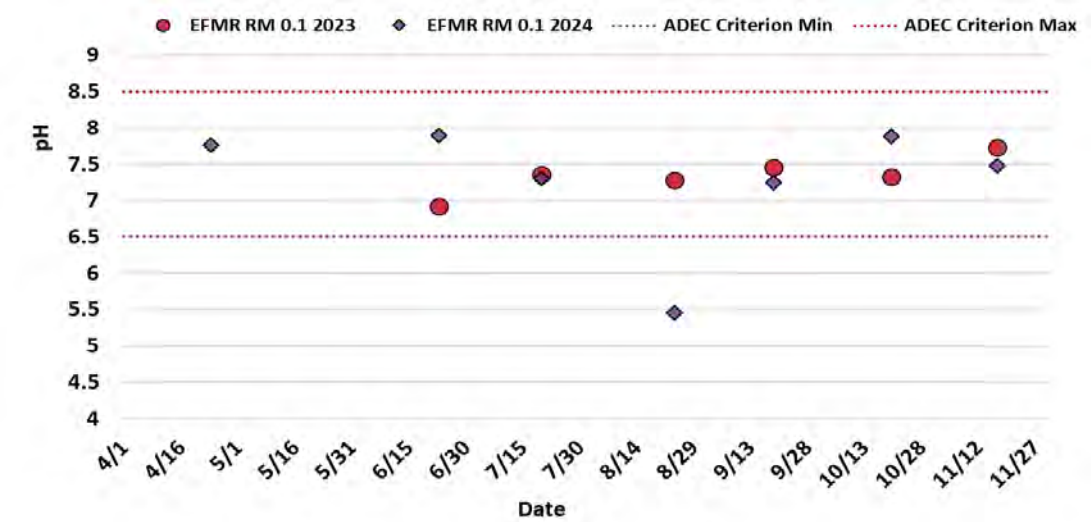


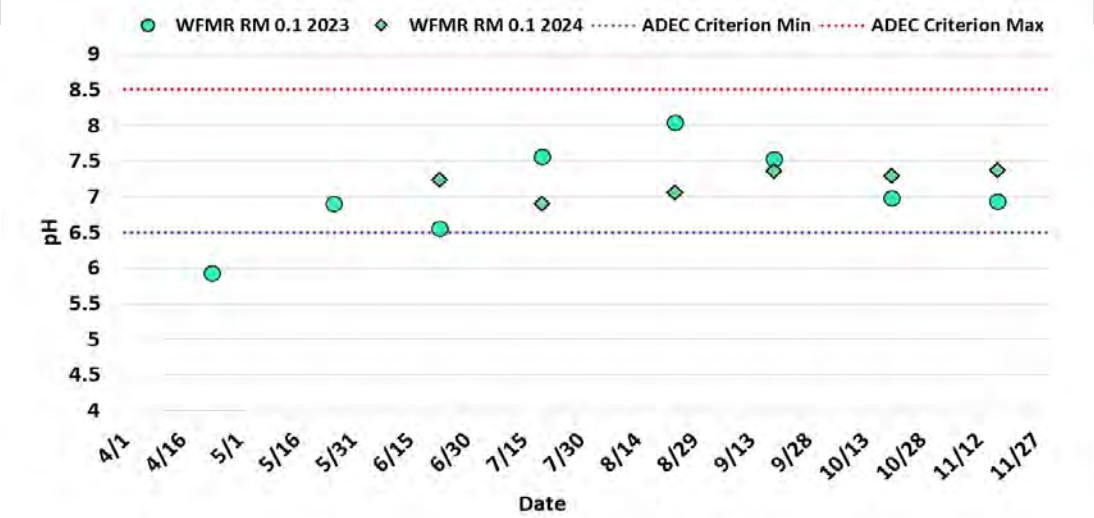


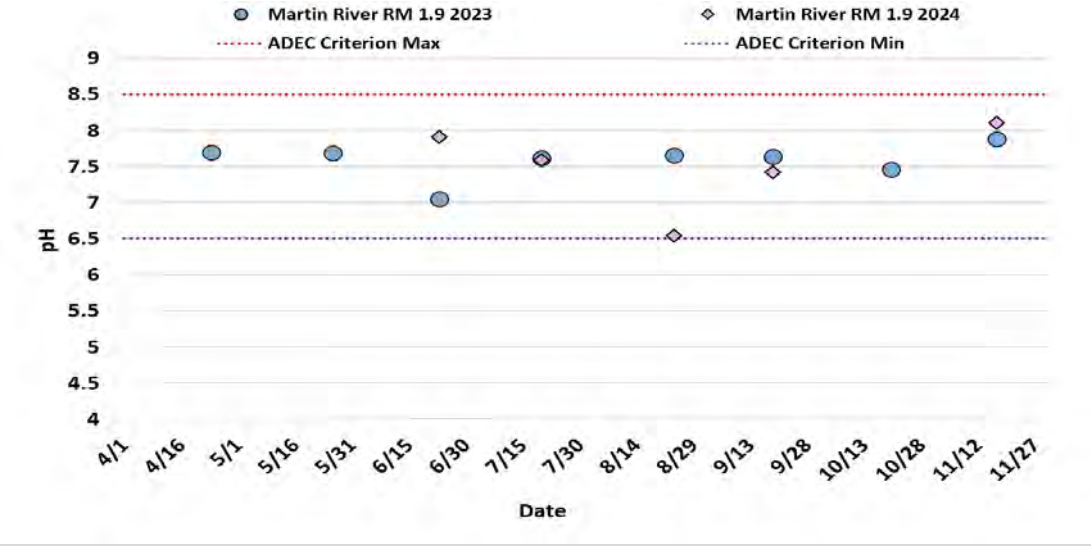


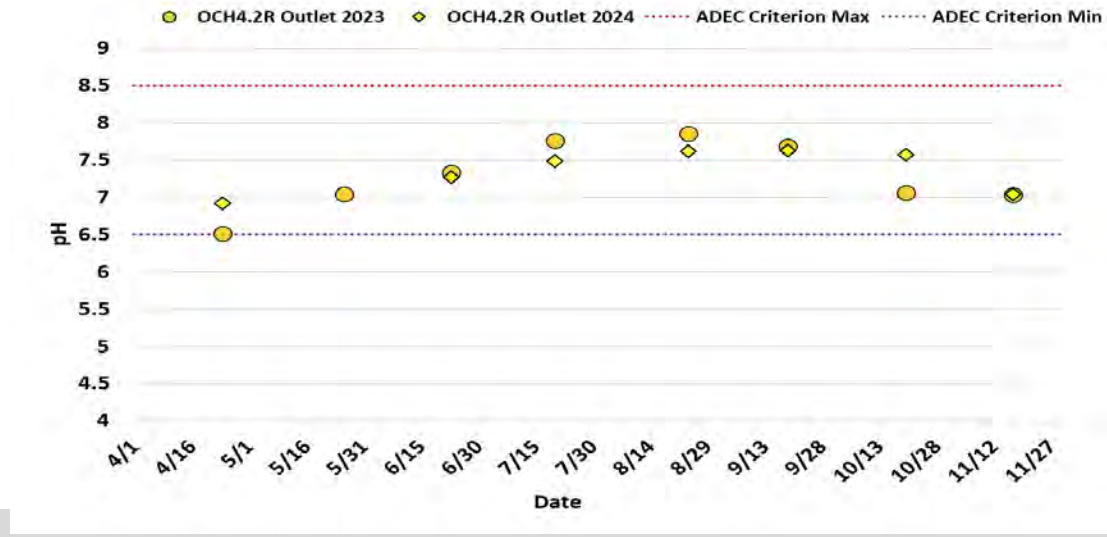


Results: pH

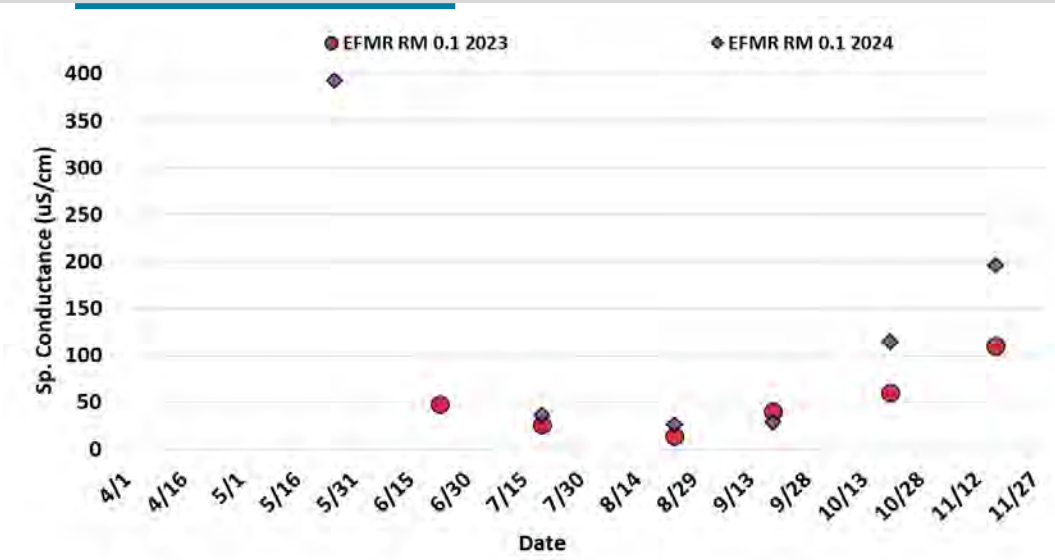

EFMR RM 0.1 2023
EFMR RM 0.1 2024
ADEC Criterion Min
ADEC Criterion Max
pH
Date

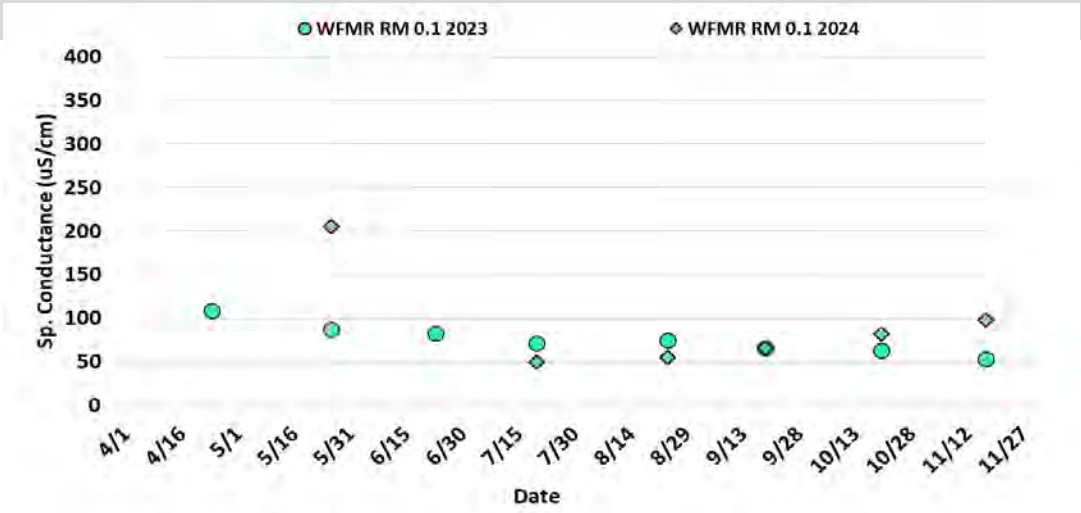

WFMR RM 0.1 2023
WFMR RM 0.1 2024
ADEC Criterion Min
ADEC Criterion Max
pH
Date

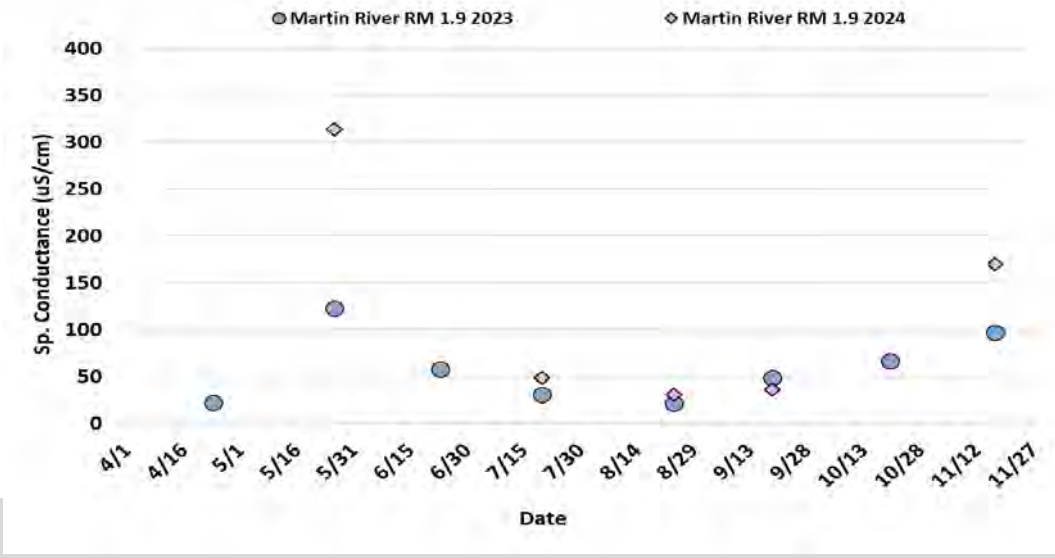

Martin River RM 1.9 2023
Martin River RM 1.9 2024
ADEC Criterion Max
ADEC Criterion Min
pH
Date

