PIT Detection System Improvements 2023

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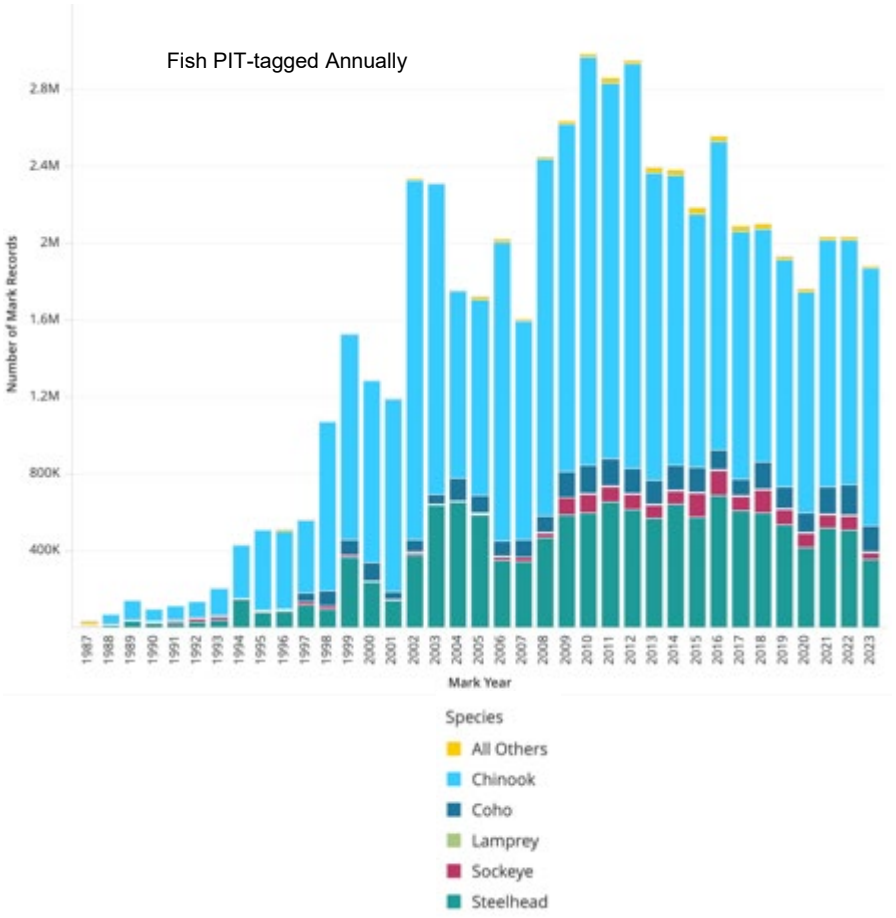
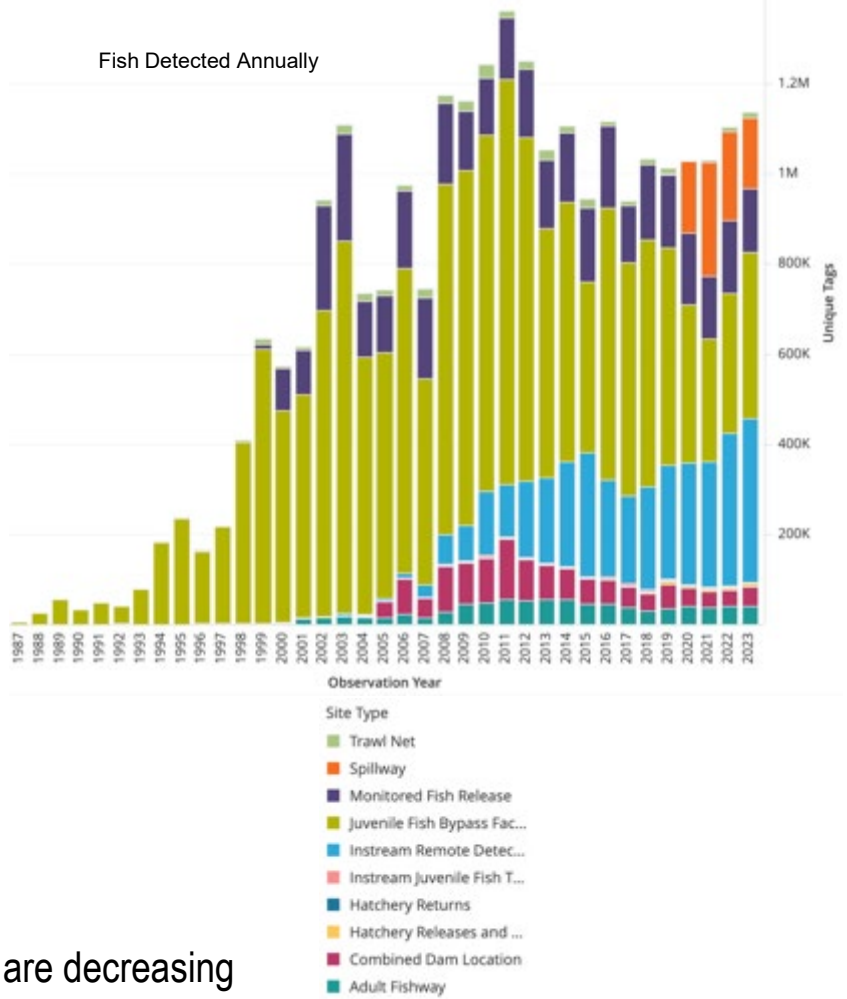
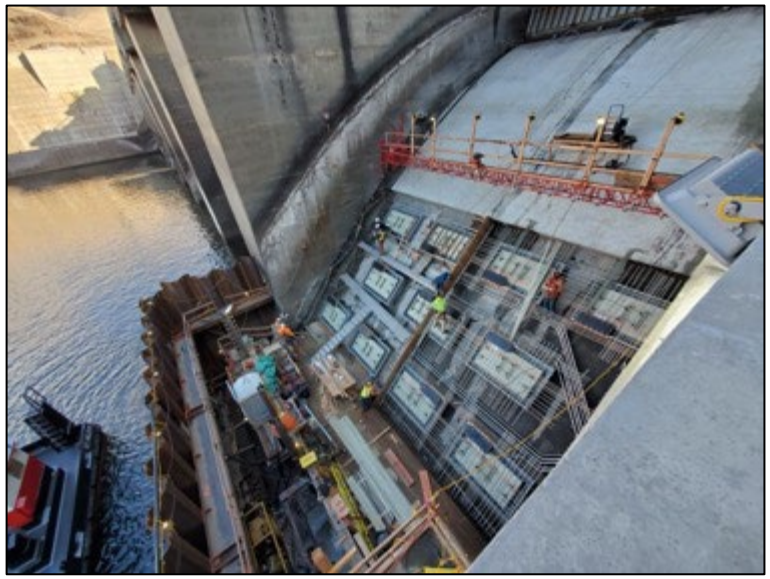
CRB PIT Overview

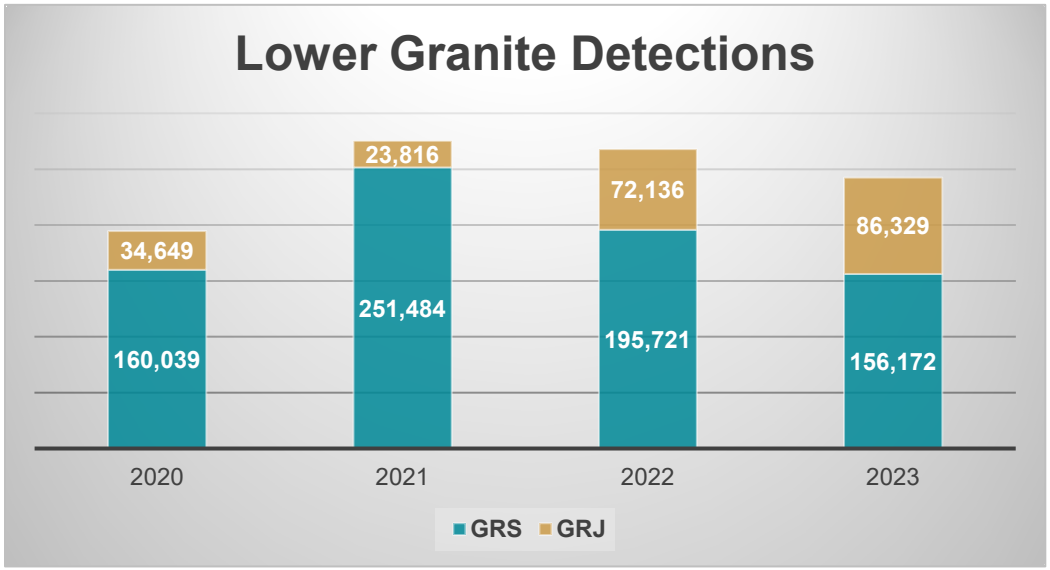




- Overall detections are increasing while tagged fish are decreasing
- GRS and Instream sites are providing significant data
- JFF detections have generally been decreasing at mainstem dams

Lower Granite Spillway (GRS)

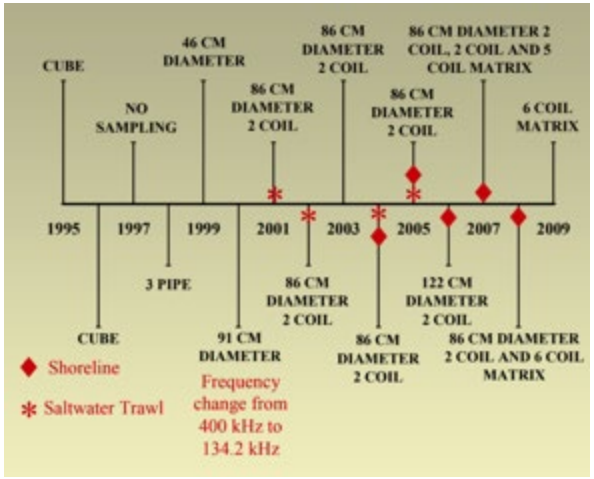


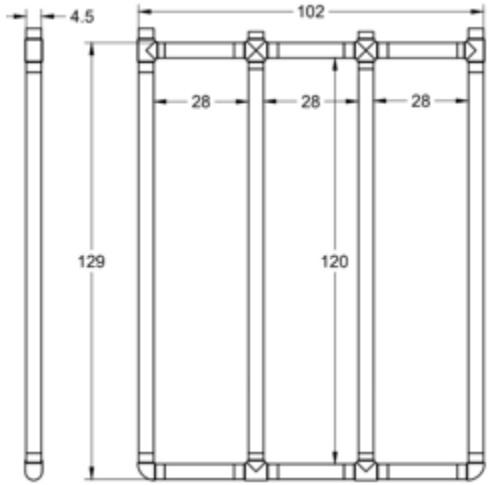


2023

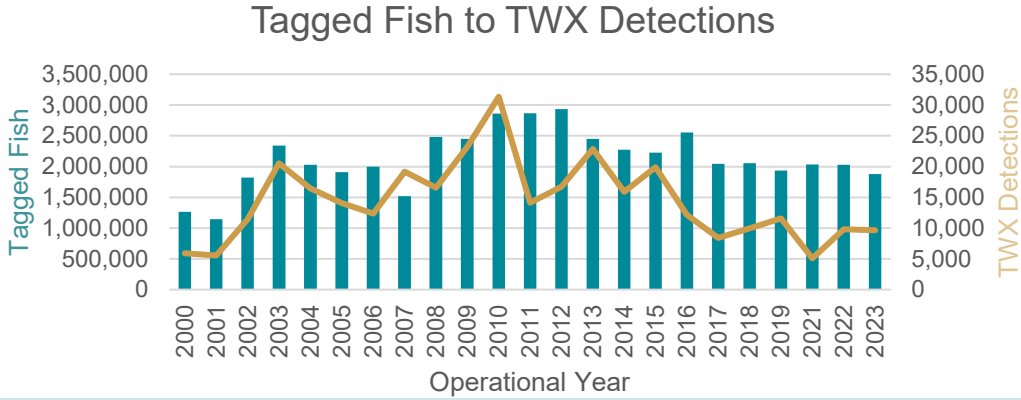
- Remote Exciter Adjustment (PSMFC/NOAA)
- NOAA completed the access platform for future maintenance

Pair Trawl (TWX)

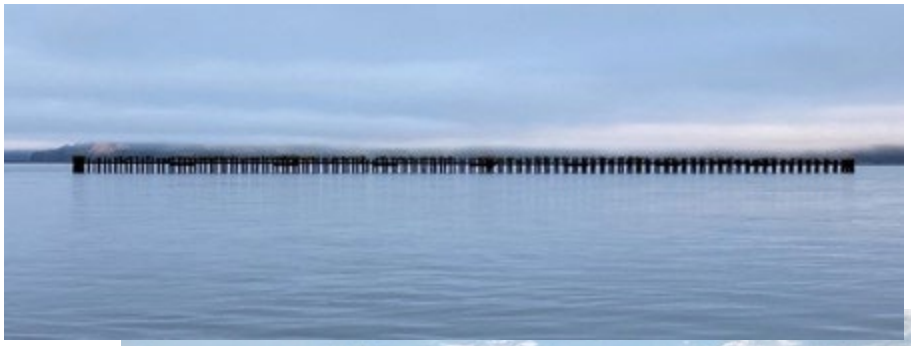




- Historic method of estuary PIT detection
- Replaced both matrix antennas
- Upgraded to the IS1001-M while maintaining backward compatibility



Pile Dikes



"… approximately 233 CENWP pile dikes located between the mouth of the Columbia River and Bonneville Dam. These pile dikes were constructed between 1885 and 1969, typically in a coordinated program of pile dike construction coupled with channel dredging. Although the specific functions of the individual pile dikes vary the original purpose of the pile dikes, in general, was to support the establishment of a stable navigation channel and/or to minimize the maintenance dredging requirements."

