Washington State Department of Transportation

Welcome to the
SR 20 Skagit River O'Brian Reach Floodplain Feasibility Study

COMMUNITY WORKSHOP #2

June 1, 2023
5:30-7:30 PM

Jenni Dykstra, WSDOT Environmental Services Office
Jen O'Neal, Natural Systems Design
Shawn Higgins, Natural Systems Design
Tim Abbe, Natural Systems Design
Hilary Wilkinson, Triangle Associates
Erin Matthews, WSDOT
April Magrane, WSDOT
Cygnia Rapp, WSDOT

WORKSHOP PURPOSE

1. Provide an overview and update of the SR 20 Skagit River O'Brian Reach Feasibility Study.

2. Present the results of the alternatives analysis.

3. Get input on a feasible alternative concept which will be incorporated into the final study report.

AGENDA

5:30	**Welcome and Introductions**	**Hilary Wilkinson, Triangle Associates** **Jenni Dykstra, WSDOT**
5:40	Study Background and Context	Jenni Dykstra, WSDOT Jen O'Neal, Natural Systems Design (NSD)
6:00	Results of Alternatives Analysis	Jen O'Neal, NSD Shawn Higgins, NSD
6:30	Discussion of Alternatives Evaluation	All
7:10	Next Steps and Study Completion	
7:30	Adjourn	

Meeting Ground Rules

1. Please stay on mute unless invited to speak.
2. Everyone is encouraged to participate. Please be respectful when asking questions or sharing thoughts. Use Q/A, chat and/or raise real/virtual hand to speak.
3. Listen respectfully to others.
4. One person to speak at a time.
5. No side conversations or disruptions. Please silence cell phones.
6. Meeting will end at 7:30.

STUDY BACKGROUND AND CONTEXT

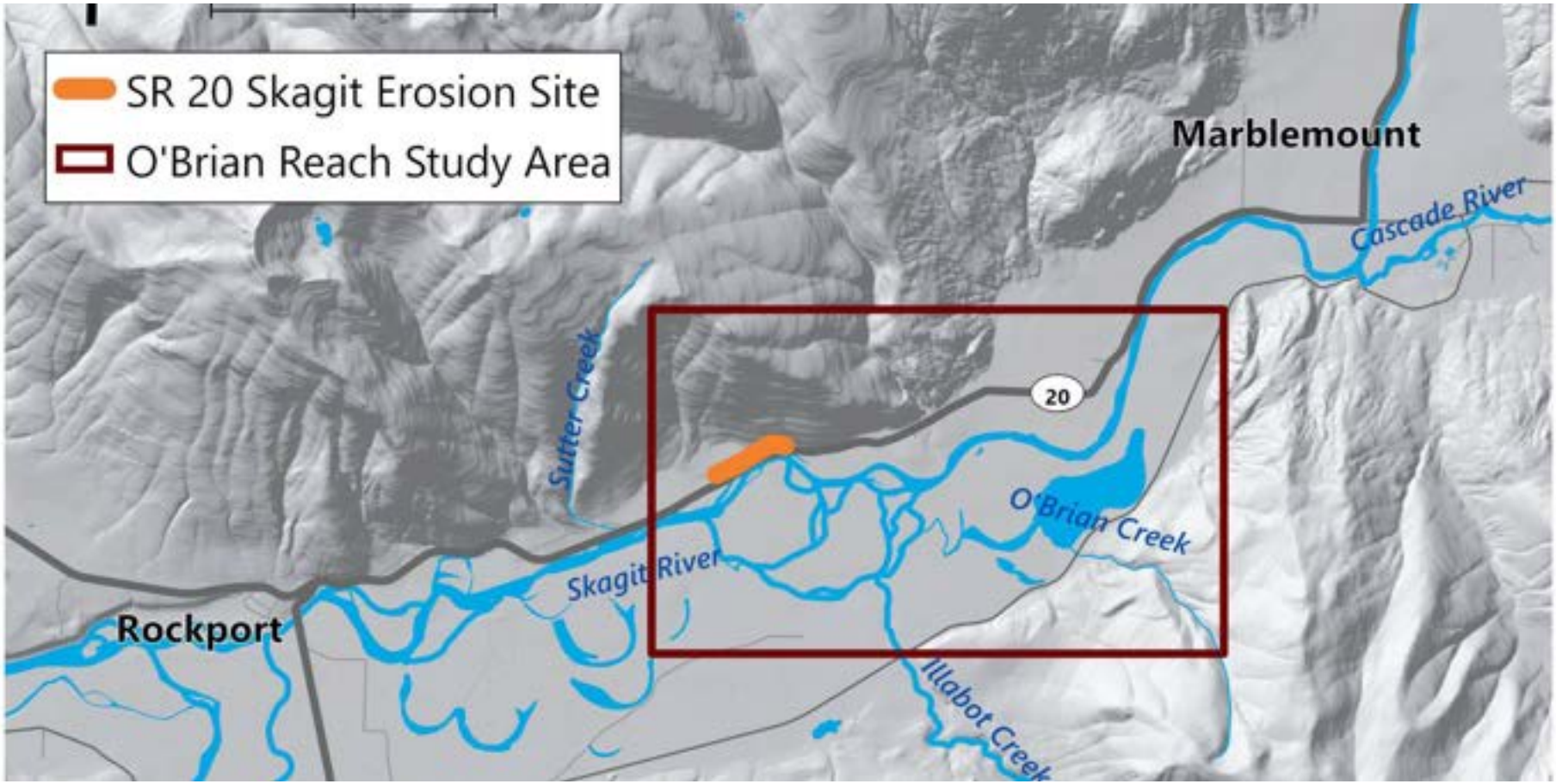
Washington State Department of Transportation

SR 20 Skagit River O'Brian Reach Floodplain Feasibility Study

COMMUNITY WORKSHOP #2

June 1, 2023

Jenni Dykstra, WSDOT Environmental Services Office
Jen O'Neal, Natural System's Design
Shawn Higgins, Natural System's Design
Hilary Wilkinson, Triangle Associates



SR 20 Skagit River O'Brian Reach Vicinity

- Flood/Erosion Location: State Route 20, milepost 100.7 to 101
- O'Brian Reach Study Location: Skagit River, river-mile 72-74

Salmon Recovery Funding Board (SRFB) Grant Request June 2020

Proposal: Feasibility study to investigate fluvial processes and identify opportunities to reconnect side channels in a 3.7-mile study reach.

Project Location: O'Brian Reach of the Skagit River Floodplain, RM 72-75

Goal: Improve and restore native salmon habitat in the Skagit River floodplain by reconnecting side channels during small-medium floods.

Objectives:

- Engage the public early
- Identify reconnection opportunities
- Develop alternatives that enhance floodplain processes
- Collaboratively identify a concept that maximizes floodplain habitats and diversity in this reach

Species: Chinook, Coho, Steelhead, Chum, Pink, Bull Trout

SWC Strategic Approach: Floodplain Target Area

SRFB Fund Request: $232,700 (of $293,000)

Why is WSDOT sponsoring this study?

November 24, 2017

November 30, 2017

History of damage and repairs on SR 20

- 1970s – river eroded into 30-40’ buffer. Rip rap installed on the bank.
- 1995 – 500 feet of roadway damaged, more rip rap
- 2003 – flooding almost to top of jersey barrier
- 2004 – emergency rip rap installation along 40 feet of roadway
- 2004 – additional bank erosion
- 2005 – additional bank erosion
- 2006 – emergency rip rap installation along additional 150 feet of roadway.
- 2006 –immediately, river eroded additional 200 feet of the adjacent embankment and a portion of the 2006 repair was undermined by scour.
- 2007 – river migrated downstream and eroded the unprotected embankment and riparian area. Rip rap installed.
- 2014 – WSDOT constructed 4 dolotimber engineered log jams and a revetment along 1475 feet of the riverbank near milepost 100.7.
- 2017 – flooding overtopped SR 20 upstream of the dolotimber revetment and destroyed 1 lane of SR 20. EB lane closed for 4 weeks to repair the roadway and replace the rip rap. Detour 95 miles initial response.
- 2021 – flooding 6-ft deep over the roadway surface, scour undermined pavement on both sides, requiring repair. Closure during initial response to remove debris.

Chronic Environmental Deficiencies Program

- Long term repairs to address flooding and erosion
- Better for fish
- Creative approach using nature-based solutions

- 2002 Memorandum of Agreement with WDFW
- Goals of the CED program:
  - Protect WSDOT highways from environmental threats.
  - Reduce need for repairs that impact fish habitat.
  - Improve fish habitat with nature-based solutions that
  - Work with natural processes and minimize use of damaging materials.
  - Support WSDOT's mandate to maintain state highways.
  - Improve safety and resilience to climate change.

- Special process that requires WDFW concurrence to ensure that project concepts protect or improve fish habitat.

https://wsdot.wa.gov/construction-planning/protecting-environment/chronic-environmental-deficiencies-ceds

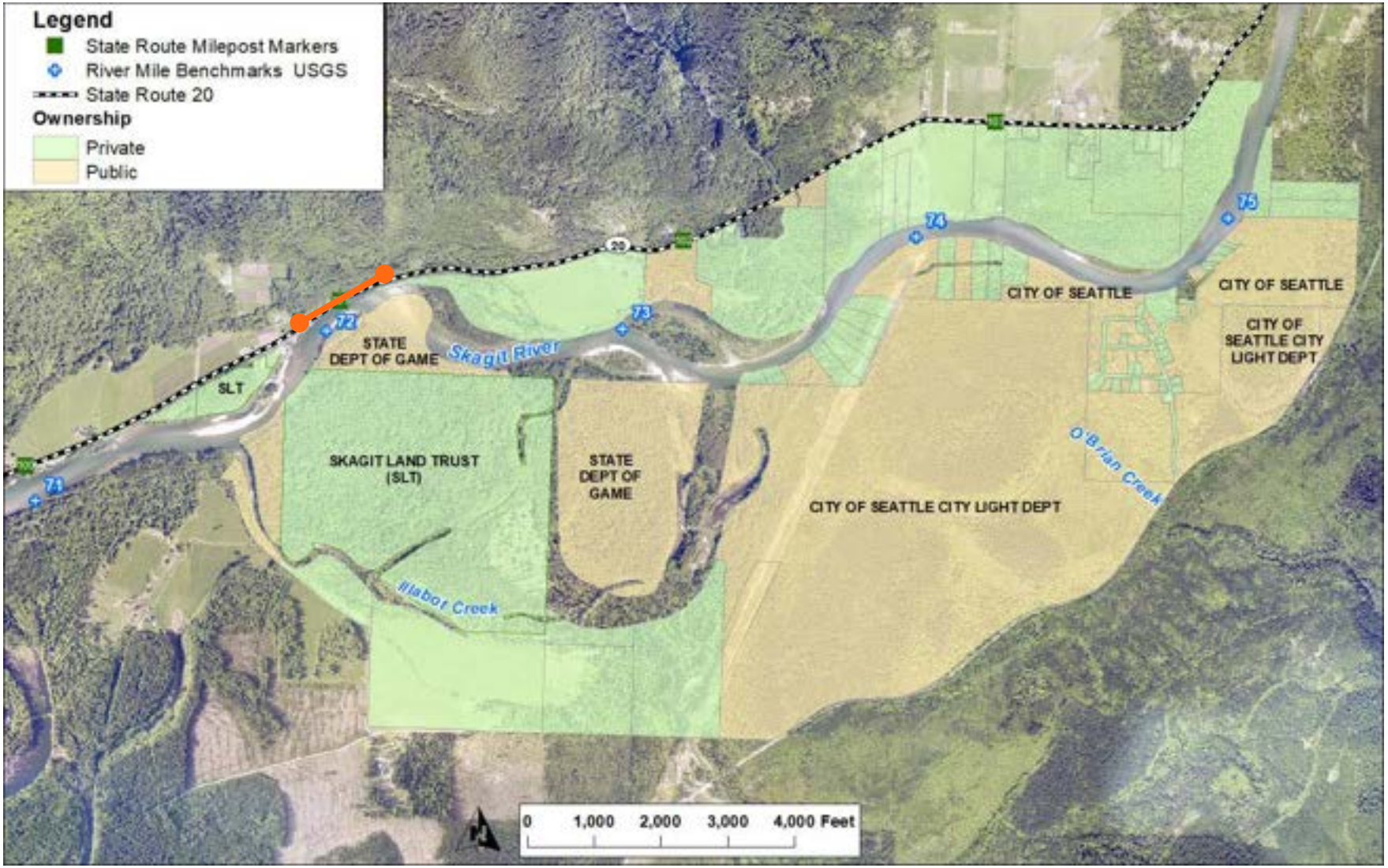
Adjacent 2014 Skagit CED project following November storm December 21, 2021

CED Site and Reach Assessment (SRA)

- Technical study
- Evaluates the watershed and reach-scale processes that contribute to flooding and erosion
- Identifies and evaluates several feasible alternatives
- Recommends a project concept
- Provides WSDOT with information to scope and request project funds to plan, design, and construct a CED project.

WSDOT began an SRA for the SR 20 Skagit River CED in fall 2019 and identified 4 potential alternatives. This O'Brian Reach study provides information needed to evaluate one of them.

Landowners in the O'Brian Reach floodplain



Opportunity: Enhance existing side channels in the Skagit River floodplain.

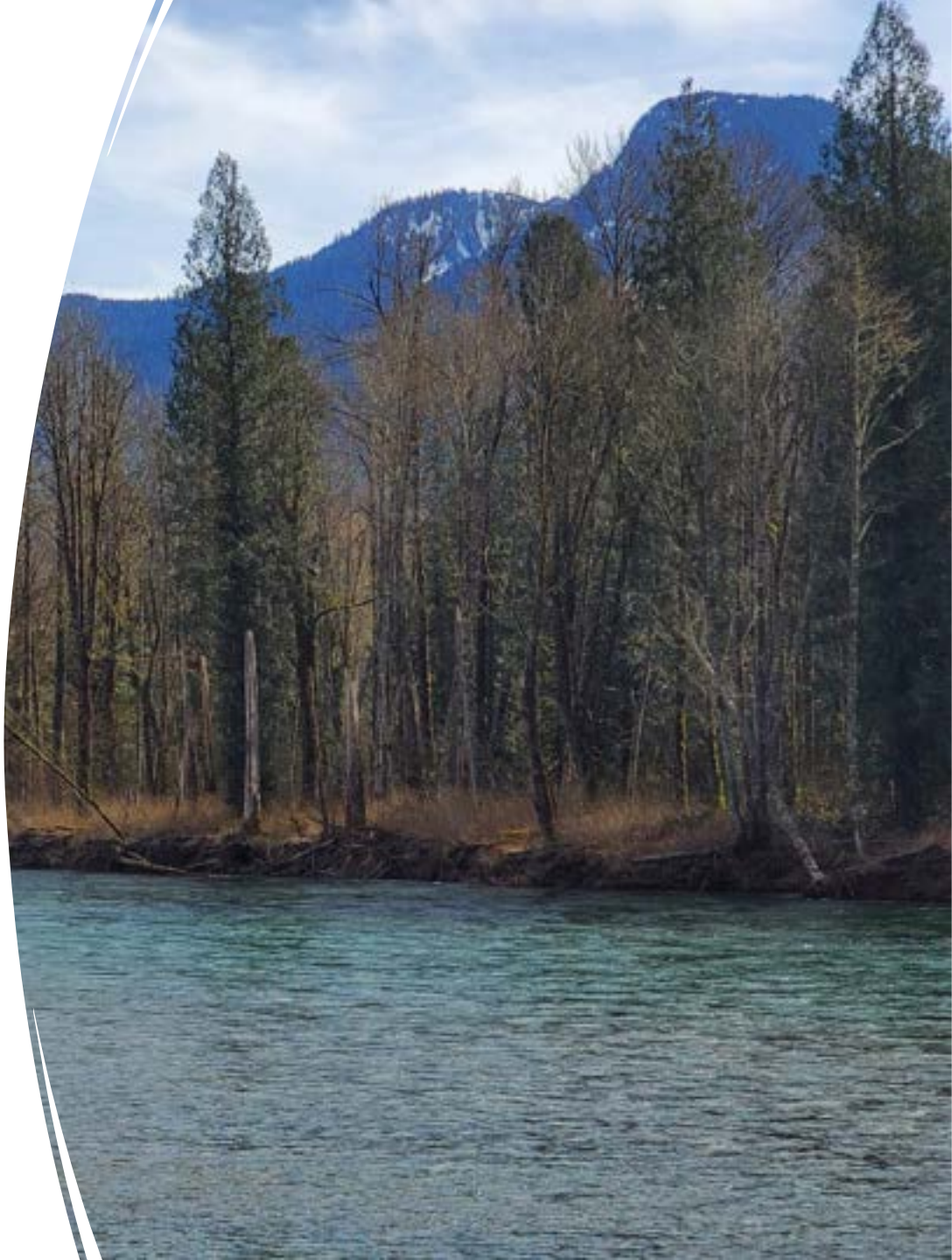
Opportunity

- Enhancing flows in floodplains and side channels can reduce pressure and flooding in other parts of a river corridor.
- CED program has used this approach in other projects.
- Land in the O'Brian Reach is in conservation use
- Salmon conservation partnership opportunities in the Skagit River Basin

This study aims to find out if this approach is feasible in the Skagit to reduce pressure on the SR 20 embankment.

SR 20 Skagit O'Brian Reach Floodplain Feasibility Study

- SRFB Grant awarded July 2021
- Study kickoff February 2022
- Study completion December 2023
- Grant funds: $232,700
  - WSDOT contribution: $40,000
  - Seattle City Light contributed $25,000
- Natural Systems Design (NSD) implementing the study
- Triangle Associates supporting outreach



STUDY GOALS

Goal of the study: Determine if there is a feasible floodplain enhancement alternative that:

1. Improves salmon habitat in the floodplain and river margins
2. Reduces flood and erosion risk to SR 20
3. Does not increase flood or erosion risk to adjacent property or infrastructure

Feasibility of alternatives assessed using Evaluation Criteria.

Fish Habitat

1. Improve salmon habitat in the floodplain and river margins

Project Objective	Metric for comparison
Benefit multiple salmonid species	Habitat Suitability Index (HSI), Weighted Usable Area for multiple species (Chinook, chum, and steelhead) and life stages.
Increase low-flow rearing habitat	Spring: Compare area of habitat that is > 0.5 ft deep in June between existing and proposed conditions. Fall: Compare area of habitat that is >0.5 ft in September between existing and proposed conditions.
Increase high-flow refuge habitat	Quality and quantity of flood refuge during an annual flood. Difference in the areas of inundation and HSIs in the floodplain and river margins under existing and proposed conditions.
Does not reduce the diversity and quality of other valuable habitat types	Compare HSI under existing conditions to HSI under proposed conditions to determine range (diversity) of depths and velocities within a given alternative.
Minimize Risks of stranding fish in floodplains during receding flows	Identify areas that are likely to pool or pond and consider enhancing connections in the project concept.

Infrastructure and Property Risk

2. Reduce flood and erosion risk to SR 20
3. Does not increase flood or erosion risk to adjacent property or infrastructure

Project Objective	Metric for comparison
Reduce flood risk to SR 20	Compare water surface elevations during flood events along SR 20 between existing and proposed conditions.
Reduce erosion risk to SR 20	Sheer stress on the SR 20 embankment above the threshold where bank protection is required.
Does not increase flood or erosion risk to adjacent property or infrastructure	Water surface elevations and shear stress at and near adjacent structures, roadways, and private land.
Does not reduce potential effectiveness of Barnaby Project at meeting its objectives	Potential to increase or decrease flows entering the Barnaby Project above a threshold. Water surface elevations, velocity and depth in the Barnaby reach calculated from the change in flows in the Illabot outlet, using output from the existing Barnaby model

Other

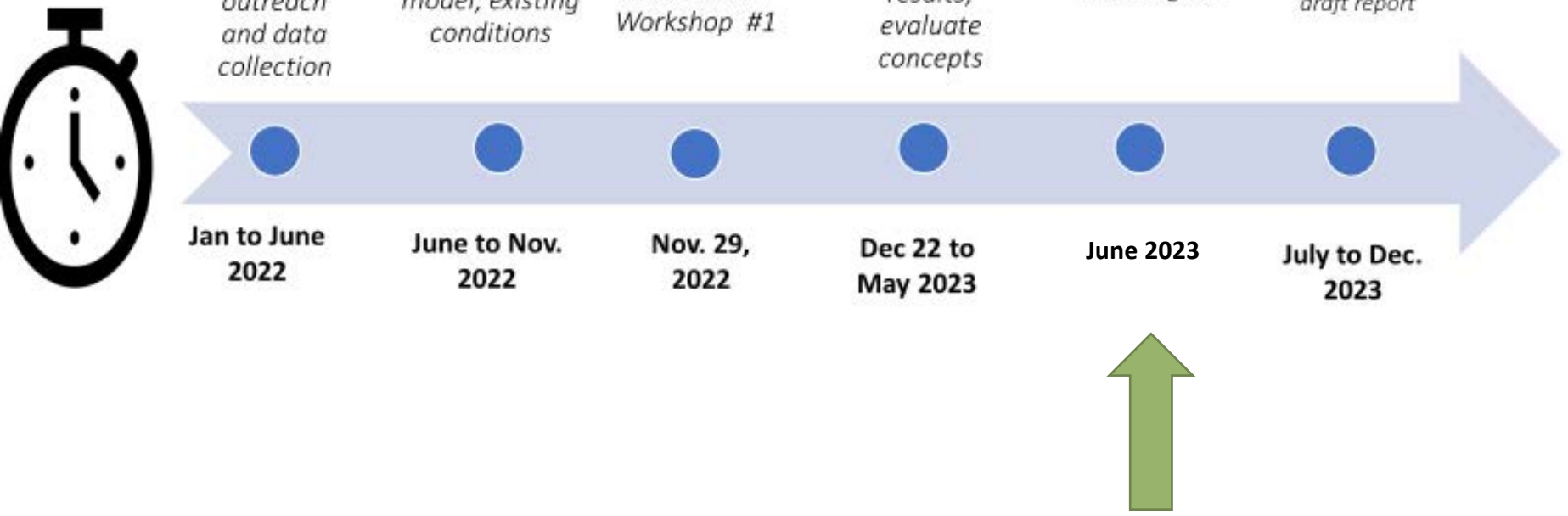
Project Objective	Metric for comparison
Cost and ease of construction	Relative comparison of cost, property acquisition, logistics, and vegetation management.
Sustainable	Qualitative assessment of durability and little to no need for maintenance - sedimentation, longevity of ELJs, need to manage invasive vegetation.
Timing of habitat benefits	Minimal lag time and maximum duration of habitat benefits.
Opportunity to collaborate	Review plans for road or habitat restoration work and identify potential opportunities to partner or coordinate.
Wildlife effects	Review species list and habitat types to qualitatively evaluate effects on wildlife likely to inhabit the study area.
Recreation	Qualitative assessment of potential impacts to safety and useability for boating, fishing, and recreating.
Aesthetically appropriate	Qualitative estimate of aesthetic impacts.
Perceived risk of flooding at adjacent properties	Qualitative assessment and input from stakeholders of the appearance or perception of a risk.