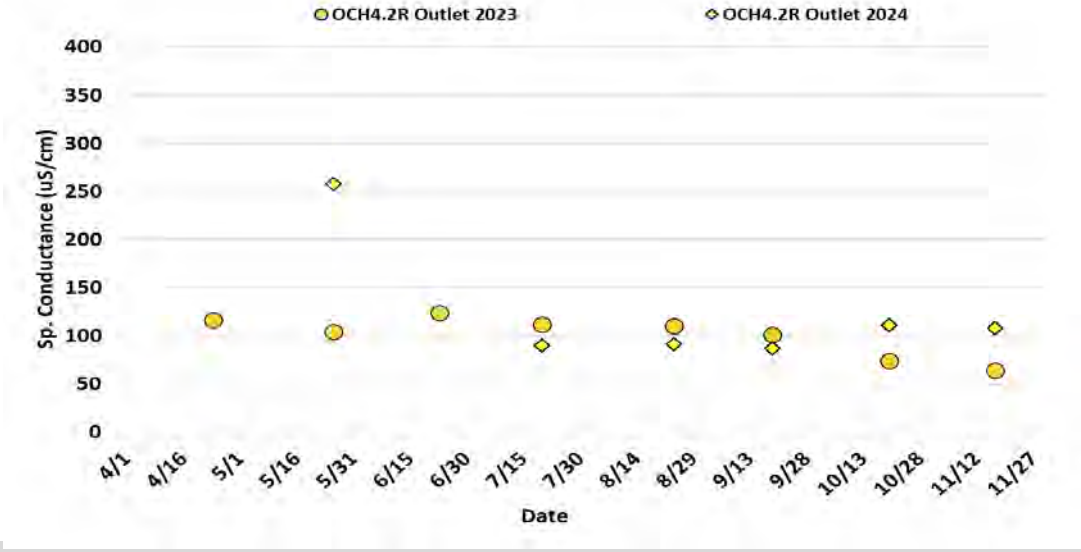

OCH4.2R Outlet 2023
OCH4.2R Outlet 2024
ADEC Criterion Max
ADEC Criterion Min
pH
Date

Results: Specific Conductance

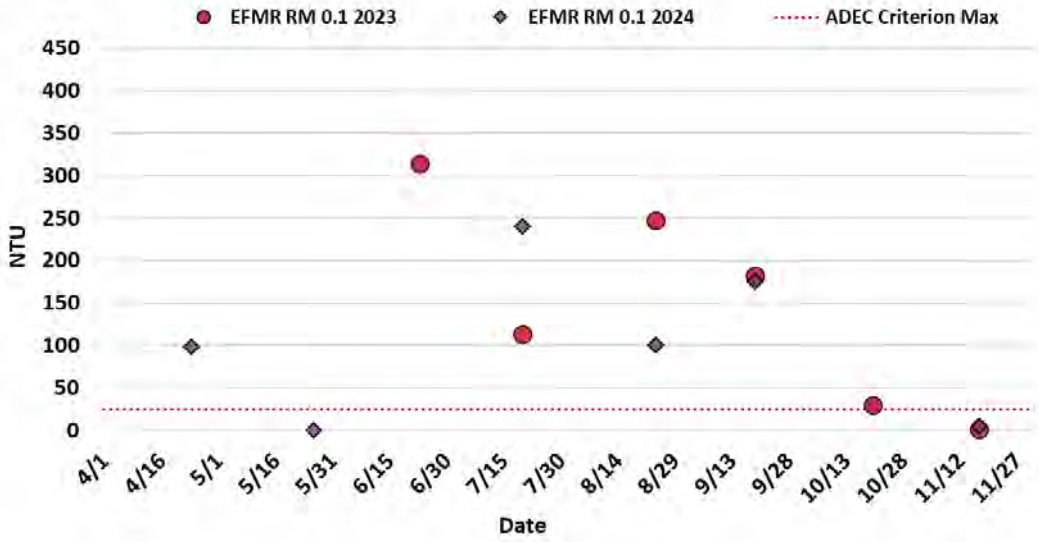


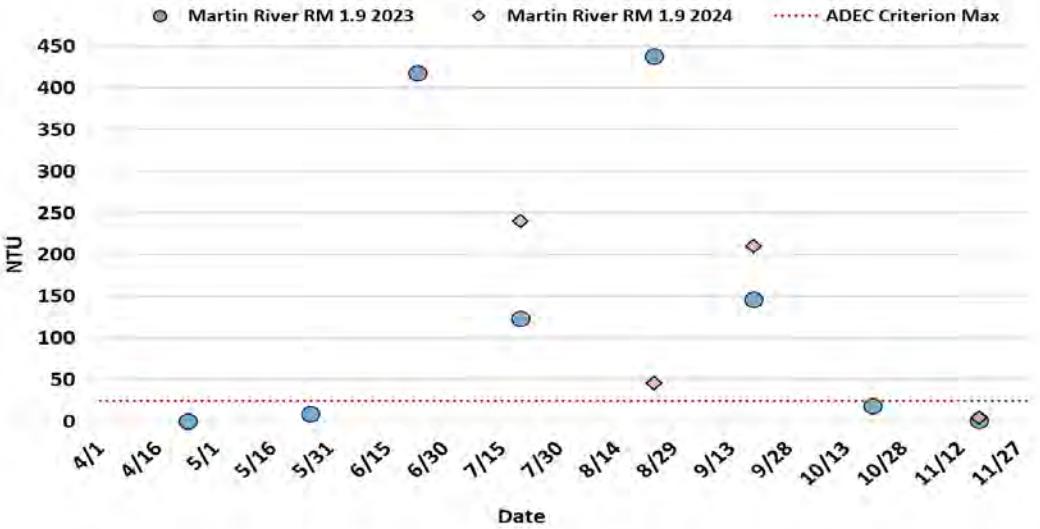


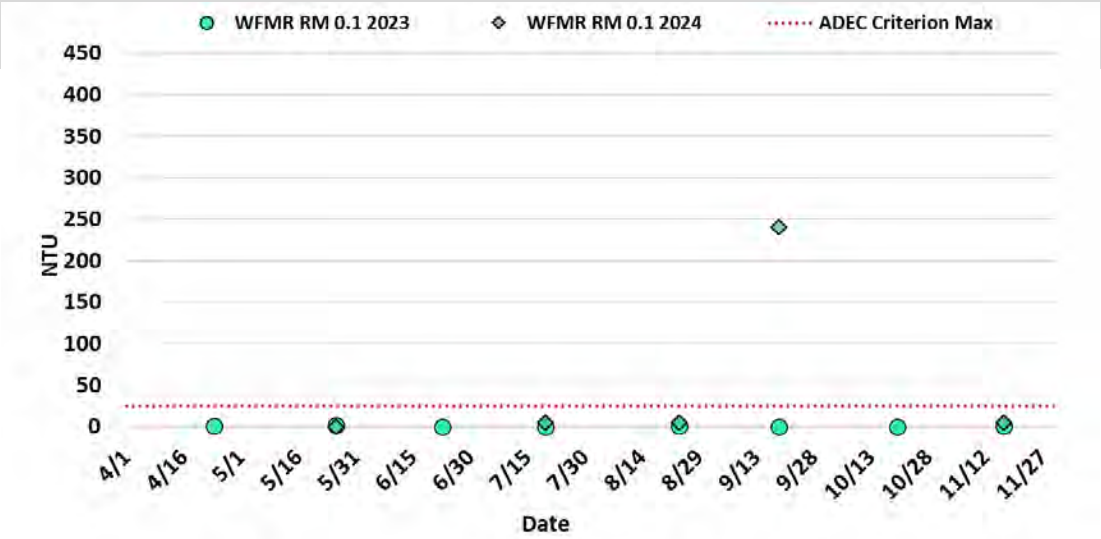


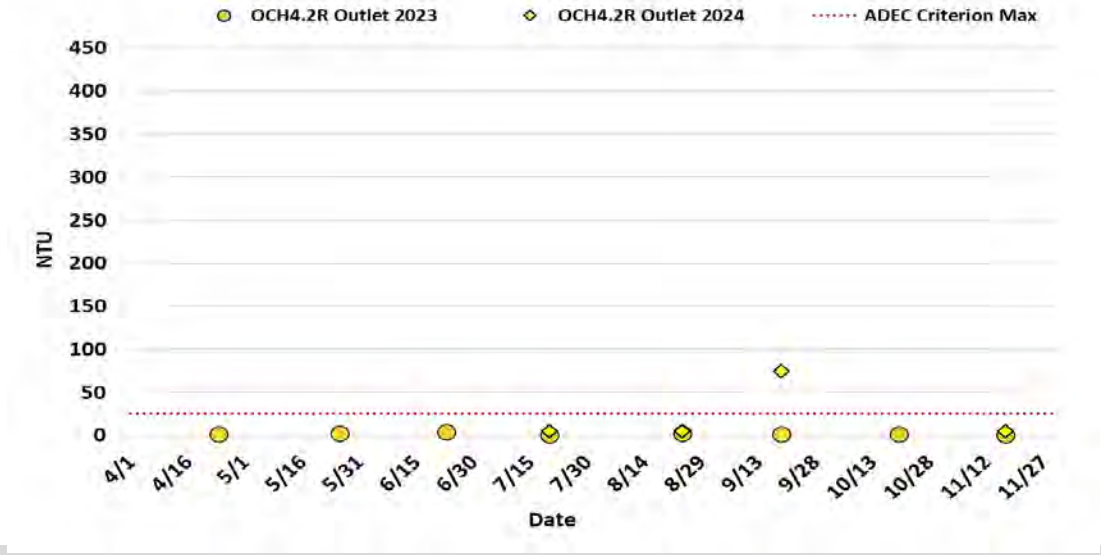


Results: Turbidity









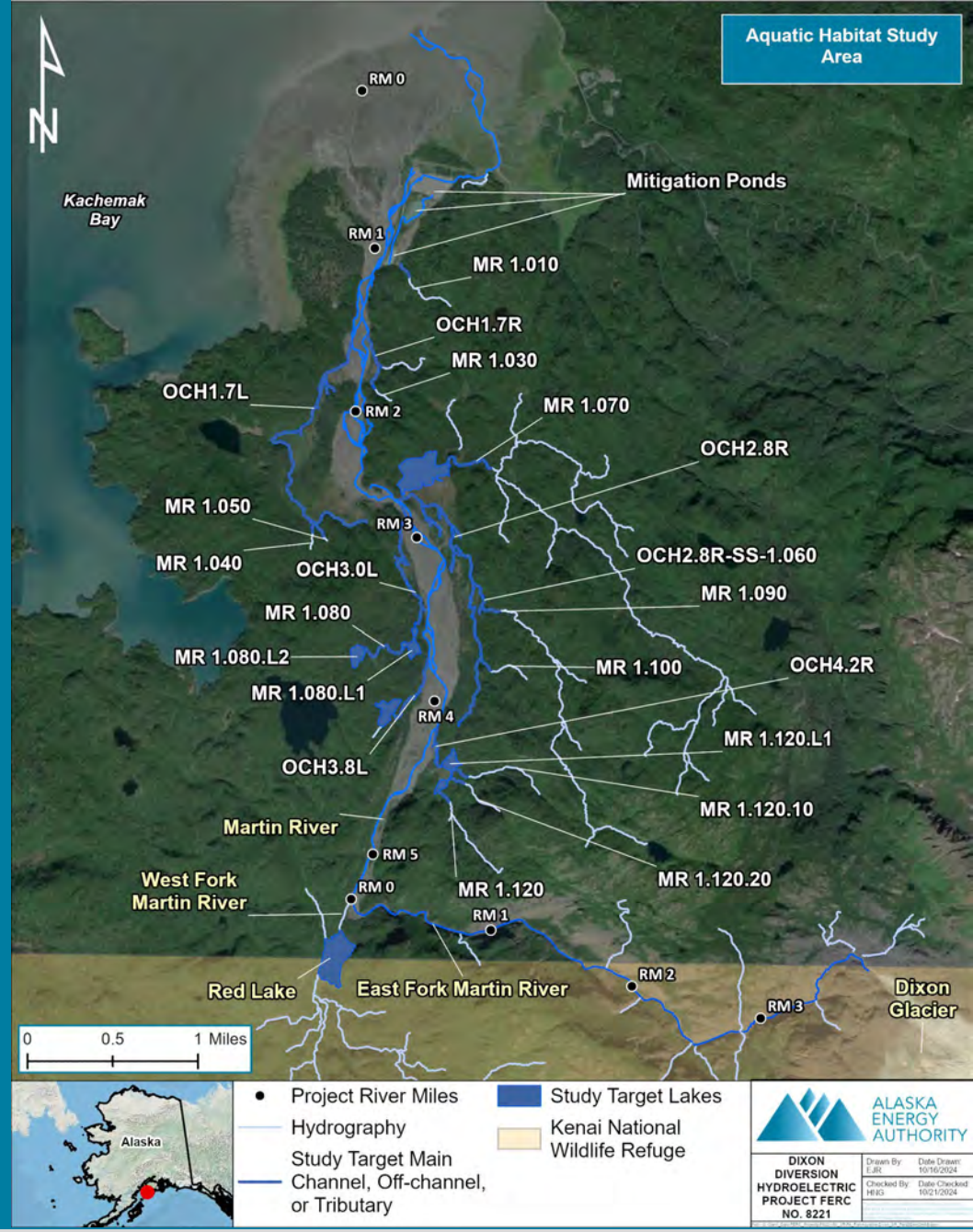
Schedule

- Data collected 2023 and 2024.
- Goals and objectives met.
- Study has been completed.