-*Structural and Hydraulic Analysis of Columbia River Pile Dikes Final Report*

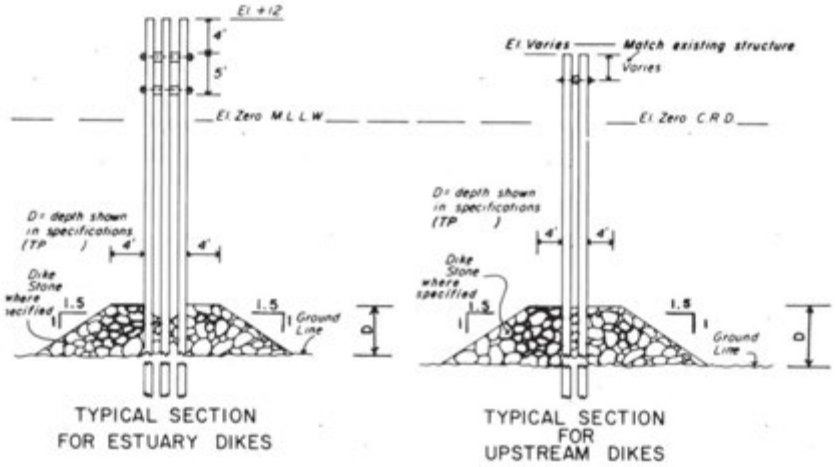


Figure 2-4 Typical Pile Dike Cross-Sections (USACE, 1988)

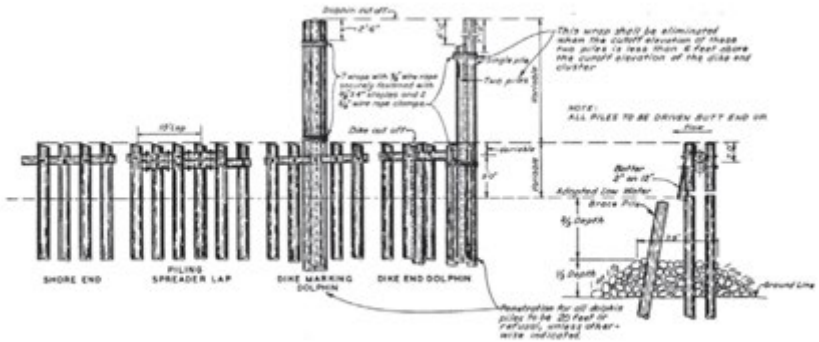
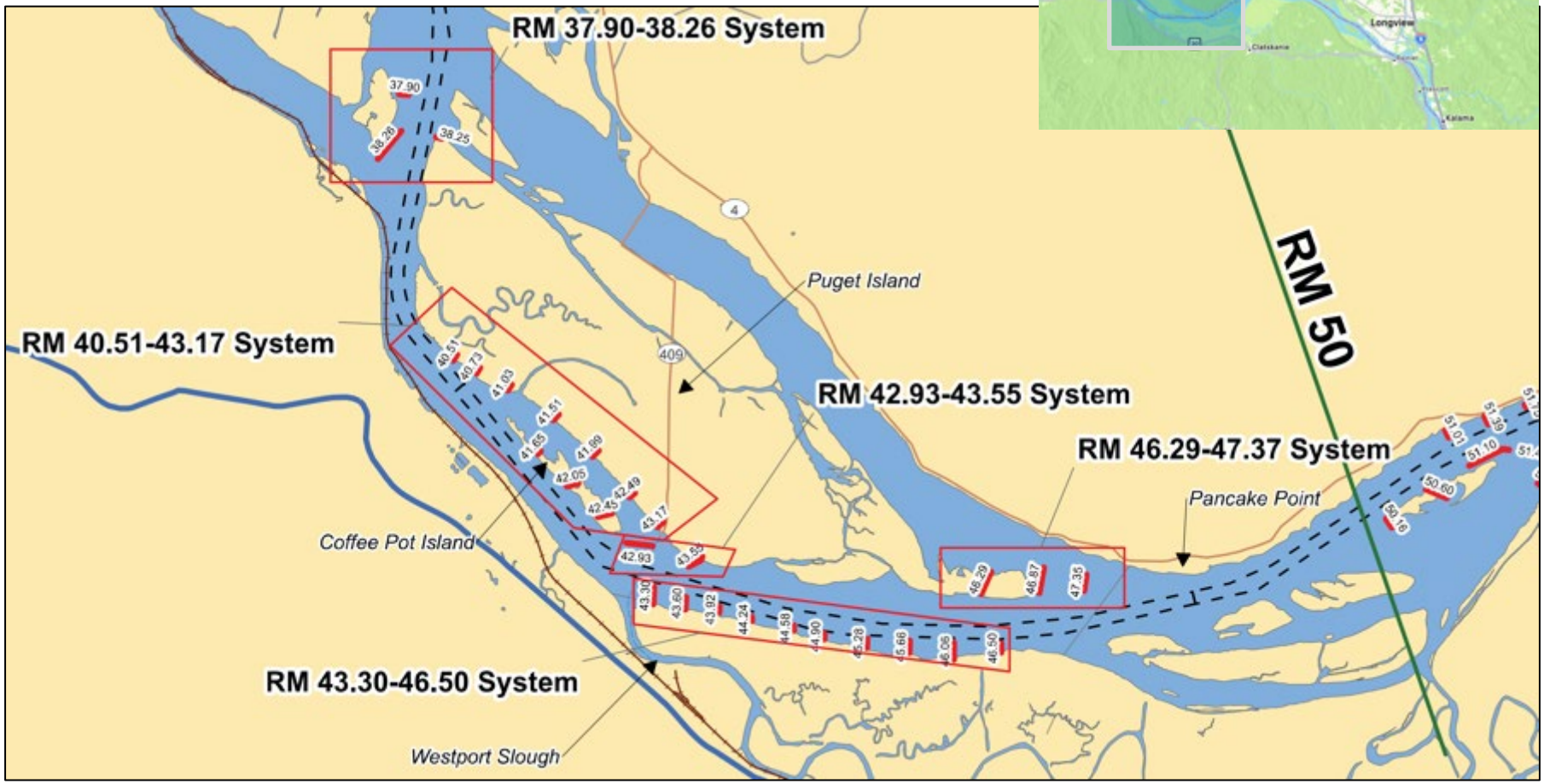
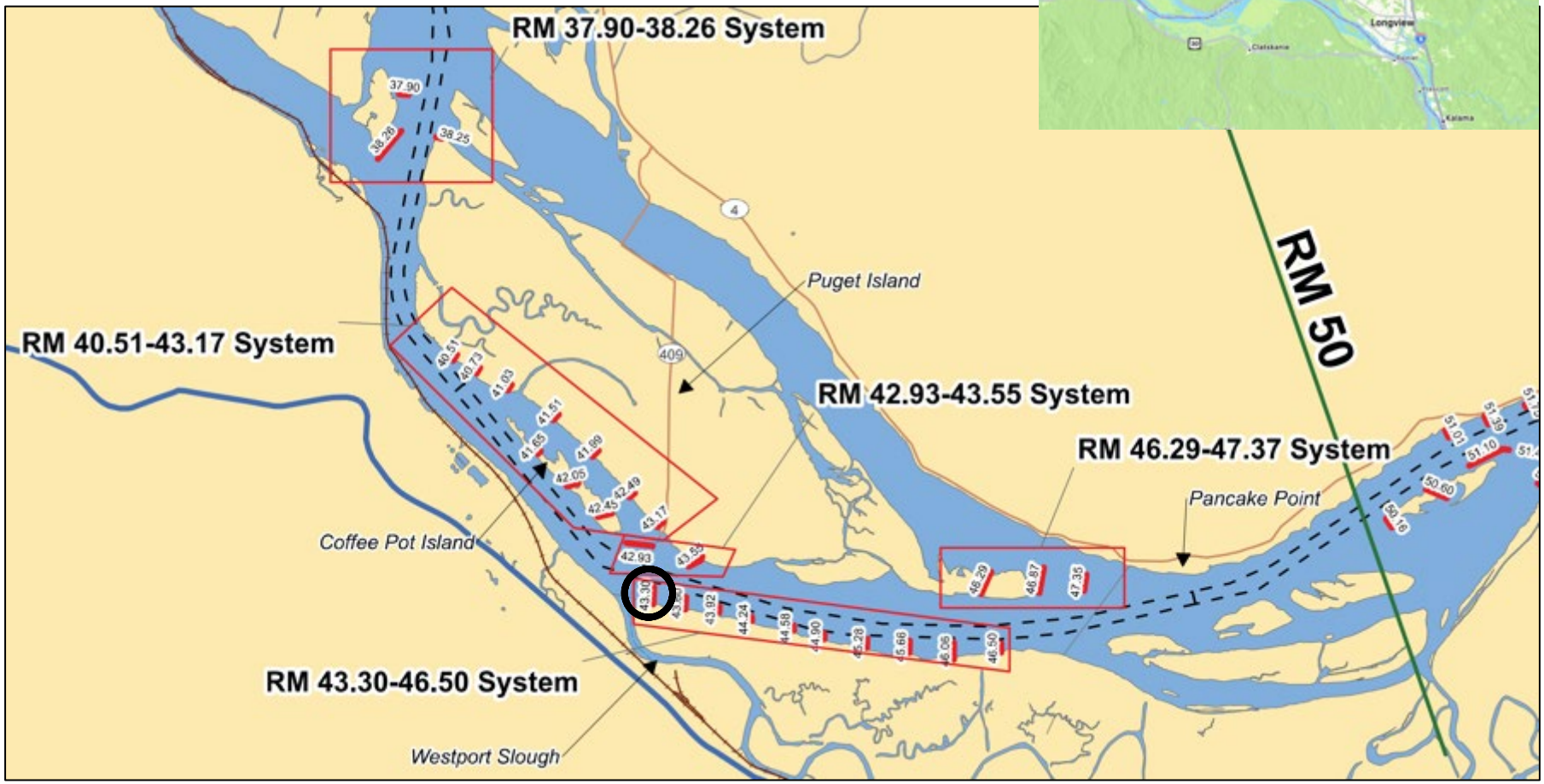


Figure 2-5 Typical Pile Dike Elevation (USACE, 1988)