O’Brian Reach Feasibility Assessment

Natural Systems Design

Study Status

TIMELINE



Stakeholder Presentations and Input

TIMELINE

Feb 2022 Landowner kickoff mtg

Nov 2022 Key Partner update mtg

Nov 2022 Stakeholder workshop #1

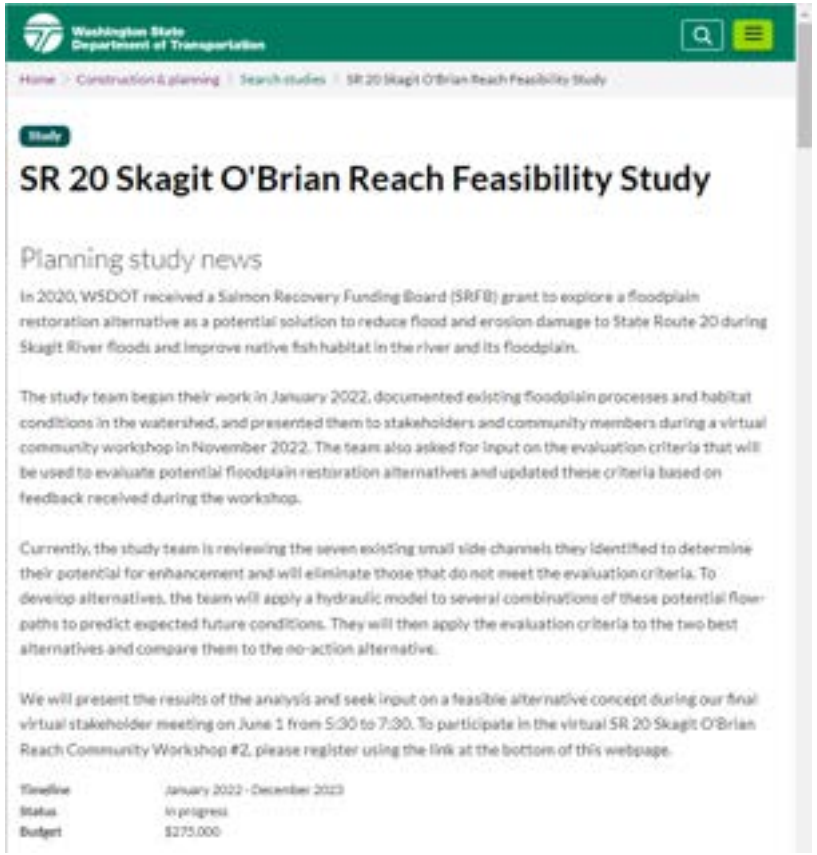
Mar 2023 In-person mtg with Skagit residents

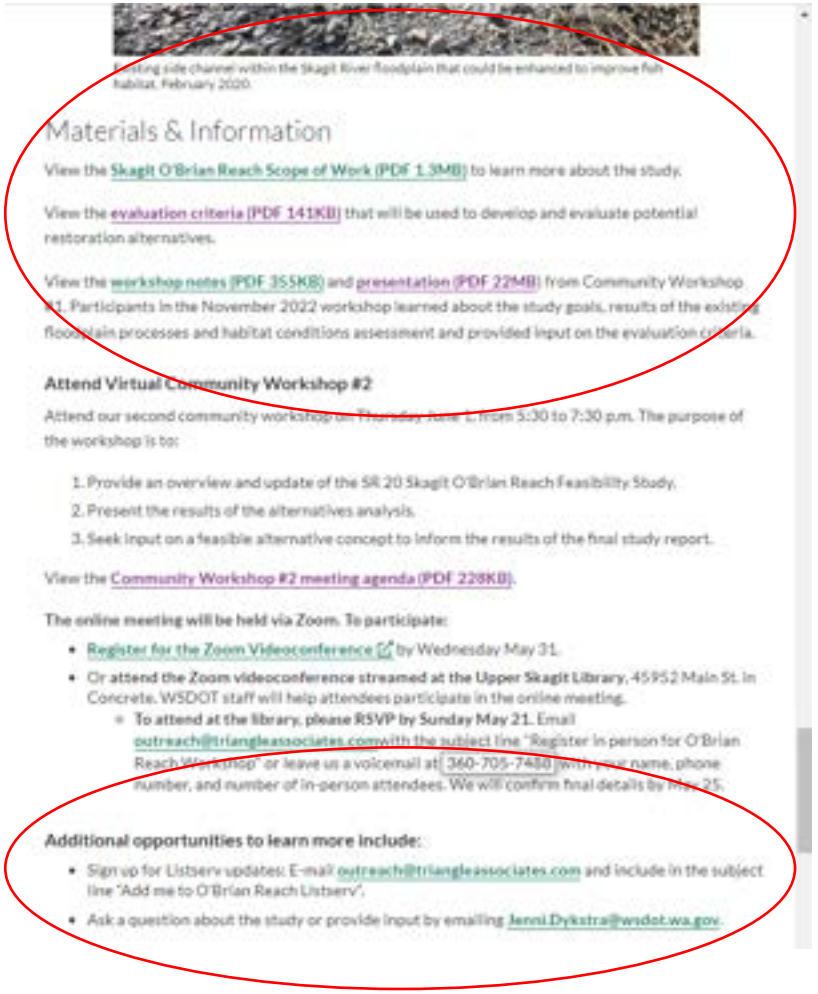
Jun 2023 Stakeholder workshop #2

Dec 2022 Input incorporated into FINAL O'Brian Study report

Skagit O'Brian Reach Study Website

https://wsdot.wa.gov/construction-planning/search-studies/sr-20-skagit-obrian-reach-feasibility-study





RESULTS OF ALTERNATIVES ANALYSIS

Overview and Results of Existing Conditions Analysis

Study Setting and Preliminary Results

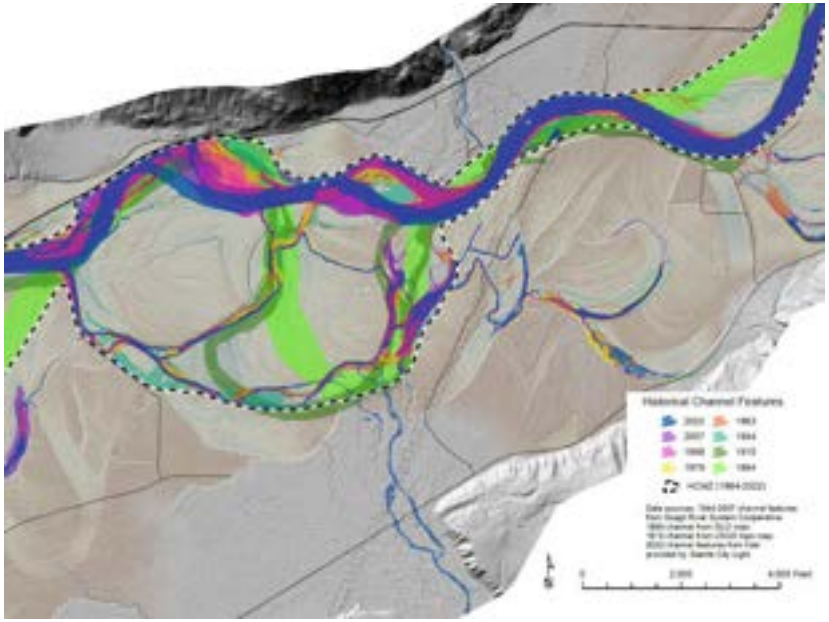
Technical Assessments:

- Geomorphic Characterization
- Hydraulic Model Development and Analysis
- Habitat Quantification

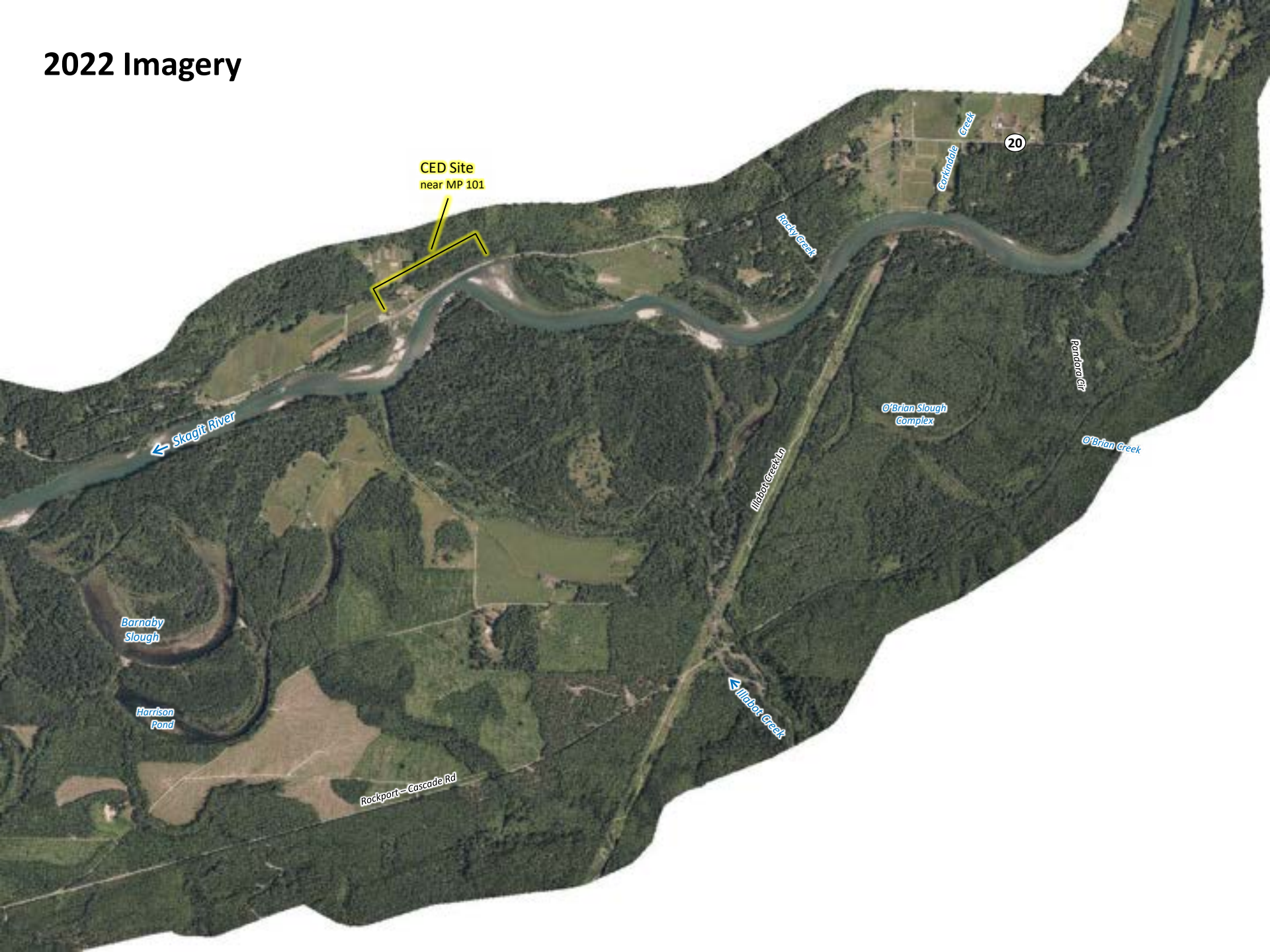
Hydraulic and Geomorphic Assessment

Methods and Approach:

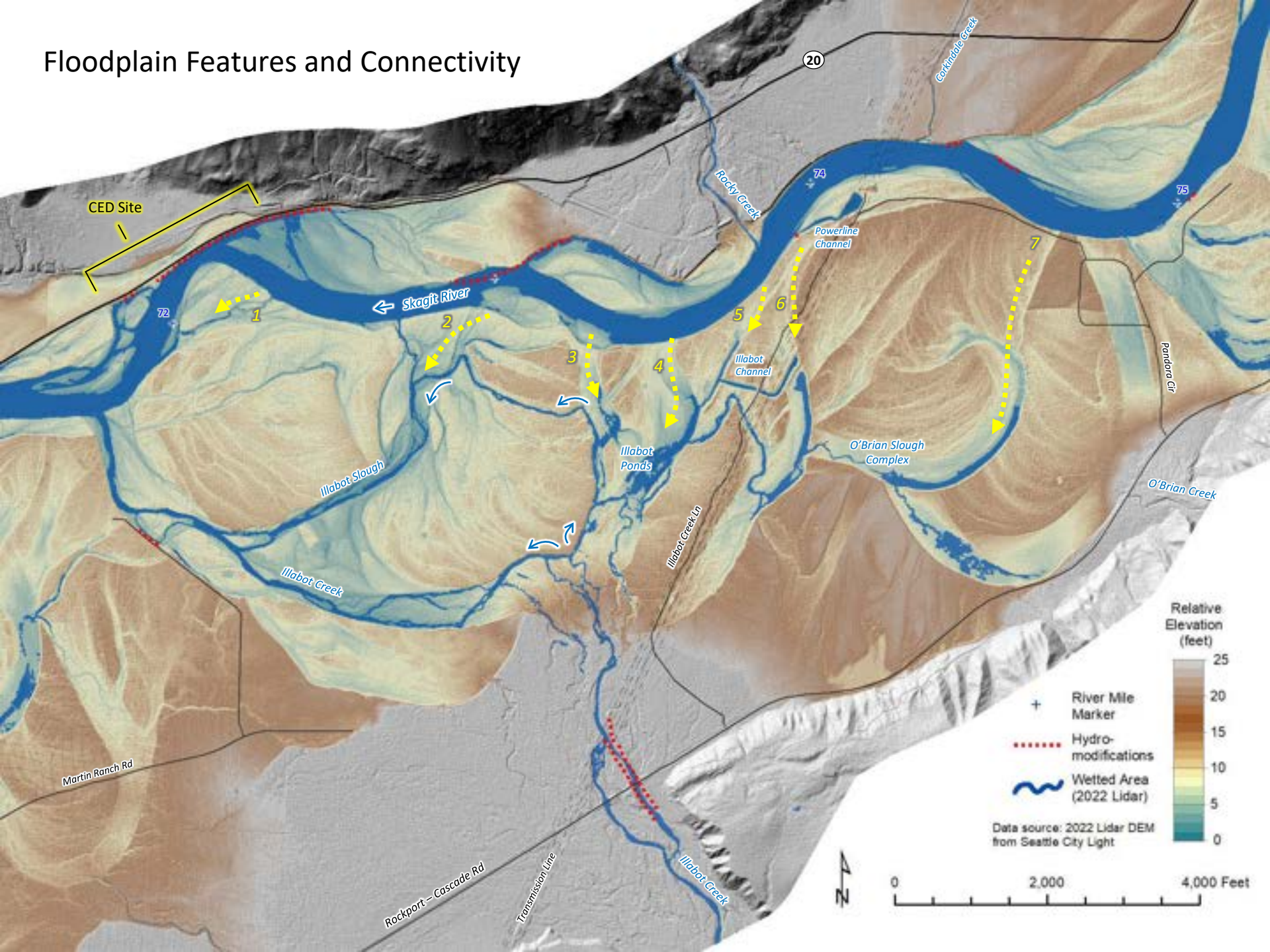
- Characterize Floodplain Topography and Landforms
- Assess Mechanisms of Bank Erosion and Lateral Migration Rates
- Evaluate Trajectories of Meander Bend Migration and Avulsion Risk Potential
- Utilize 2D Hydraulic Model to Characterize Side Channel Connectivity
- Provide Baseline for Development and Evaluation of Design Alternatives



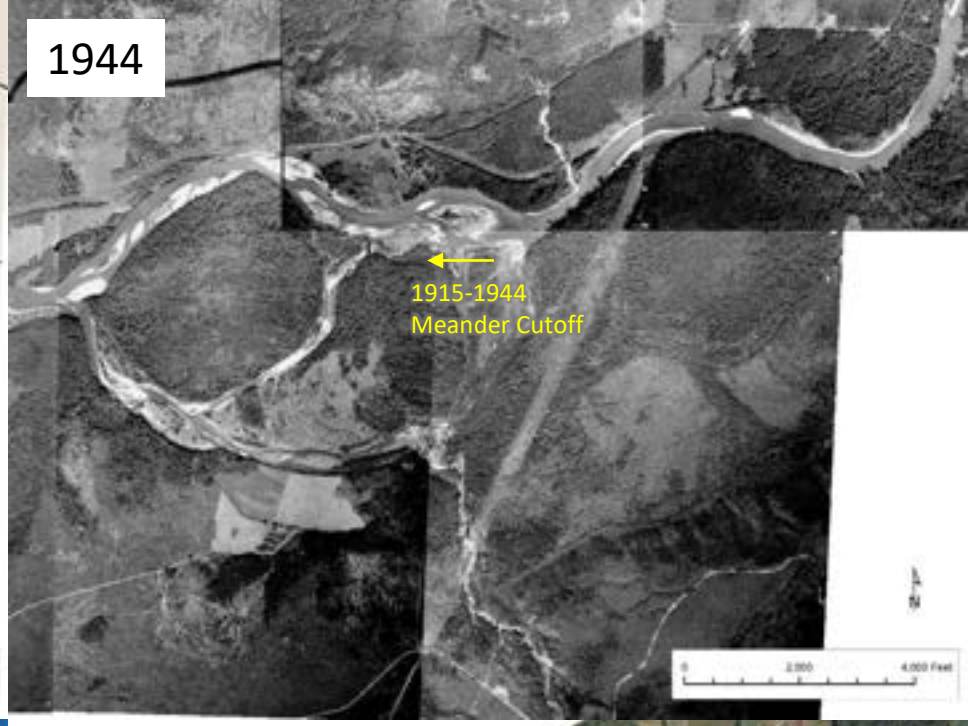
2022 Imagery

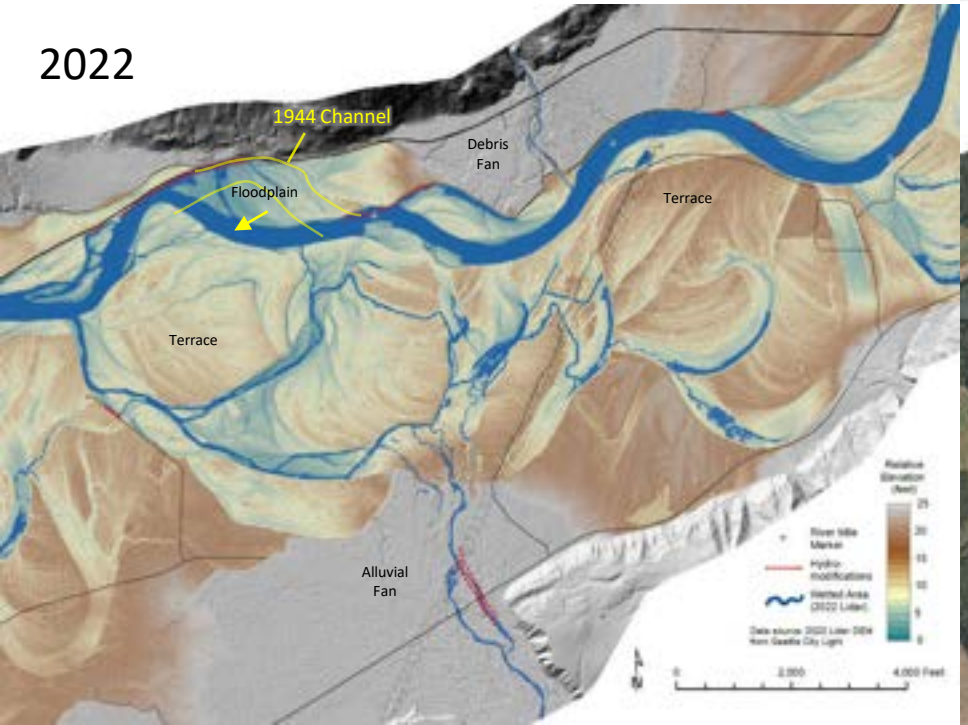


Floodplain Features and Connectivity



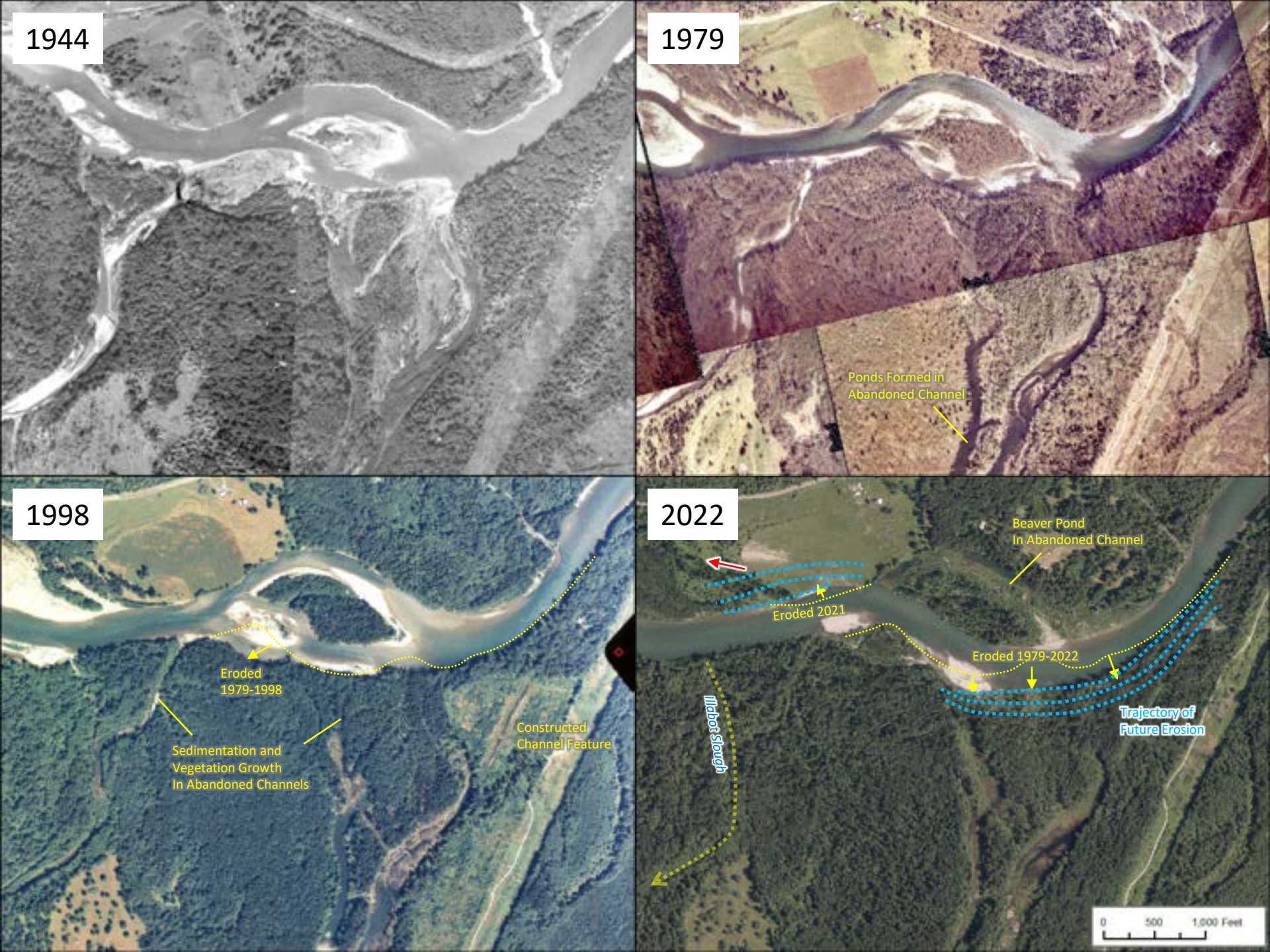

1915
RIVER
Rocky Cr.
Illabot Cr.
16
17
18
19
20
21
23
27
28
400
300
260


1944
1915-1944
Meander Cutoff

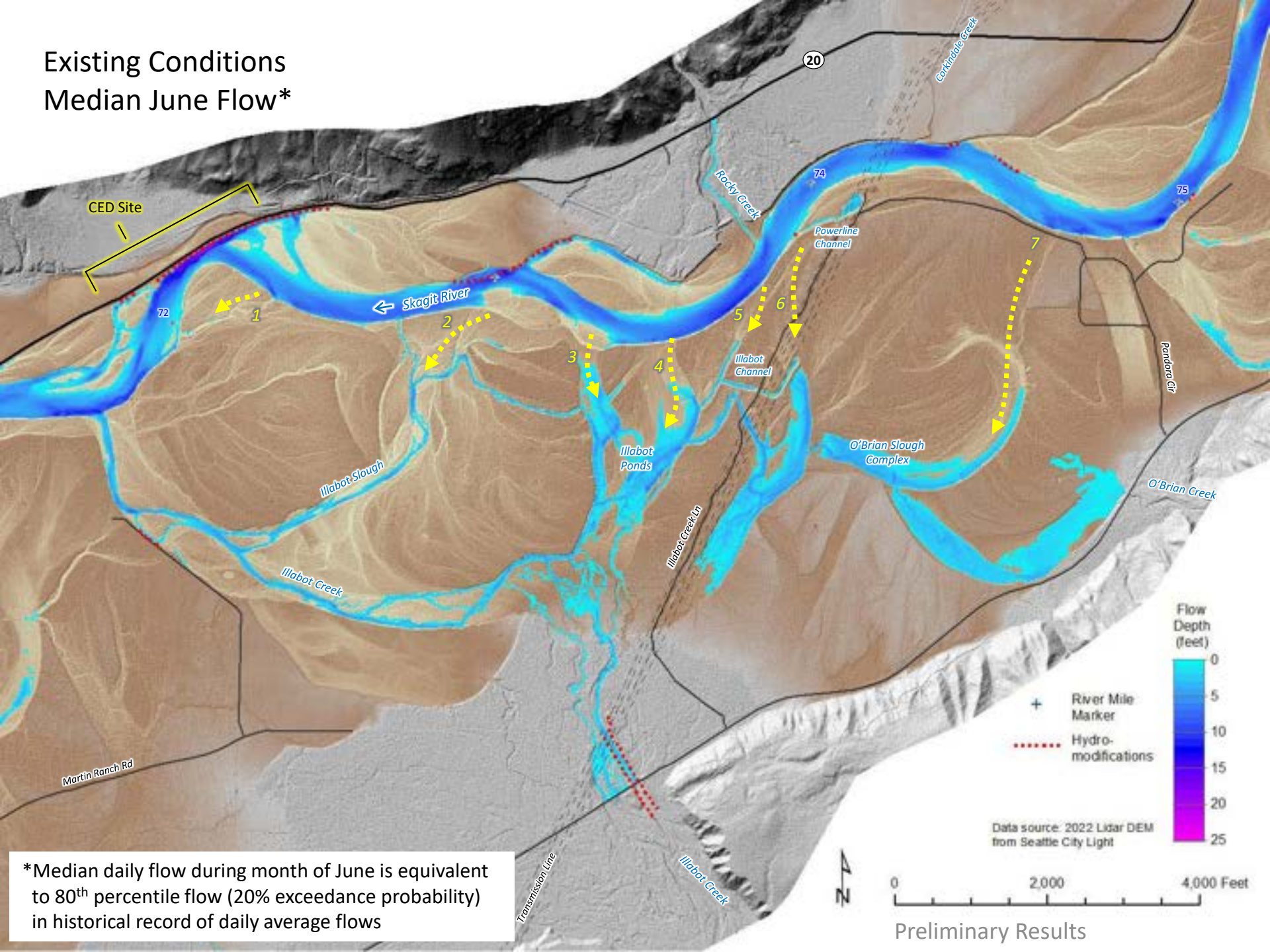

2022
1944 Channel
Floodplain
Debris
Fan
Terrace
Terrace
Alluvial
Fan


2022
1944 Channel
Eroding Banks


1944
1979
1944 Banklines
1998
1944 Banklines
2022
1944 Banklines
Meander Bend
Migration 1944-2022
1,400 ft (18 ft/yr)
Trajectory of
Future Erosion
Potential
Avulsion
Pathway
0
500
1,000 Feet