QUESTIONS?

Aquatic Habitat Characterization

- Kleinschmidt Associates:
  Betsy McGregor

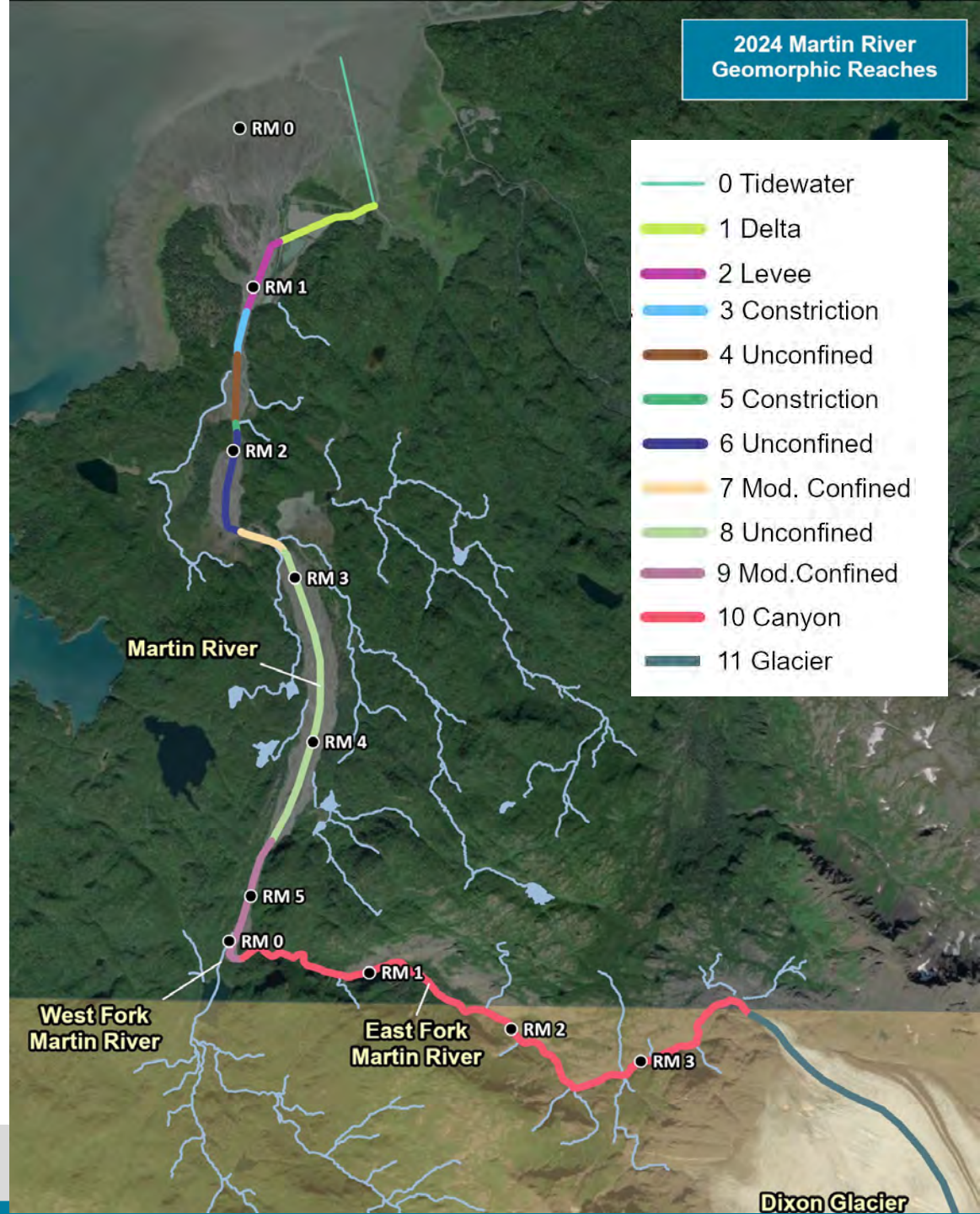


Goals and Objectives

- Goal
  - Characterize aquatic habitat in the Martin River basin
- Objectives
  - Gather baseline data to evaluate changes in accessible aquatic habitats
  - Inform other aquatic habitat studies

Methods – Habitat Characterization

1. **Geomorphic Reach Delineation**
   - Geomorphology Study
2. **Macrohabitat Type**
   - Remote line mapping
   - May 2024 aerial imagery and LiDAR
   - Ground-truthed May 2024
   - Macrohabitat lengths
3. **Mesohabitat Type**
   - Ground mapping
   - Clearwater OCH May 2024
   - Tributaries & Lakes Sept/Oct 2024



Methods – Habitat Types

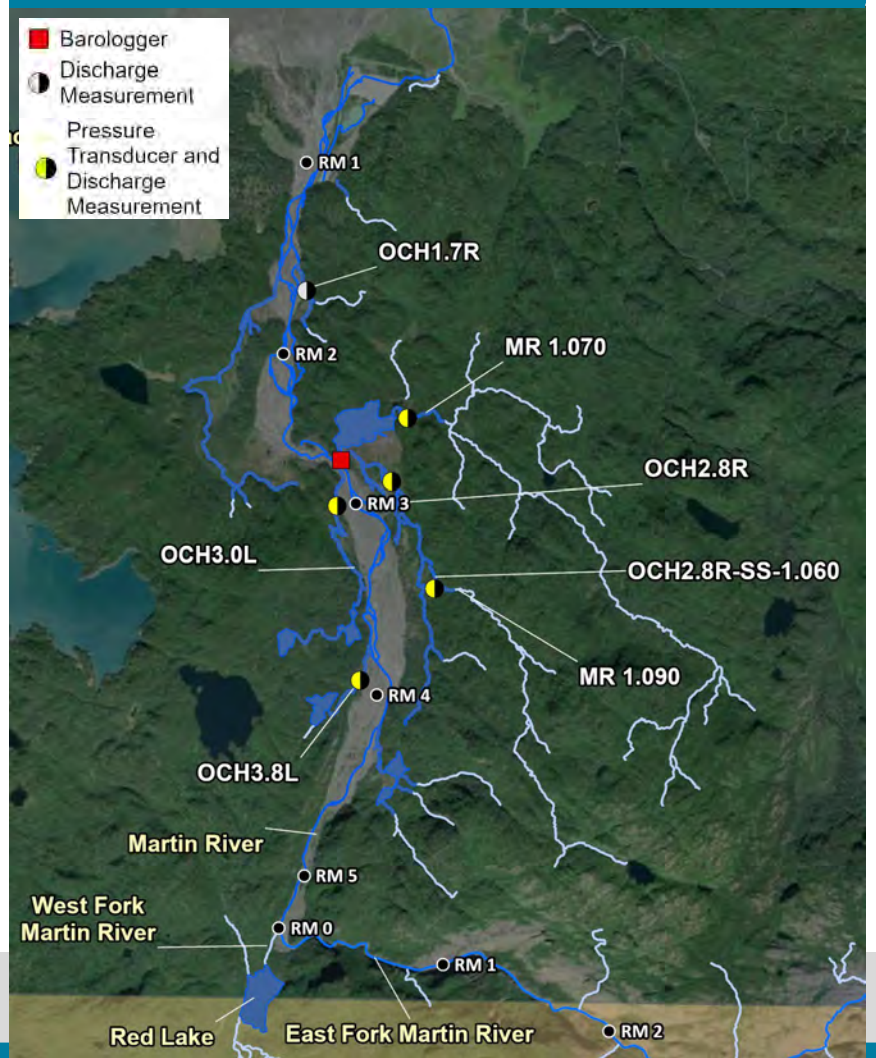
- **Macrohabitat Types**
  - Martin River Main Channel
    - Main Channel, Split Main, Multiple Split Main
    - Side Channel
    - Tributary Mouth
  - **Martin River Off-channel**
    - Side Slough
    - Upland Slough
    - Backwater
    - Beaver Pond
  - **Tributary**
  - Lake/Pond

- **Mesohabitat Types**
  - Pool
  - Glide
  - Riffle
  - Cascade
  - Beaver Pond

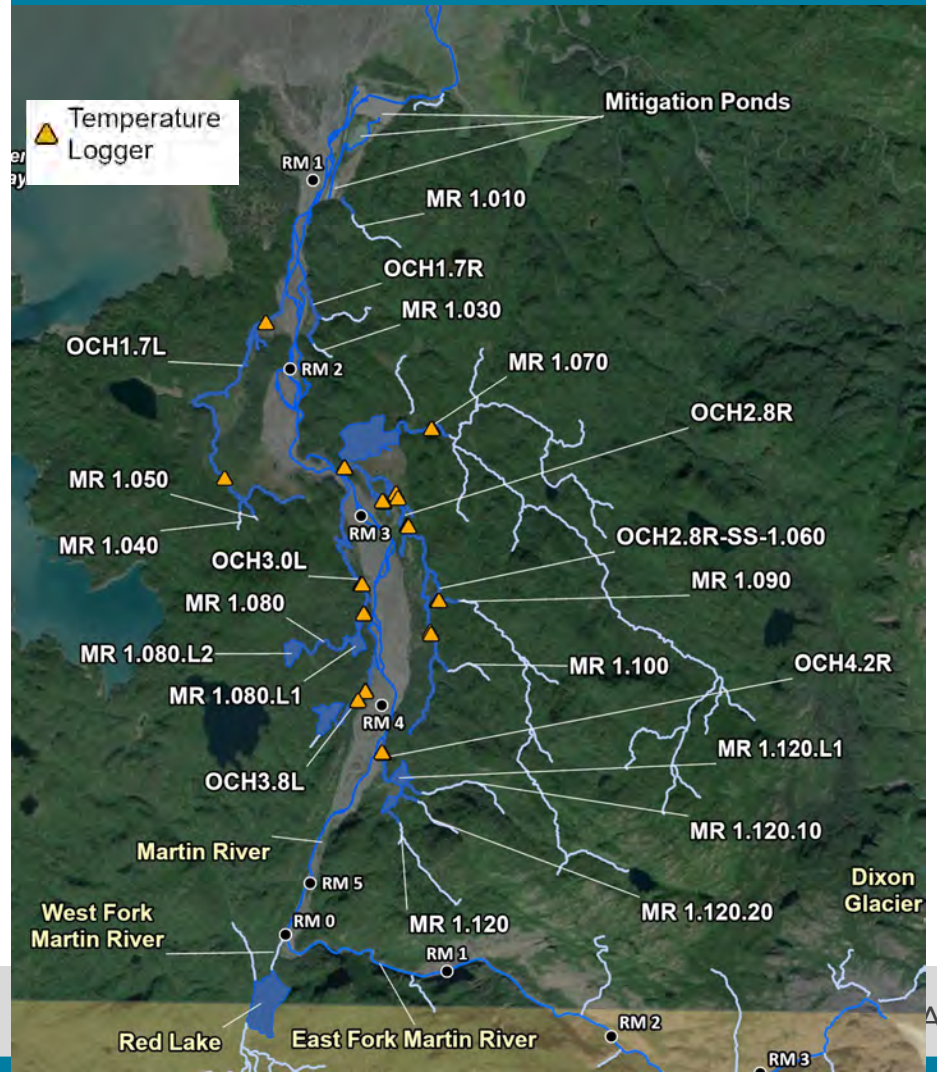
- **Modified USFS Protocol - Data Collected**
  - Gradient
  - Length
  - Pool max depth, crest depth, forming feature
  - Substrate
  - Cover
  - Erosion
  - Riparian cover
  - LWD count
  - Wetted width*
  - Thalwag depth*
  - Bankfull depth*
  - Bankfull width*