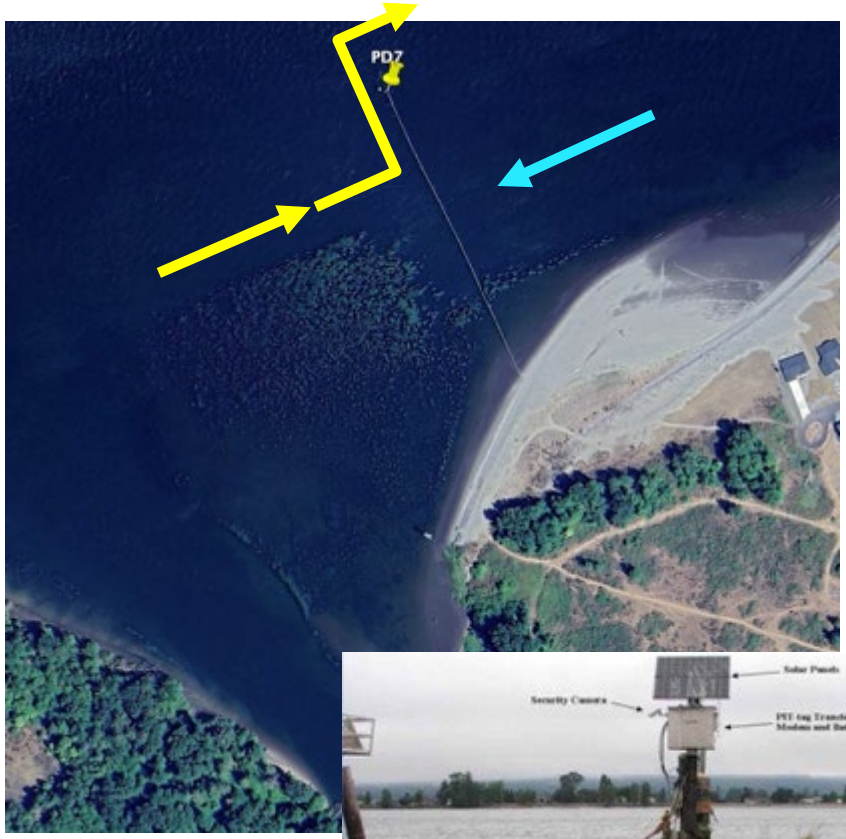
Pile Dike Site Limitations

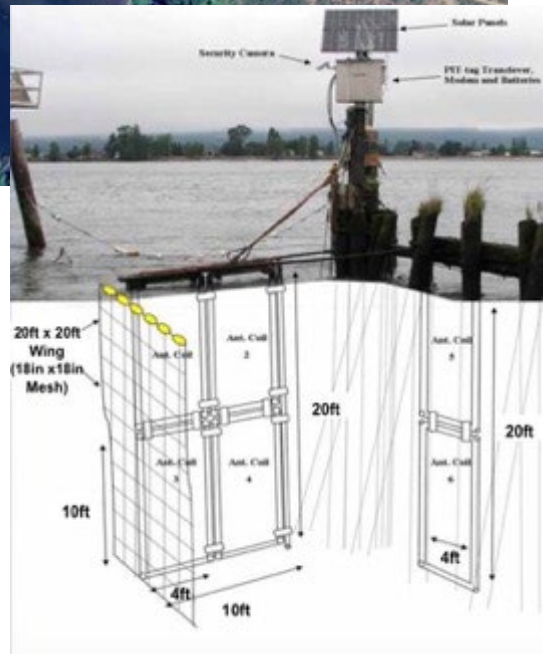


PD7 – Original Pile Dike Site



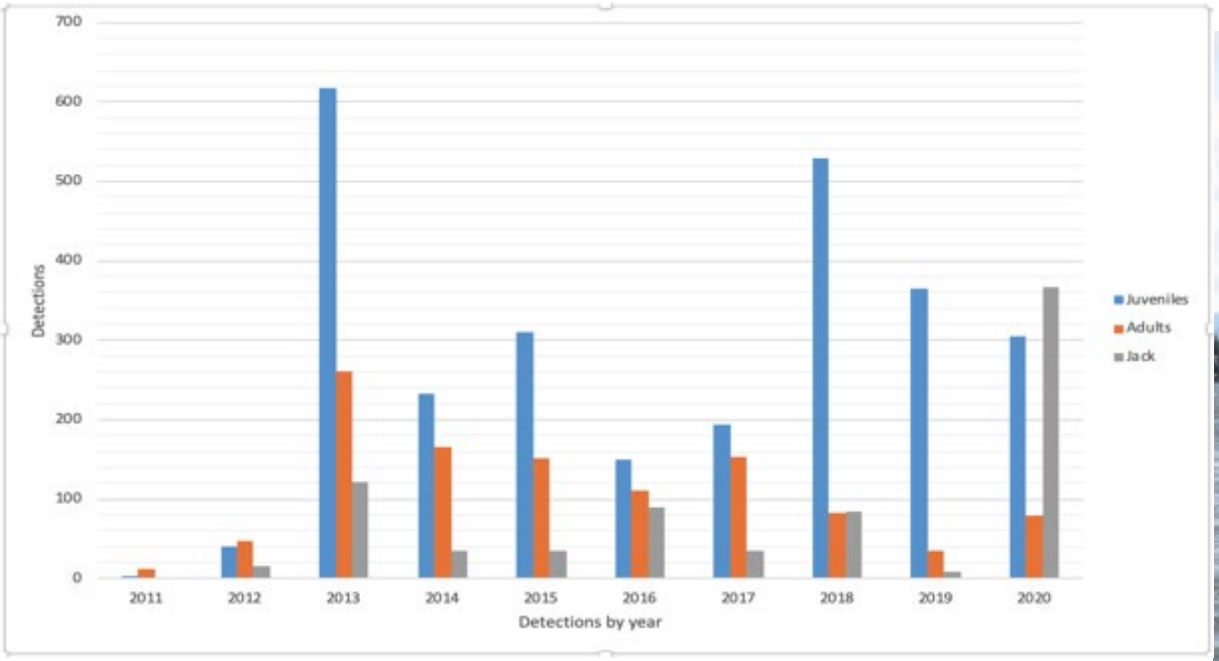
PD7





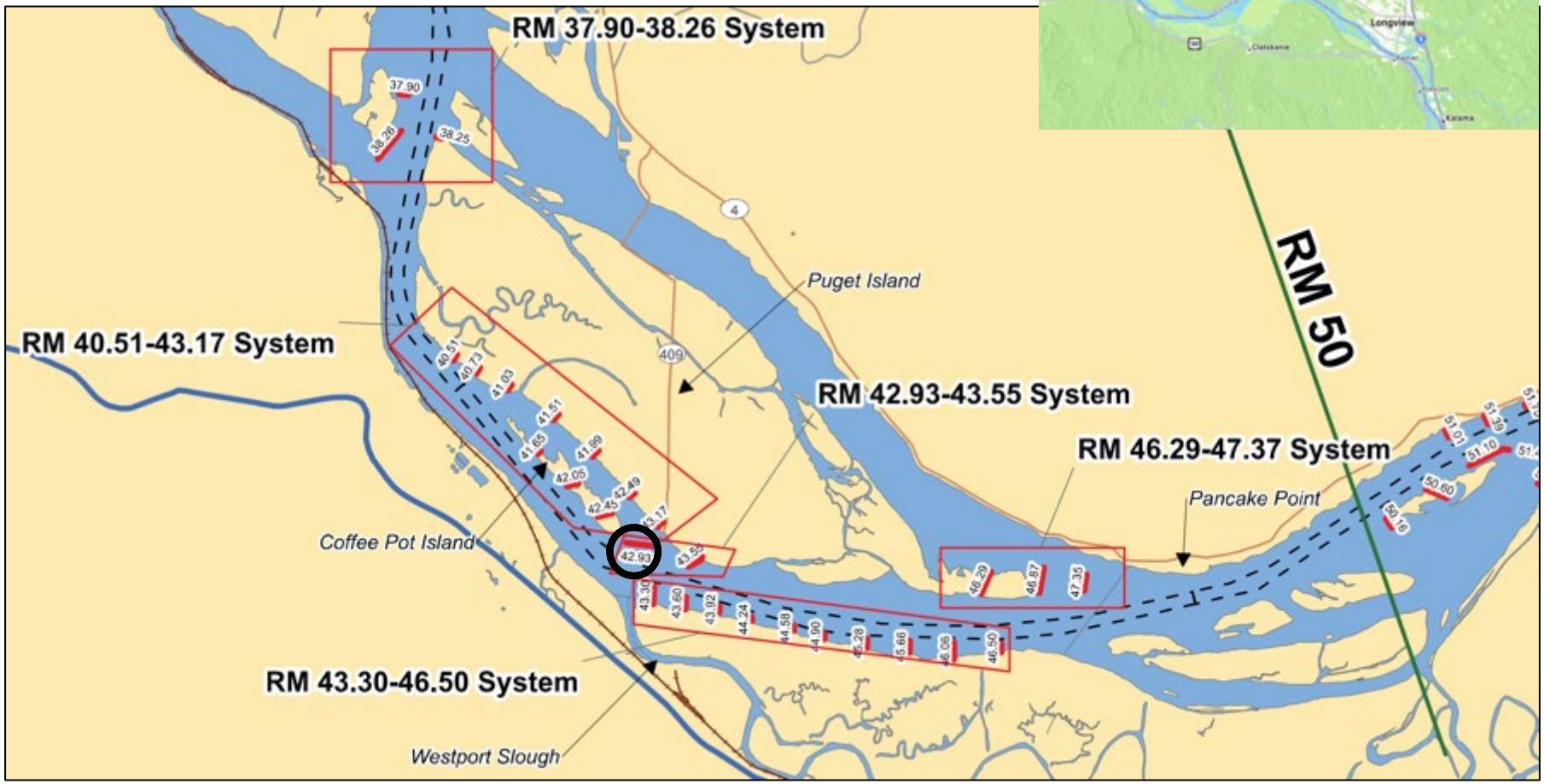
- Installed in 2011 – six antennas
- Primary focus was on upstream returning adults
- Run timing and survival to BON

PD7 Performance – 2011 to 2020

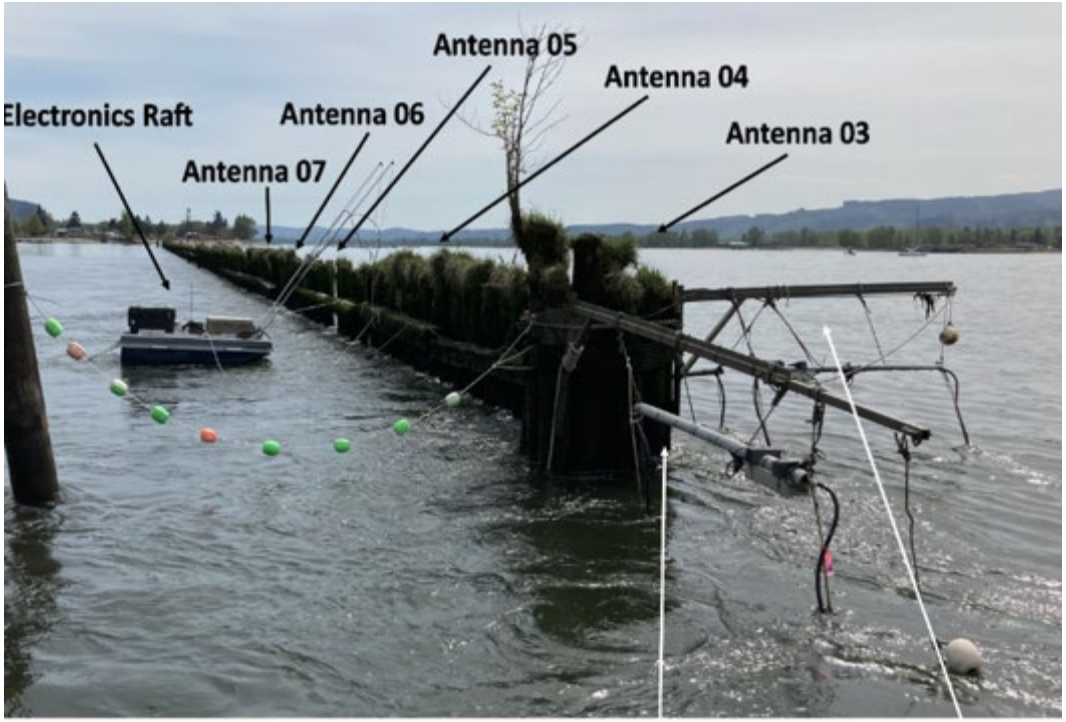


- 1,098 - Total adult detections from 2011 – 2020
- 2,747 - Total juvenile detections from 2011 – 2020

PD6 (RM42.93) - 2022

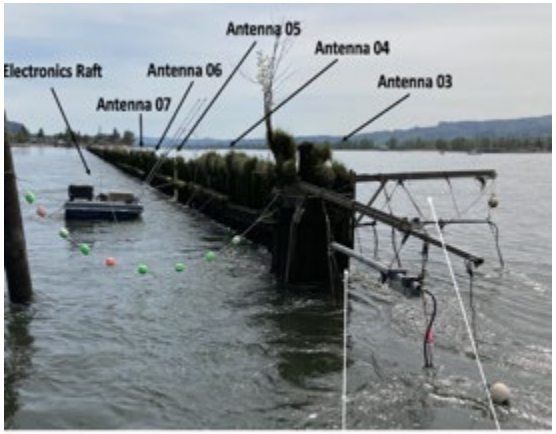


PD6 (RM42.93) - 2022



- Installed in 2022 – seven antennas and a floating electronics platform
- Primary focus was to test detection of out-migrating smolts
- Supplement decreasing trawl detections