1944
1979
Ponds Formed in
Abandoned Channel
1998
Eroded
1979-1998
Sedimentation and
Vegetation Growth
In Abandoned Channels
Constructed
Channel Feature
2022
Beaver Pond
In Abandoned Channel
Eroded 2021
Eroded 1979-2022
Trajectory of
Future Erosion
Ilabot Slough
0
500
1,000 Feet

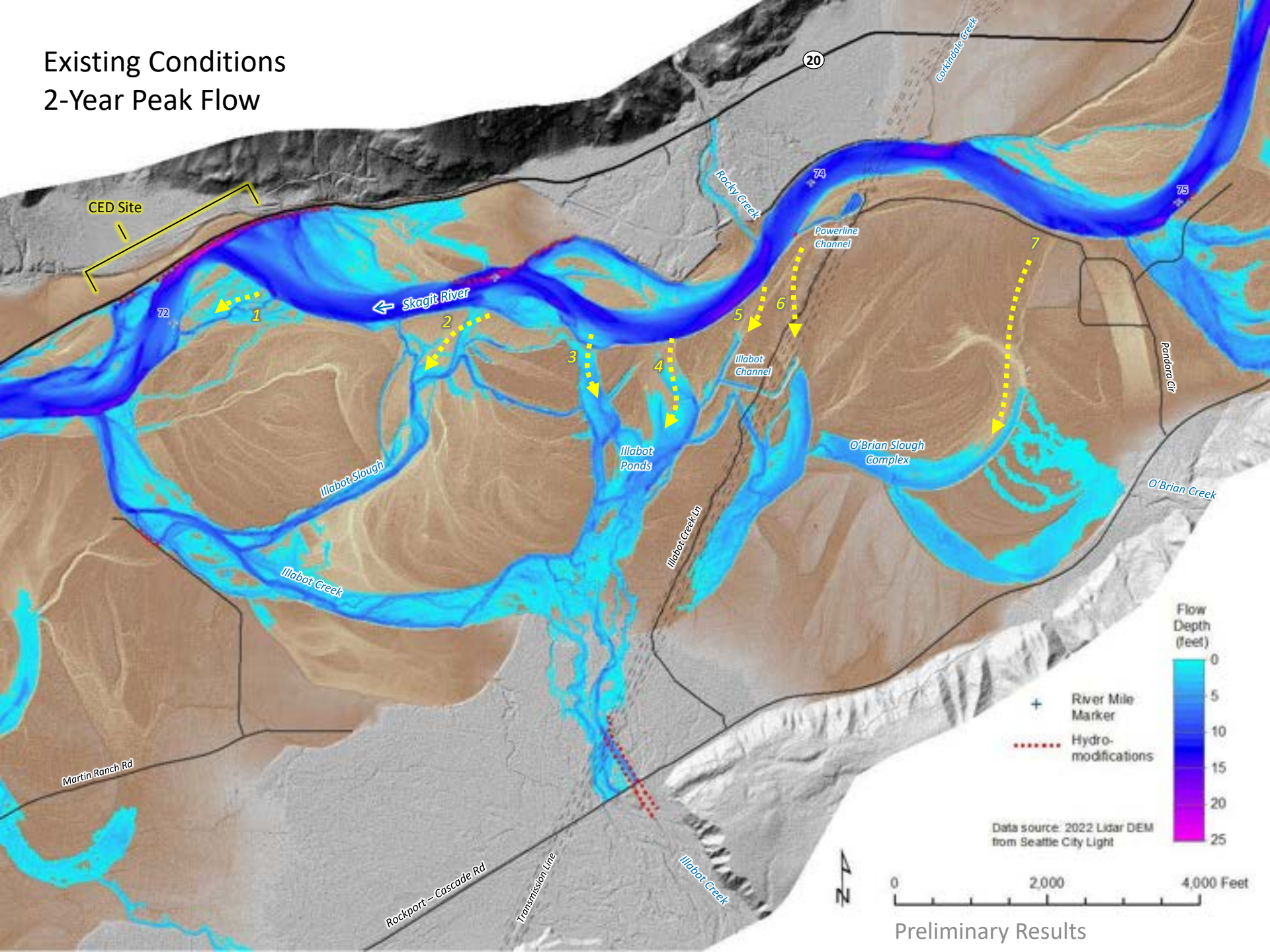
Existing Conditions
Median June Flow*



*Median daily flow during month of June is equivalent to 80th percentile flow (20% exceedance probability) in historical record of daily average flows

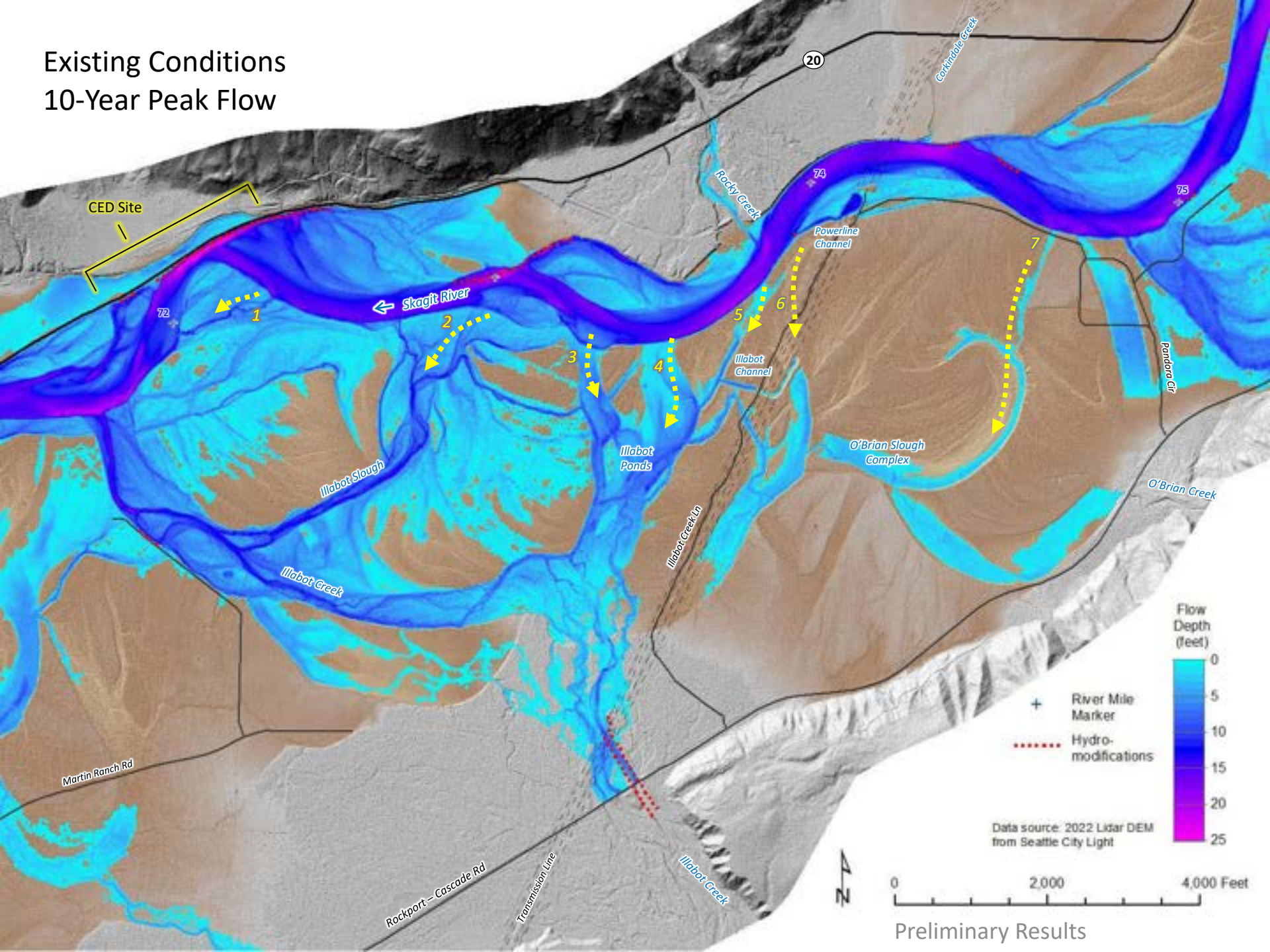
Preliminary Results

Existing Conditions
2-Year Peak Flow



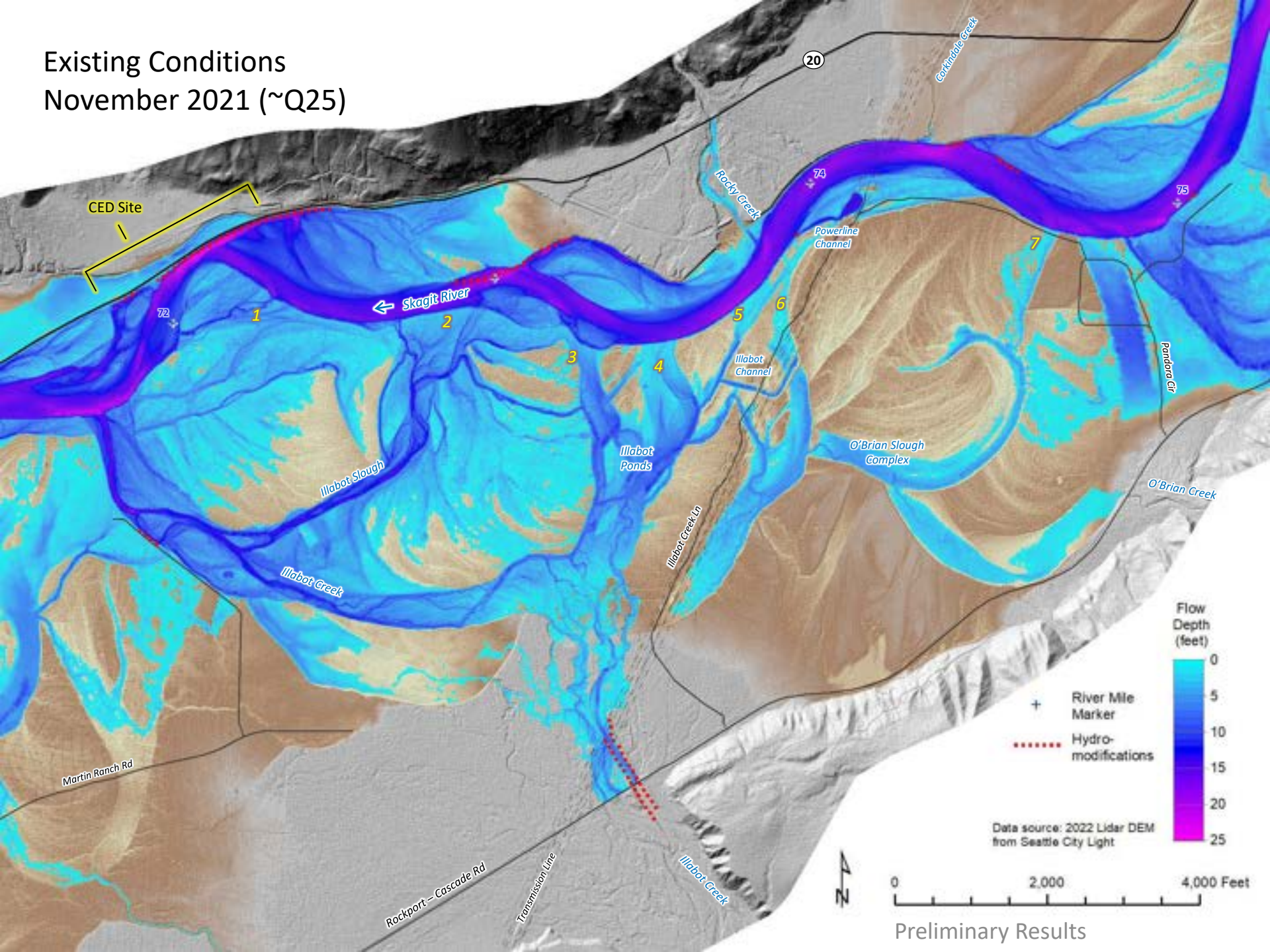
Preliminary Results

Existing Conditions
10-Year Peak Flow



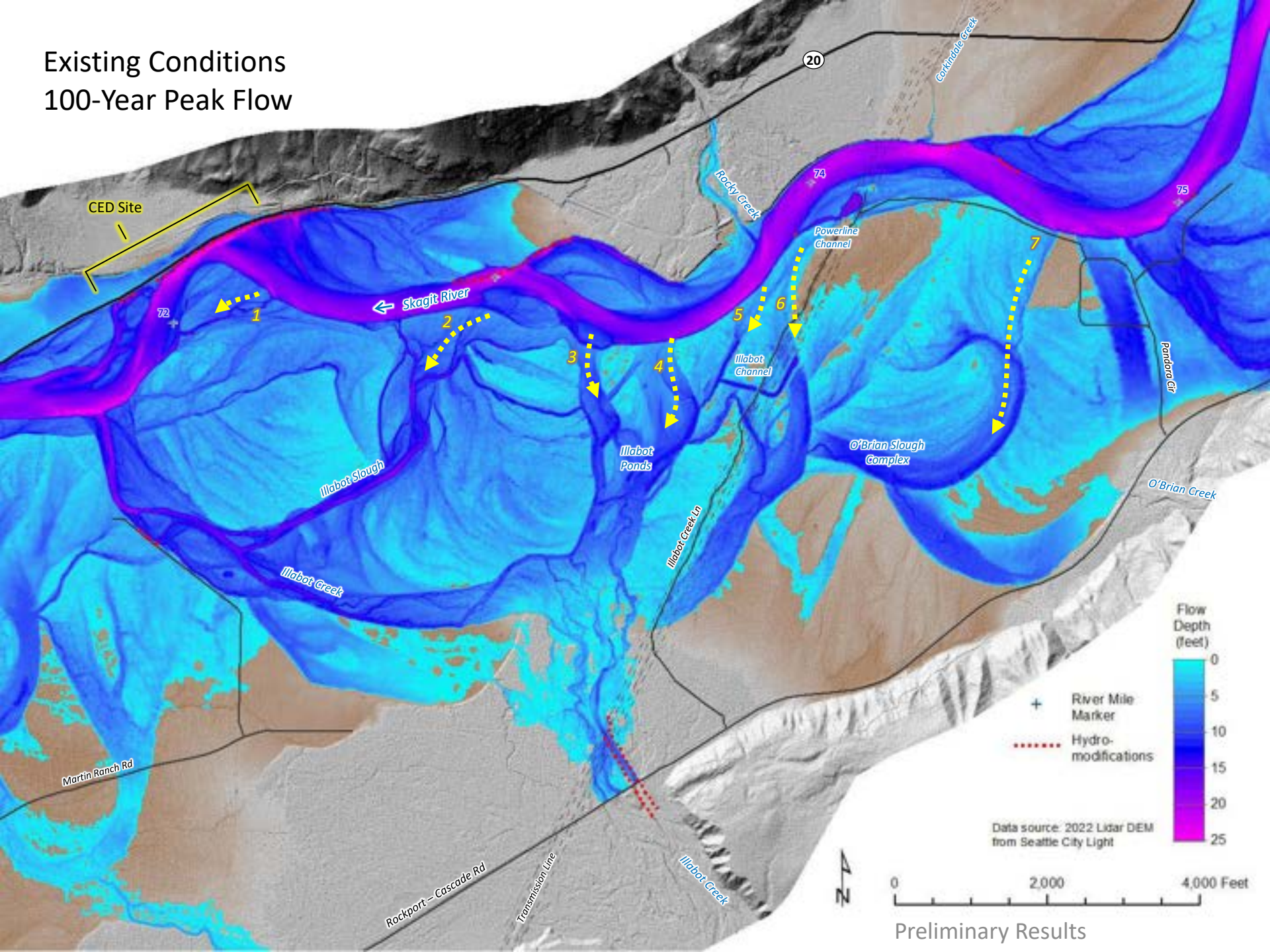
Preliminary Results

Existing Conditions
November 2021 (~Q25)



Preliminary Results

Existing Conditions
100-Year Peak Flow



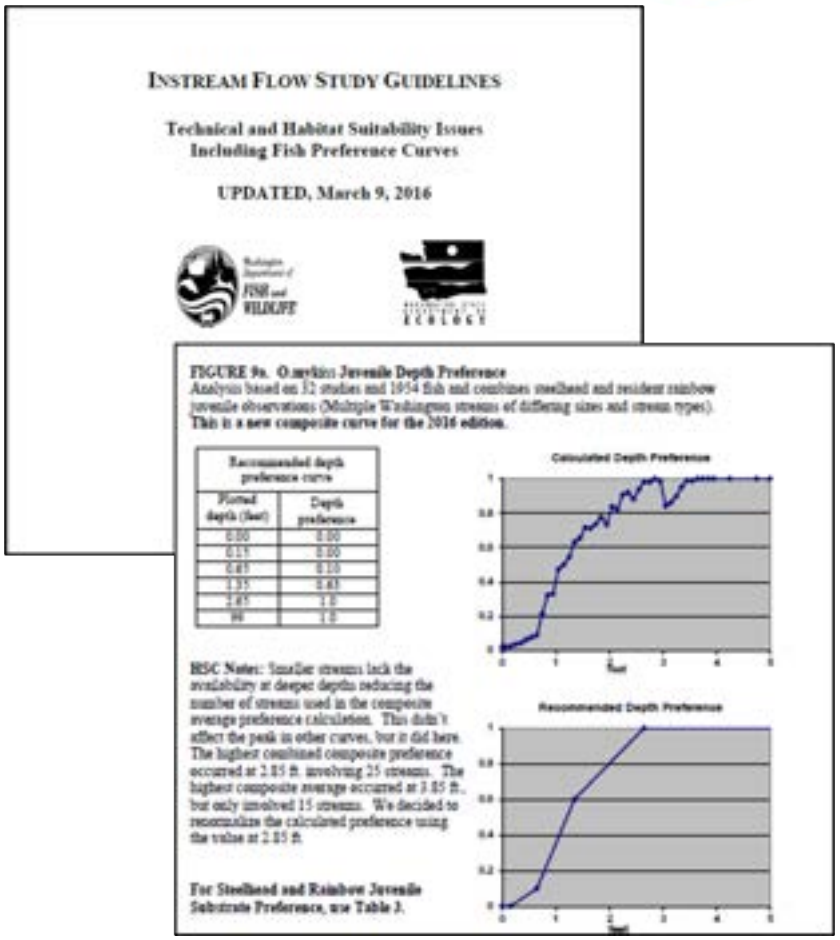
Preliminary Results

Fish Habitat

Habitat Suitability Modeling

Existing side channel and off channel habitat

- Spawning and rearing evaluated using WA DOE/WDFW suitability criteria
- Input variables included:
  - Depth
  - Velocity
  - Substrate Size
  - Instream cover
- Three flows used for model:
  - 50% exceedance (Typical Spring June Flow)
  - 90% exceedance (Typical Low September Flow)
  - 1-year flow



INSTREAM FLOW STUDY GUIDELINES

Technical and Habitat Suitability Issues
Including Fish Preference Curves

UPDATED, March 9, 2016

FISH and WILDLIFE

ECOLOGY

FIGURE 9a. O.mykiss Juvenile Depth Preference
Analysis based on 32 studies and 1954 fish and combines steelhead and resident rainbow juvenile observations (Multiple Washington streams of differing sizes and stream types).
This is a new composite curve for the 2016 edition.

Recommended depth preference curve	
Plotted depth (feet)	Depth preference
0.00	0.00
0.15	0.00
0.45	0.10
1.35	0.85
2.85	1.0
99	1.0

Calculated Depth Preference

Recommended Depth Preference

RSC Notes: Smaller streams lack the availability at deeper depths reducing the number of streams used in the composite average preference calculation. This didn't affect the peak in other curves, but it did here. The highest combined composite preference occurred at 2.85 ft. involving 25 streams. The highest composite average occurred at 3.85 ft., but only involved 15 streams. We decided to recommend the calculated preference using the value at 2.85 ft.

For Steelhead and Rainbow Juvenile Substrate Preference, use Table 3.