Methods – Habitat Characterization

Flow Monitoring Sites



Temperature and WQ Monitoring Sites



EF Martin River: Fish Passage Barriers

Results – Macrohabitats

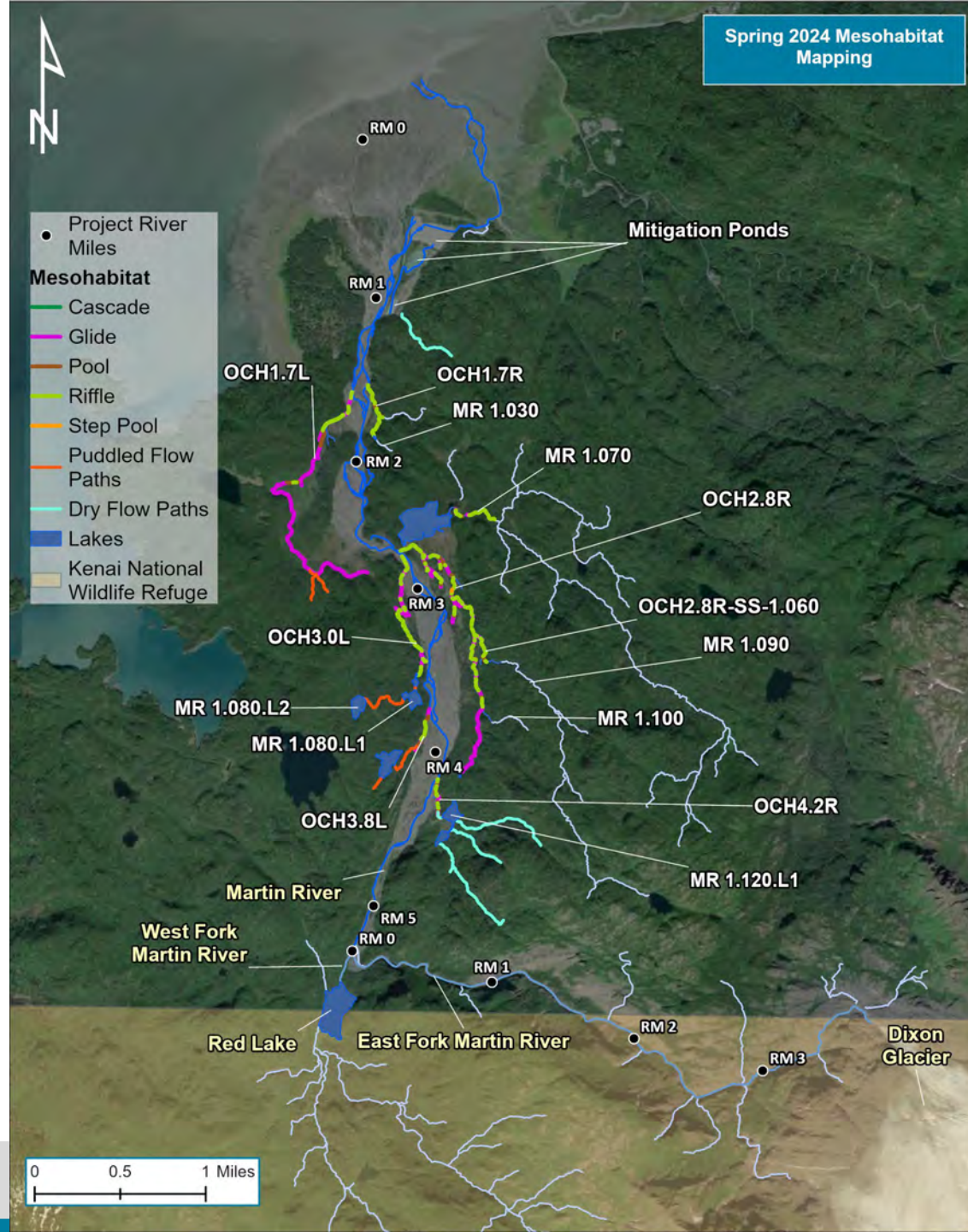
Reach	Main Channel [1]				Off-Channel [1]		Tributary [1]	Lake/ Pond [2]
	Main	Split Main	Multiple Split Main	Side Channel	Upland Slough	Side Slough		
0-Tidewater	1,030	1,616						
1-Delta	494	547	222	36	347			59,313
2-Levee	160	18	1,362				712	27,532
3-Constriction	2		760					
4-Unconfined	155		1,464			4,216	1,255	535
5-Constriction	40		87					
6-Unconfined	388	220	2,325					
7- Mod Confined	425	187		262		6,075	18,776	159,943
8-Unconfined	1,772	158	2,896			884	3,542	61,464
9- Mod Confined	5,473	351					13,577	99,060
10-EFMR Canyon	435						8,239	

[1] meters
[2] square meters

Results – Mesohabitat Focus

Reach	Off-Channel [1]	Tributary [1]	Lake/ Pond [2]
	Side Slough		
2-Levee		**712**	27,532
		Trib 1.010	
4-Unconfined	**4,216**	**1,255**	**535**
	OCH1.7R	Trib 1.020 Trib 1.030	
	OCH1.7L	Trib 1.040 Trib 1.050	
7- Mod Confined	**6,075**	**18,776**	**159,943**
		Trib 1.070	Swan Lake
	OCH2.8R	Trib 1.090 Trib 1.100	
	OCH3.0L	Trib 1.080	Lake Complex
8-Unconfined	**884**	**3,542**	**61,464**
	OCH3.8L	Trib 1.110	Lake Complex
	OCH4.2R	Trib 1.120	Lake Complex

Temperature Site Flow Site Temperature and Flow Site

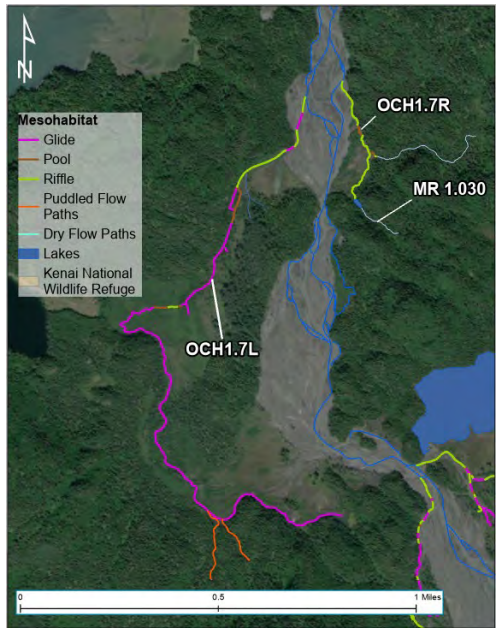


Results – OCH1.7L Complex

- 2nd largest OCH surveyed
- Side slough, 2 wet secondary channels, dry channels
- Rearing habitat; ≤sand substrate
- Small spawning habitat area

- Glide = 84%
- Riffle = 11%
- Pool = 5%

- Mean wetted width = 6.0 m
- Mean thalweg depth = 0.5 m
- Mean pool depth = 0.92 m



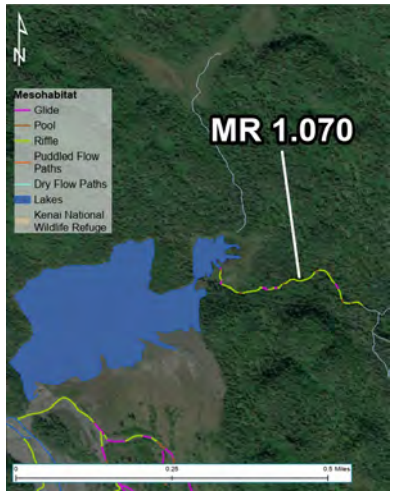
Tributaries were shallow vegetated run-off gullies with no evident channels

Results – Trib MR1.070 & Swan Lake

- Tributary MR 1.070 (3.6 km)
- Upper Swan Lake (1,788 m^2)
  - Clear relic beaver pond
  - Fine organic matter
  - Submerged macrophytes, large wood
- Lower Swan Lake (111,450 m^2)
  - Turbid
  - Fine organic matter
  - Submerged macrophytes
- OCH2.8R enters Lower Swan Lake at confluence with Martin River RM2.8

Results – Trib MR1.070 & Swan Lake

- Largest tributary surveyed (3.6 km)
- >16 cfs May – 6.2 cfs Oct
- Rearing habitat
- Coho Salmon and Dolly Varden spawning



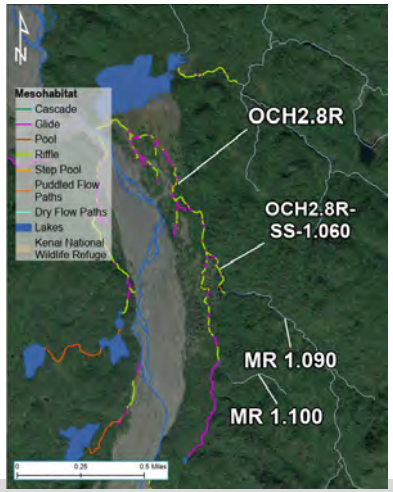
Confluence area, Upper Swan Lake and Tributary MR 1.070, spring.

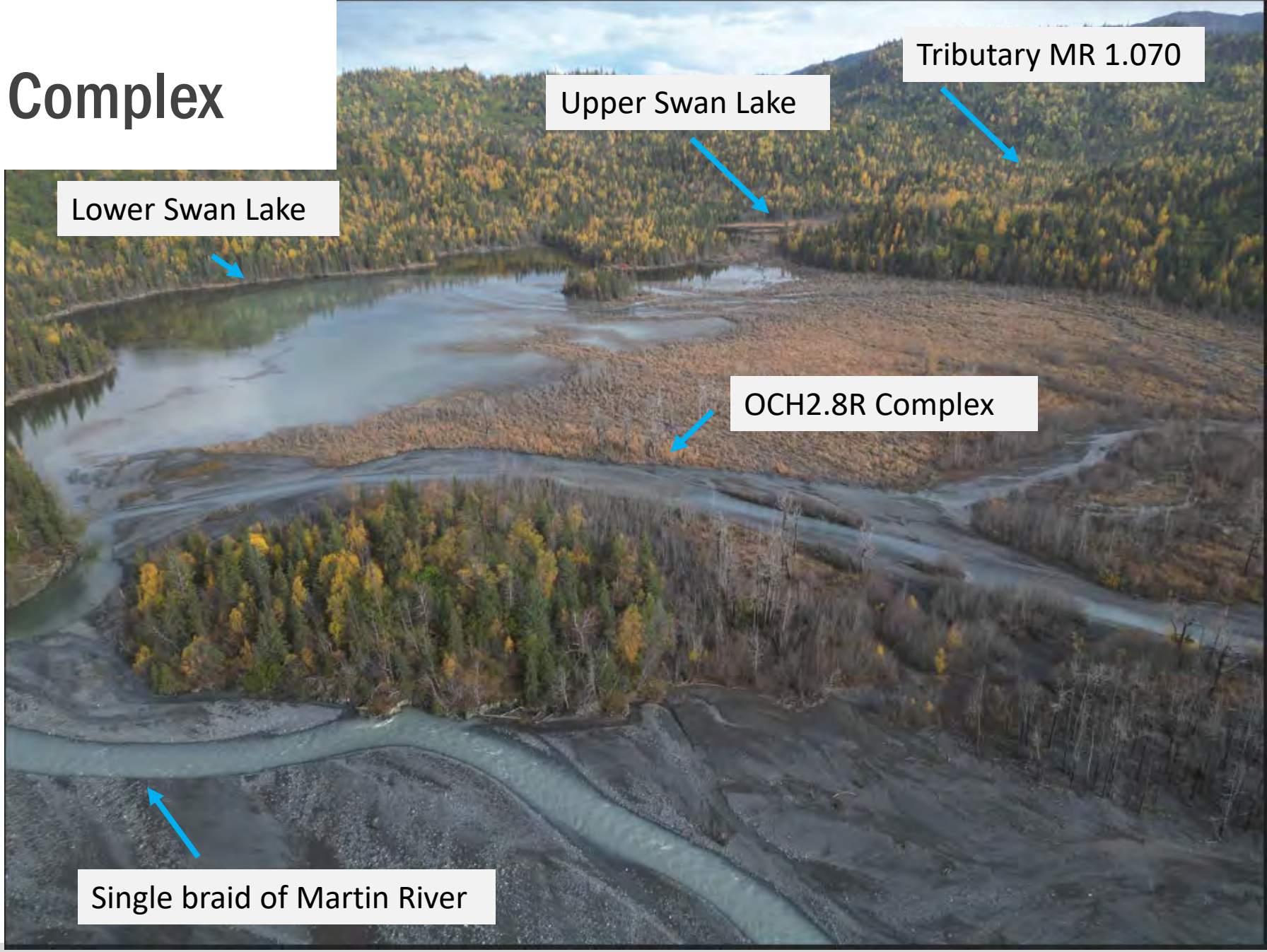
- Glide = 18%
- Riffle = 65%
- Pool = 17%

- Mean wetted width = 4.7 m
- Mean thalweg depth = 0.44 m
- Mean pool depth = 0.92 m

Results – OCH2.8R Complex

- Main side slough with many wet and dry secondary channels
- Trib MR 1.090 and Trib 1.100