2022 – Estuary Detections

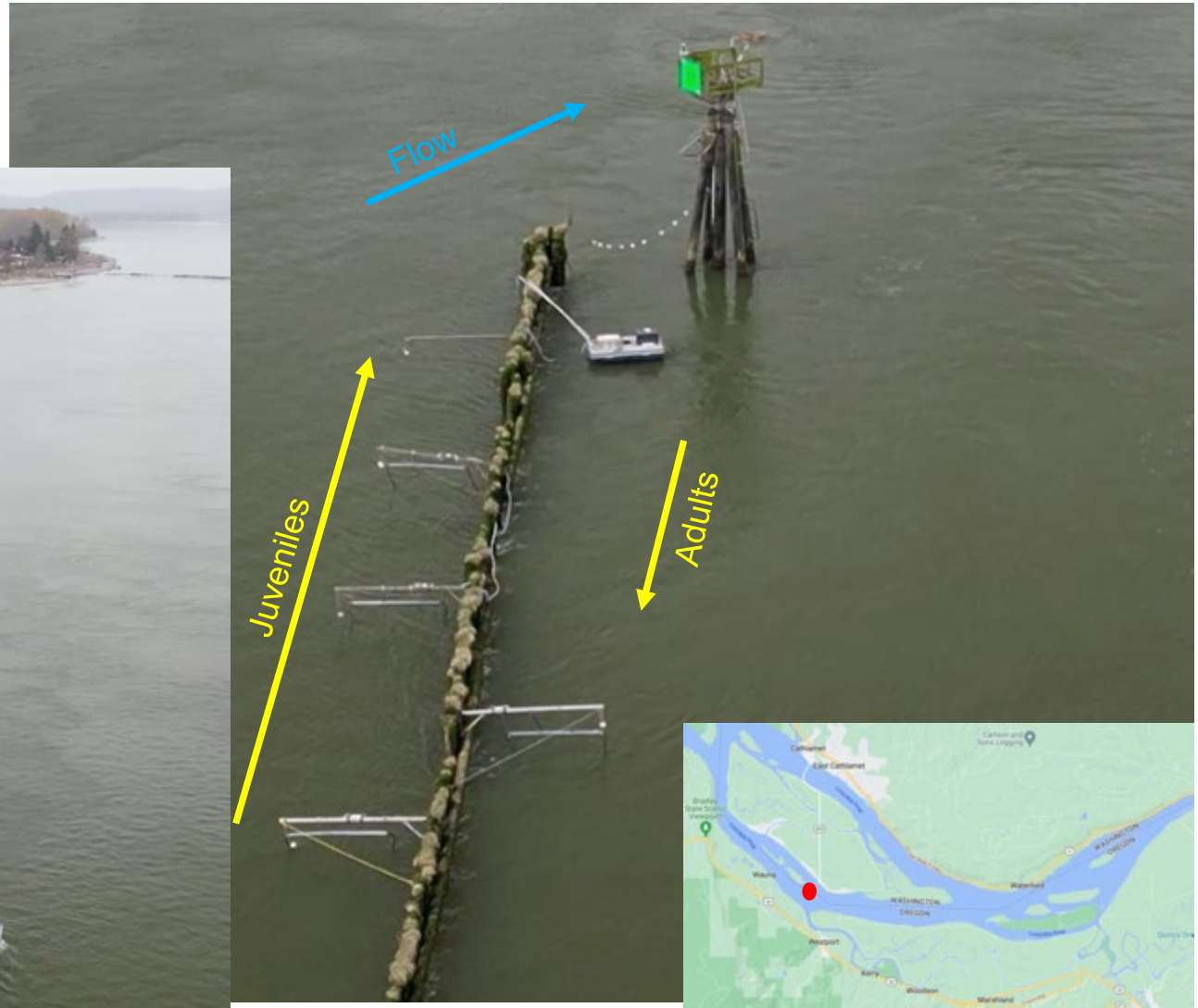


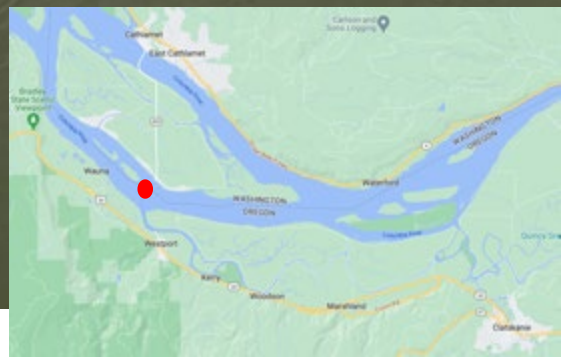
- PD7 – **491**
- PD6 – **3,232**
- TWX – 9,838

2023 – Pile Dike Expansion

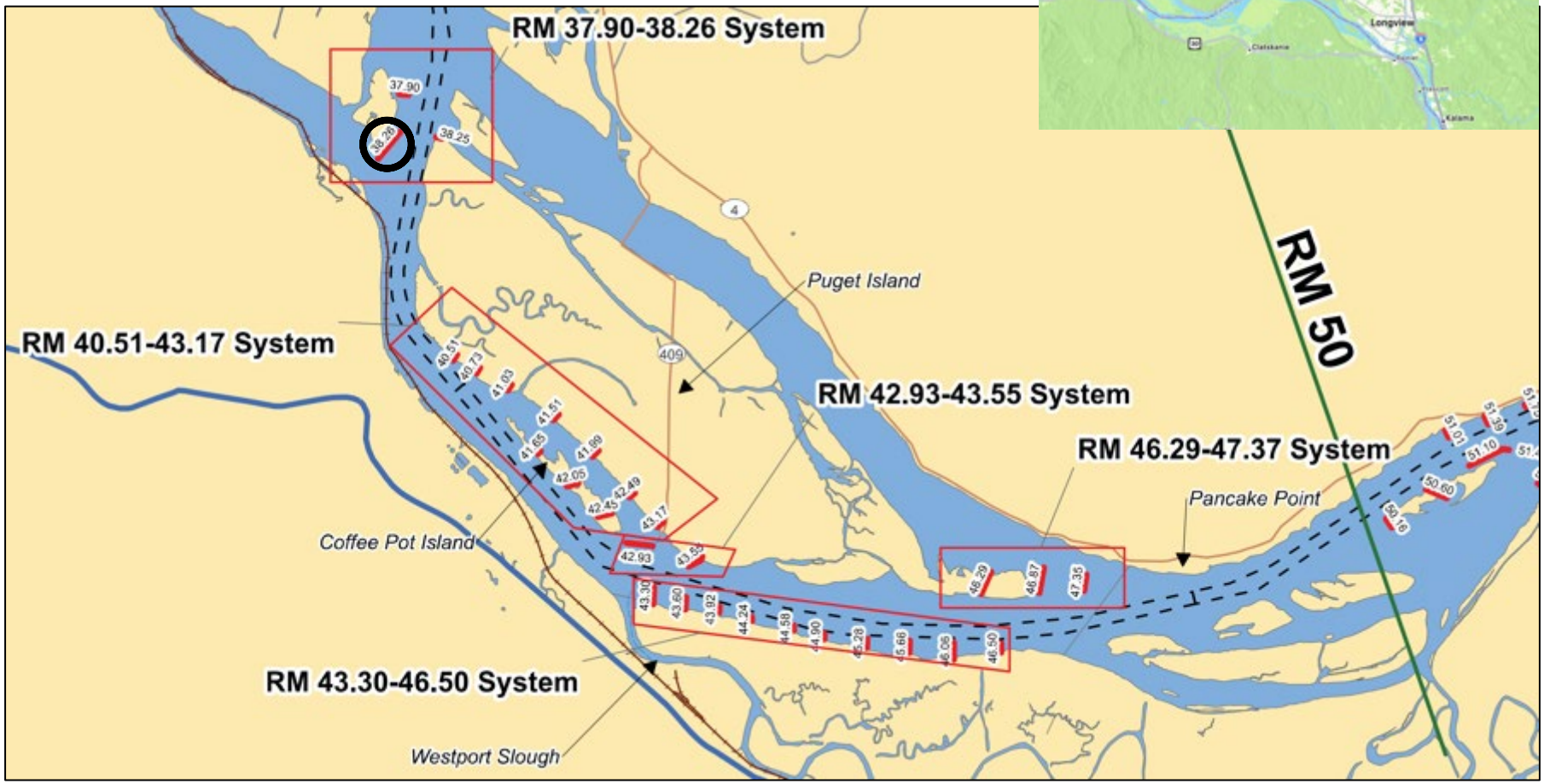
- Funding for MCN and ITS stalled, worked with BPA to move R&D funds to estuary work
- Expansion to four sites, permits allow for up to seven
- Supplemental funding provided by WDFW for adult detections