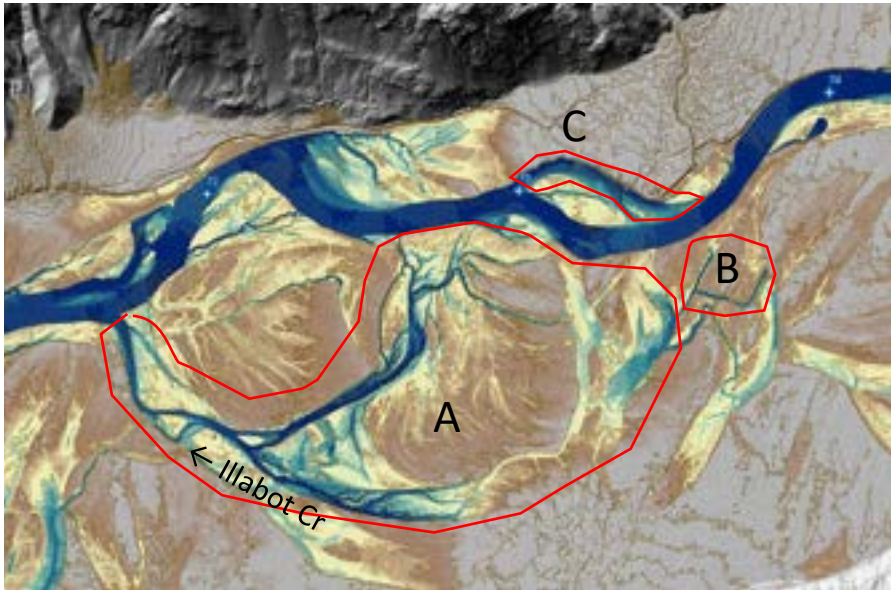
Fish Habitat

Existing side channel and off channel habitat

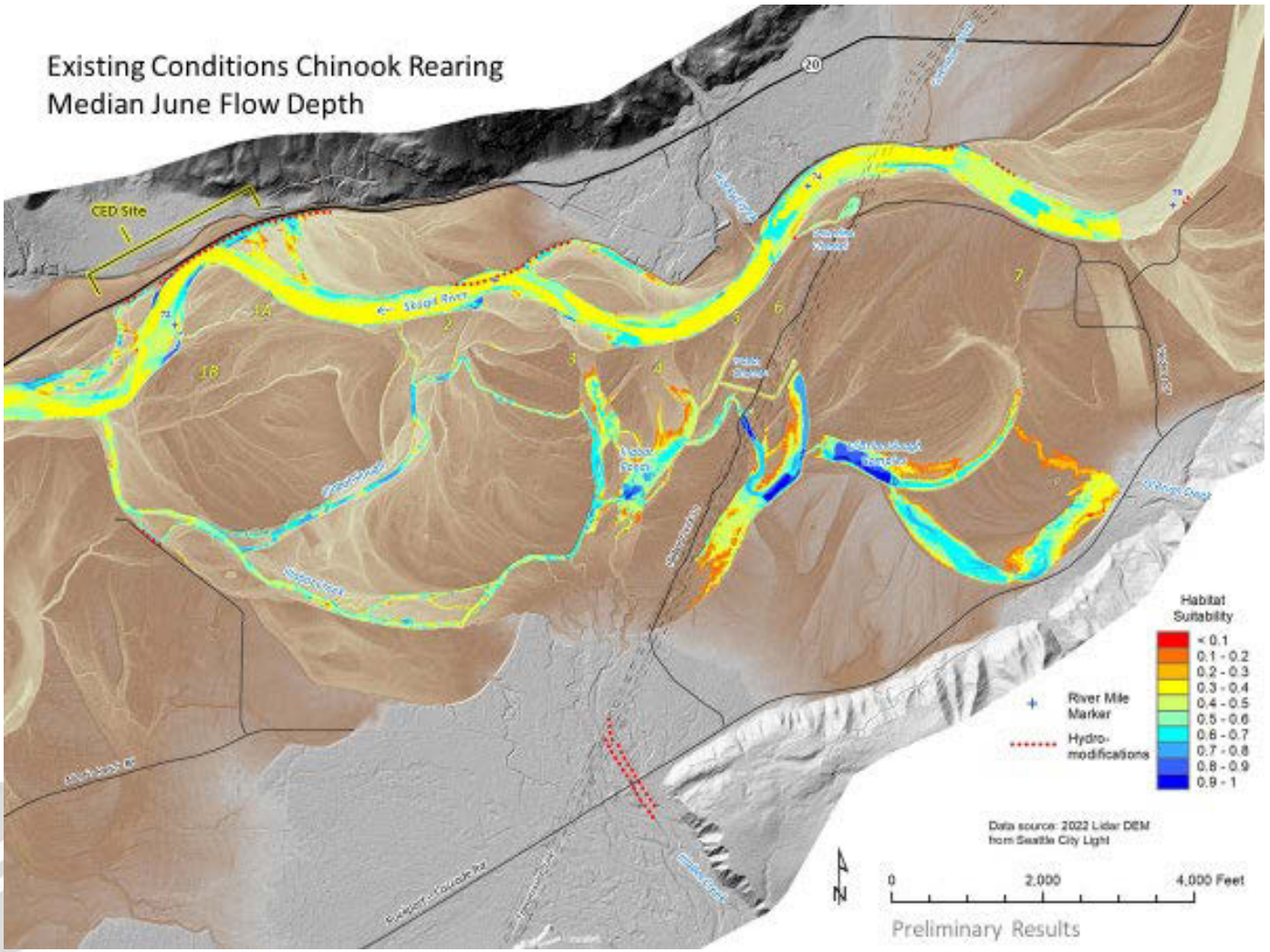
A. Illabot side channels
- Relict Skagit River channels
- Illabot Creek flows through western portion into Skagit River
- Complex side channels and off channel wetlands
- Provides high quality spawning and rearing habitat

B. Illabot constructed channel
- Blind channel originally constructed for spawning
- Some filling with fine sediment and currently functions as off channel rearing habitat

C. Slough at RM 73
- Relict mainstem channel
- Series of beaver dams - ponded off channel habitat
- Spawning gravels and backwater habitat in downstream portion



Existing Conditions Maps – Habitat Suitability



Existing Conditions – Field Survey Photos

O'Brian Reach
June 1, 2023

Development of Alternatives

Developing Alternatives

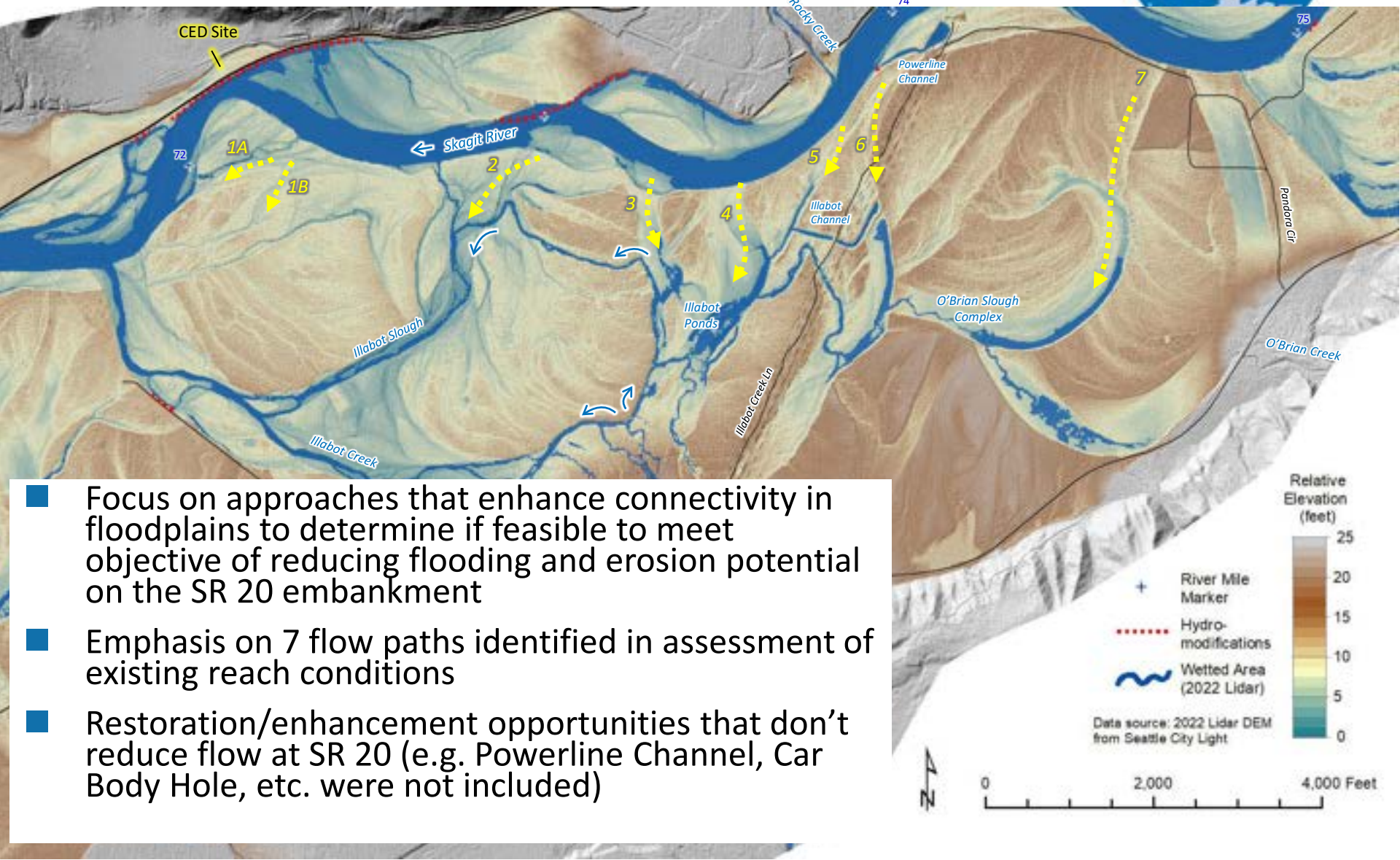
Study Goal: Determine if there is a feasible floodplain enhancement alternative that:

- Improves salmon habitat in the floodplain and river margins
- Reduces flood and erosion risk to CED Site at SR 20
- Does not increase flood or erosion risk to adjacent property or infrastructure

Scoping Design Alternatives:

- Two Action Alternatives
- One No Action Alternative
- Stakeholder and Key Partner Input
- Evaluate Using Specific Criteria

Developing Alternatives



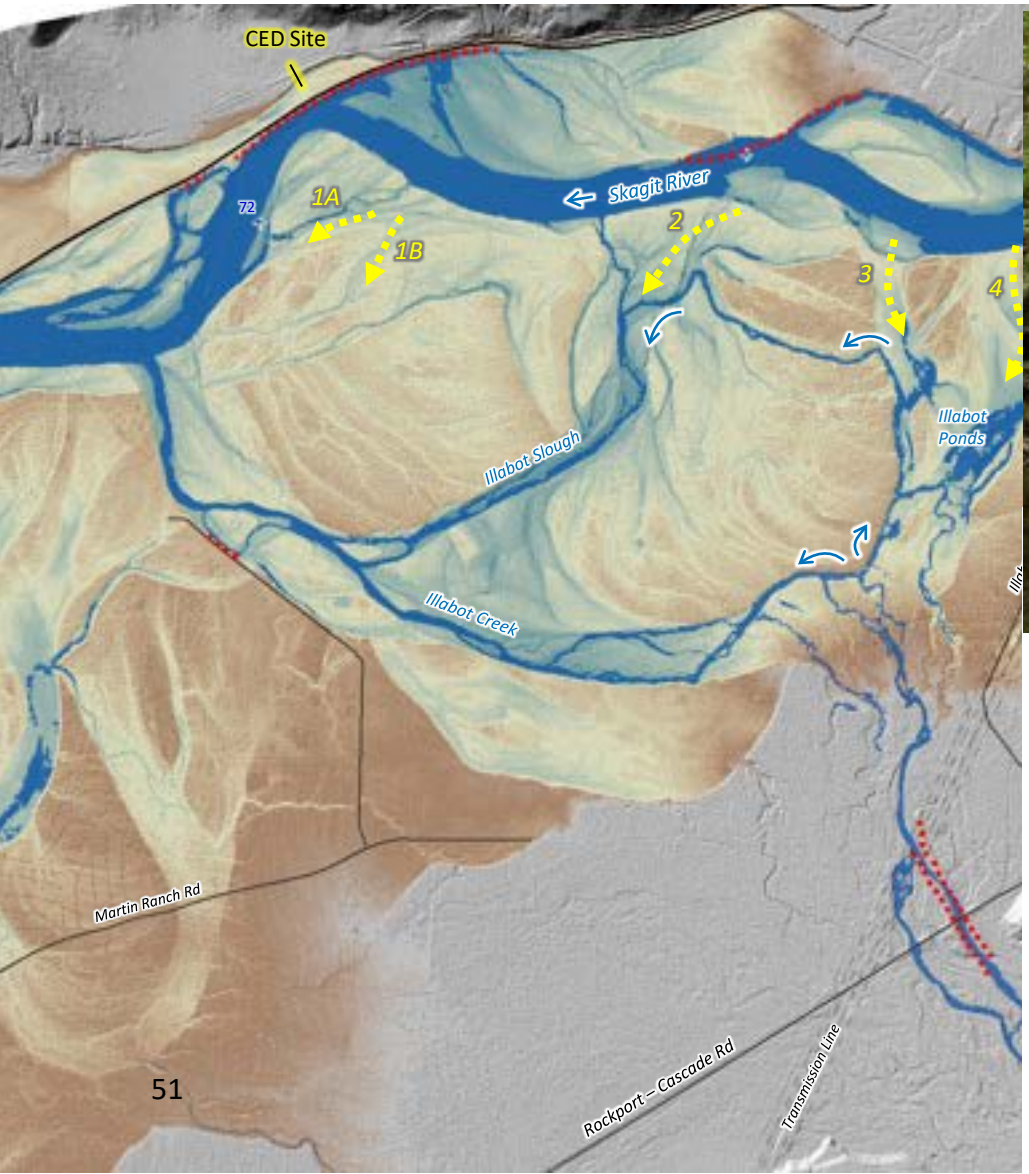
- Focus on approaches that enhance connectivity in floodplains to determine if feasible to meet objective of reducing flooding and erosion potential on the SR 20 embankment
- Emphasis on 7 flow paths identified in assessment of existing reach conditions
- Restoration/enhancement opportunities that don't reduce flow at SR 20 (e.g. Powerline Channel, Car Body Hole, etc. were not included)

Developing Alternatives

Flow Paths 1A/1B

- Opportunity to increase flow capacity in seasonal side channel (1A)
- Secondary channel (1B) currently connected at 2-year flood
- Channel migration trends directed toward 1A
- Potential avulsion pathway

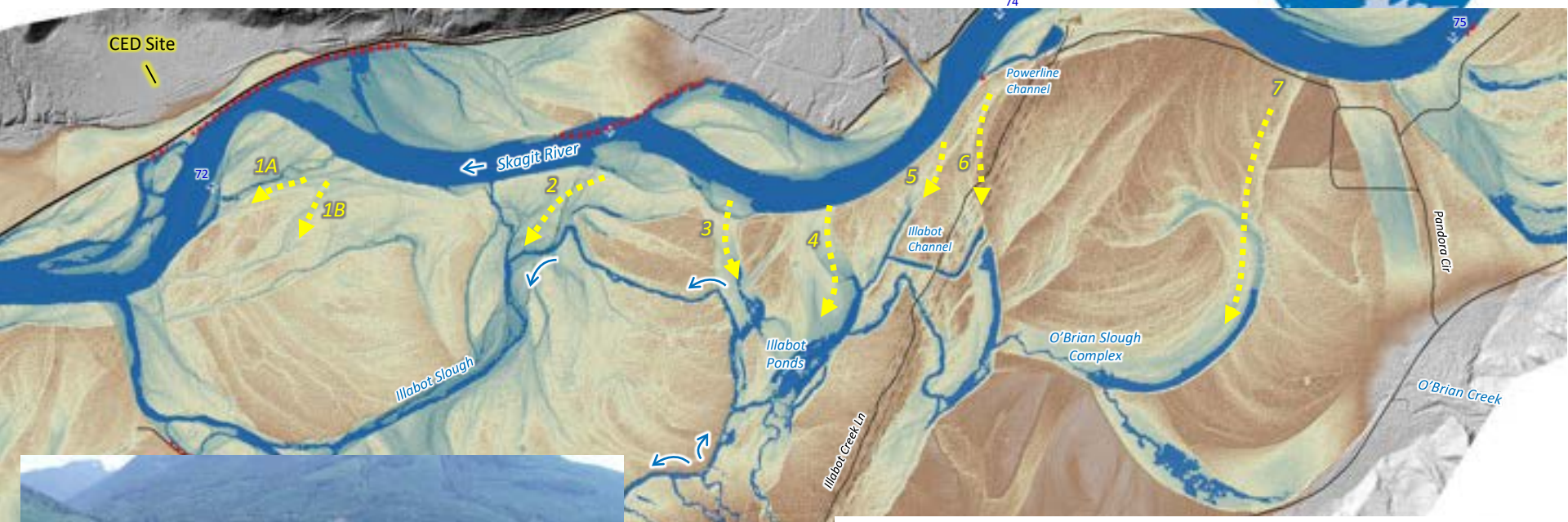
Developing Alternatives



Flow Path 2 (Illabot Slough)

- Connectivity with main channel and tributary inflow (via Ponds)
- Predominantly glide habitat with gravel substrate
- Monitoring data show consistent fish usage in existing condition

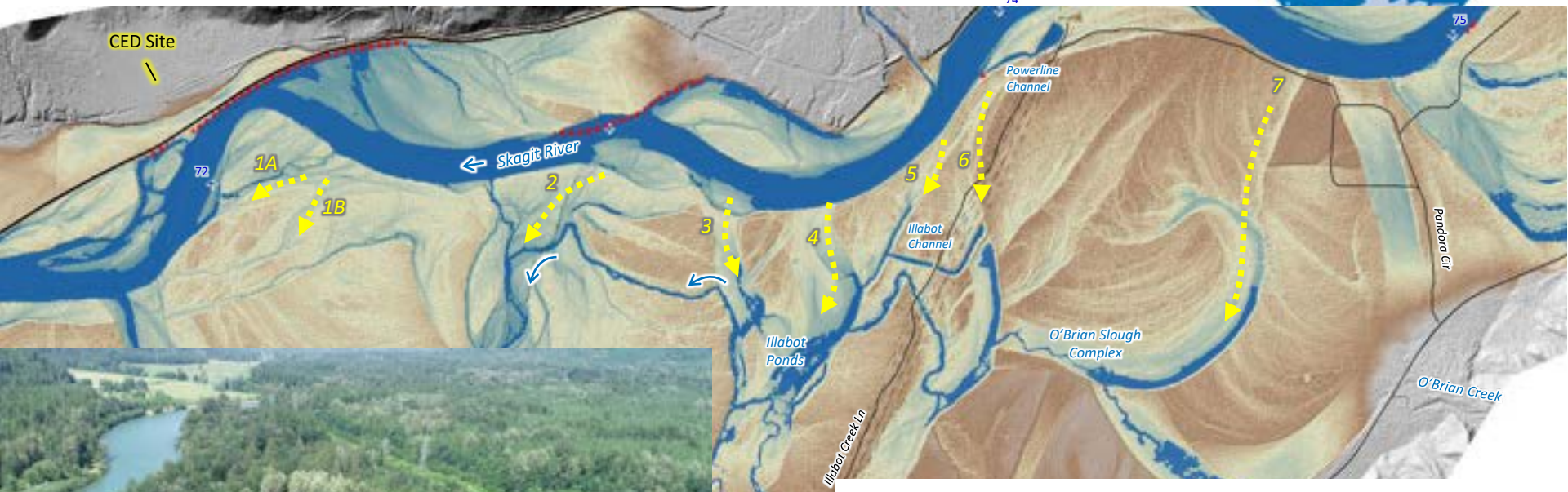
Developing Alternatives



Flow Path 3

- Abandoned channel from early 1900s avulsion
- Tributary inflow from Illabot Ck
- Connectivity with Illabot Ponds currently only at flood stage (>Q2)
- WSE in ponds typically higher than main channel water surface

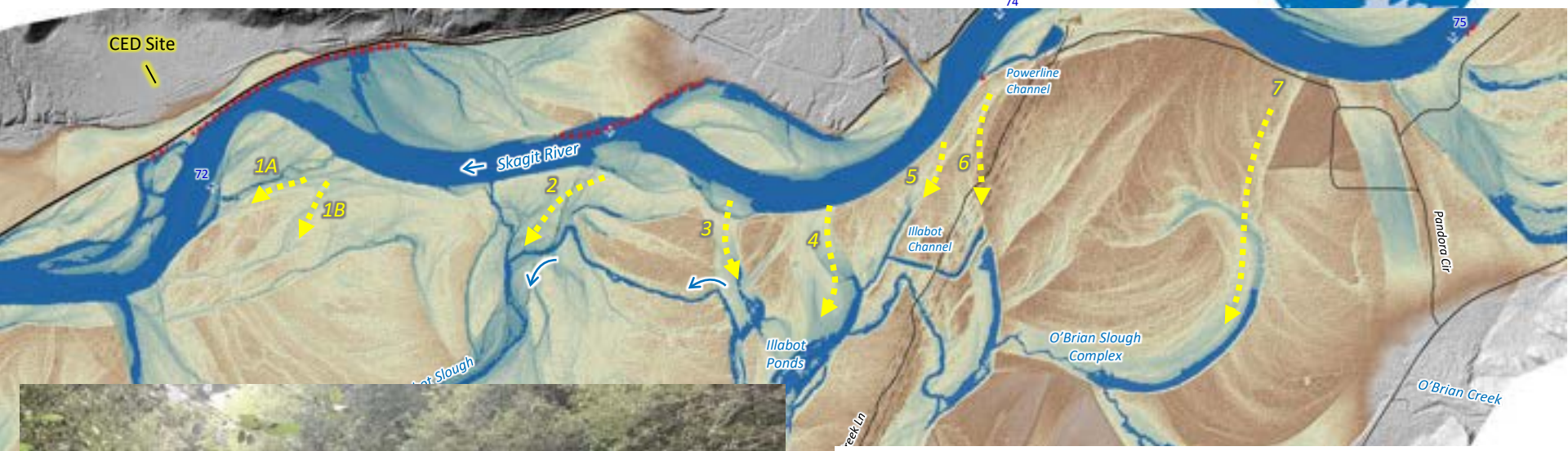
Developing Alternatives

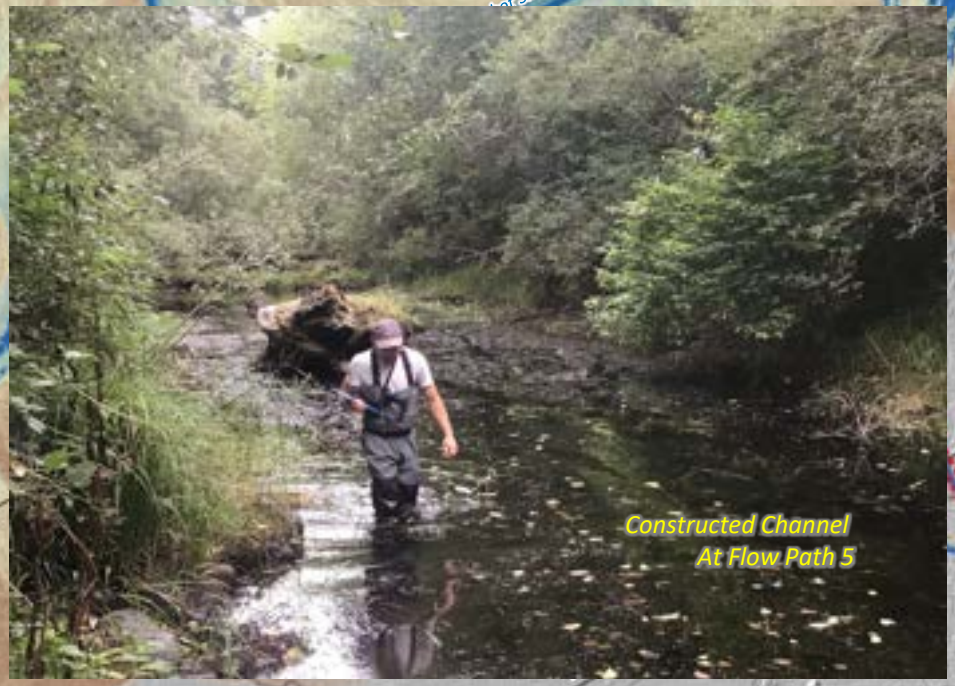


Flow Path 4

- Abandoned channel from early 1900s avulsion
- Tributary inflow from Illabot Ck and O'Brian Wetland Complex
- Connectivity with Illabot Ponds currently only at flood stage (>Q2)
- WSE in ponds typically higher than main channel water surface