Results – OCH2.8R Complex

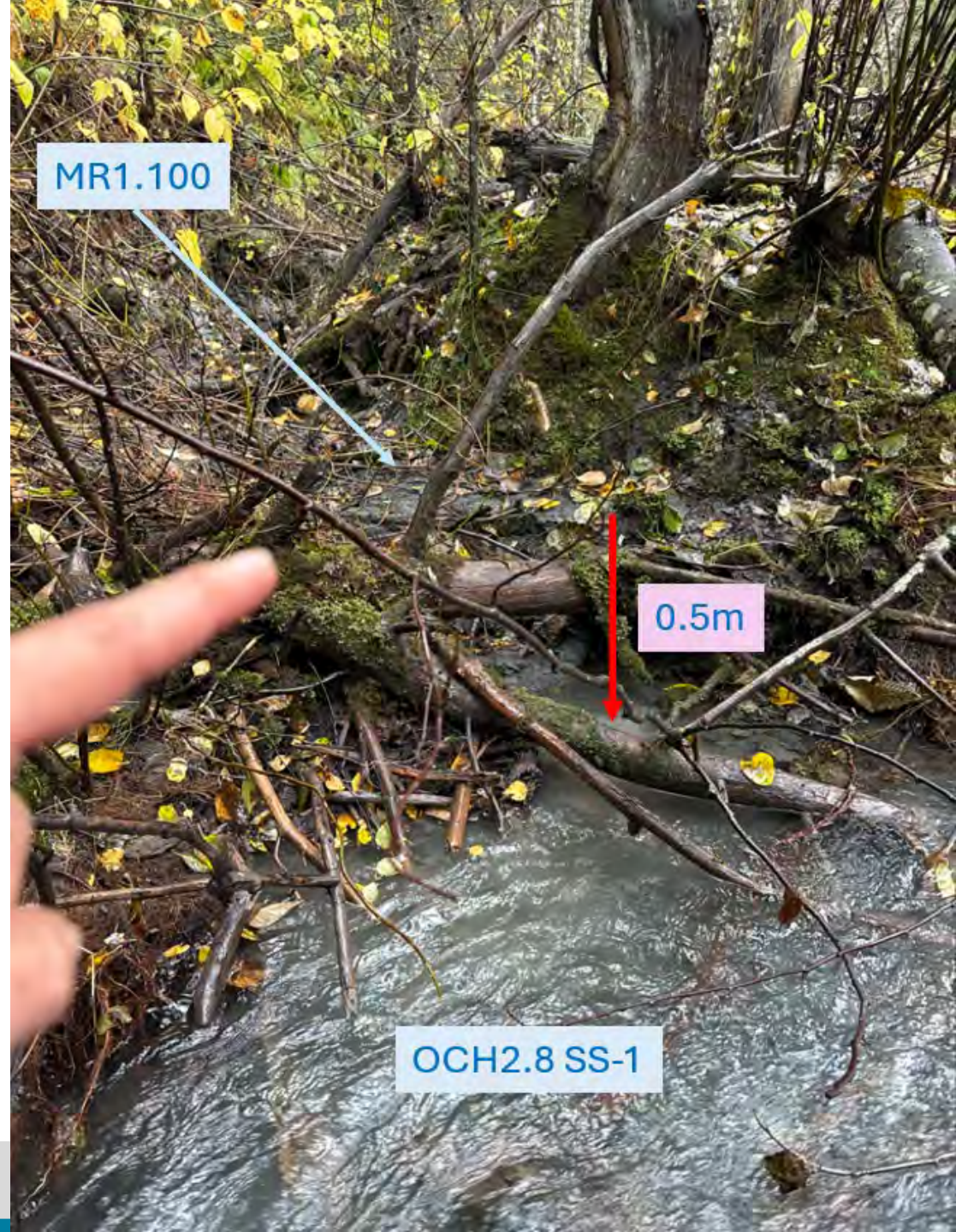
OCH 2.8R SS-1 (main braid, middle reach)

- Main slough 2.3 km
- Mean wetted width = 6.0 m
- Mean thalweg depth = 1.3 m
- Mean pool depth = 0.92 m
- Glide = 56%
- Riffle = 31%
- Pool = 13%
- Cascade = 0.5%

Good spawning habitat and gravels for both Coho and Sockeye salmon

Results – OCH2.8R Complex

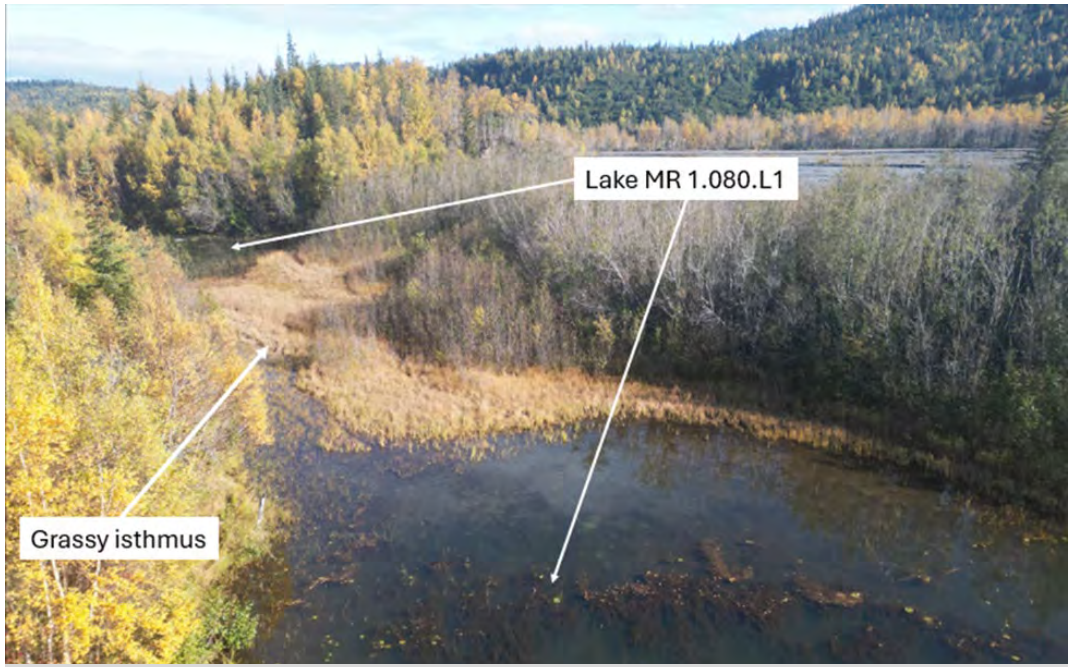
- Tributary MR 1.090 was disconnected from the slough complex during fall surveys and not accessible to fish
- Tributary MR 1.100 had a steep drop at the connection point on the survey date and was likely not accessible to fish



Results – OCH3.0L Complex

- Left Bank at RM 3.0
- Shallow gravel riffle that may be impassable to adult fish at low flows
- Fed by two lakes (MR 1.080.L1 MR 1.080.L2) perched ~50′ above floodplain

- Main slough 1.35 km
- Mean wetted width = 2.9 m
- Mean thalweg depth = 1.3 m
- Mean pool depth = 0.5 m
- Glide = 43%
- Riffle = 54%
- Pool = <2%



Intermittent vegetated channel/seep (Tributary MR 1.080) connects lakes was dry and encroached with grass at the time of survey on September 27, 2024

Shallow gravel riffle at mouth may be impassable to adult fish at low flows

Results – OCH3.0L Complex

Middle section of OCH 3.0 L, after August 6 flooding event, note heavy sedimentation in floodplain

Fine sediment undercut bank on OCH 3.0L-SS-1

Mid reach section of OCH 3.0L-SS-1

Results –OCH3.8L Complex

- Left Bank at RM 3.8
- Flow mostly shallow gravel riffle that may be impassable to adult fish
- Fed by ground seepage and Tributary MR 1.110 from Hawk Lake
  - Main slough 379 m
  - Mean wetted width = 2.9 m
  - Mean thalweg depth = 0.25 m
  - Mean pool depth = 0.54 m
  - Glide = 55%
  - Riffle = 18%
  - Pool = 27%

Backwatered slough near confluence

Low water near mid-reach OCH 3.8L-SS-1

Results –OCH4.2R Complex

- Right Bank at RM 4.2
- Shallow gravel riffle that may be impassable to adult fish at low flows
- Fed by Lake MR 1.120.L1

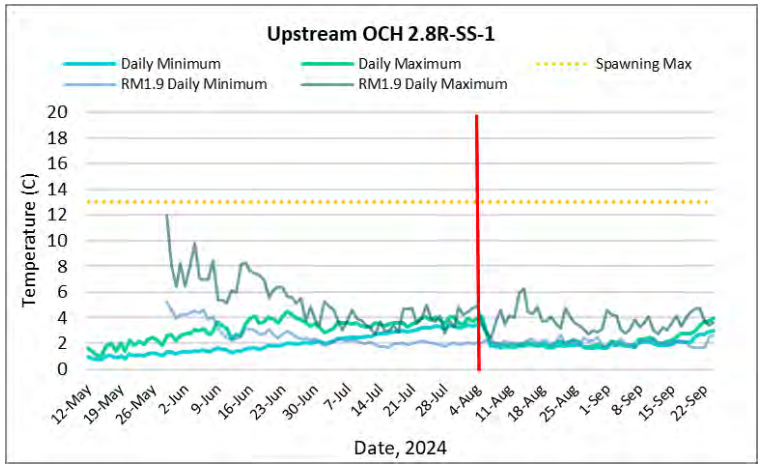
- Main slough = 394 km
- Mean wetted width = 5.1 m
- Mean thalweg depth = 0.3 m
- Mean pool depth = 0.6 m

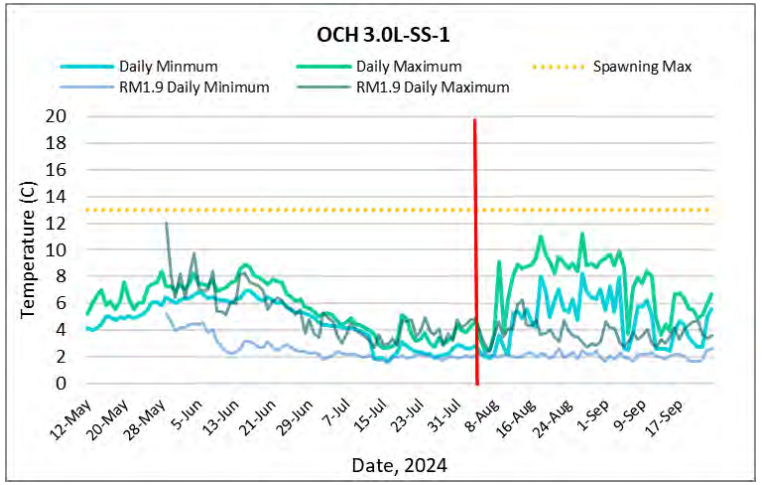
- Glide = 42%
- Riffle = 33%
- Pool = 15%
- Cobble/gravel substrate
- 578 m^2 potential spawning habitat

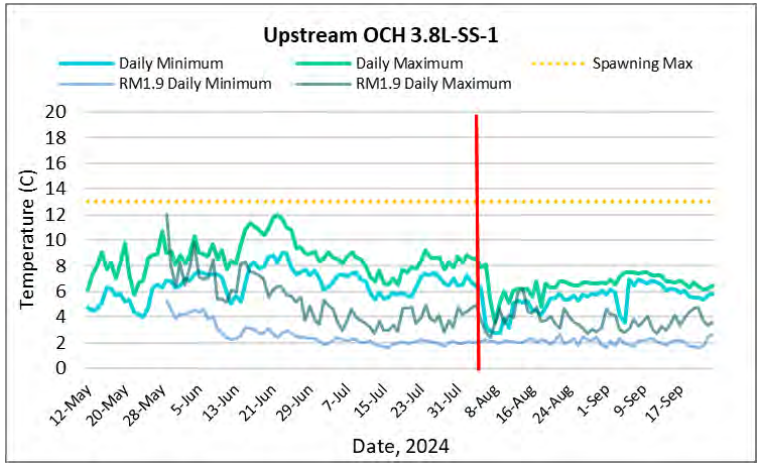
Lower MR 1.120.L1 Lake, turbid

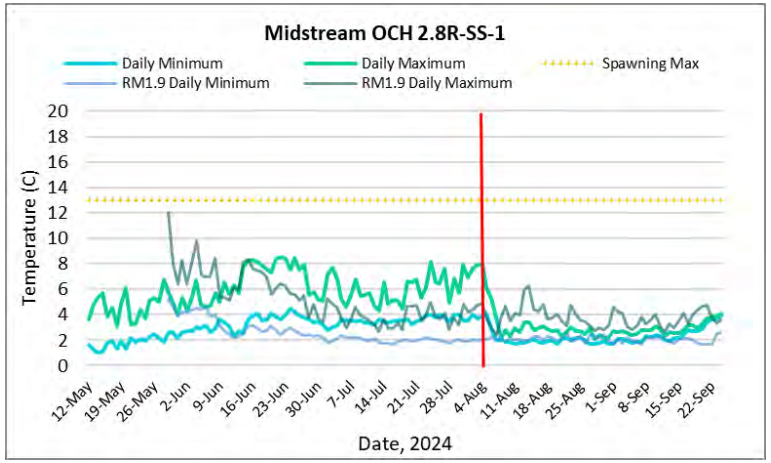
Bifurcated MR 1.120.L1 showing connection.