PD6 (RM42.93) - 2023



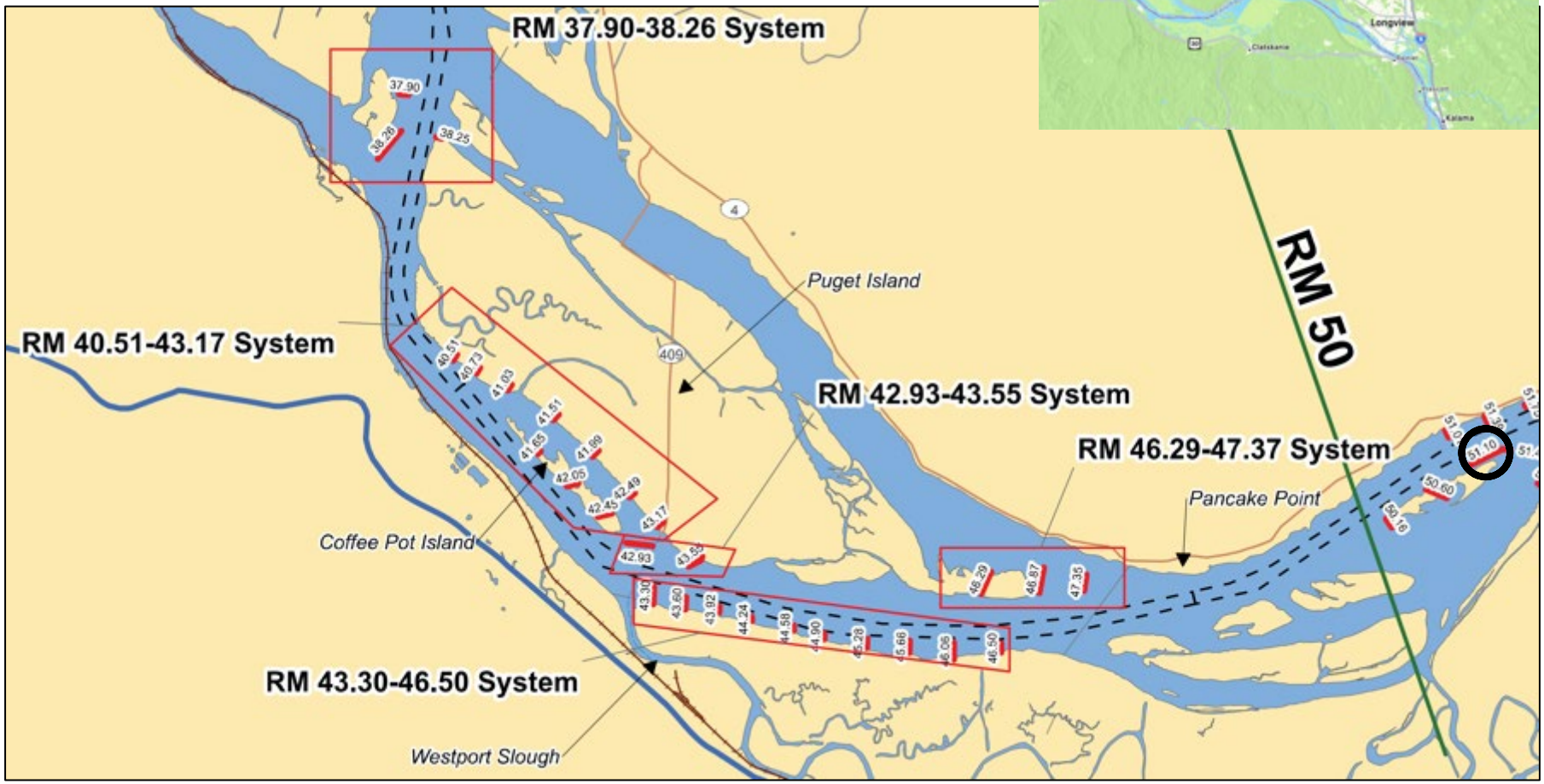


PD5 (RM38.26) - 2023

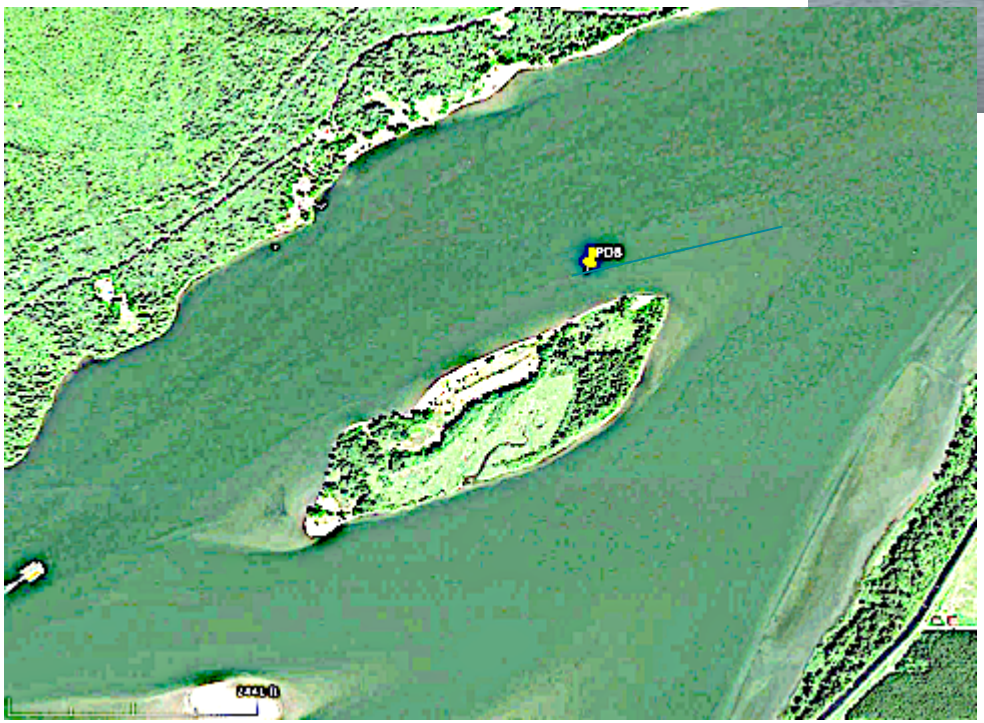


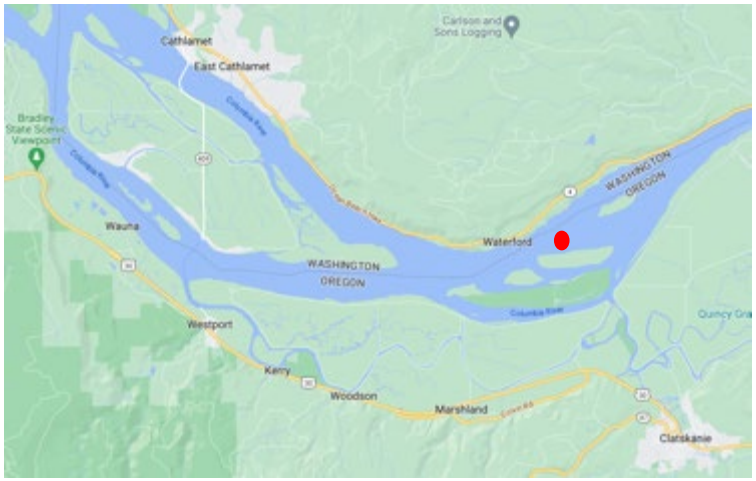
PD5 (RM38.26) - 2023

PD8 (RM51.10) - 2023

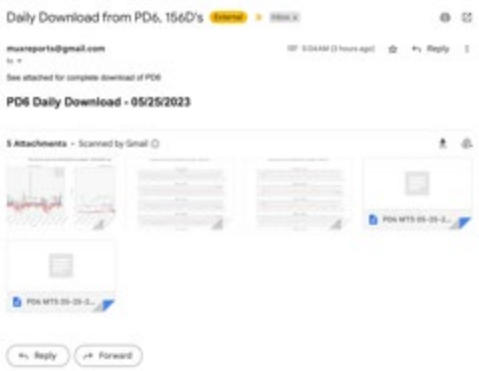


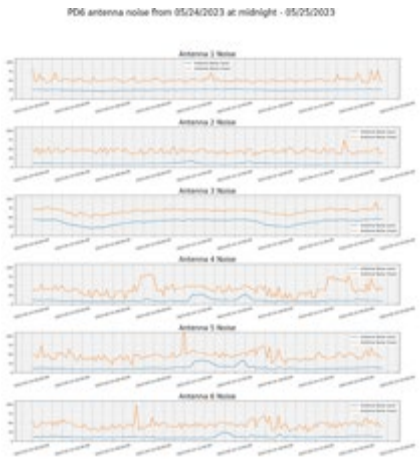
PD8 (RM51.10) - 2023

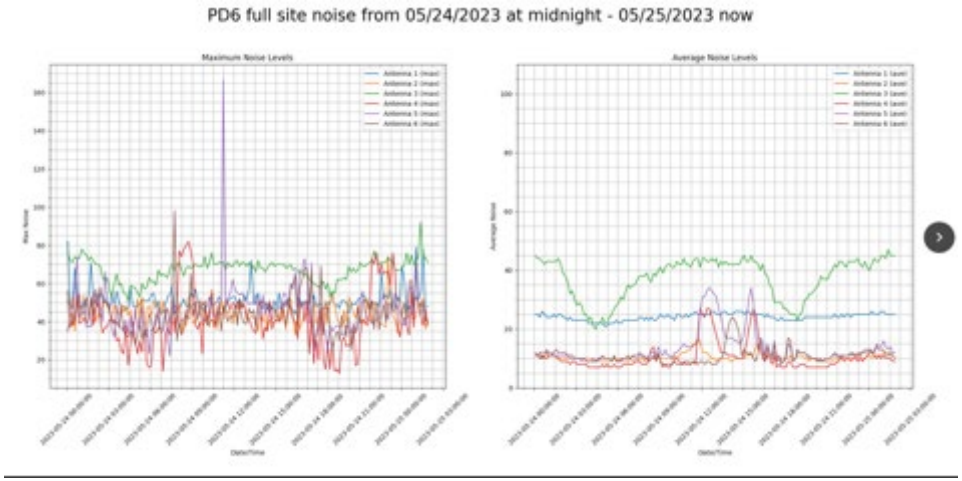




Pile Dike O&M - 2023








```
Number of unique tags detected: 10

Number of unique tags detected per antenna:
Antenna 03: 7
Antenna 04: 3
Antenna 05: 1
Antenna 06: 5
Antenna 07: 4

Cumulative detections per antenna:
Antenna 03: 10
Antenna 04: 4
Antenna 05: 1
Antenna 06: 6
Antenna 07: 10

Detections by Release Year:
2022: 6
2021: 3
2020: 1
Orphans: 0

VTT results:
3E7.0000001D01: 01
3E7.0000001D03: 03 03 03 03
3E7.0000001D04: 04 04 04 04 04 04 04 04 04 04
3E7.0000001D05: 05 05 05 05 05 05 05 05 05 05 05 05 05 05 05 05 05 05 05 05
3E7.0000001D07: 07 07 07 07 07 07 07 07 07 07 07 07 07 07 07 07 07 07 07 07

3DD.003D94FA52: 07:3 06:1 03:2
01/05/2021              Nat. Summer Steelhead   Dworshak NFH, release into mainstem Clearwater River

3DD.00304A1123: 03:1
04/22/2020              Nat. Fall Chinook       Captain John Rapids Acclimation Pond

3DD.003E2180SE: 07:1 03:1
05/11/2022              Wild Coho               Lewis River

3DD.003D865320: 06:1 04:2 03:1