Developing Alternatives





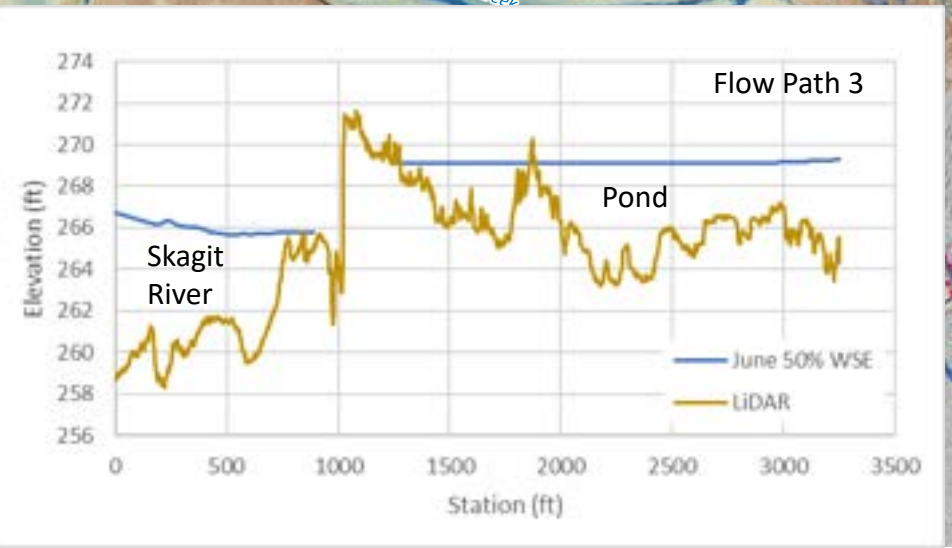
Flow Path 5

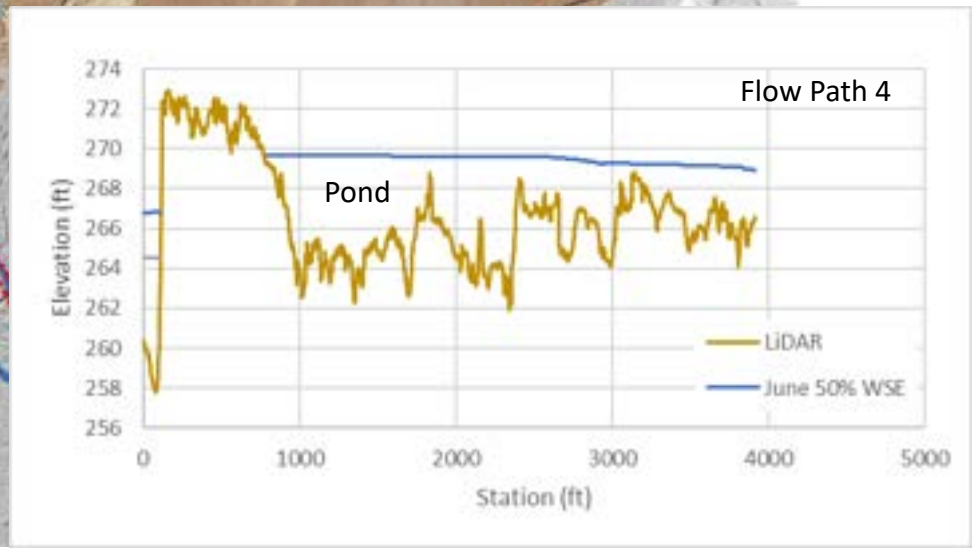
- Constructed groundwater-fed channel
- Water surface elevation perched higher than adjacent main channel

Flow Path 6

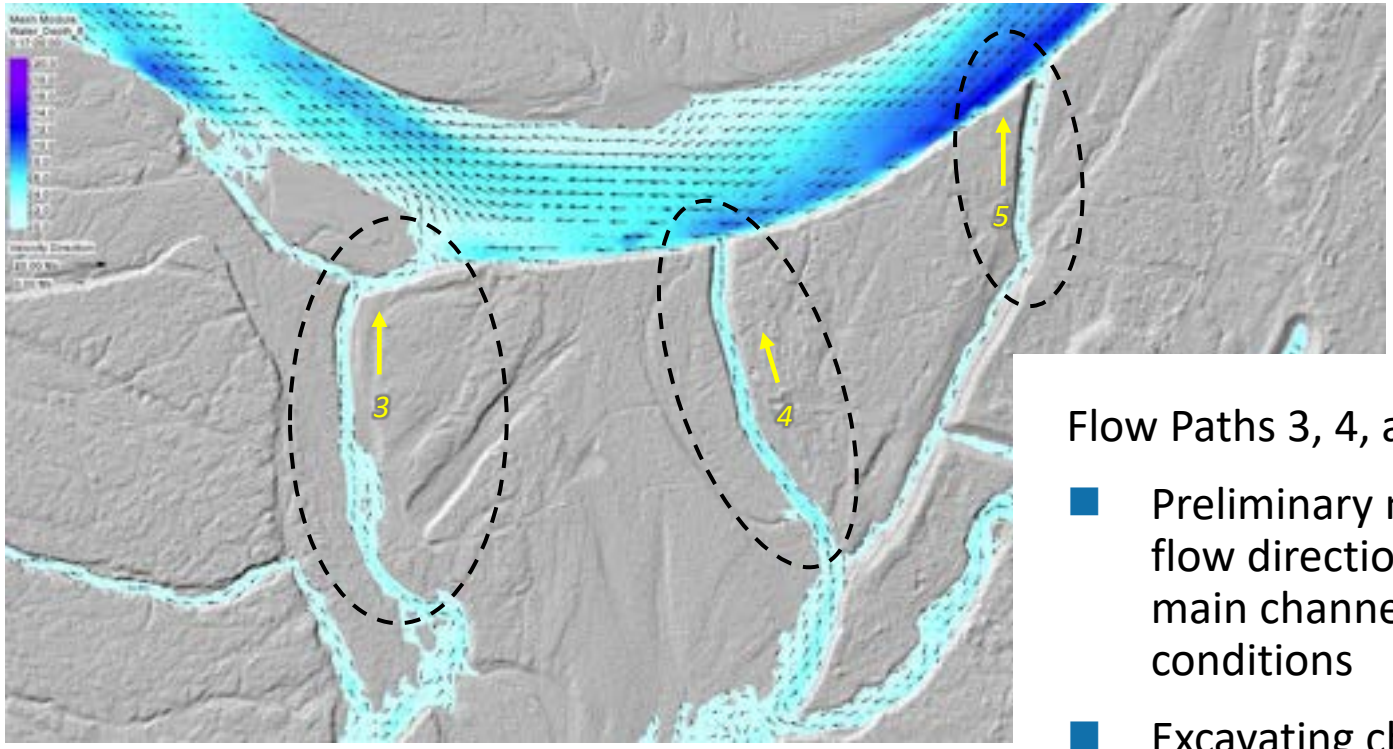
- High swale on terrace surface
- Only connected at large floods
- Crosses private property

Developing Alternatives





Developing Alternatives

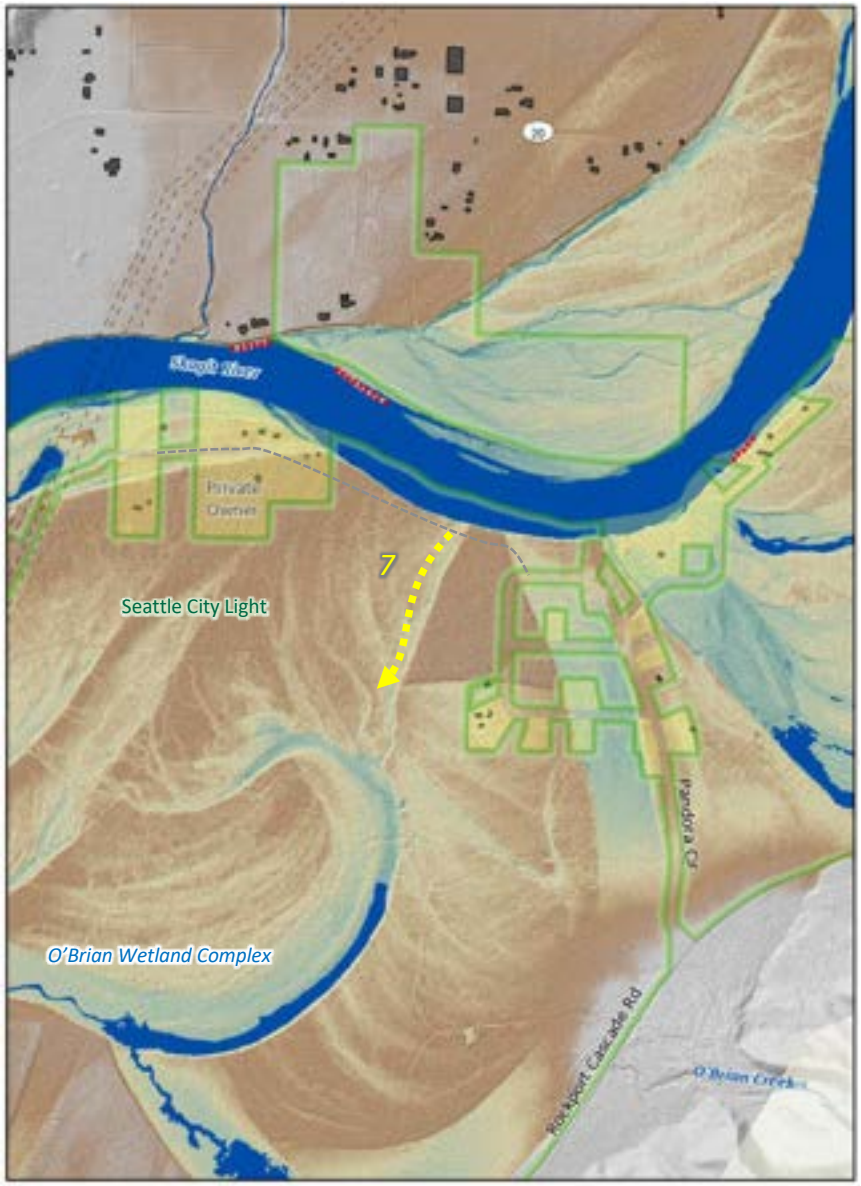


Spring flow (50% June)
Model Scenario of
Excavated floodplain channels
At Flow Paths 3, 4, and 5

Flow Paths 3, 4, and 5

- Preliminary model scenario shows flow direction from Illabot toward main channel under base flow conditions
- Excavating channels to main stem could reduce area of floodplain wetlands and flow toward Illabot Slough (#2)
- High risk of sedimentation to constructed channel features given low gradient

Developing Alternatives



Flow Path 7

- Swale on terrace surface
- High terrace; Connectivity at Q10
- City Light owned mitigation parcel
- Access road parallel to bank connects to private property (via easement)

Developing Alternatives

Flow Path	Notes
1	Existing flow paths with intermittent connectivity; Limited Access; Avulsion Risk
2	Existing flow path well connected with high quality habitat
3	Hydraulic gradient directed from floodplain to channel at base flow; Risk of draining floodplain wetland
4	Hydraulic gradient directed from floodplain to channel at base flow; Risk of draining floodplain wetland
5	Hydraulic gradient directed from floodplain to channel at base flow; Risk of draining Illabot Channel
6	Private Property
7	Existing flow path only connected at large floods Road in easement

Developing Alternatives

Flow Path	Notes
1	Existing flow paths with intermittent connectivity; Limited Access; Avulsion Risk
2	Existing flow path well connected with high quality habitat
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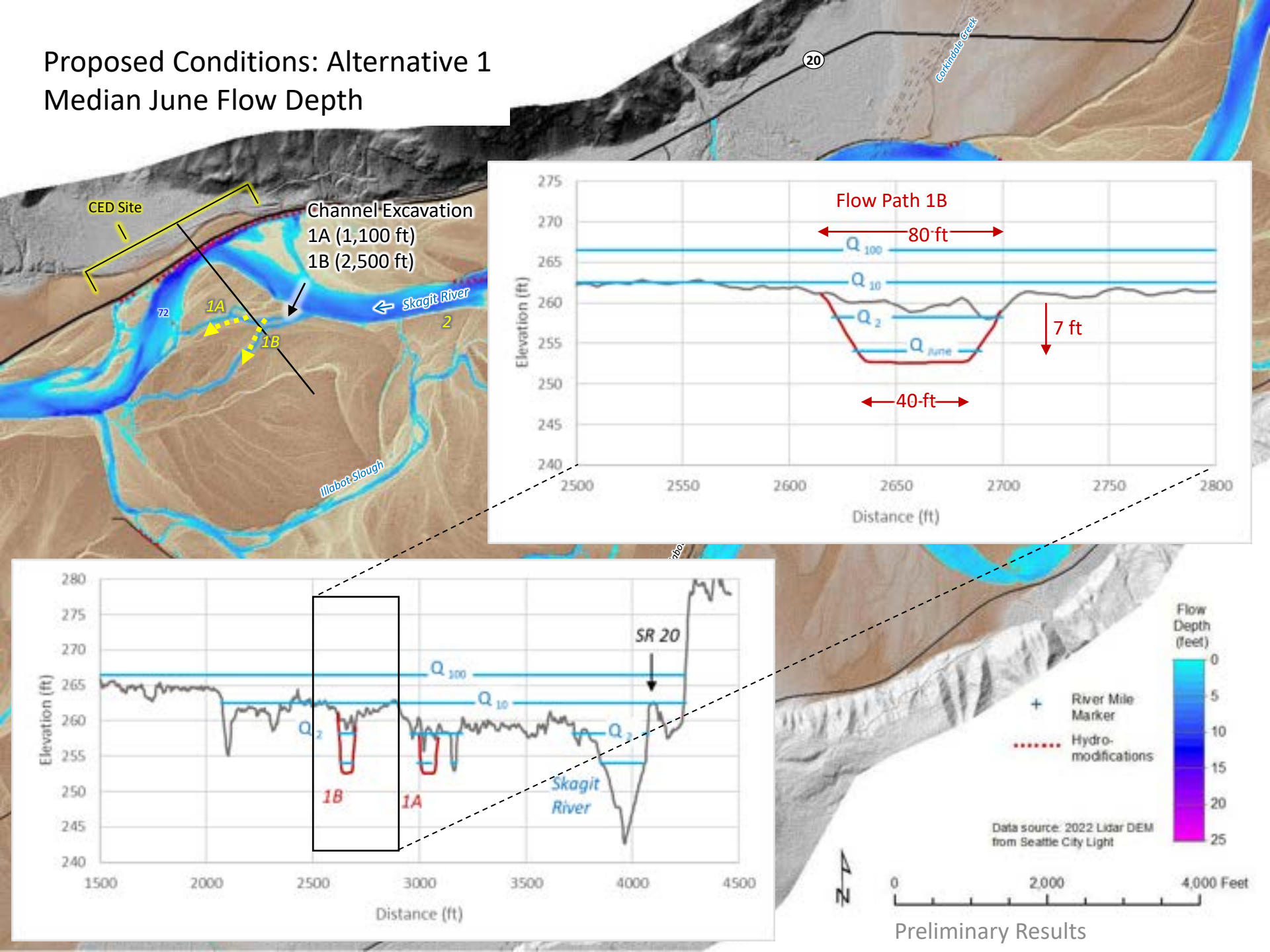
5	Hydraulic gradient directed from floodplain to channel at base flow; Risk of draining Illabot Channel
6	Private Property
7	Existing flow path only connected at large floods Road in easement

Potential Action Types

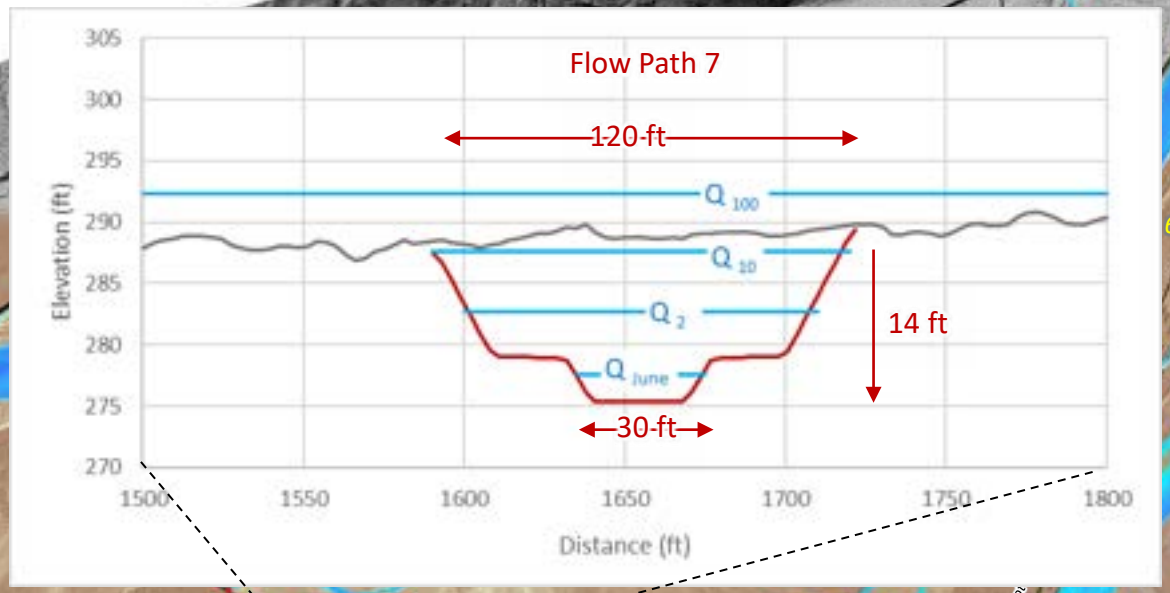
- Channel Excavation
- Engineered Log Jams
- LWD Placement
- Planting

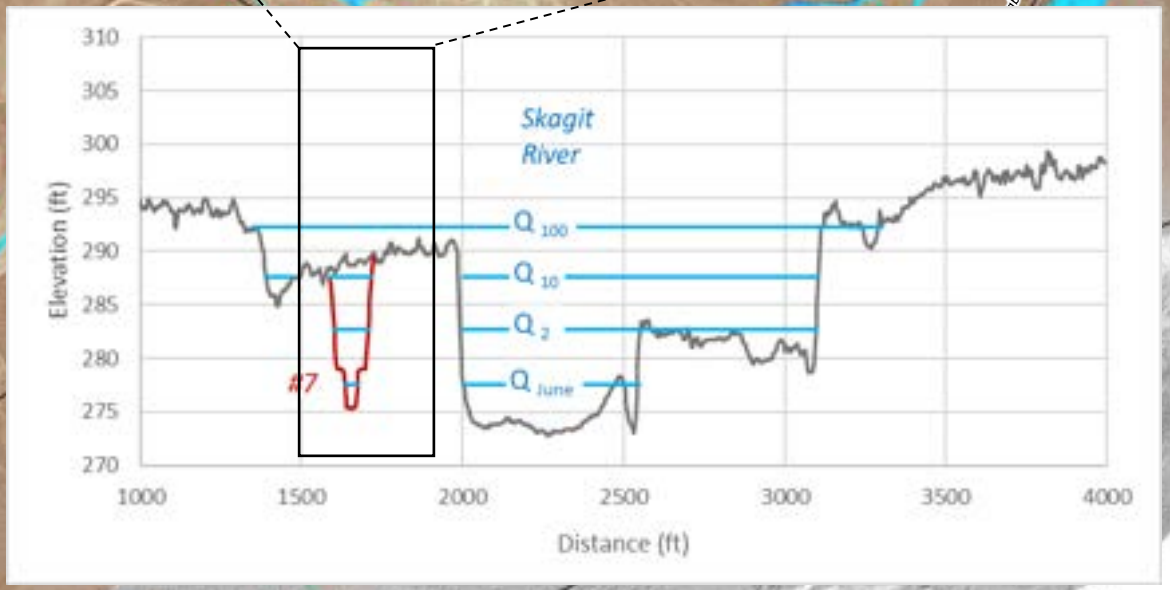
Proposed Conditions: Alternative 1
Median June Flow Depth

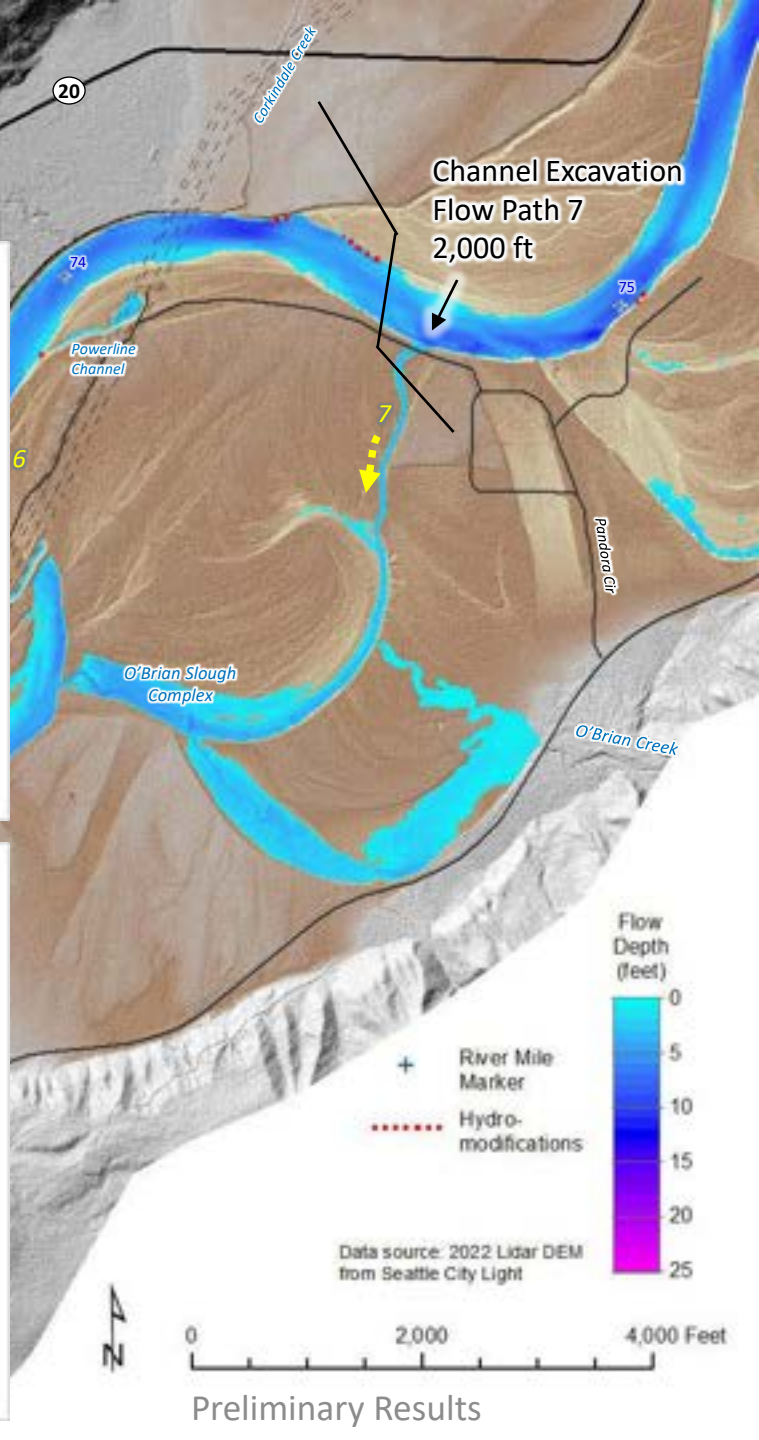


Preliminary Results

Proposed Conditions: Alternative 2
Median June Flow Depth







Preliminary Results

Design Alternatives

Alternative 1
Channel Excavation: 57,000 CY
3,600 feet of Channel Grading
3 Large ELJs (mainstem/flow splitting)
15-20 Small Wood Placement (side channels)
Planning level estimate: $1.5 - $2M

Alternative 2
Channel Excavation: 119,000 CY
5,600 feet of Channel Grading
5 Large ELJs (mainstem/flow splitting)
25-30 Small Wood Placement (side channels)
Planning level estimate: $3 - $3.5M

Questions?

