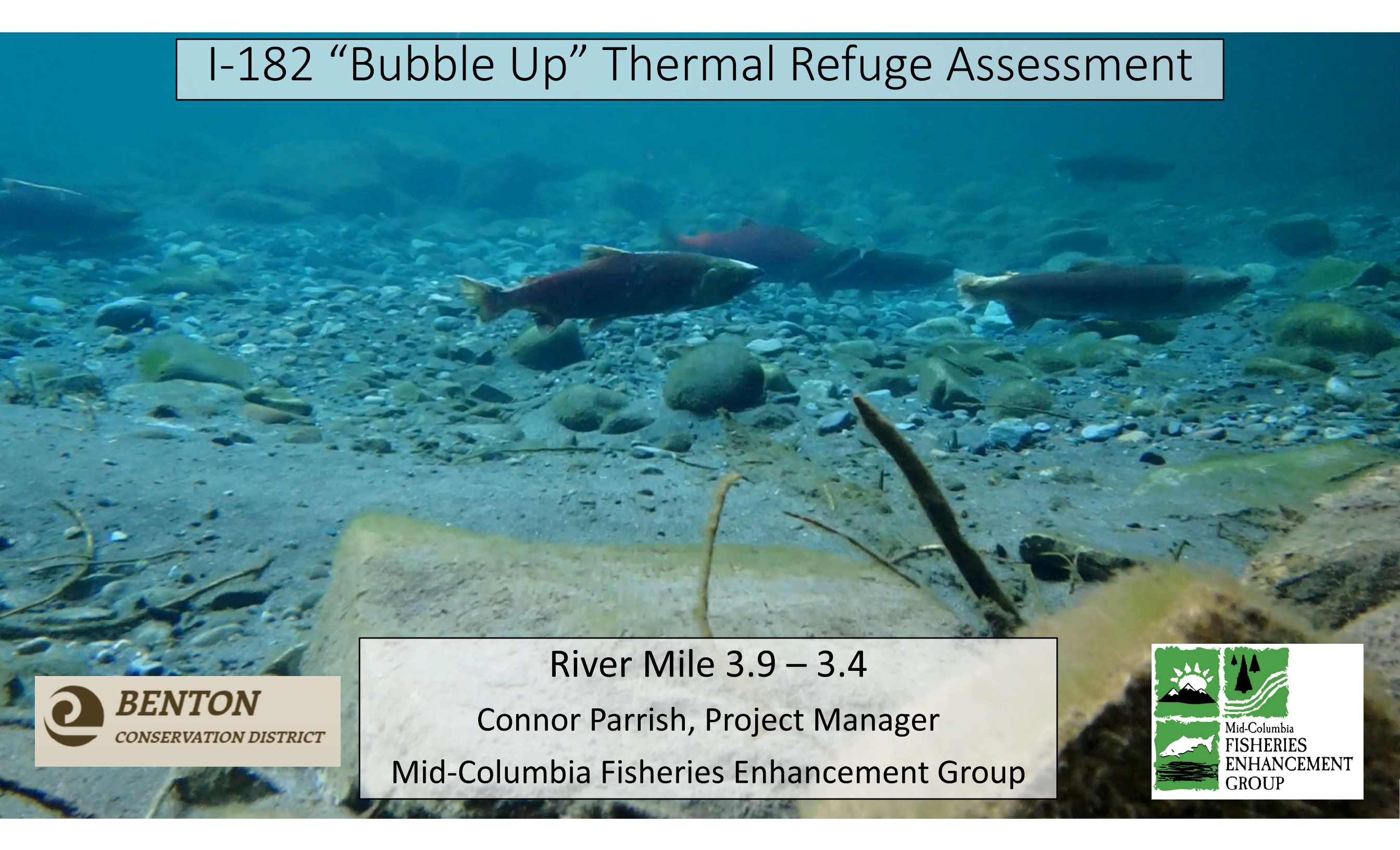
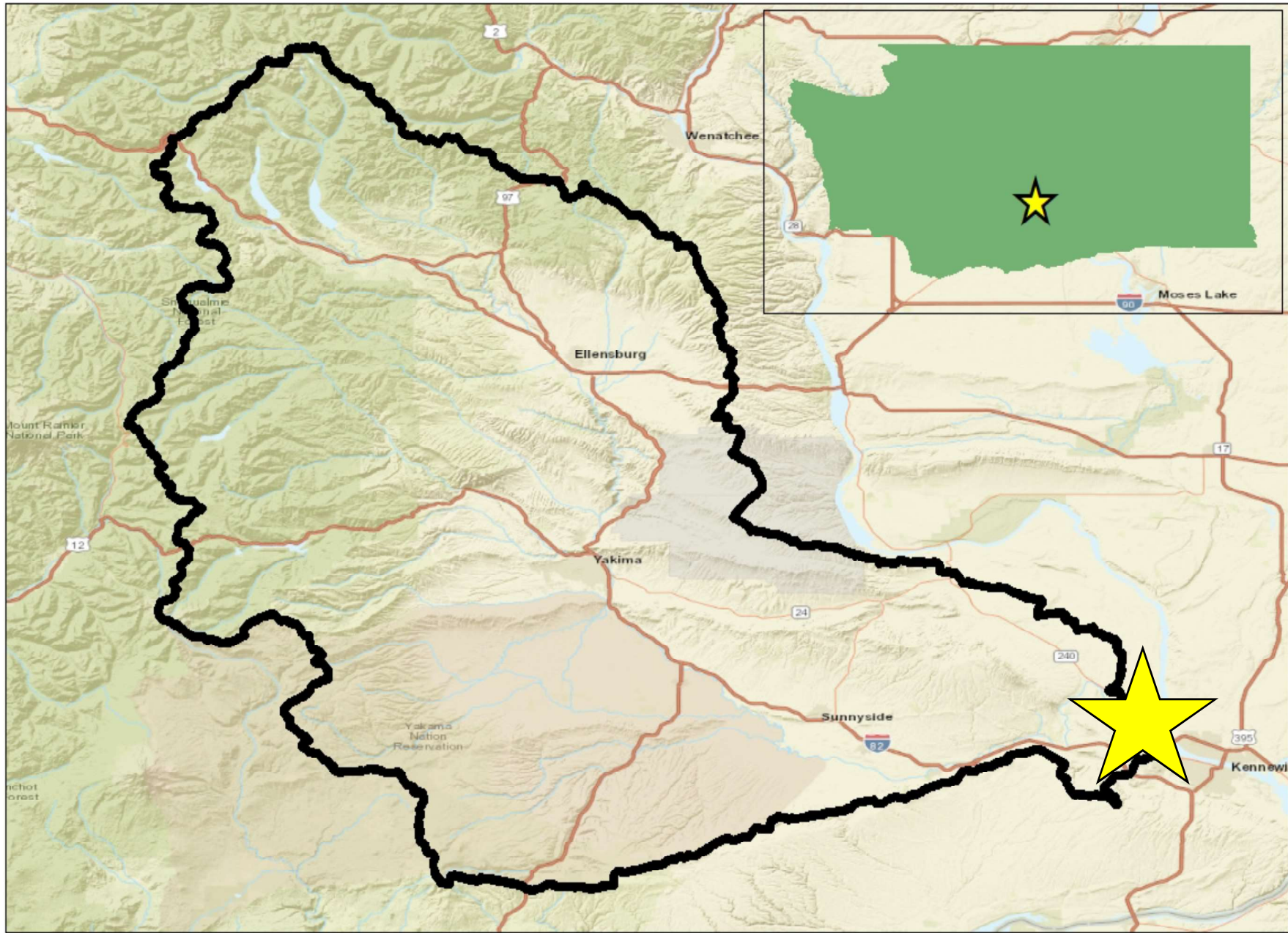


I-182 “Bubble Up” Thermal Refuge Assessment

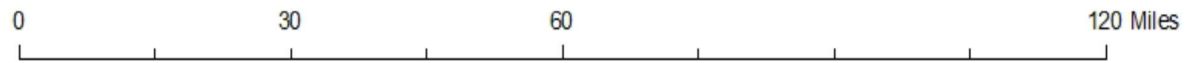


River Mile 3.9 – 3.4
Connor Parrish, Project Manager
Mid-Columbia Fisheries Enhancement Group





Yakima Basin











Bubble Up



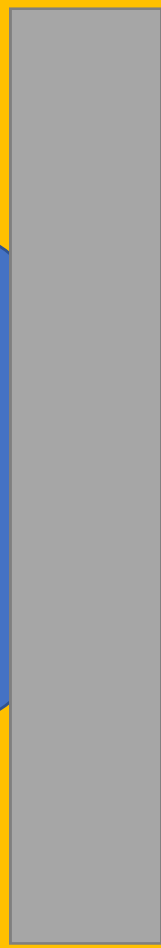
Length: 143.2 ft Width: 48 ft



Concrete Barrier



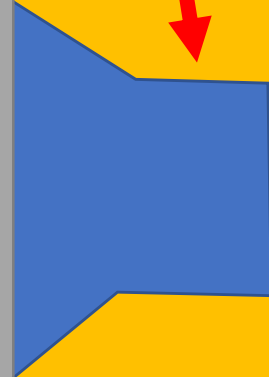
Length: 65.5 ft Width: 36 ft



Concrete Barrier



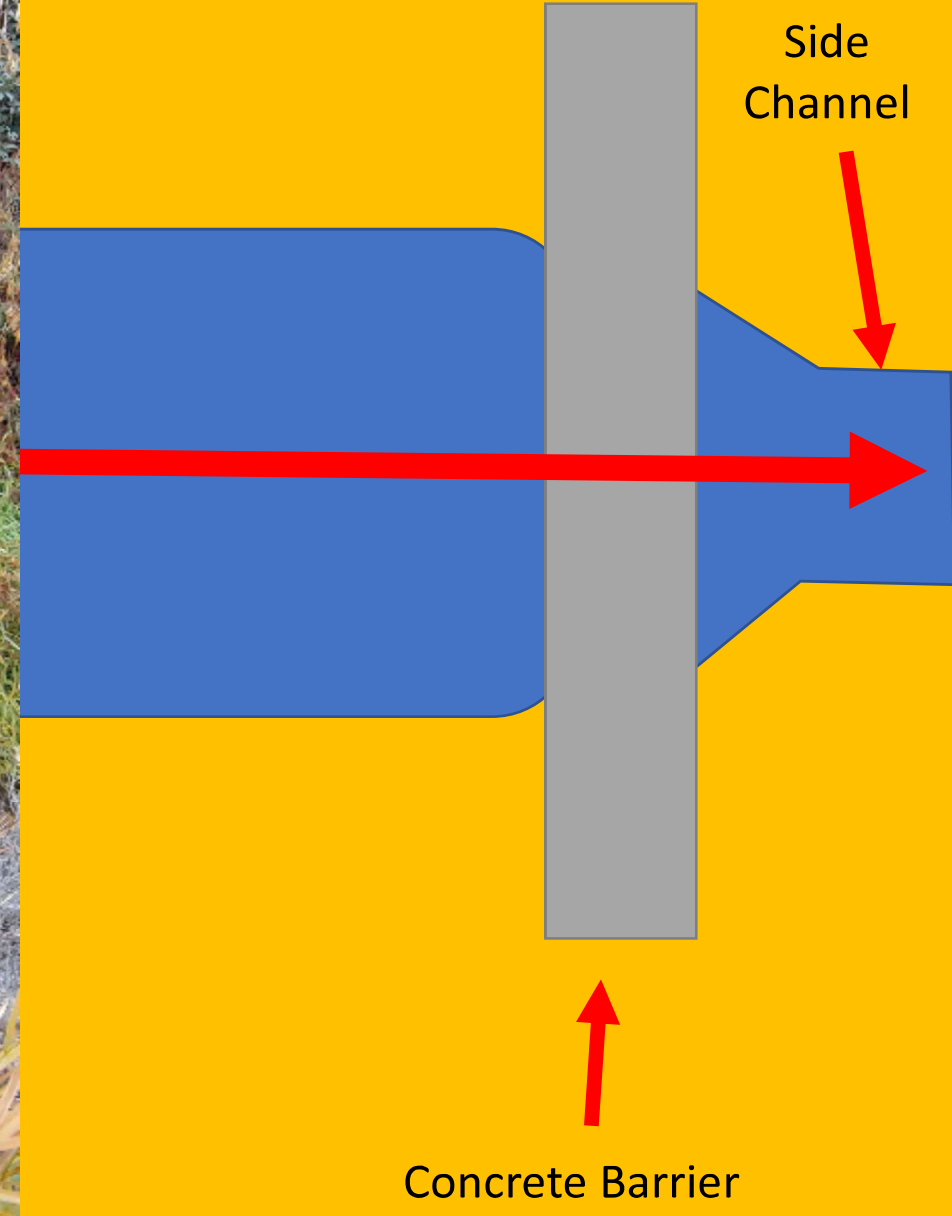
Outlet
To
Side
Channel



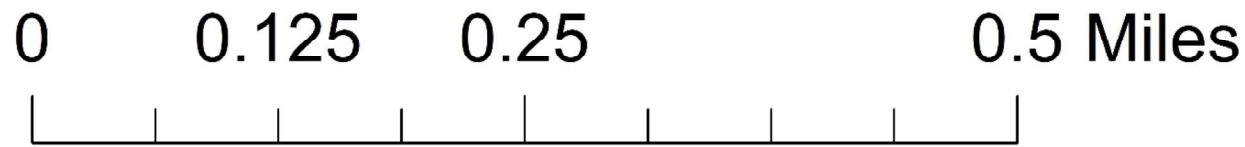
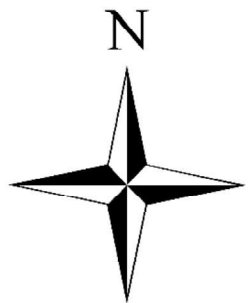
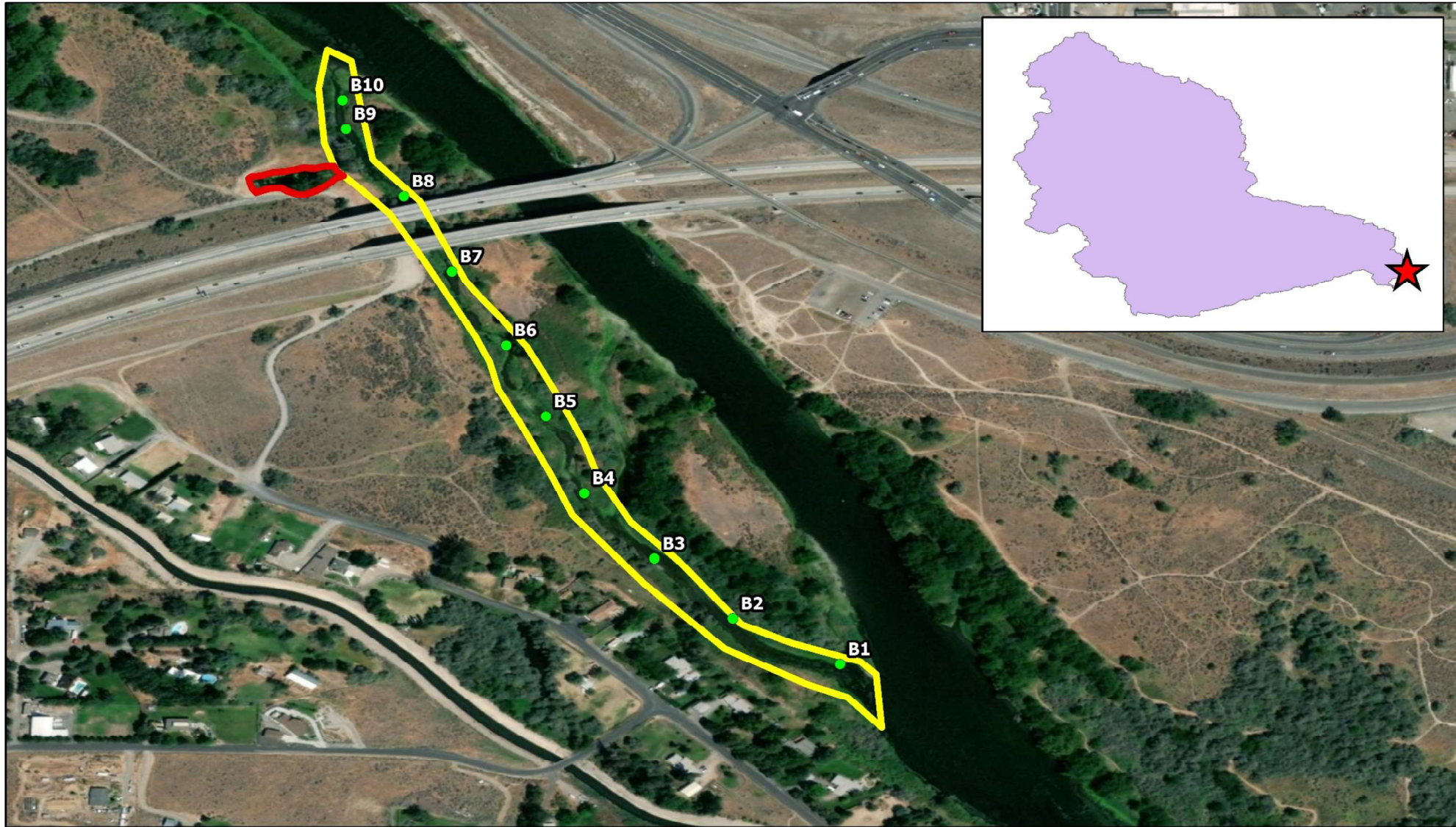
Bubble Up



Outlet
To
Side
Channel



Concrete Barrier



Legend

Cross Section

-  Cross Section
-  Bubble Up Pool
-  Side Channel

2019 Data Collection

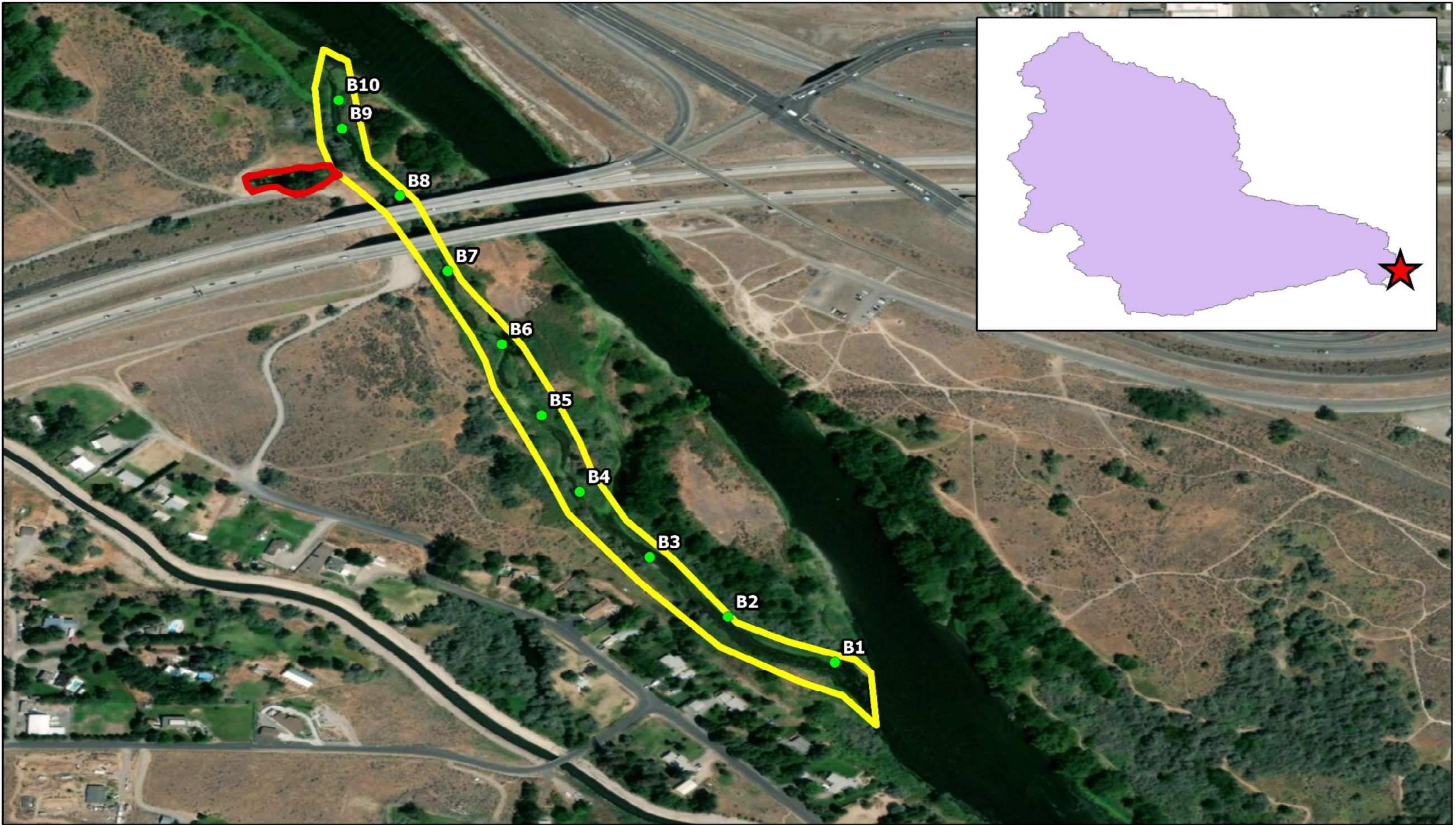
- Habitat Assessment

- Substrate
- LWD
- Riparian cover
- Fish species present
- BF width
- BF depth
- Temperature



7/9/2019





B10

B9

B8

B7

B6

B5

B4

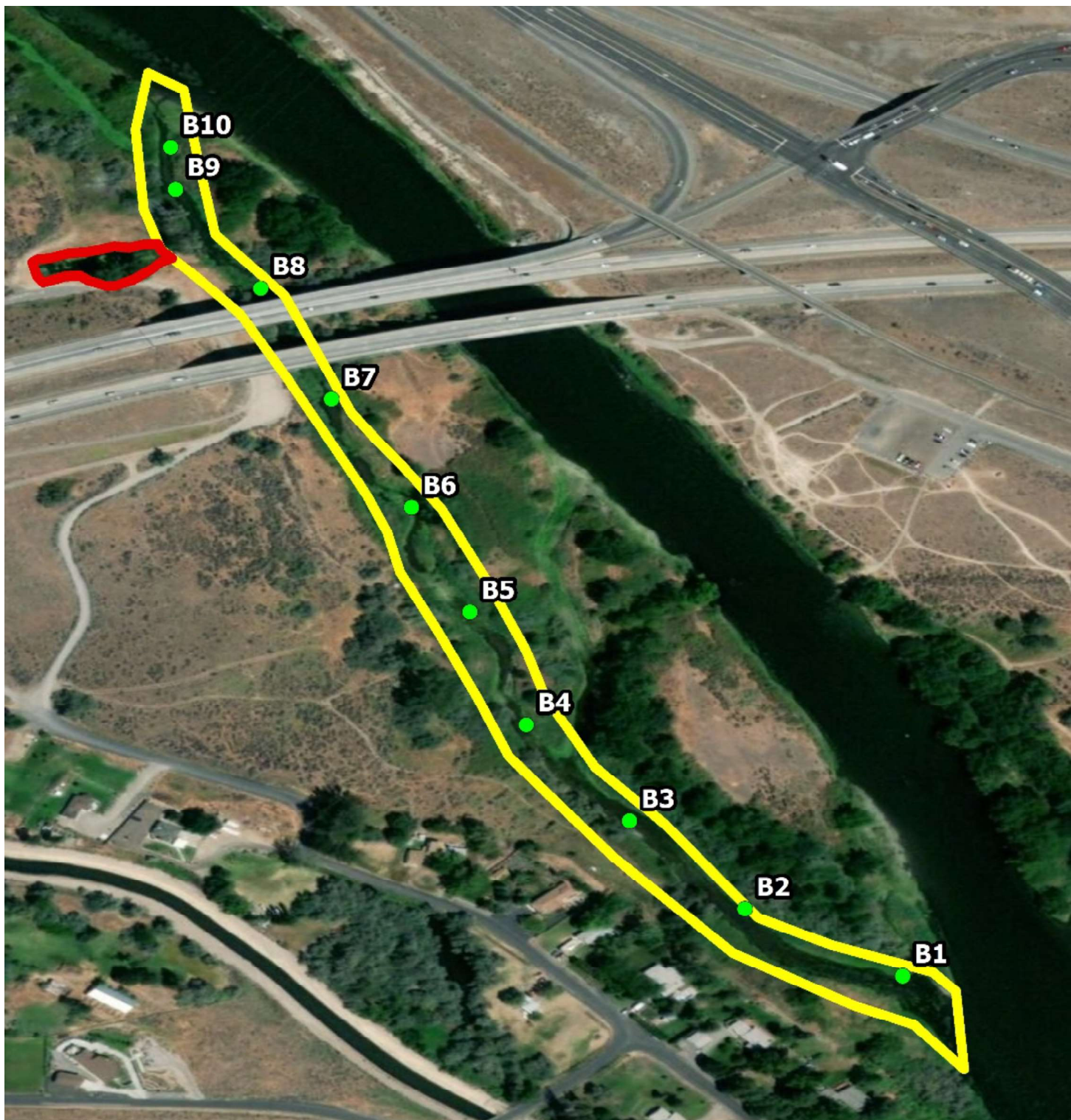
B3

B2

B1

Data Summary 7/9/2019

- Little riparian cover (<5%)
- 1 piece of LWD
- Substrate- cobble, gravel, fines
- Little flowing water
- Small mouth bass in side channel





Cross Section	Temp (°C)
B1	27
B2	23
B3	23
B4	23
B5	23.5
B6	20.5
B7	21
B8	19.5
Bubble Up	18
B9	19.5
B10	21

New Questions!

- Could this be altered to create thermal refuge?
- How big of a pocket of cold water could this create?

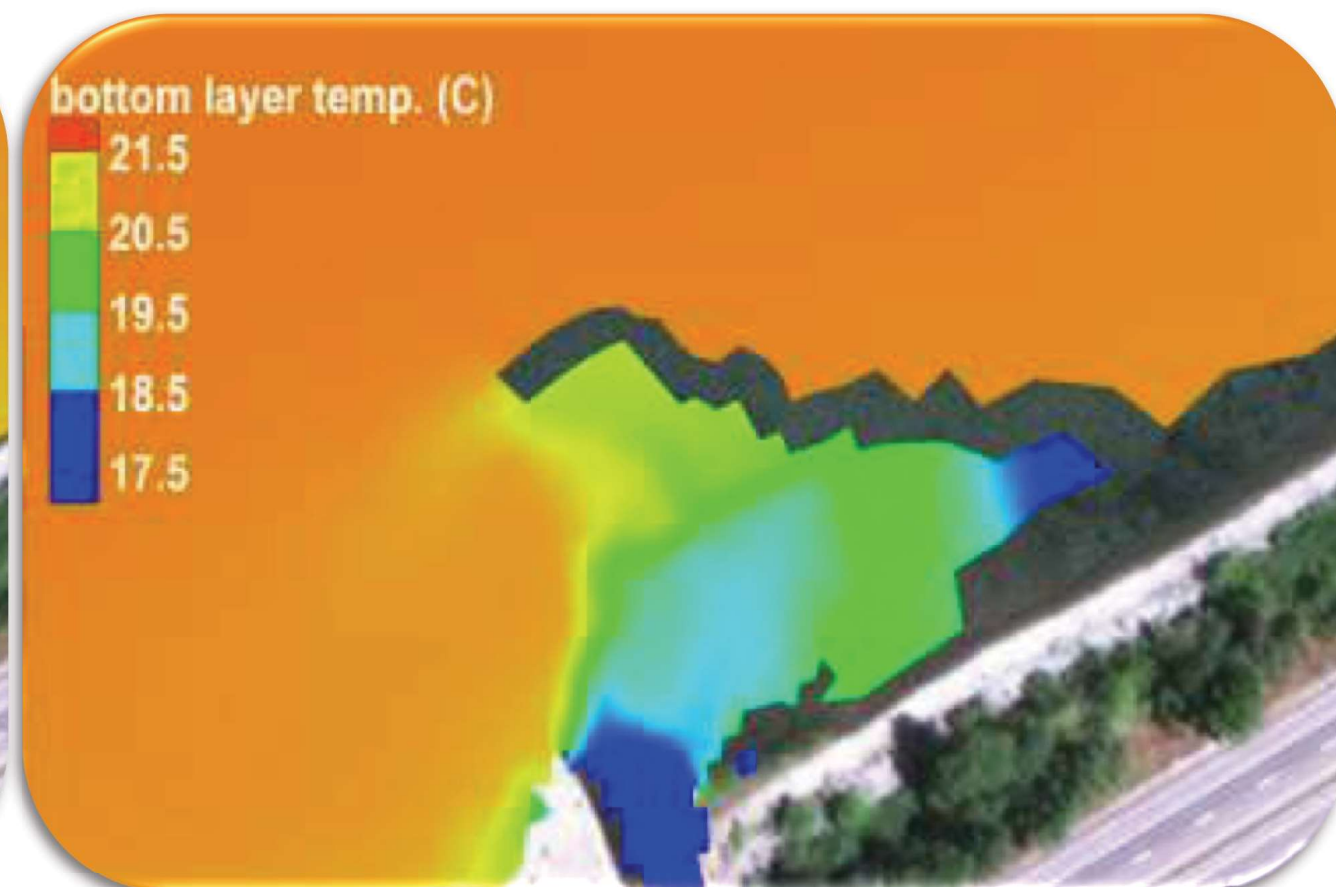
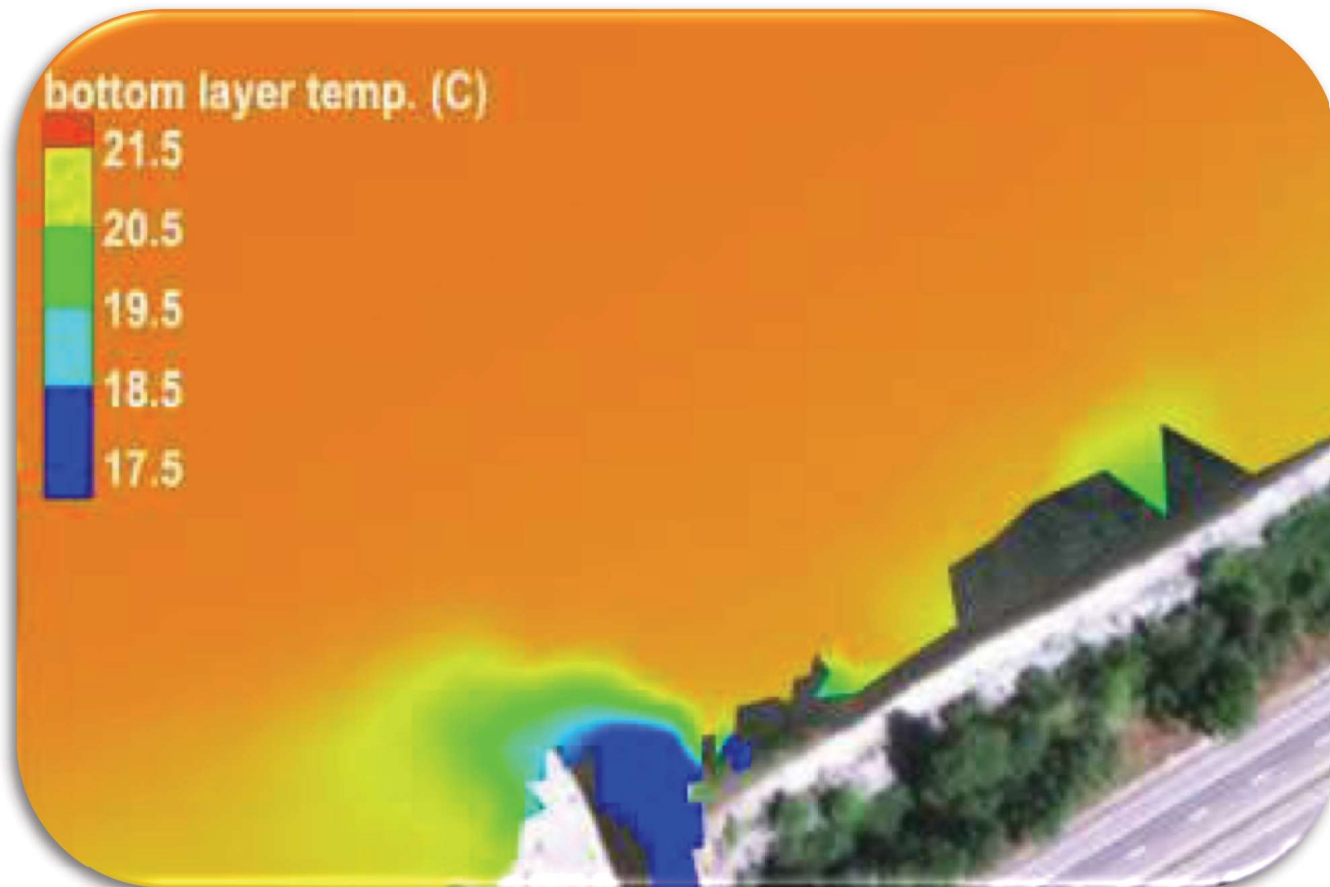




Lower Columbia
Estuary
Partnership

Existing

Enhanced



Data We Have

- 2 Years of Water Temperature
 - Bubble Up
 - Mainstem

Data We Need

- Flow
 - Bubble Up
 - Mainstem
- Topography/Bathymetry

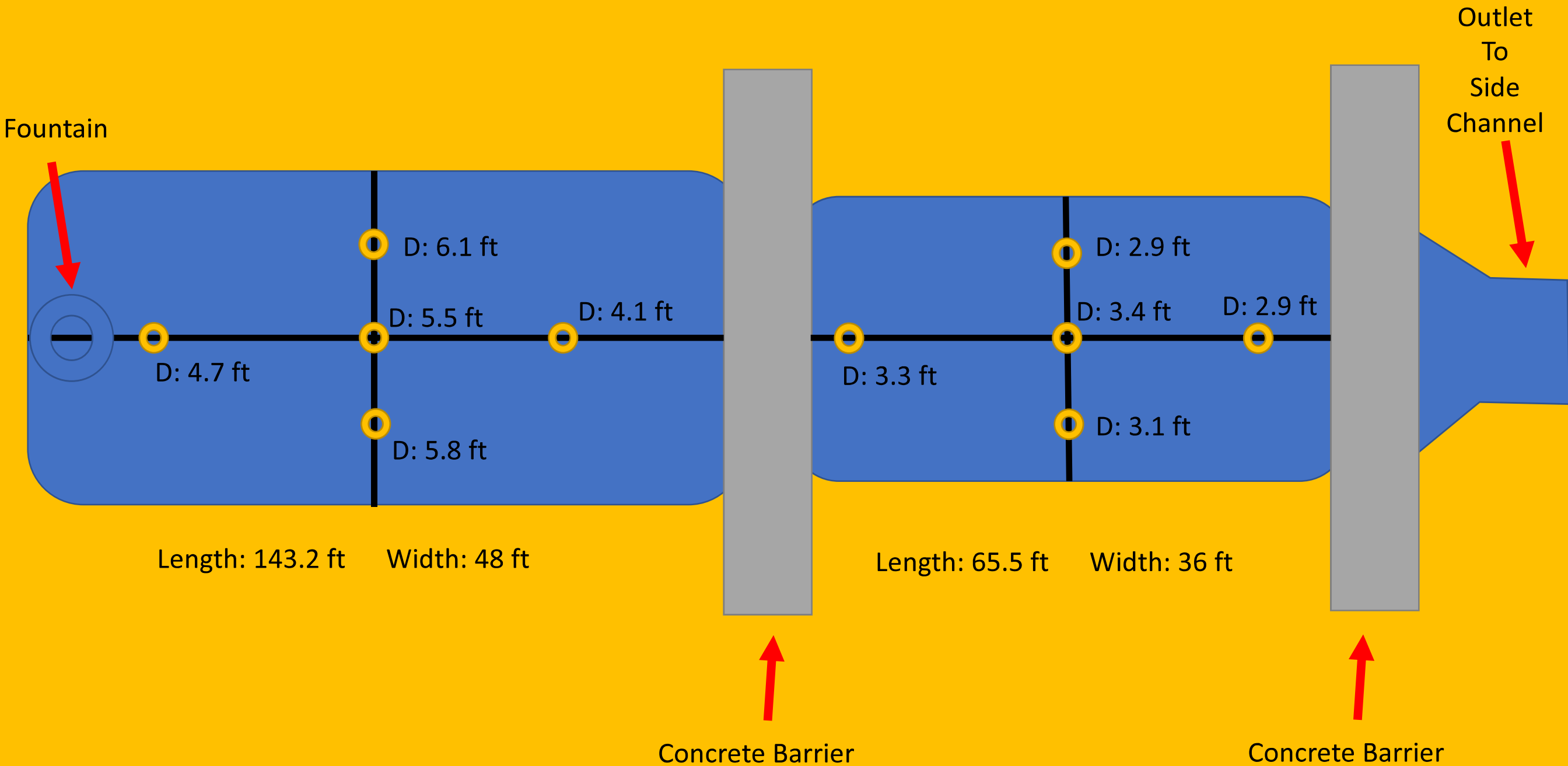
Next Steps?

- Provide data to LCEP
- Review preliminary model
- Seek additional funding for further design/permitting

A man with a full brown beard and short hair is wearing a dark olive-green wetsuit. He is positioned in the foreground, looking directly at the camera. Behind him is a river with a small weir or dam structure. The water is dark and rippling. In the background, there are green bushes, a fence, and utility poles under a bright sky. A semi-transparent speech bubble is overlaid on the left side of the image, containing the text "Questions??".

Questions??

Bubble Up Pool Dimensions





Cross Section	Temp (°C)
B1	27
B2	23
B3	23
B4	23
B5	23.5
B6	20.5
B7	21
B8	19.5
Bubble Up	18
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