01/19/2022              Nat. Coho               Rolfing Acclimation Pond, Wenatchee River Basin

3DD.003DF7B783: 04:1 03:3
10/28/2021              Nat. Summer Steelhead   Little Salmon River

3DD.003D864C41: 06:1 03:1
01/19/2022              Nat. Coho               Rolfing Acclimation Pond, Wenatchee River Basin

3DD.003D62021E: 07:2 06:1
11/22/2021              Nat. Coho               Mid-Valley Acclimation Pond, Methow River Watershed

384.0F9985A086: 07:4 06:2
07/21/2022              White Sturgeon          Columbia River - Three Tree Point, WA to Lewis River (km 69-140)

3DD.003E370B63: 05:1
09/15/2022              Nat. Fall Chinook       Rufus Woods Net Pens RV Park/Boat Launch

3DD.003D8665B7: 04:1 03:1
01/12/2022              Nat. Coho               Chewuch Acclimation Pond (WDFW)
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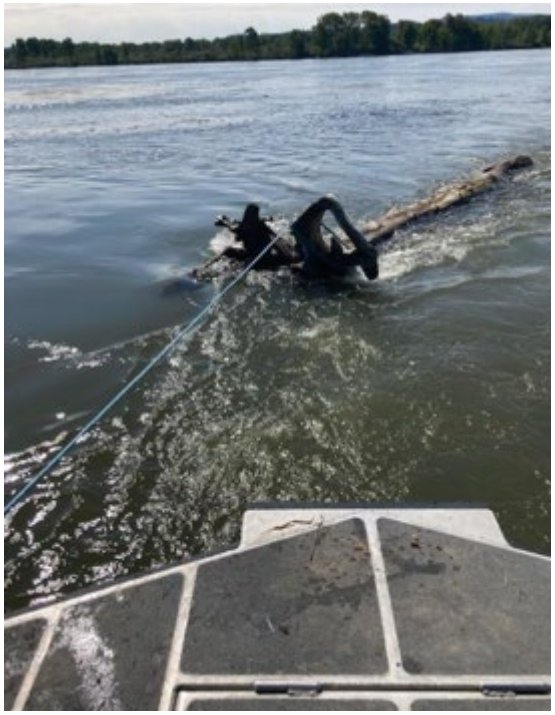
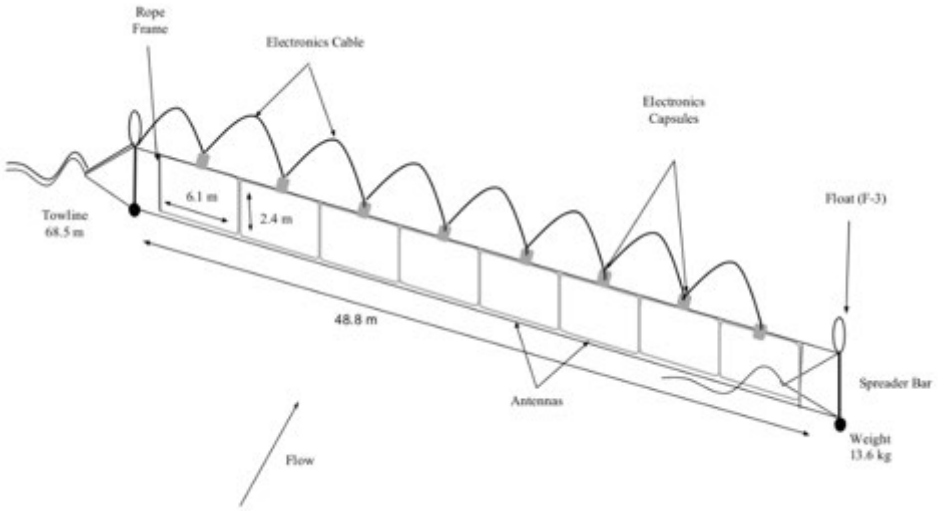
Pile Dike O&M - 2023

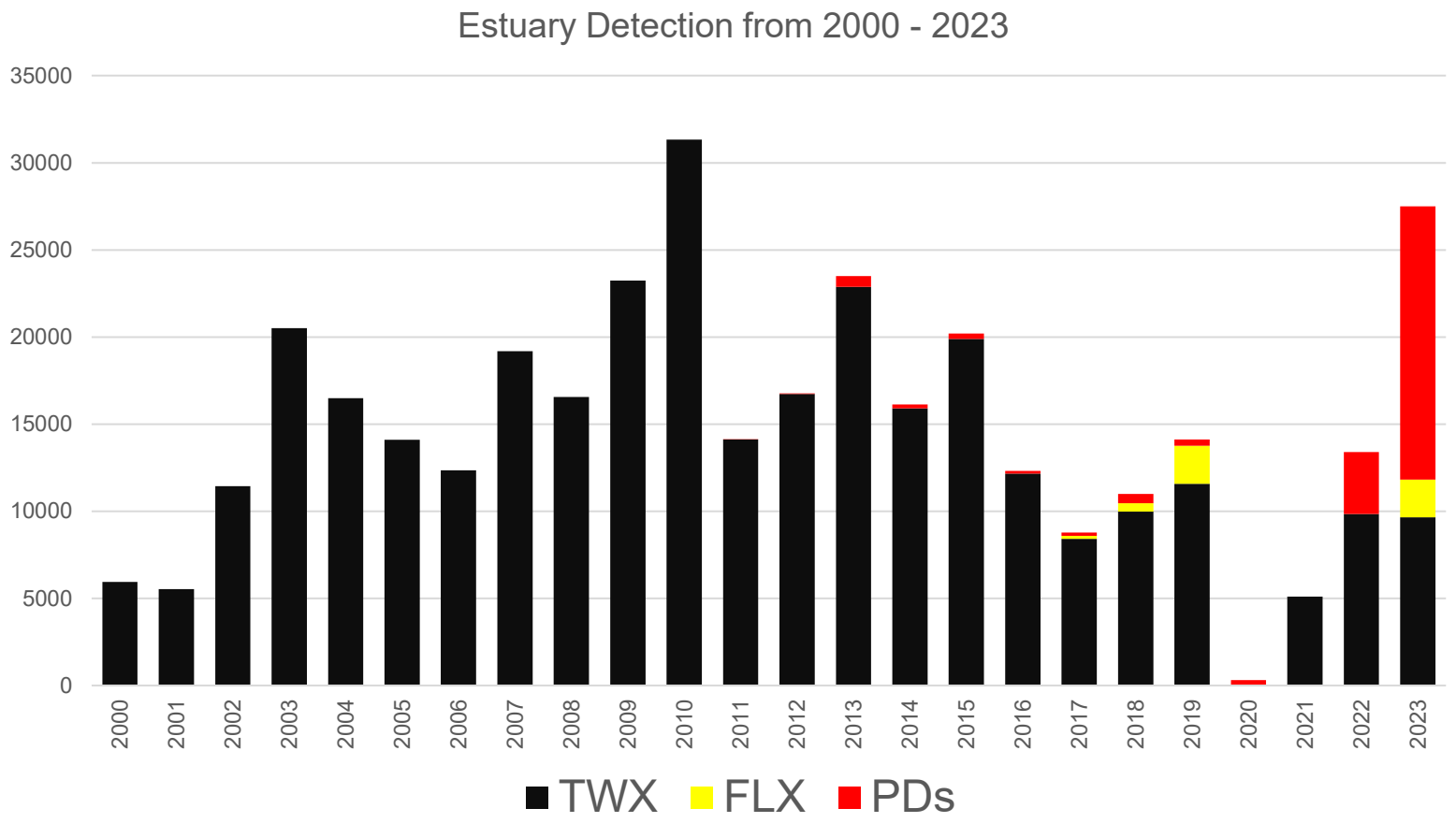


Flexible Array - 2023

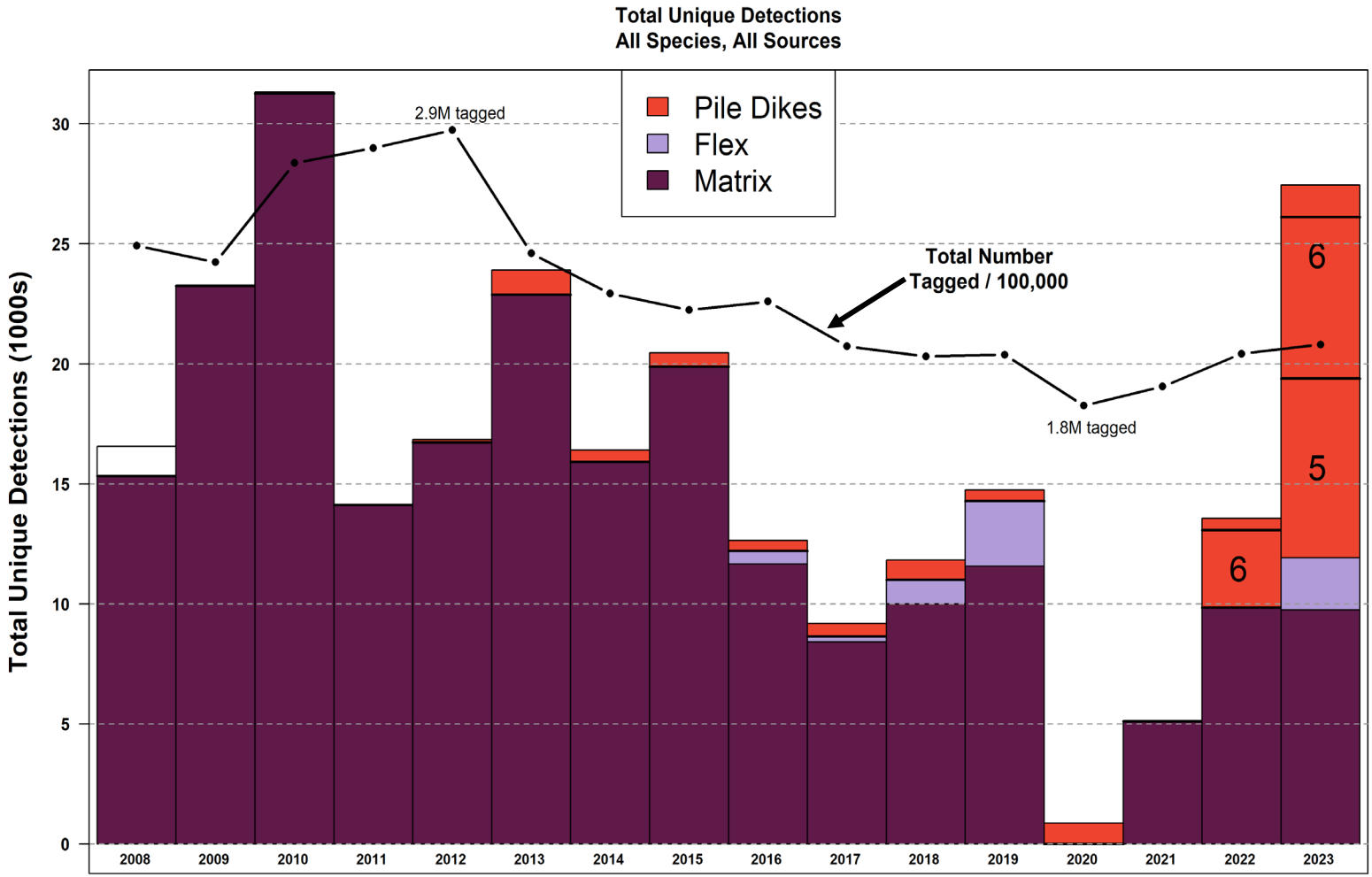


- Operated the FLX system horizontally and during daylight hours to target steelhead
- Installed and operated a net reel to ease deployment and retrieval, reducing staffing requirements and increasing operational safety

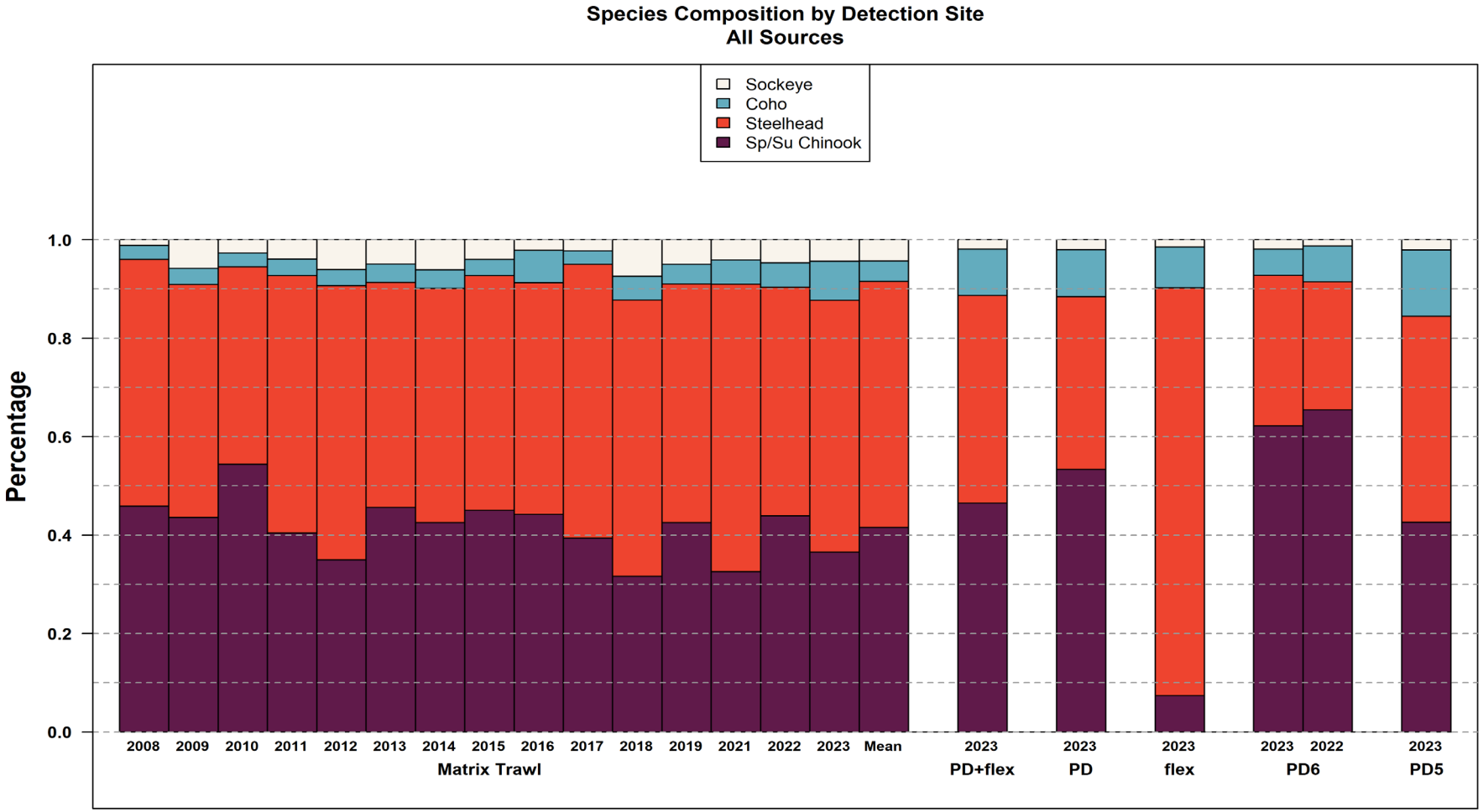