Question:

Do these alternatives make sense?

DISCUSSION OF ALTERNATIVES EVALUATION

Evaluation Criteria

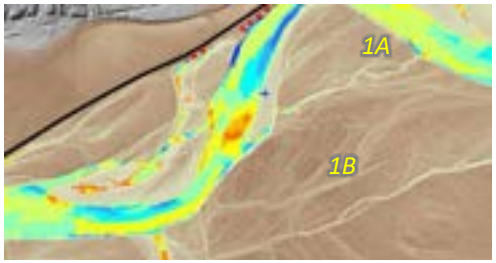
Goal	Project Objective
Fish Habitat	Benefit multiple salmonid species
	Increase low-flow rearing habitat
	Increase high-flow refuge habitat
	Does not reduce the diversity and quality of other valuable habitat types
	Minimize Risks of stranding fish in floodplains during receding flows
Infrastructure and Property Risk	Reduce flood risk to SR 20
	Reduce erosion risk to SR 20
	Does not increase flood or erosion risk to adjacent property or infrastructure
	Does not reduce potential effectiveness of Barnaby Project at meeting its objectives
Other	Cost and ease of construction
	Sustainable
	Timing of habitat benefits
	Opportunity to collaborate with other nearby habitat and infrastructure efforts
	Wildlife effects
	Recreation
	Aesthetically appropriate
	Perceived risk of flooding at adjacent properties

Fish Habitat Criteria

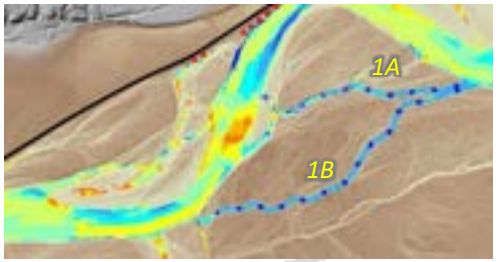
Goal	Study Objective
Fish Habitat	Benefit multiple salmonid species
	Increase low-flow rearing habitat
	Increase high-flow refuge habitat
	Does not reduce the diversity and quality of other valuable habitat types
	Minimize Risks of stranding fish in floodplains during receding flows

Fish Habitat Modeling Results

Weighted Usable Area
Benefits multiple salmonid species
(e.g Chinook low flow Alternative 1)

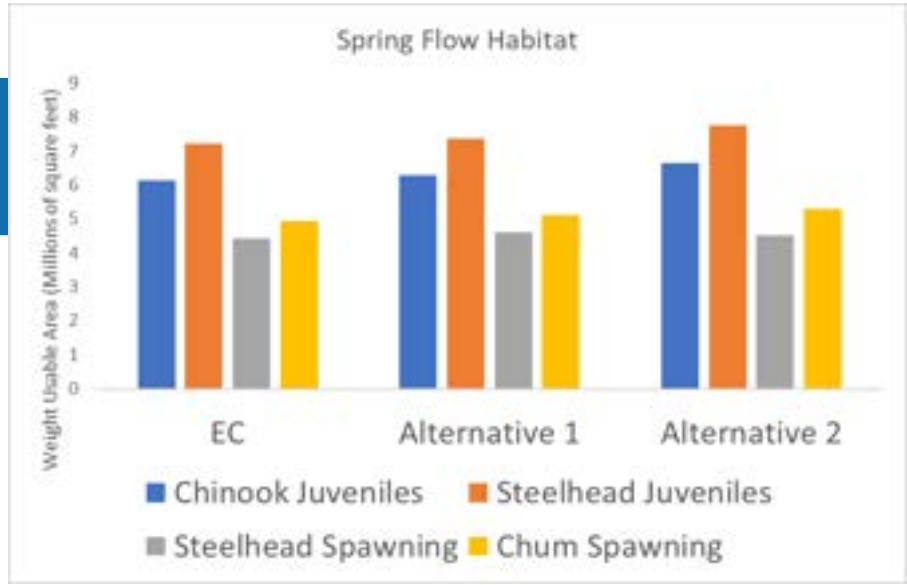


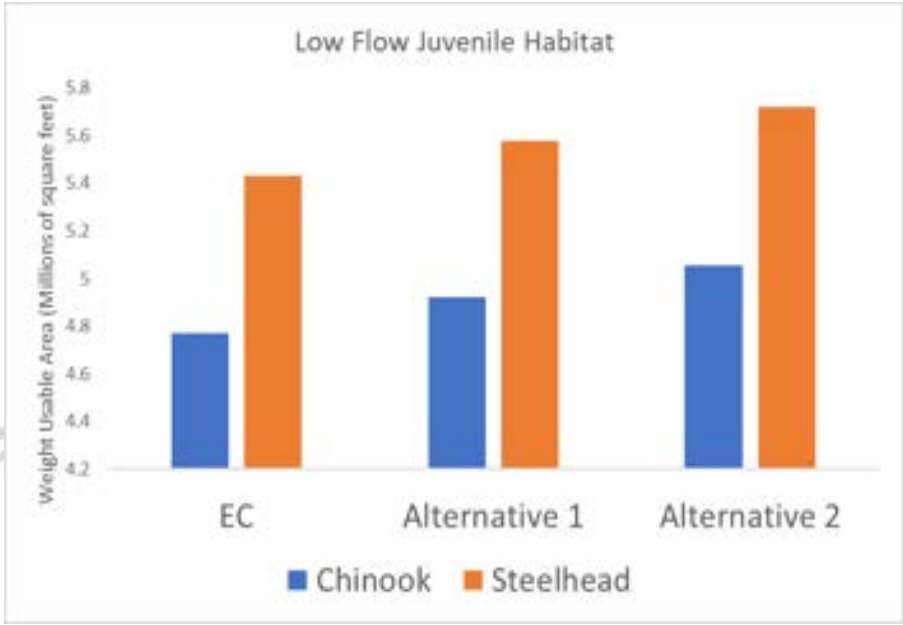
Existing Condition
(no habitat)



Proposed Condition
(new habitat)

Change in Habitat
Quality



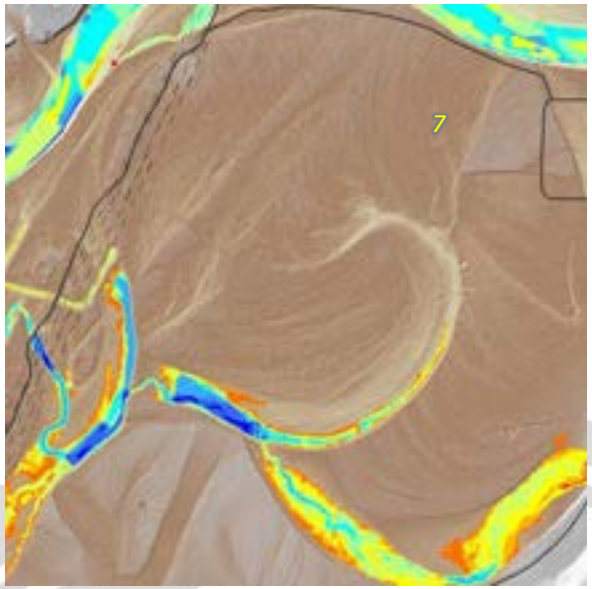


Fish Habitat Modeling Results

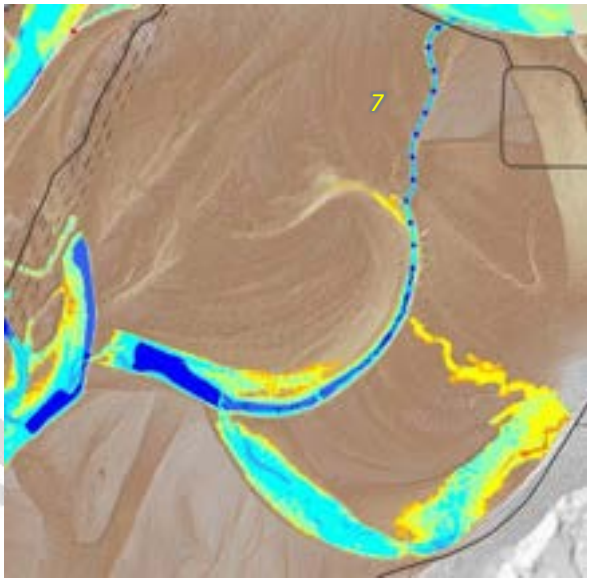
Weighted Usable Area

Benefits multiple salmonid species
(e.g. Chinook Low Flow – Flow Path 7)

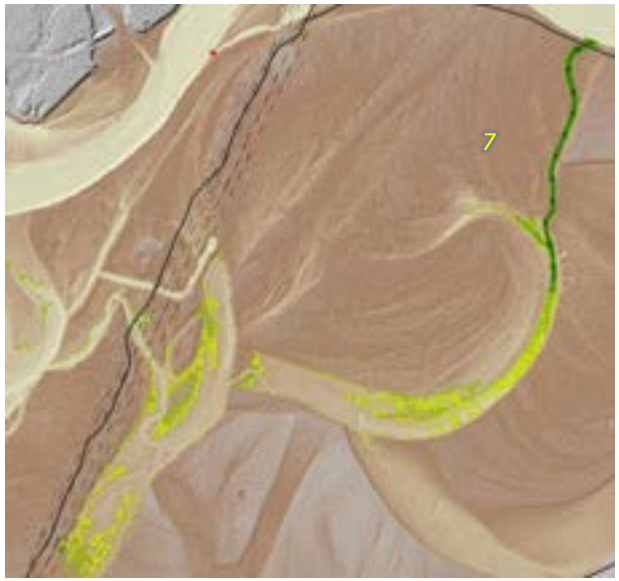
Existing Condition
(no habitat)



Proposed Condition
(new habitat)



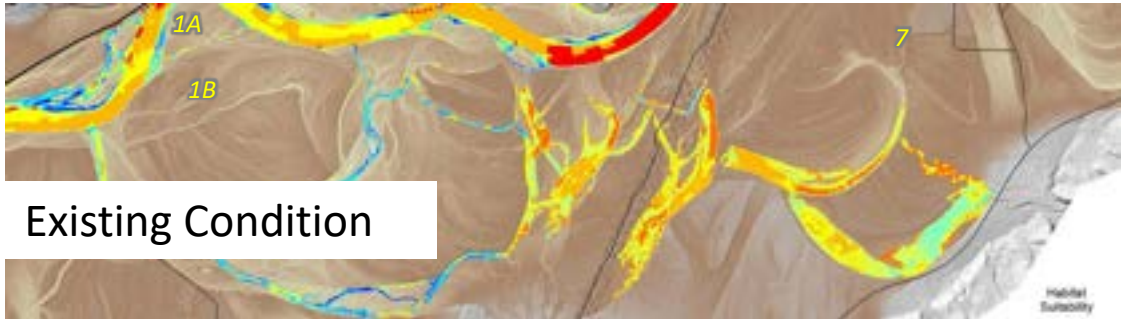
Change in Habitat
Quality



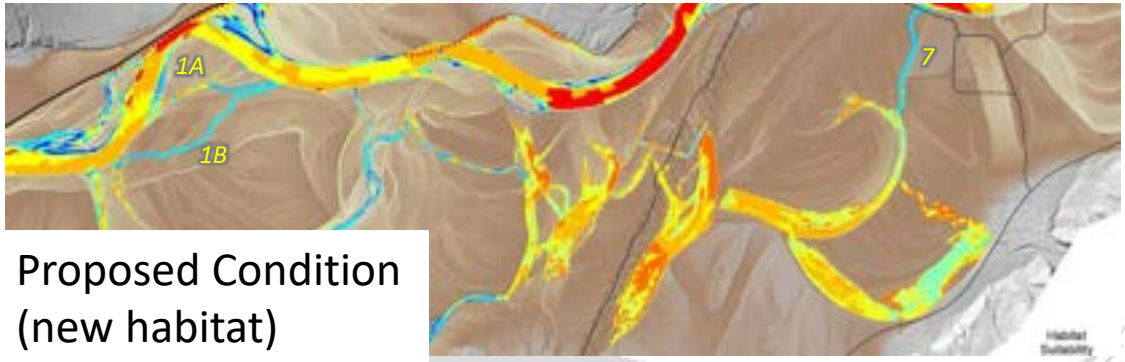
Fish Habitat Modeling Results

Weighted Usable Area

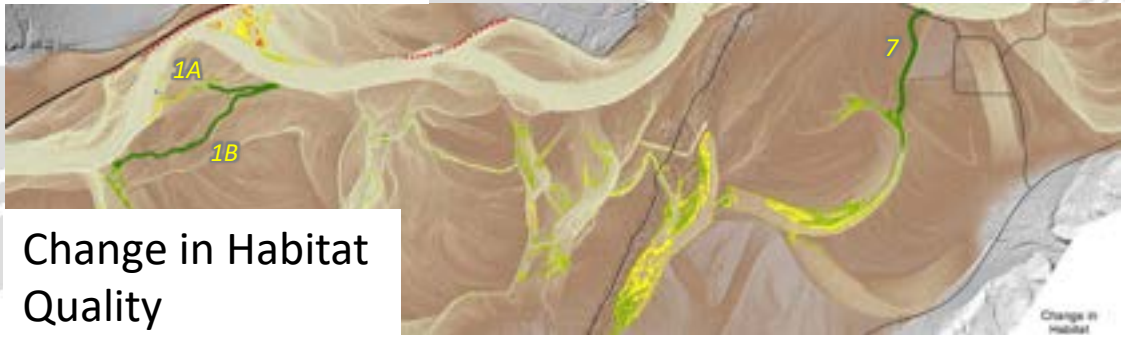
Benefits multiple salmonid species – e.g. Chum Spawning



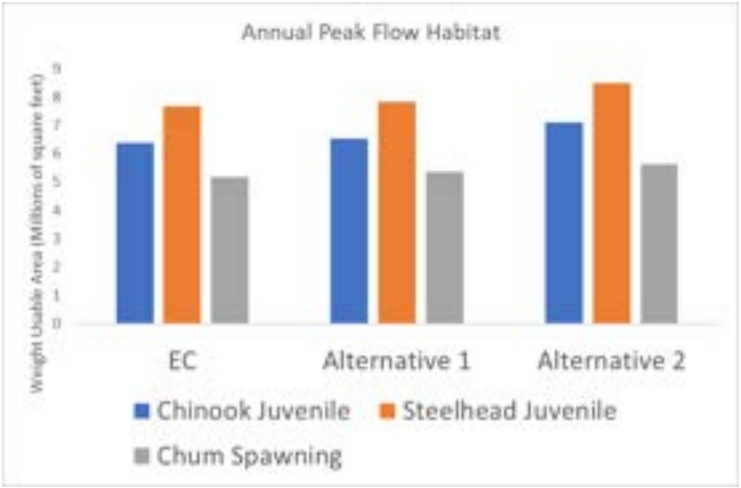
Existing Condition



Proposed Condition (new habitat)



Change in Habitat Quality

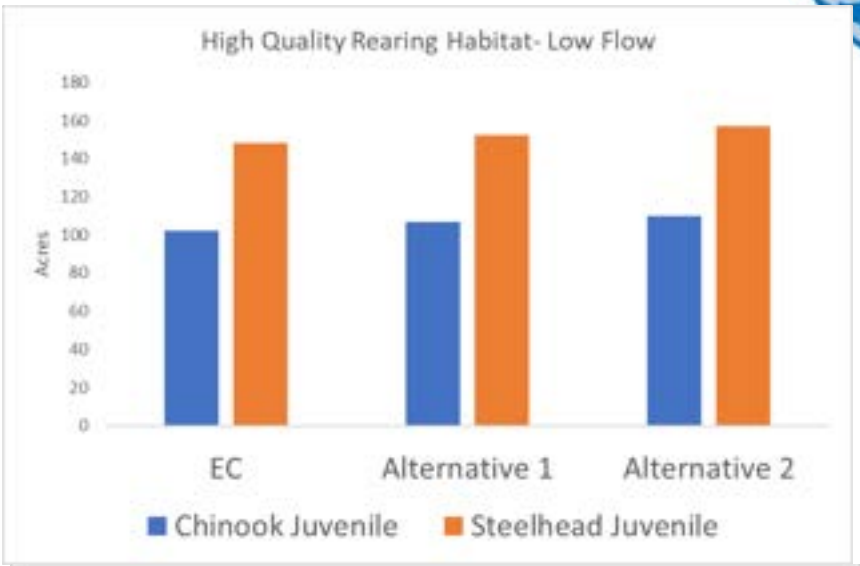


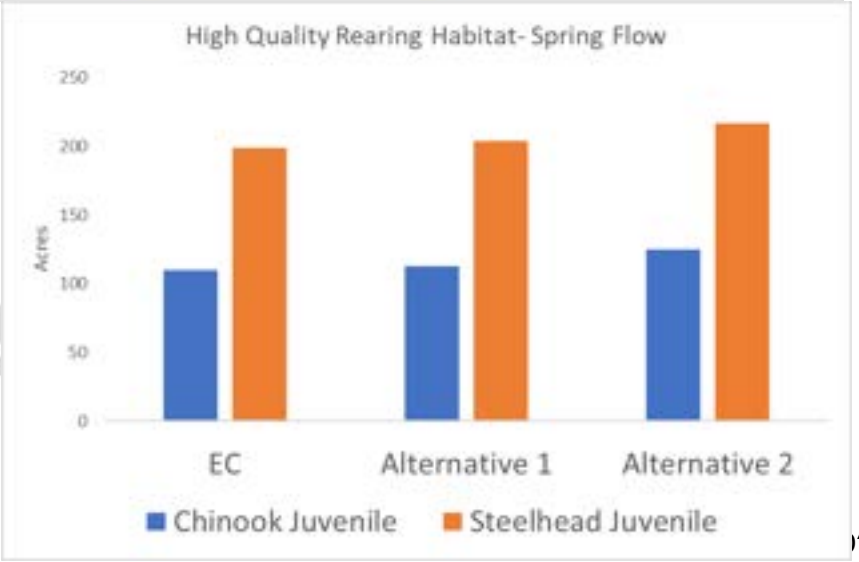
Habitat Modeling Results

Area of High-Quality Habitat

- Increase in Area of low-flow rearing habitat
- Increase in area of spring flow refuge habitat

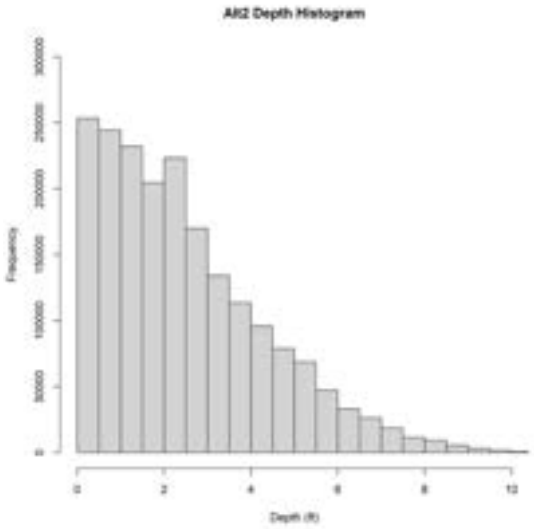
Alternative 1 increase
Chinook Juvenile: +5-6 acres
Steelhead Juvenile: +4-5 acres
Alternative 2 increase
Chinook Juvenile: +8-15 acres
Steelhead Juvenile:+9-18 acres



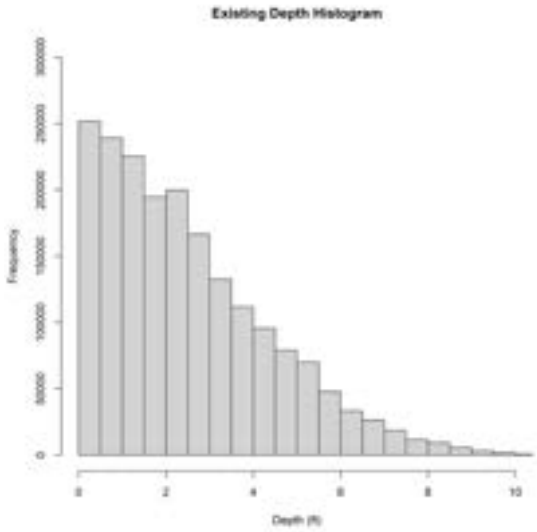


Habitat Modeling Results

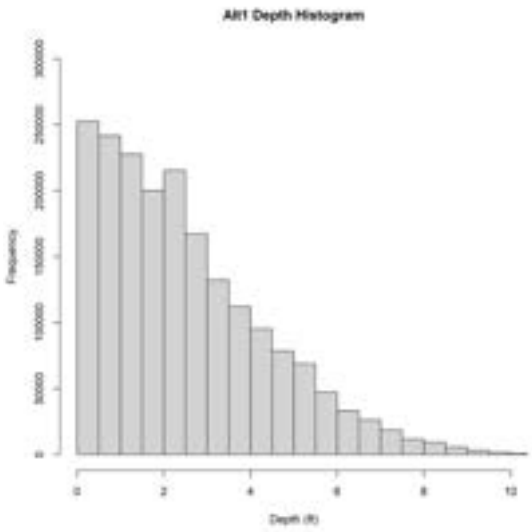
Existing Conditions



Alternative 1

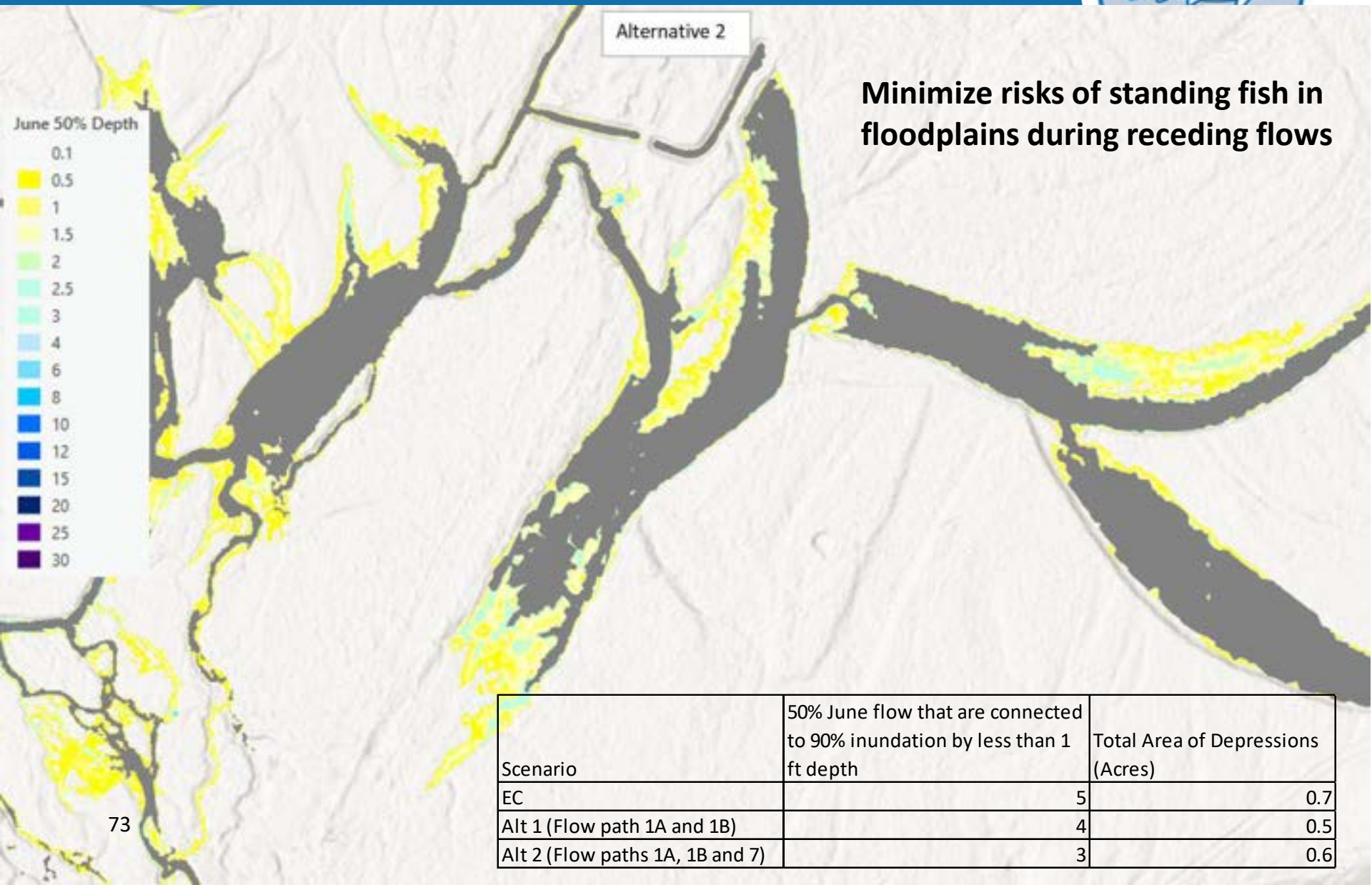


Alternative 2



Does not reduce the diversity and quality of other habitat types

Habitat Modeling Results



Minimize risks of standing fish in floodplains during receding flows

Scenario	50% June flow that are connected to 90% inundation by less than 1 ft depth	Total Area of Depressions (Acres)
EC	5	0.7
Alt 1 (Flow path 1A and 1B)	4	0.5
Alt 2 (Flow paths 1A, 1B and 7)	3	0.6