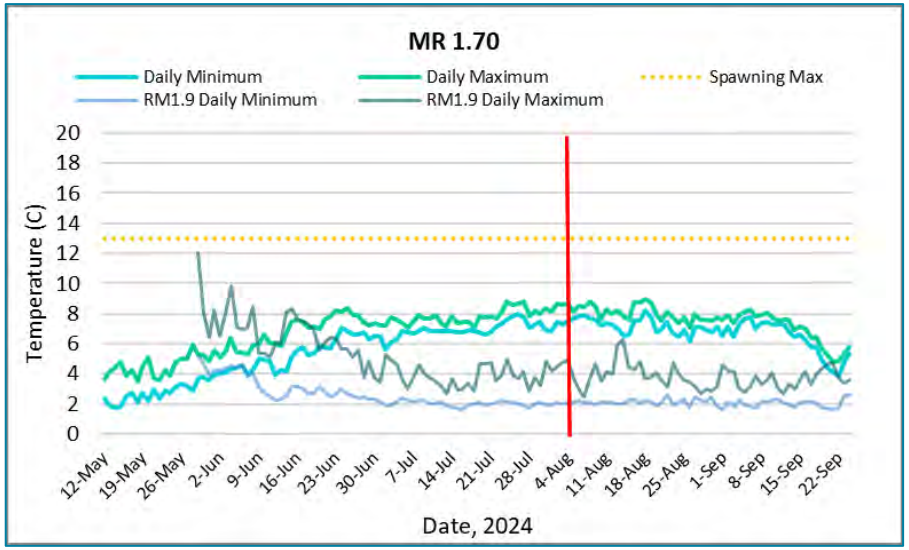
Results – Continuous Water Temperature

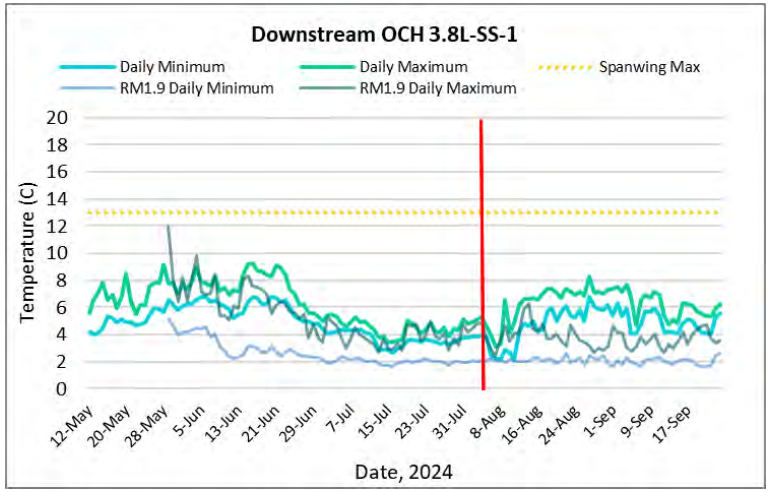






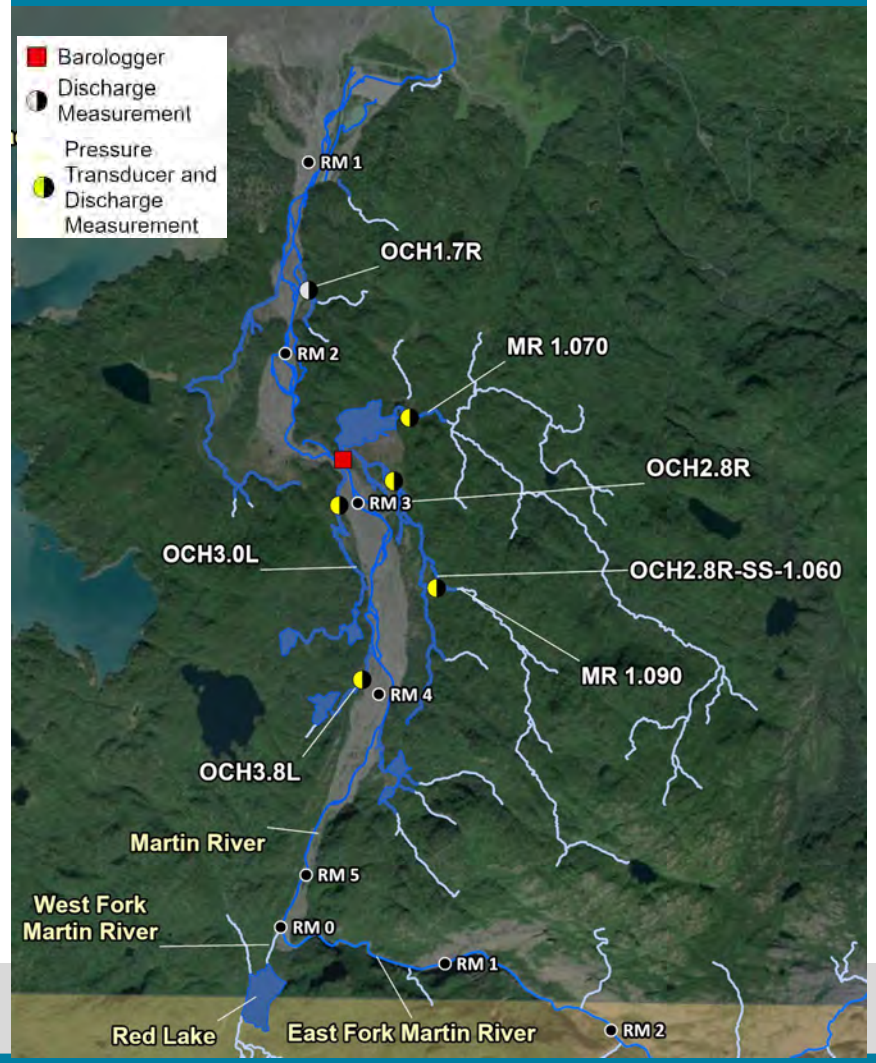


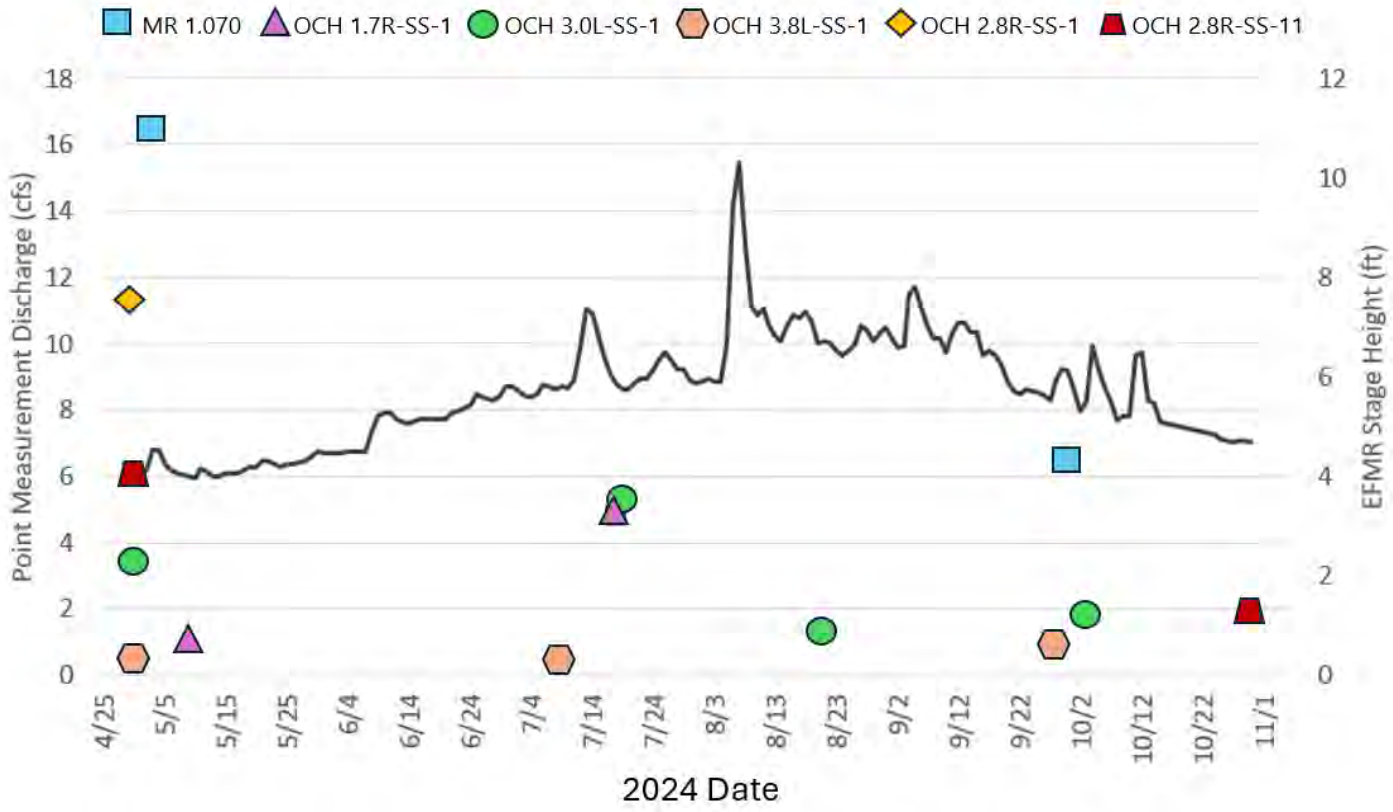




Results – Flow Monitoring

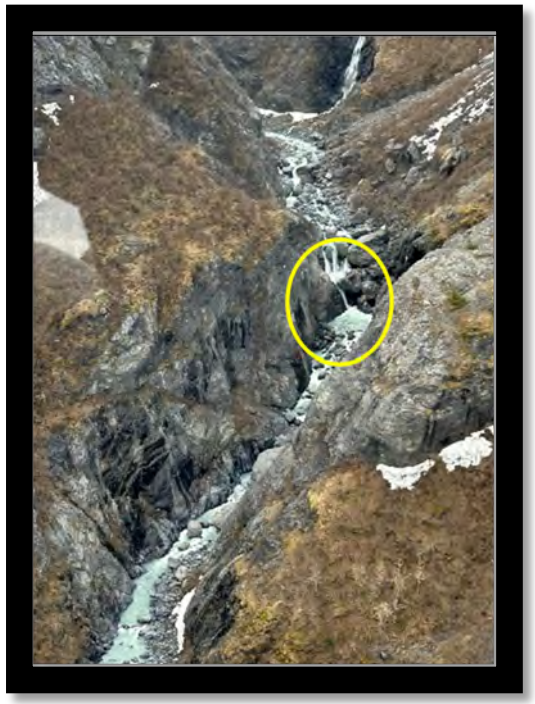
Flow Monitoring Sites





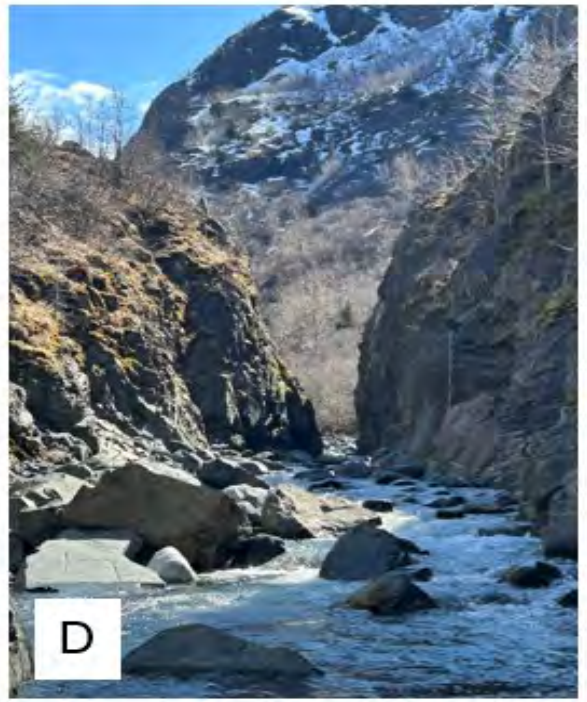
Results – EFMR Potential Barriers

- Surveyed April 27, 2024
- Images A and B show the mouth of the EFMR looking upstream.
- Images C and D show the EFMR looking upstream into the constriction near RM 1.35.



PB EFM RM 2.45

PB EFM RM 3.45



Schedule

- Data collected 2024.
- Goals and objectives met.
- Study has been completed.

QUESTIONS?