Estuary Detections – 2000 to 2023



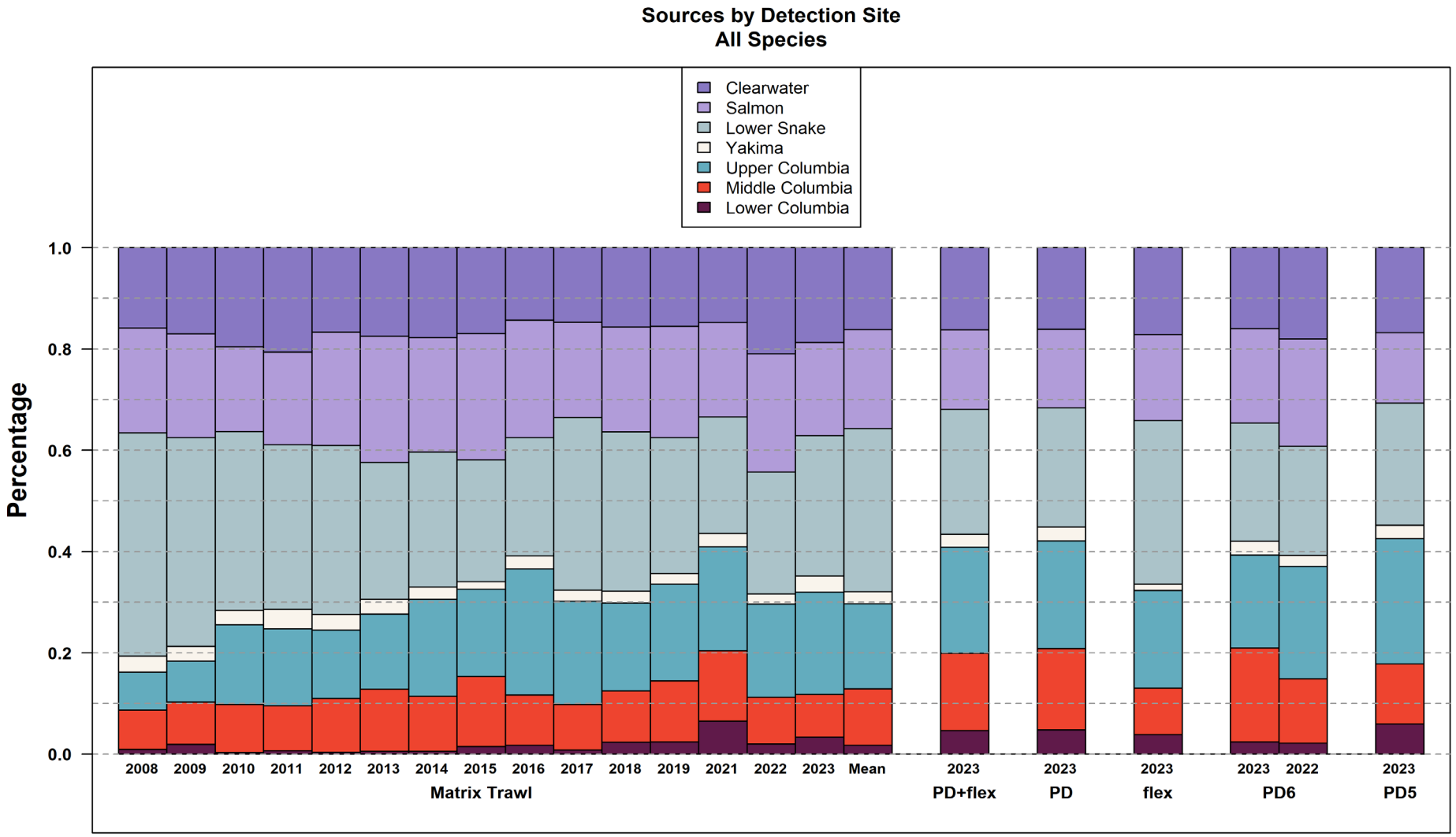
Estuary Detections Results – 2008 to 2023



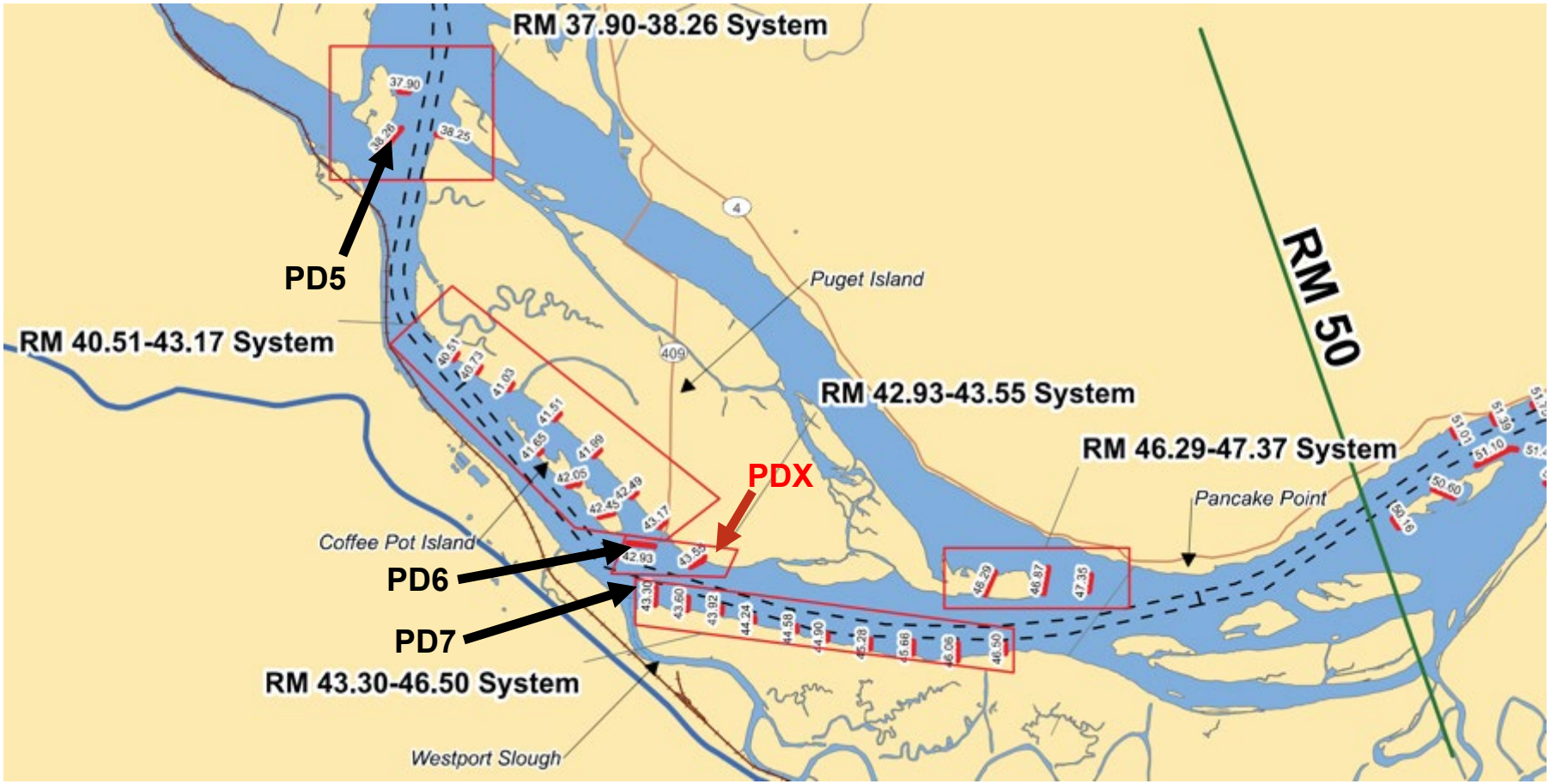
Estuary Detections Species Comp. – 2008 to 2023



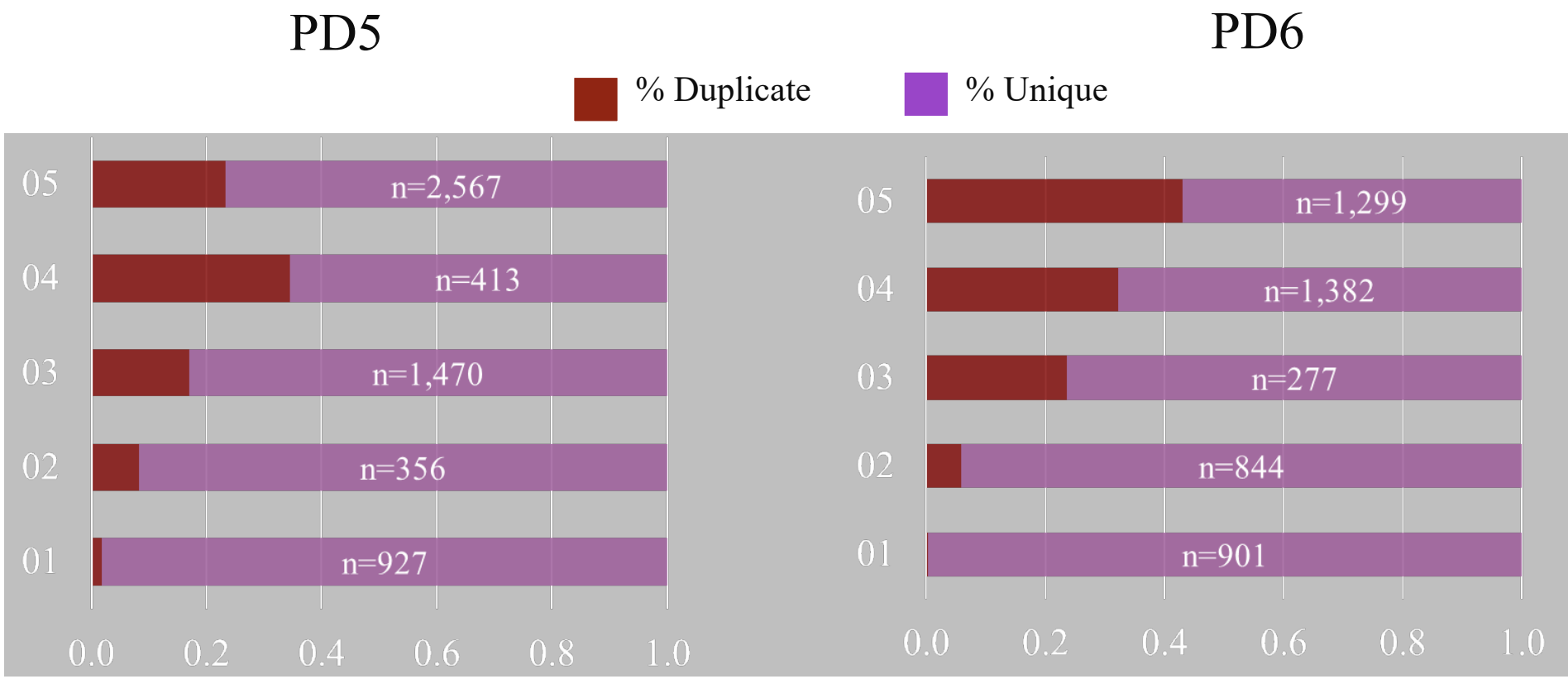
Estuary Detections Basin of Origin – 2008 to 2023



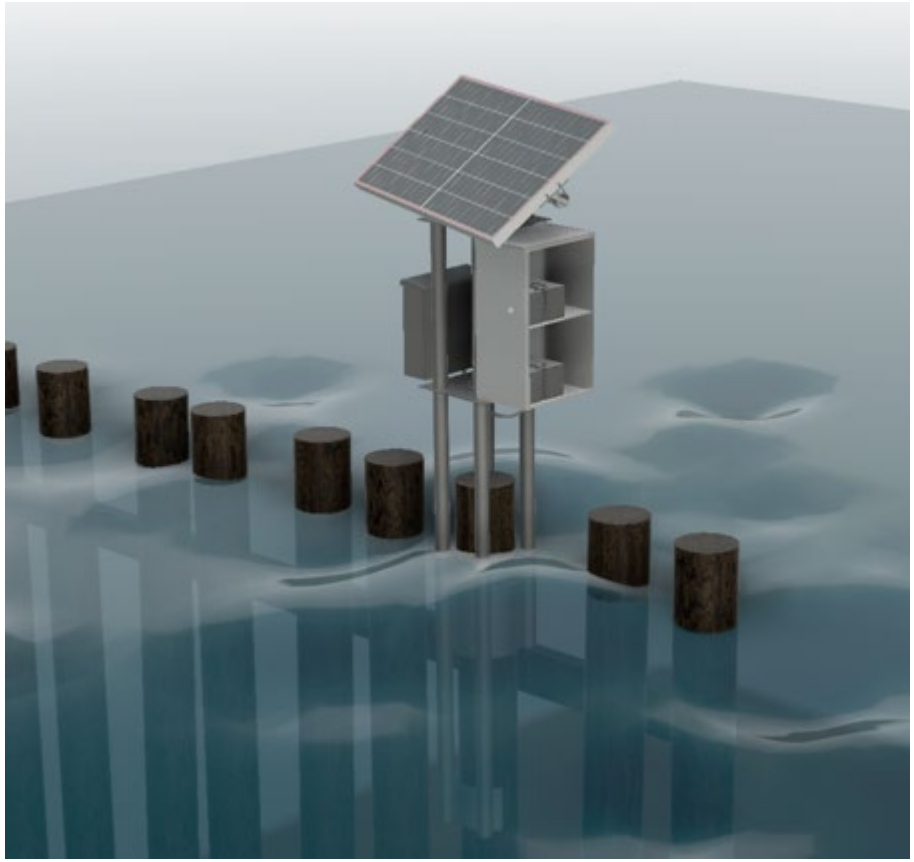
Estuary Detection Expansion – 2024



Estuary Detection Expansion – 2024

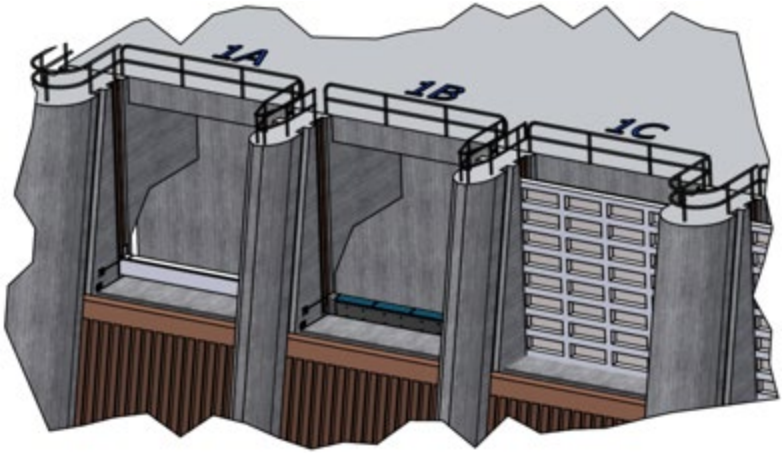


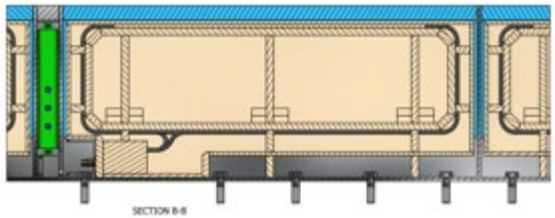
Estuary Detection Upgrades – 2024



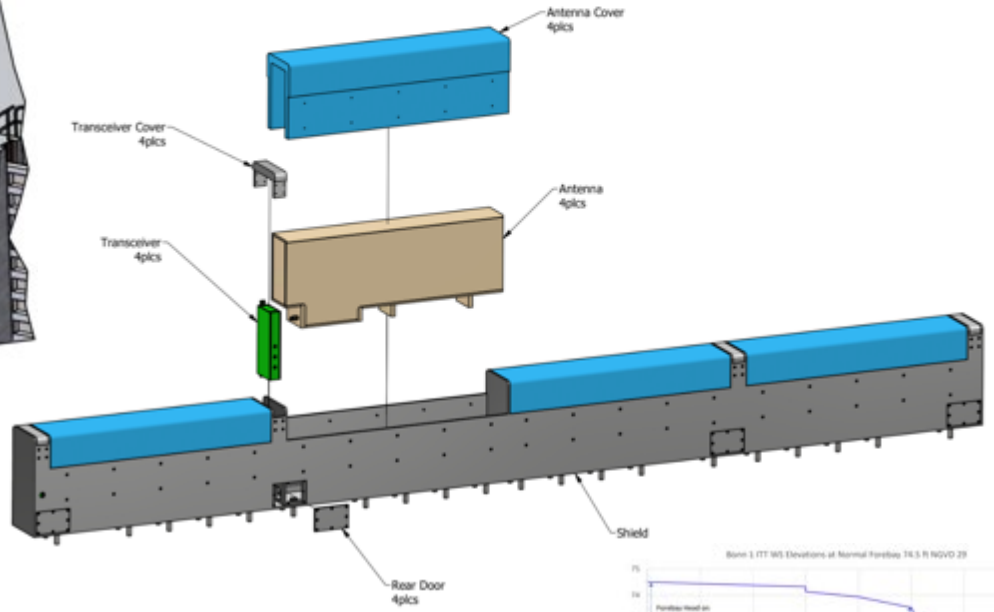
- Four PD sites
  - 3 – “Permanent” (PD5, PD6, PD7)
  - 1 – Additional test site (PDX)
- Expand PD5 and PD6 to 16 antennas each with two “permanent” equipment platforms on each site.

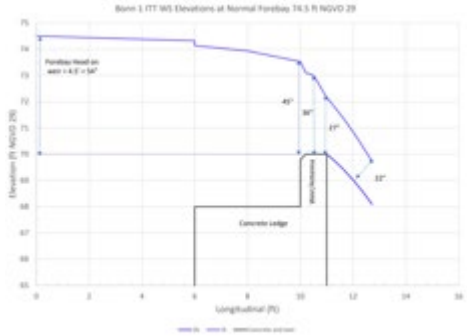
Bonneville ITS Installation – 2024



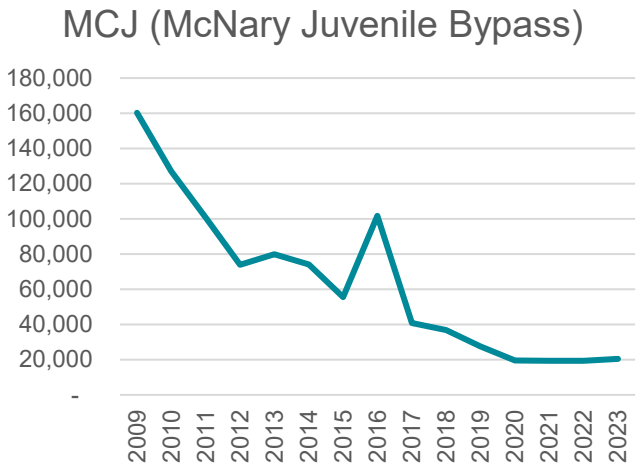


BONNEVILLE PH1 ICE AND TRASH SLUICEWAY
PIT TAG ARRAY FOR GATE 1B



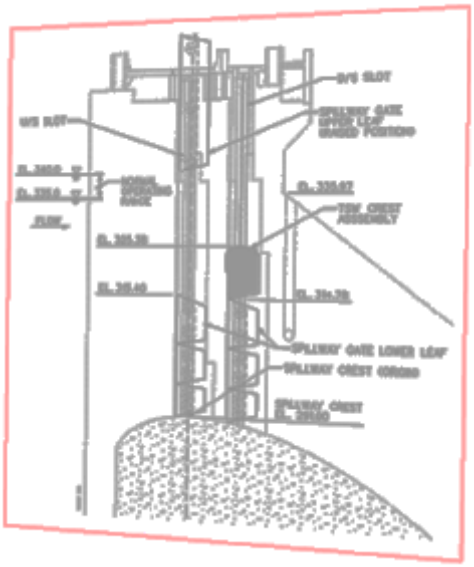


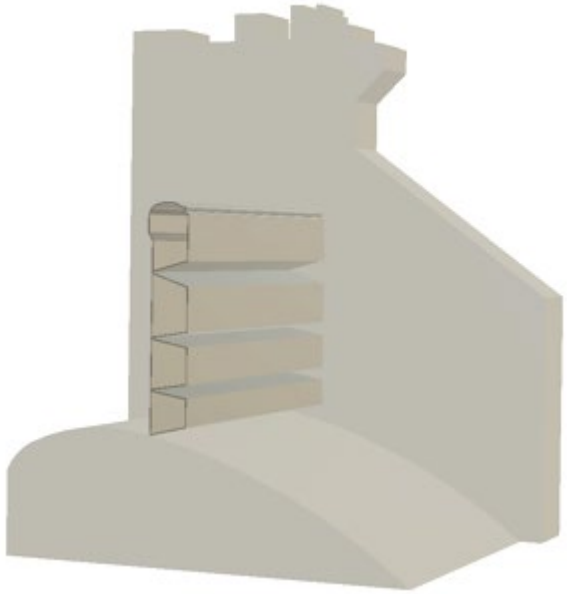
McNary PIT


MCJ (McNary Juvenile Bypass)
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


Umatilla

McNary PIT

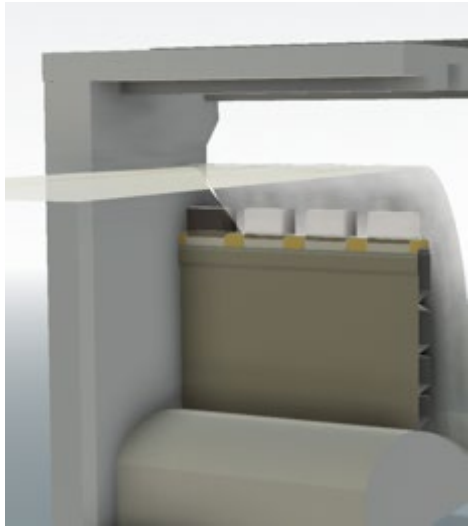




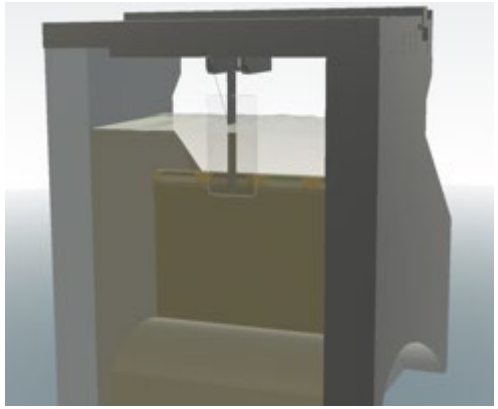
- Take lessons learned from GRS, BON ITS and develop an antenna system for use atop TSWs and ASWs