Summary of Fish Habitat Findings

Criteria	Alternative 1 (Flow Paths 1A and 1B)	Alternative 2 (Alt 1 + Flow Path 7)
Benefits multiple salmonid species	Increase	Increase above Alt. 1
Area of high-quality habitat	Chinook Juvenile: +5-6 acres Steelhead Juvenile: +4-5 acres	Chinook Juvenile: +8-15 acres Steelhead Juvenile:+9-18 acres
Does not reduce the diversity and quality of other habitat types	No change	No Change
Minimize risks of stranding fish in floodplains	Small Reduction	Small Reduction

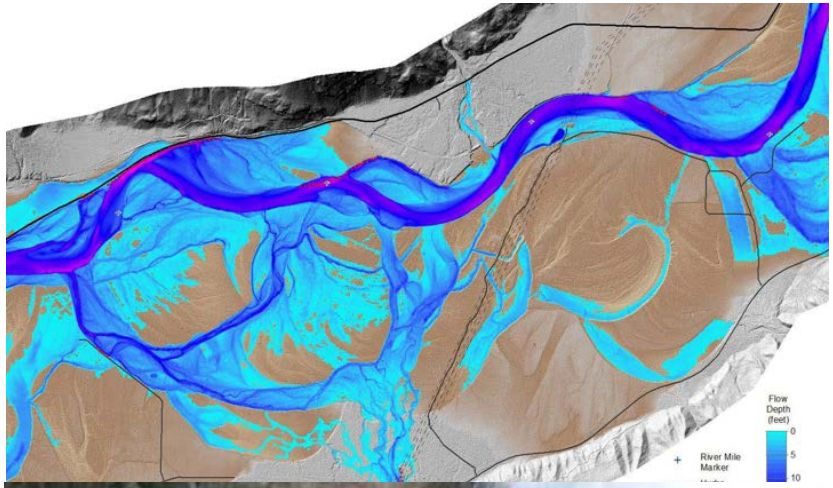
Question (especially fish biologists!):

Do you think this amount of habitat gain is substantial enough to warrant the cost of investment?

Infrastructure and Property Risk Criteria

Goal	Study Objective
Infrastructure and Property Risk	Reduce flood risk to SR 20
	Reduce erosion risk to SR 20
	Does not increase flood or erosion risk to adjacent property or infrastructure
	Does not reduce potential effectiveness of Barnaby Project at meeting its objectives

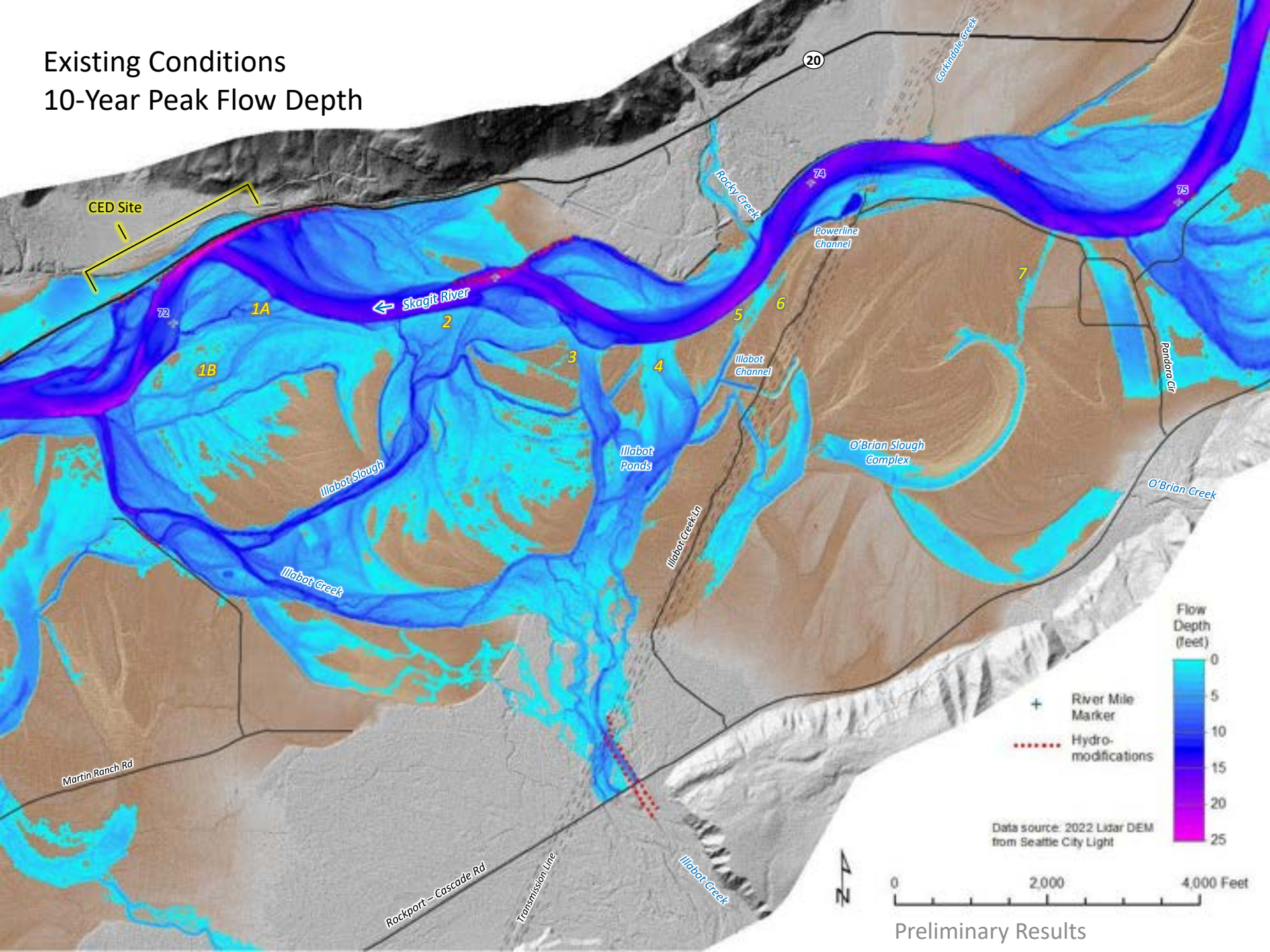
Infrastructure and Property Risk



Comparison of Existing Conditions and Action Alternatives

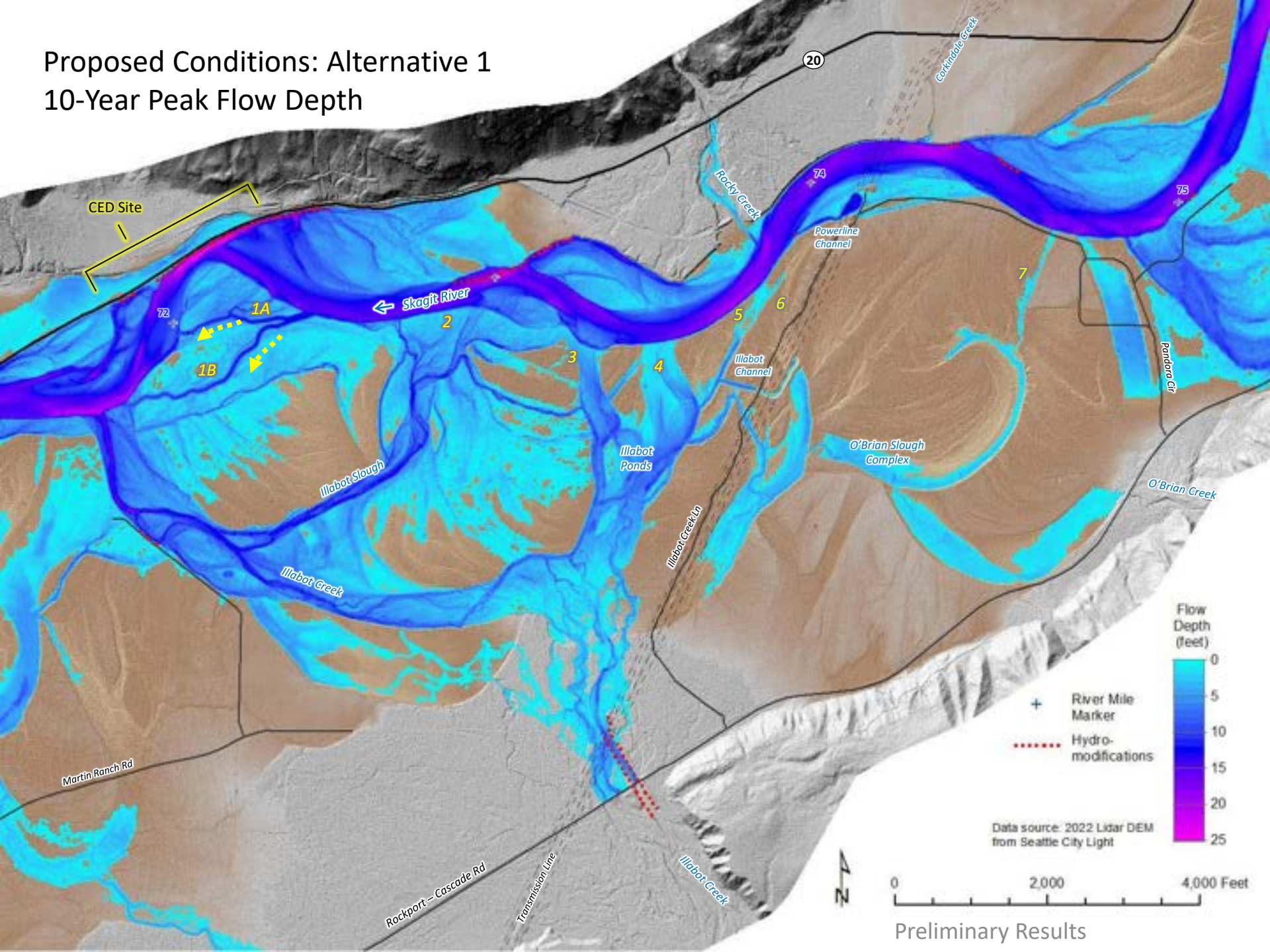
10-Year Recurrence Interval Peak Flow

Existing Conditions
10-Year Peak Flow Depth

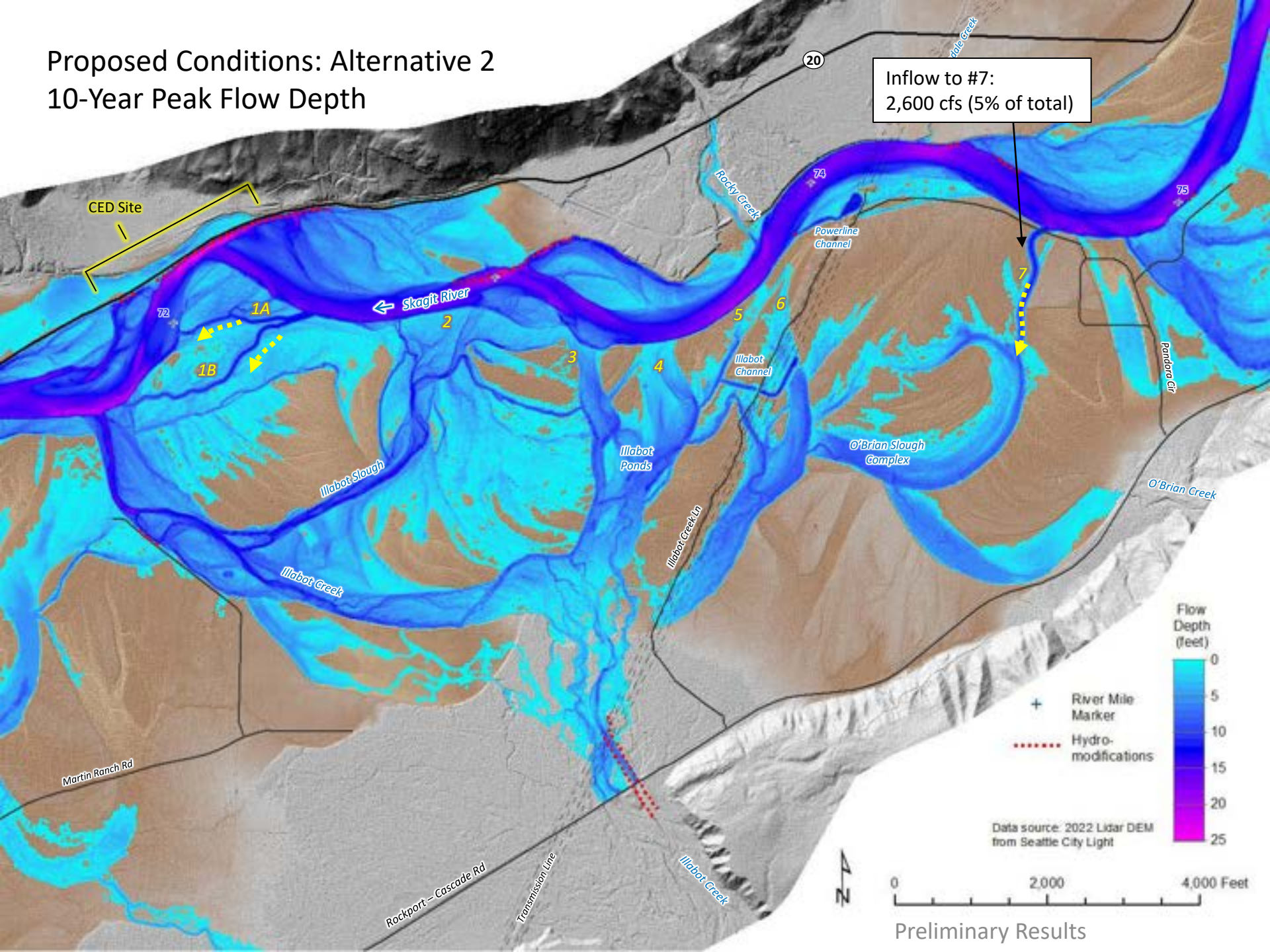


Preliminary Results

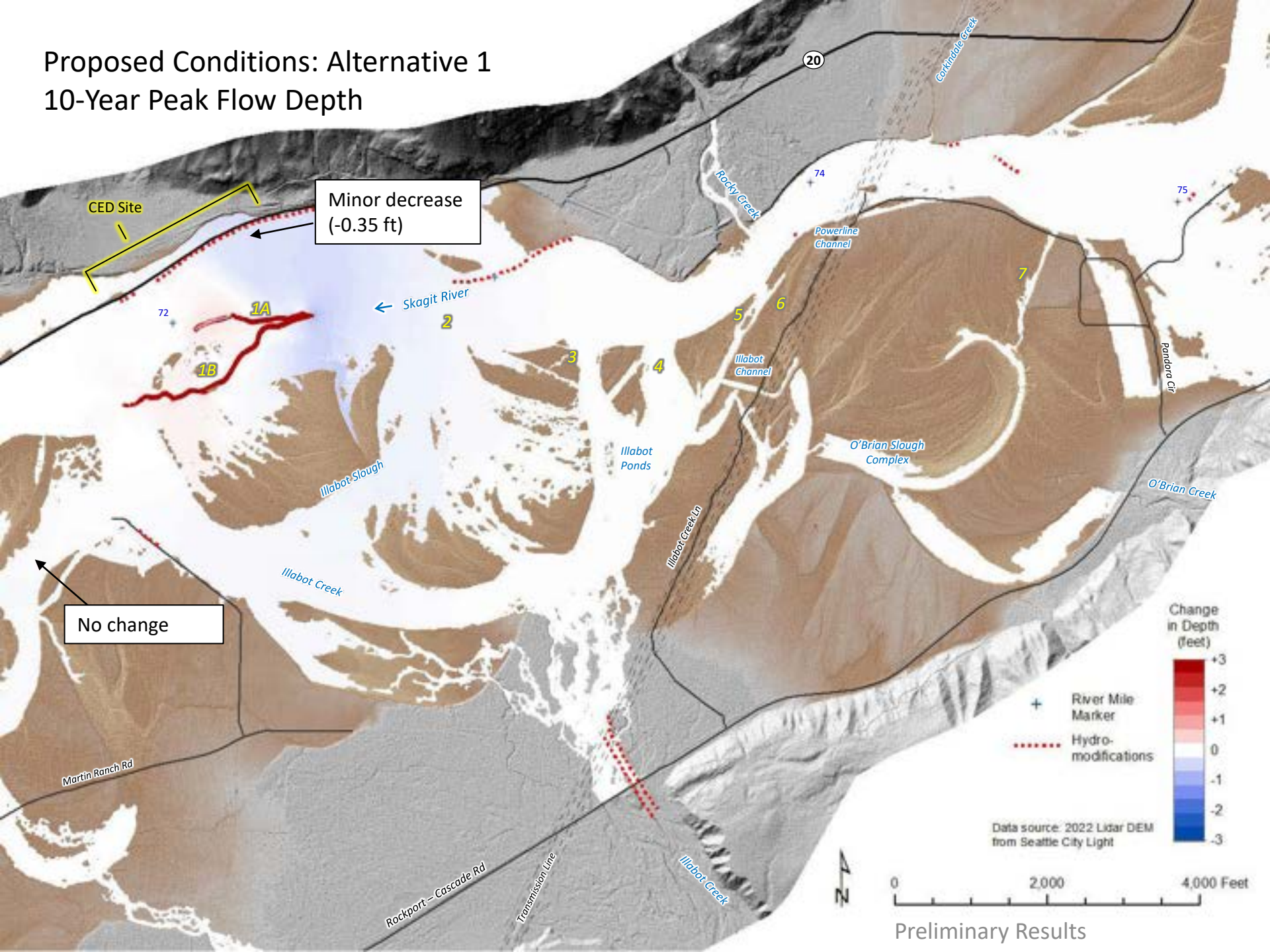
Proposed Conditions: Alternative 1
10-Year Peak Flow Depth



Preliminary Results

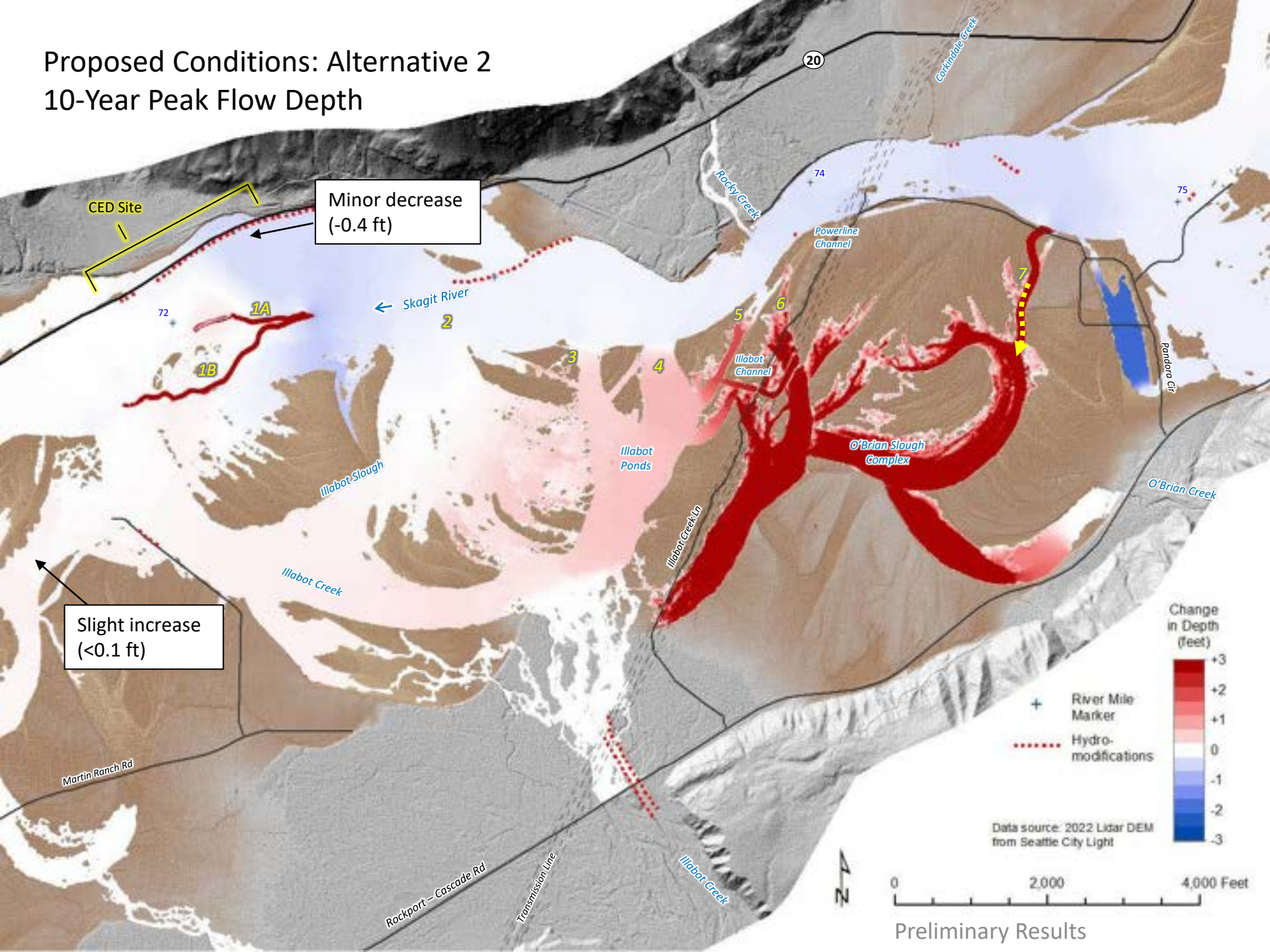

Proposed Conditions: Alternative 2
10-Year Peak Flow Depth
Inflow to #7:
2,600 cfs (5% of total)
CED Site
20
72
74
75
1A
1B
2
3
4
5
6
7
Skagit River
Rocky Creek
Powerline Channel
Illabot Channel
Illabot Ponds
O'Brian Slough Complex
O'Brian Creek
Pandora Cir
Illabot Slough
Illabot Creek
Illabot Creek Ln
Martin Ranch Rd
Rockport – Cascade Rd
Transmission Line
Illabot Creek
Flow Depth (feet)
0
5
10
15
20
25
River Mile Marker
Hydro-modifications
Data source: 2022 Lidar DEM from Seattle City Light
N
0
2,000
4,000 Feet
Preliminary Results

Proposed Conditions: Alternative 1
10-Year Peak Flow Depth



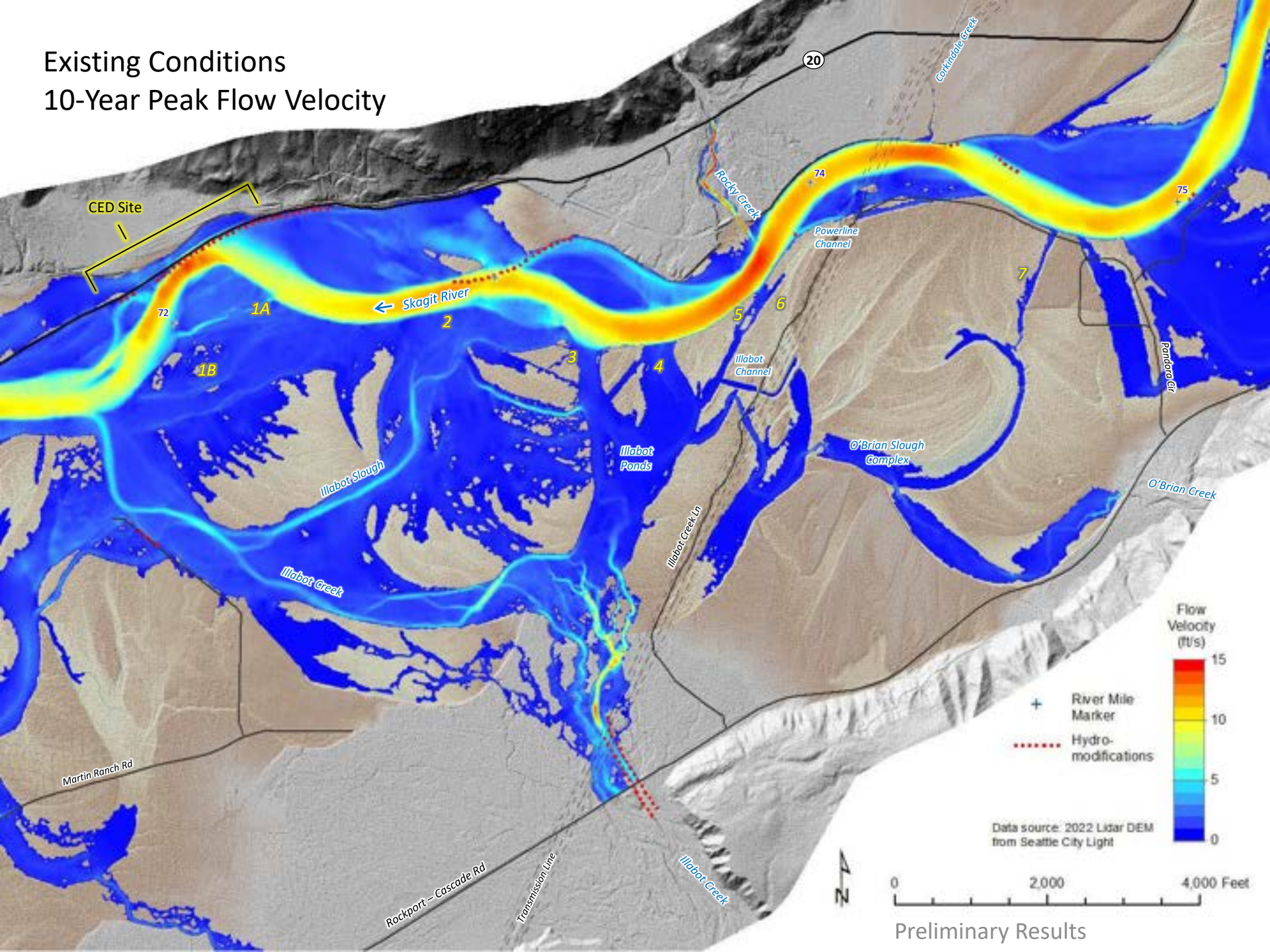
Preliminary Results

Proposed Conditions: Alternative 2
10-Year Peak Flow Depth



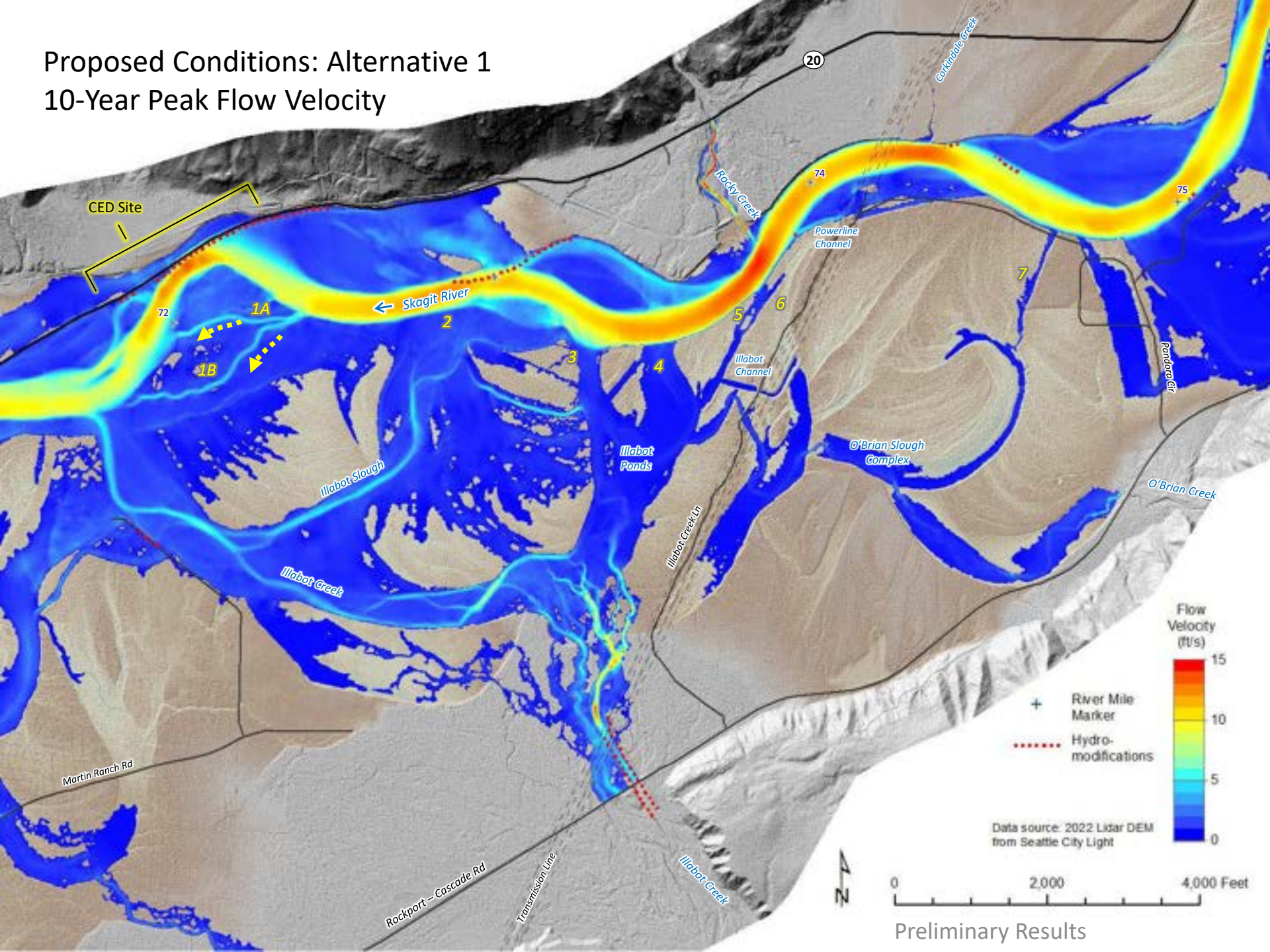
Preliminary Results

Existing Conditions
10-Year Peak Flow Velocity



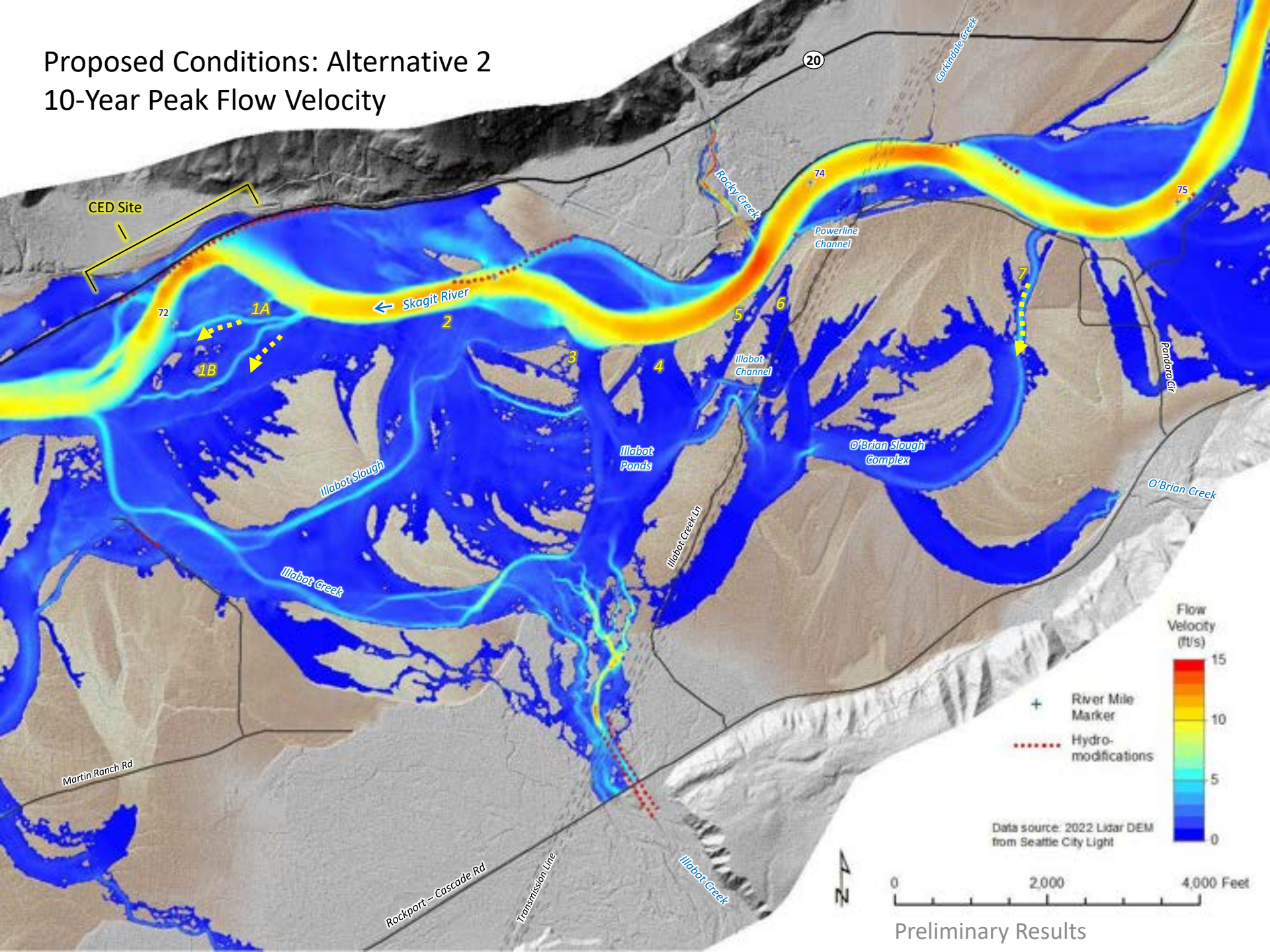
Preliminary Results

Proposed Conditions: Alternative 1
10-Year Peak Flow Velocity



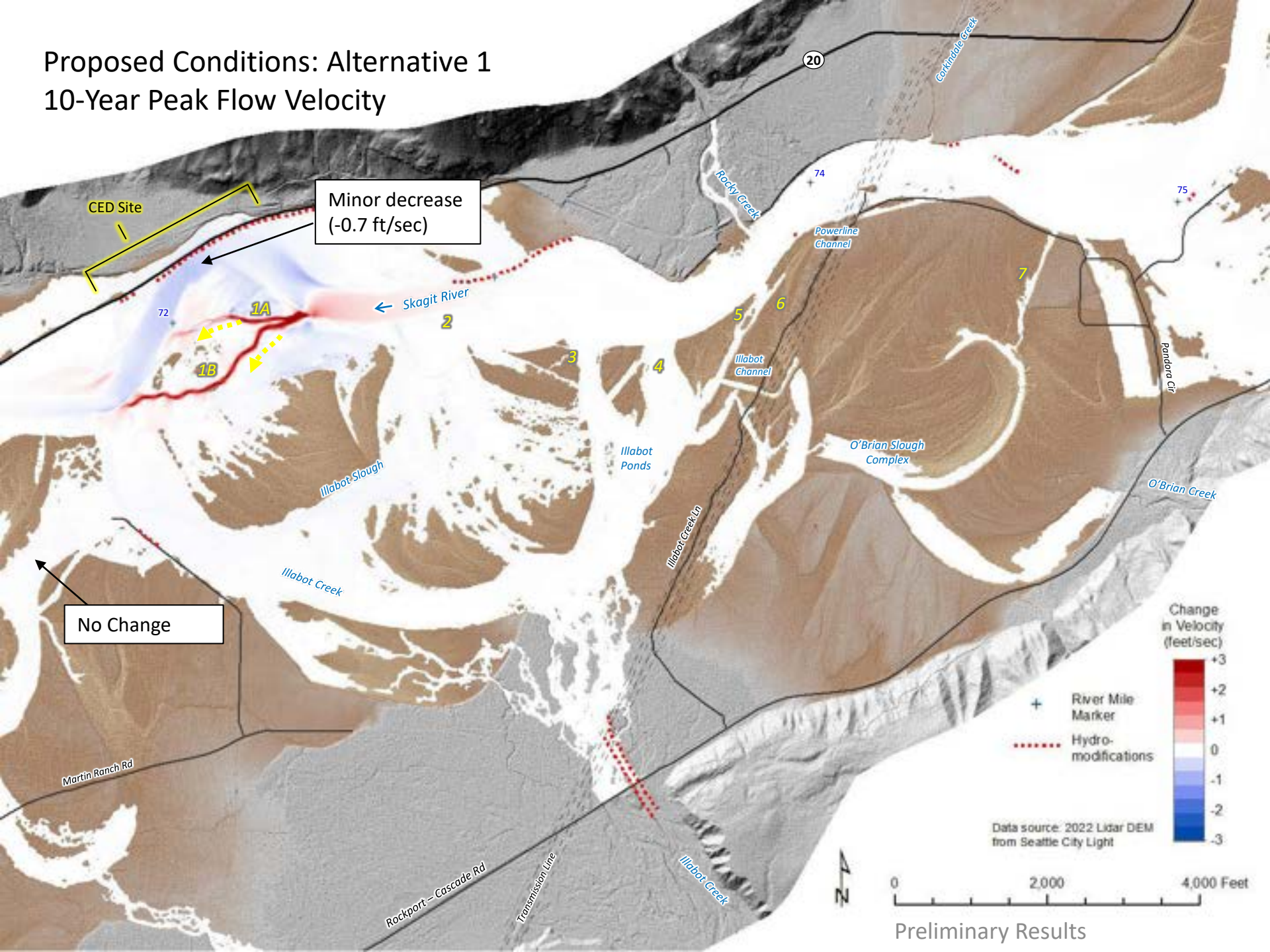
Preliminary Results

Proposed Conditions: Alternative 2
10-Year Peak Flow Velocity



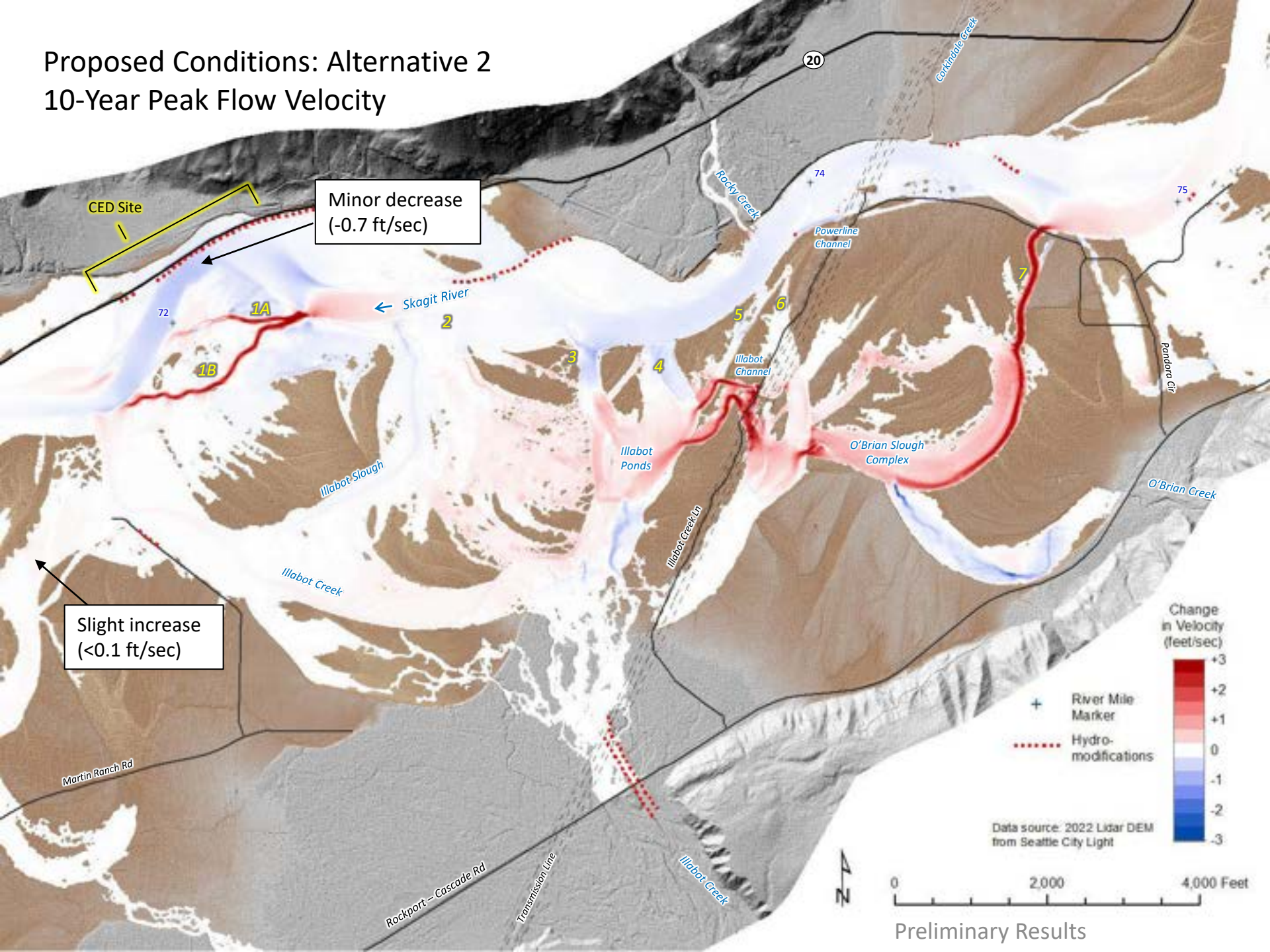
Preliminary Results

Proposed Conditions: Alternative 1
10-Year Peak Flow Velocity



Preliminary Results

Proposed Conditions: Alternative 2
10-Year Peak Flow Velocity



Preliminary Results

Summary of Infrastructure and Property Risk

Criteria	Alternative 1 (Flow Paths 1A and 1B)	Alternative 2 (Alt 1 + Flow Path 7)
Reduce flood risk to SR 20	Minor Reduction (-0.35 ft at Q10)	Minor Reduction (-0.4 ft at Q10)
Reduce erosion risk to SR 20	Minor Reduction	Minor Reduction
Does not increase flood or erosion risk to adjacent property or infrastructure	No Increase	One inch increase in Flow Depth Toward Upper Harrison (+0.1 ft at Q10)
Does not reduce potential effectiveness of Barnaby Project at meeting its objectives	No Reduction	No Reduction

Other Criteria

Goal	Study Objective
Other	Cost and ease of construction
	Sustainable
	Timing of habitat benefits
	Opportunity to collaborate
	Wildlife effects
	Recreation
	Aesthetically appropriate
	Perceived risk of flooding at adjacent properties

Main Findings for "Other" Criteria

Cost

Excavation Alternative 1 – 57,000 yds^3
3600 feet of channel
$1.5 - $2M

Excavation Alternative 2 – 119,000 yds^3
5600 feet of channel
$3 - $3.5M

Sustainability

Avulsion and Erosion Risk at Flow Path 1

Timing of Benefits

Excavated channels would have immediate benefits
Long-term benefits may be affected by sedimentation and avulsion

Recreation Impacts

No mainstem spanning jams in current plan
Jams along the river bank would be signed

Wildlife

Potential to increase wildlife with increased riparian areas for birds, deer, and other species.

Aesthetically Appropriate

No concrete
Natural materials in wood structures

Photo Credit : R. Savey

Main Findings for “Other” Criteria

Opportunity to Collaborate

Both alternatives would need a willing partner for implementation

Potential to benefit/complement other restoration projects in the area

Perceived Risk

Alternative 1 likely has a lower perceived risks to adjacent property owners

Summary of Findings

Alternative 1- Flow Path 1A and 1B

Fish Habitat – increase over existing

- Chinook Juvenile: +5-6 acres
- Steelhead Juvenile: +4-5 acres
- No loss of diversity
- Moderate reduction in stranding risk

Infrastructure

- Minor reduction in flood depth
- Minor reduction in erosion risk
- No effect on adjacent property or infrastructure
- No effect on Barnaby Project

Other

- Sustainability risk (avulsion at 1A)

Alternative 2 – Flow Paths 1A, 1B, and 7

Fish Habitat – increase over existing

- Chinook Juvenile: +8-15 acres
- Steelhead Juvenile:+9-18 acres
- No loss of diversity
- Moderate reduction in stranding risk

Infrastructure

- Minor reduction in flood depth
- Minor reduction in erosion risk
- Slight increase in flow depth on adjacent property (+0.1 ft at Q10)
- No effect on Barnaby Project

Other

- Higher cost

Questions/Discussion?

1. Did we miss anything in our analysis and evaluation?

2. Do you have any thoughts on these alternatives?

Next Steps

- Will receive input until the draft report is complete in October, and input will be incorporated into the final study report.
- Feasibility study report will be available in December 2023 on our study webpage.
- Meeting participants will be notified by email when the final report is available.

Contact and Communications

- Study webpage: https://wsdot.wa.gov/construction-planning/search-studies/sr-20-skagit-obrian-reach-feasibility-study