Martin River Fish Use

- Kleinschmidt Associates: Betsy McGregor

Goals and Objectives

- Goal
  - Characterize fish use of Martin River basin with potential to be affected the proposed project
- Objectives
  - Characterize distribution and relative abundance in clearwater habitats
  - Document salmon spawning
  - Estimate daily count of adult salmon at Red Lake outlet in WF Martin River (ADF&G)

Methods – Distribution & Relative Abundance

- Off-channel habitats and tributaries
- Fish sampling
  - Minnow trapping
  - Dip netting
- Catch per unit effort
- Water quality data:
  - Temperature (°C), dissolved oxygen (mg/L and percent saturation), conductivity, turbidity

Methods - Salmon Spawning Distribution

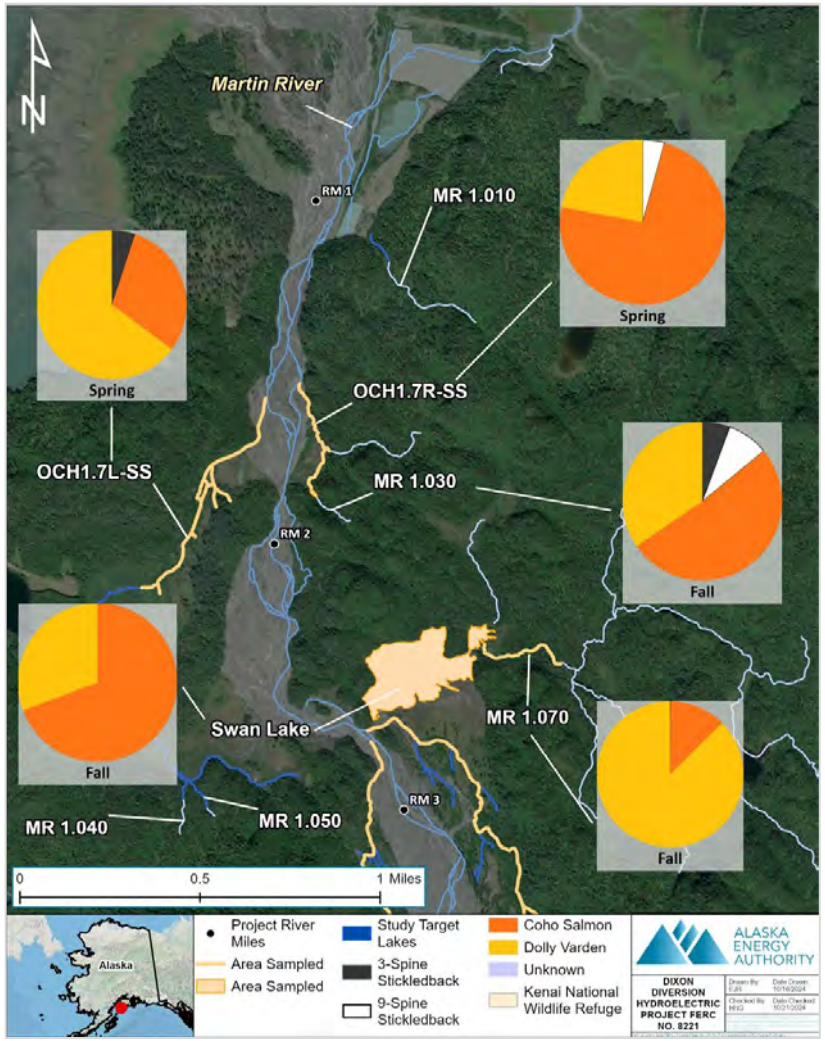
- Visual surveys of off-channel clearwater habitats and mainstem mixing zones in the fall
- Adults, carcasses, redds if evident
- Location of any young-of-the-year observations from Objective 1
- Spring 2024 survey effort of select side channel habitats identified as having suitable substrate and the potential for upwelling, as flow conditions allow

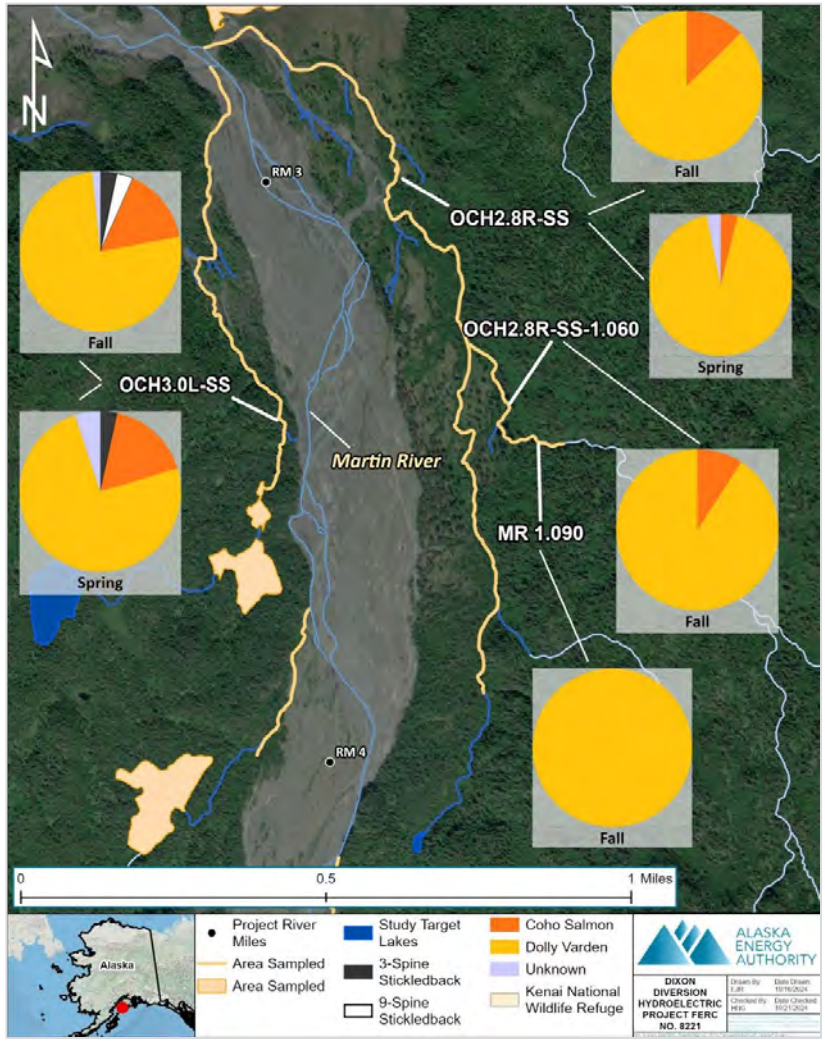
Results

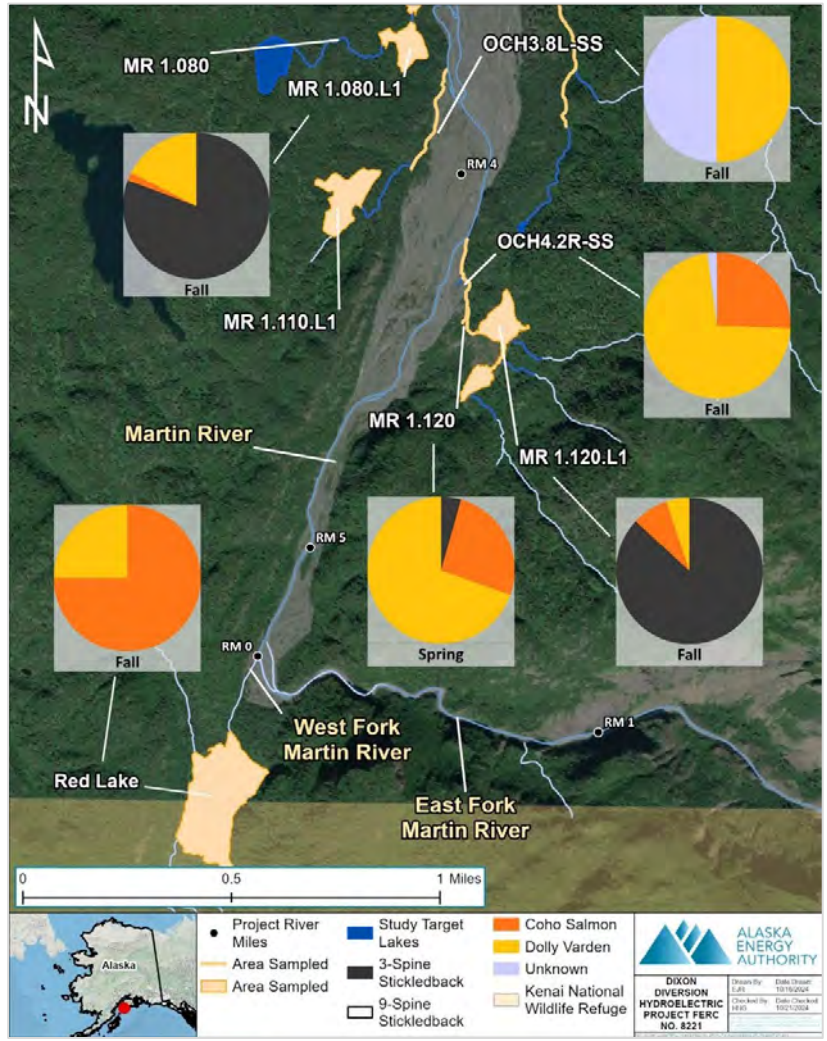
- Most targeted sampling areas were successfully minnow trapped or dip-netted
  - Exceptions-target sites with no water present
  - Fish sampling occurred spring (Apr 29-May 15) and fall (Sept 23-Oct 3) of 2024
  - Low, clearwater conditions allowed for ideal sampling conditions

Results – Minnow Trapping CPUE

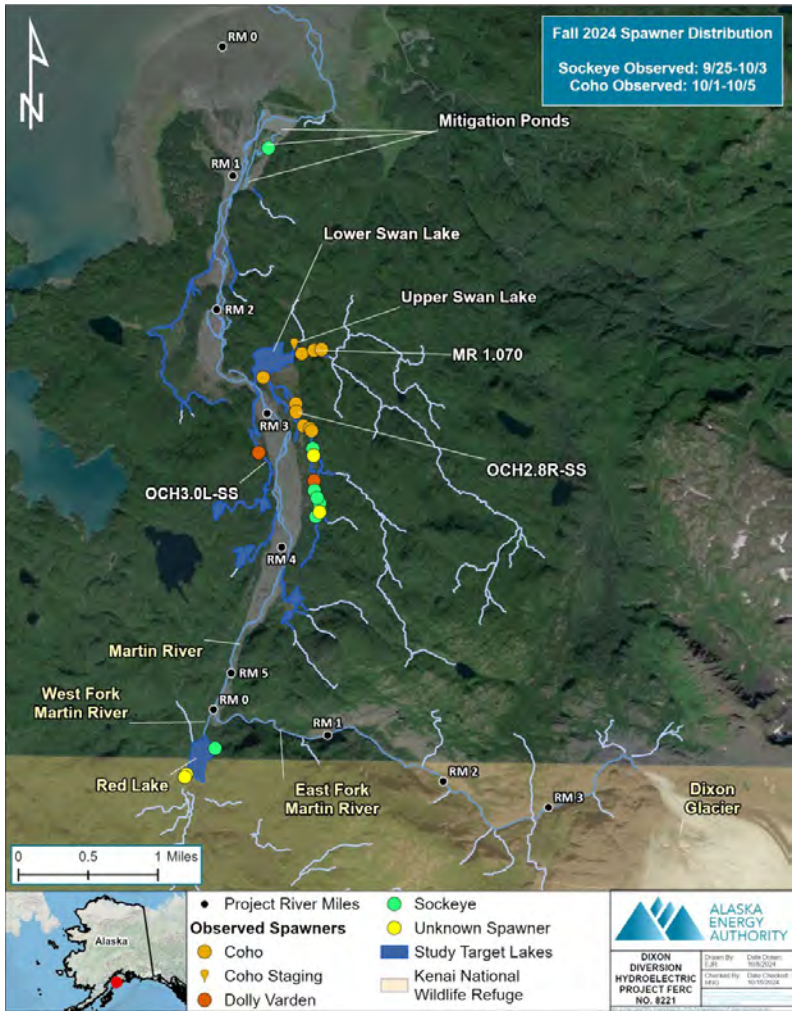
Results – Species Distribution

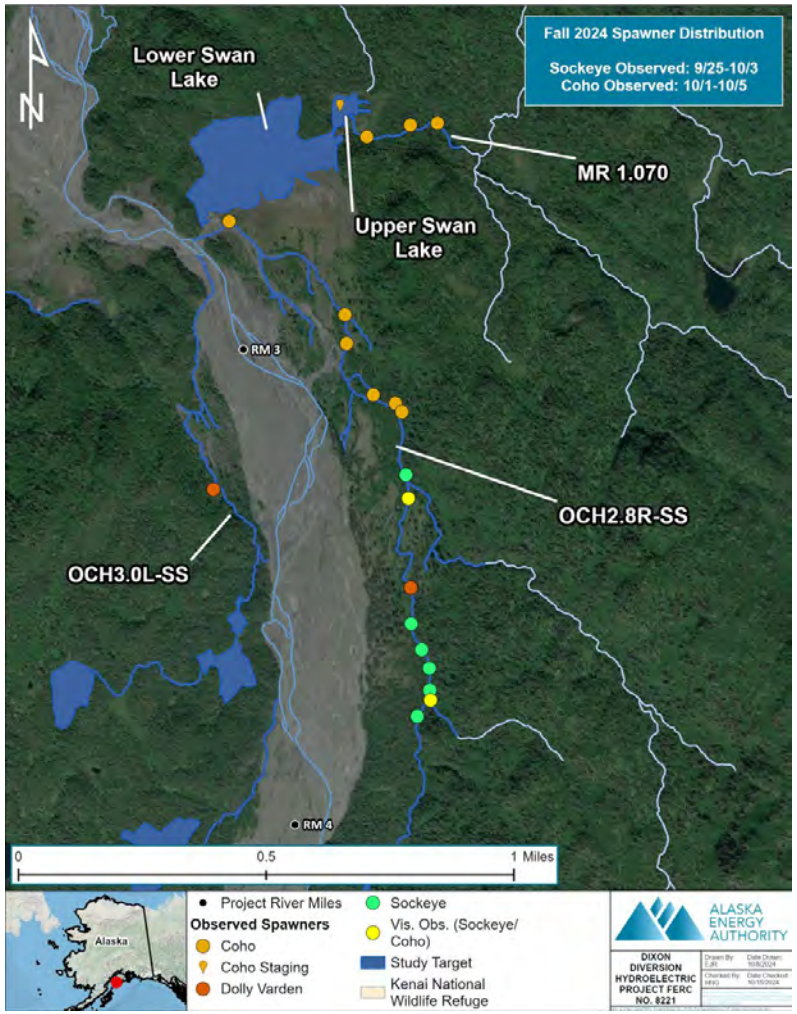


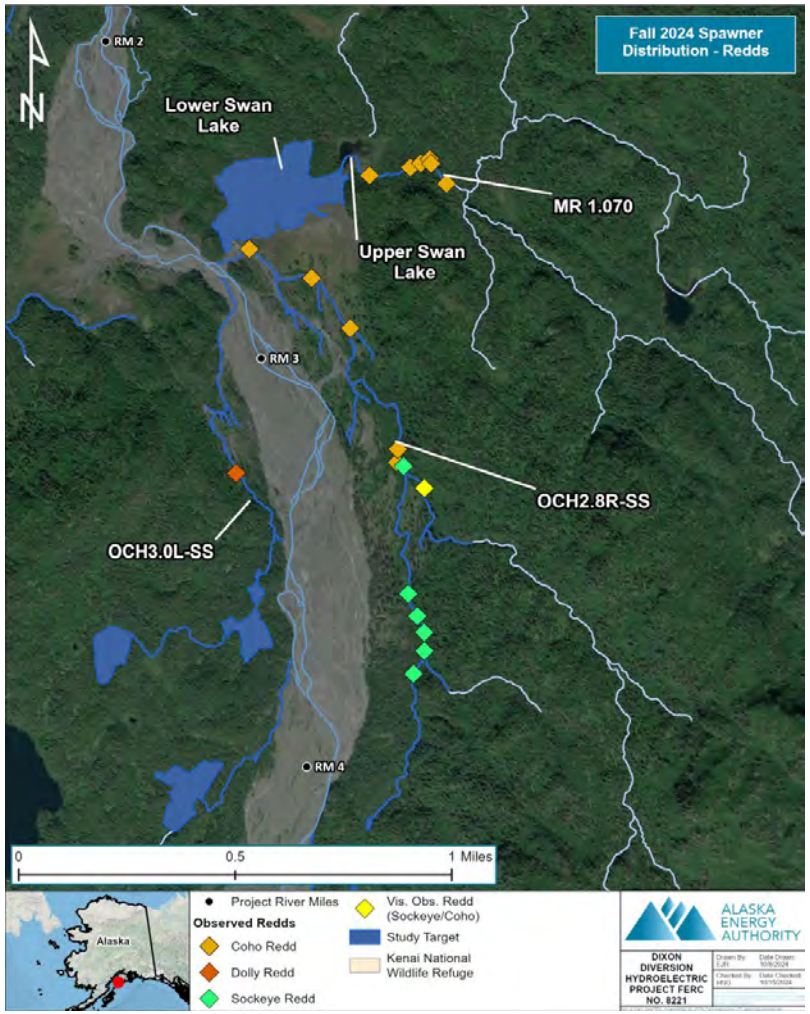




Results – Run Timing of Sockeye and Coho Salmon







Schedule

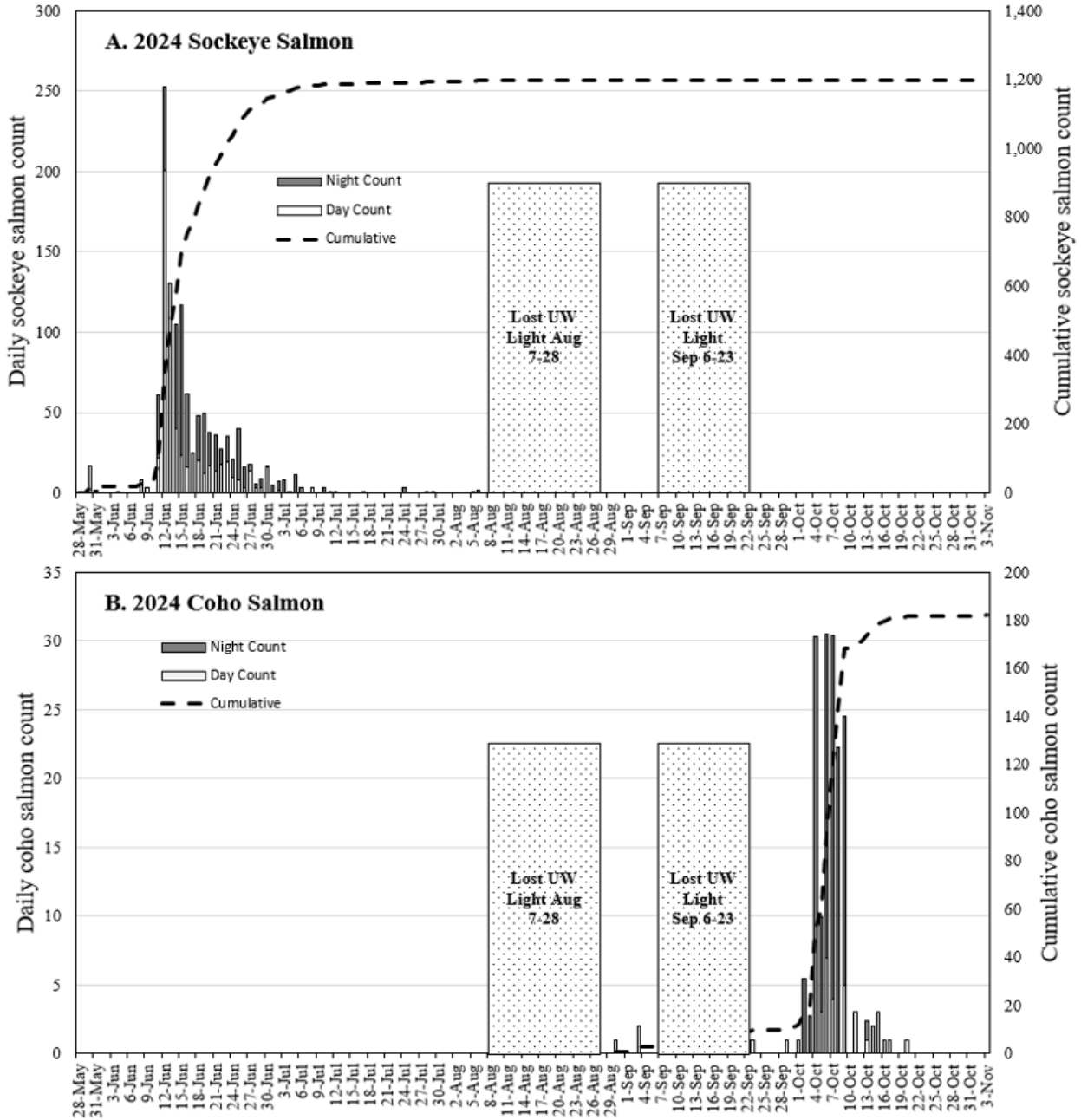
- 2025
  - Year 2 fish distribution and abundance
  - Clearwater spawning surveys and potential side channel spawning surveys
  - Red Lake AVCT fish counts (ADF&G)

Martin River Fish Use: Red Lake AVCT

- Alaska Department of Fish and Game: Ted Otis

Red Lake AVCT

- 2024 Operations
  - Operated 28 May – 2 Nov
  - 3,812 h of video recorded
  - No video interruptions in 2024
  - Aug 7 flood (high turbidity, lost lights)
  - Lights restored before coho run
- 2024 Results
  - 1,197 adult Sockeye salmon (66 in 2023)
  - 182 adult Coho salmon (205 in 2022)
  - 76% of the Coho counted at night
  - 88 Dolly Varden char (58 in 2023)
  - 14 species of wildlife, including: brown and black bears, river otters, beavers



Red Lake Adult Salmon

- Sockeye salmon
  - Video installed 28 May
  - 1st fish on 30 May
  - Peak count (253) on 12 June
  - 46% passed at night
  - Tail of run ~ 6 July
- Coho salmon
  - 1st fish on 30 Aug
  - Peak count (31) on 6 Oct
  - 76% passed at night
  - Tail of run ~15 Oct
  - Last fish on 20 Oct
  - Last day of video, 2-Nov

7-Aug flood: water level reached lower edge of solar panels, destroyed UW light/charging system, modified stream channel; increased turbidity persisted for several weeks

RED LAKE AVCT QUESTIONS?

OTHER AQUATIC RESOURCE QUESTIONS?

FERC Process & Next Steps

- Kleinschmidt Associates:
  Betsy McGregor

FERC License Amendment Process Status

ALASKA ENERGY AUTHORITY

We are here

Responsible Party	Activity	Dates
AEA/Stakeholders	Initial Agency Consultation	Jan - Mar 2022
AEA	Conduct 2022 Preliminary Studies	Summer 2022
Stage 1: Initial Consultation Document (ICD)		
AEA	File ICD, Request for Non-federal Representative, & Newspaper Notice	Apr 2022
FERC	FERC Issues Notice of Amendment Accepted	May 2022
AEA	Provide Stakeholders with Notification of Joint Meeting	May 2022
AEA/Stakeholders	Hold Joint Agency/Public Meeting and Site Visit	Jun 14-15, 2022
FERC/Stakeholders	Comments on ICD/ Proposed Studies Due	Aug 14, 2022
Stage 2: Study Planning and Implementation		
AEA	Distribute Draft Study Plans	Nov 2022
Stakeholders	Comments on Draft Study Plans	Dec 2022
AEA	Paused Amendment Process and Refined Project Design	Mar 2023 – Feb 2024
AEA/Stakeholders	Project Update and Study Plan Meetings	Mar - Apr 2024
AEA/Stakeholders	Implement Year 1 Studies	2024
AEA/Stakeholders	**2024 Study Reports & NHPA Section 106 Consultation Meetings**	**Jan - Feb 2025**
Stakeholders	**Comments on 2024 Study Results**	**Mid-Mar 2025**
AEA/Stakeholders	**Consultation with agencies, Tribes, stakeholders**	**Late Mar 2025**
AEA	Implement Year 2 Studies and Review Study Results	2025
AEA/Stakeholders	Consultation with agencies, Tribes, stakeholders	2025
AEA	File Draft Amendment Application	Jan 2026
AEA	File Final Amendment Application	Spring 2026

Kleinschmidt

Next Steps – Complete Studies

- Stream Gaging – April – Nov 2025
- Martin River Fish Use Study – spring & fall 2025
- Red Lake AVCT Salmon Counts - spring & fall 2025
- Riparian & Geomorphology Recon – July 2025
- Timelapse Cameras – spring – fall 2025

Next Steps – Consultation

- **Late March - Provide comments to AEA on 2024 studies (30 days)**
- Late-March - Meeting to discuss study comments and additional data collection or analysis needs
- Spring - Fall 2025 – Consultation to develop PMEs

Next Steps – Consultation and Development of PMEs

- AEA-proposed BMPs and PMEs
  - **Bear Safety Plan** (e.g., Battle Creek Amendment Article 63)
  - No hunting or fishing by contractors – standard BMP
  - **Site/Brush Clearing Window** outside May 1 – July 15 to avoid take of migratory bird nesting (e.g., Battle Creek Amendment Article 68)
  - **Site/Brush Clearing Window** outside May 1 – Aug 31 within 660 feet of bald eagle nests
  - **Fuel and Hazardous Substance Spill Plan** (e.g., Battle Creek Amendment Article 62)
  - **Erosion and Sediment Control Plan** (e.g., Battle Creek Amendment Article 61)

Next Steps – Consultation and Development of PMEs

- AEA-proposed BMPs and PMEs
  - **Fund ADF&G goat monitoring study**
    - Collar goats to monitor movement patterns pre- and post-construction
  - **Goat avoidance measures** (e.g., maintain 1,500 ft distance in all directions)
  - **Survey for nesting raptors** just prior to construction for current information on nest locations (delayed study component)
  - **Raptor nest disturbance avoidance plan** (e.g., timing and distance buffers)

Next Steps – Consultation and Development of PMEs

- Example PMEs to be developed through Consultation
  - **Continuous stream gaging** (e.g., Battle Creek Amendment Article 58)
  - **Diversion Flow Release Plan** (e.g., Battle Creek Amendment Article 56)
    - Establish seasonal minimum flows
    - Establish magnitude, frequency and duration of channel maintenance flows
  - **Fish and Habitat Monitoring Plan** (e.g., Battle Creek Amendment Article 60)
  - **Other measures?**

Thank you for your participation!