- Utilize the FS3001 readers and an ITS style antenna
- Antennas would hydraulically mimic weir crest, NOAA hydraulics will be consulted after initial design principles have been established
- Stainless steel structural housings/shields with cross members, pre-flooded compartments to reduce future O&M burden

McNary PIT Proposals

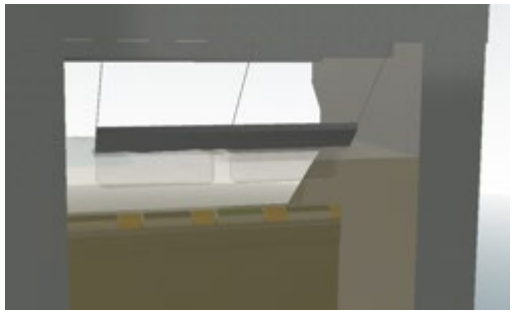
- Read range of 60” could capture approximately 25% of the water column at elev. 340



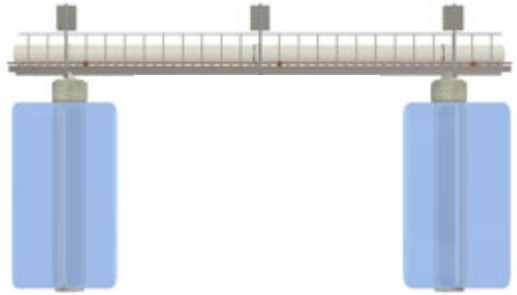
- Read range of 60” could capture approximately 20% of the water with one fin antenna



- Read range of 60” could capture approximately 30% of the water with two antennas

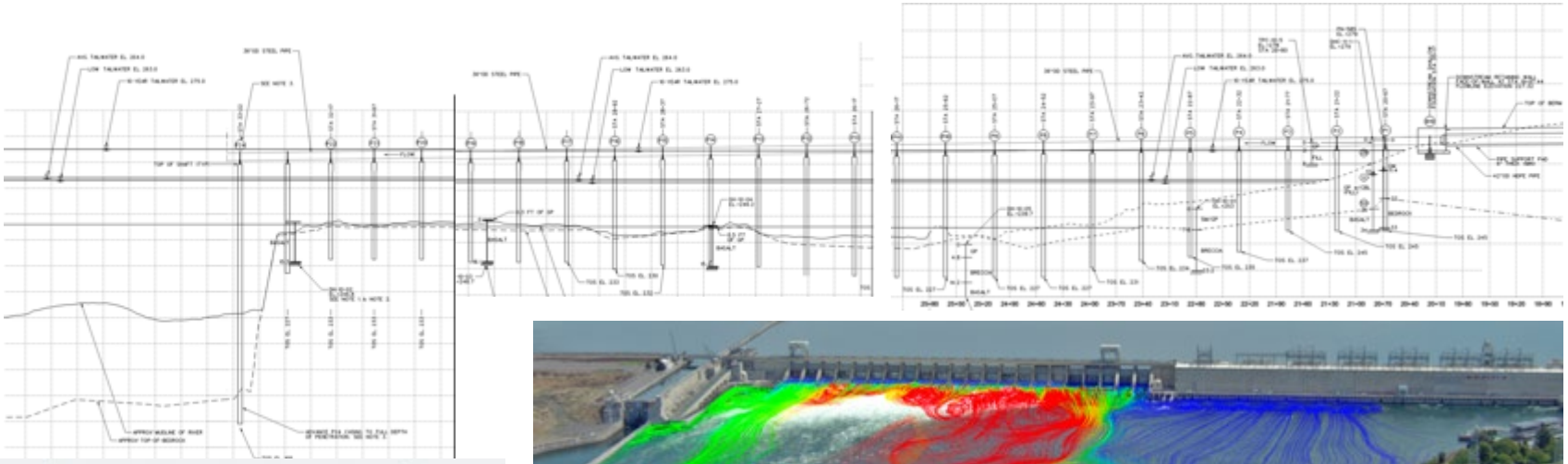


McNary PIT Proposals



- Any structure in the river could be used as a “Pile Dike” type system
- Bridge Columns, outfall piers etc.
- Scalable – Could start with a single antenna

McNary PIT Proposals



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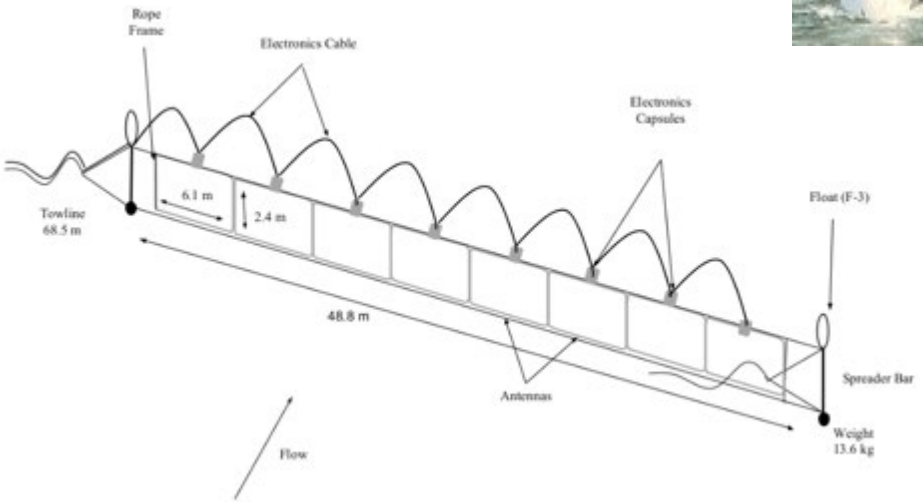
- 24 – 48” concrete pilings with 50’ spacing extending 1200’ into the river
- Option to target certain passage routes based on previous hydraulic and active tag studies

McNary PIT Proposals



- Flexible antenna array
- PIT Barge placement

Questions?

Acknowledgments: