

Using Passive Integrated Technology to Characterize and Quantify Steelhead Populations in White Creek (Klickitat River)



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Background

White Creek Steelhead

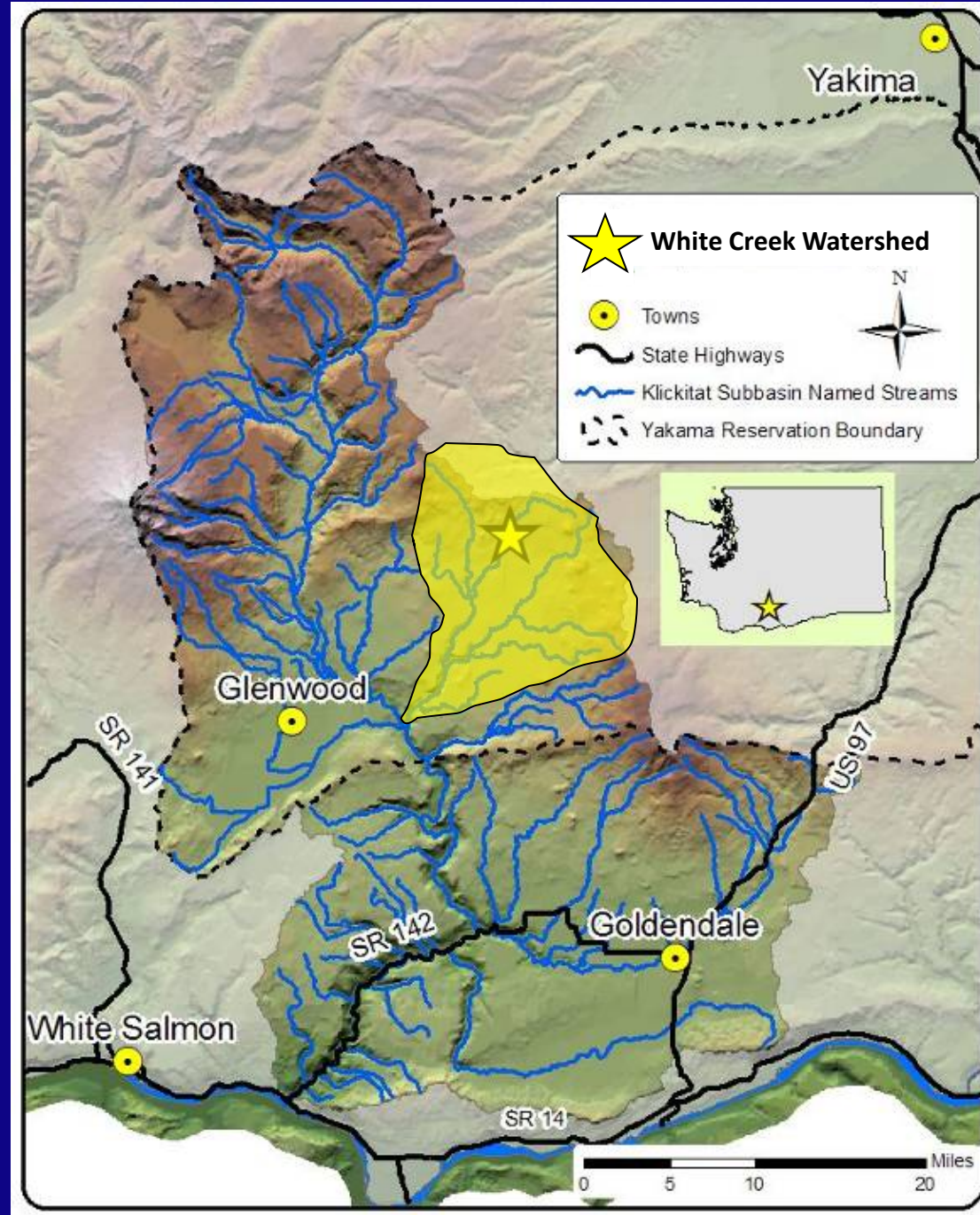


Objectives

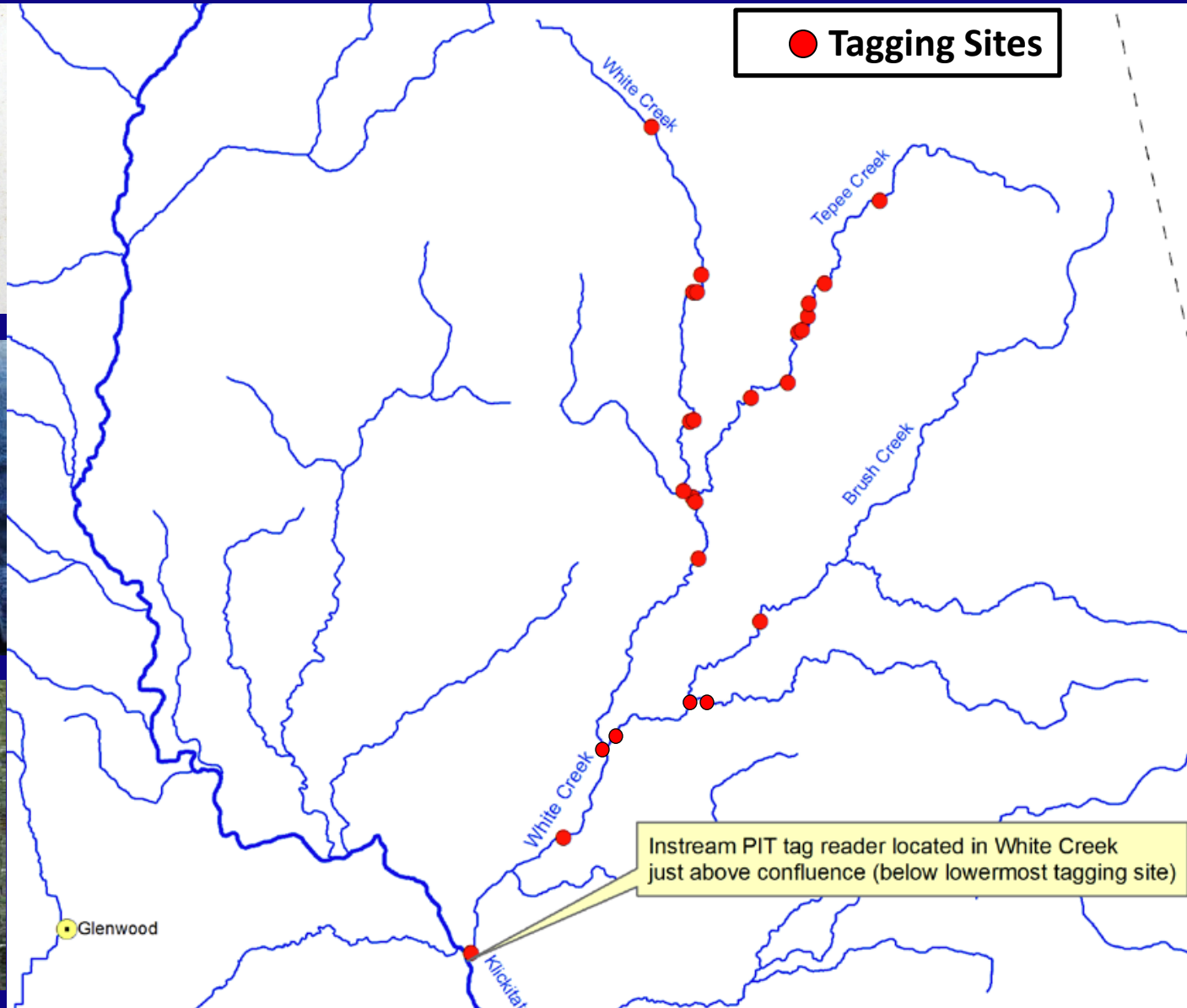
- **Quantify and Monitor *Oncorhynchus mykiss* Populations**
 - **Temporal and Spatial Movement Patterns**
 - **Juvenile Out-migration Timing**
 - **Adult Emigration**
 - **Identify and Document Life History Strategies**
- **Quantify Steelhead Production**

White CK Location

- Klickitat River tributary
- Columbia R. basin
- south-central Washington State
- east-slope of Cascade Mountains
- 16 miles SE of Mt. Adams
- within Yakama Nation Reservation



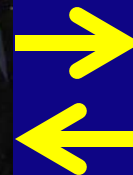
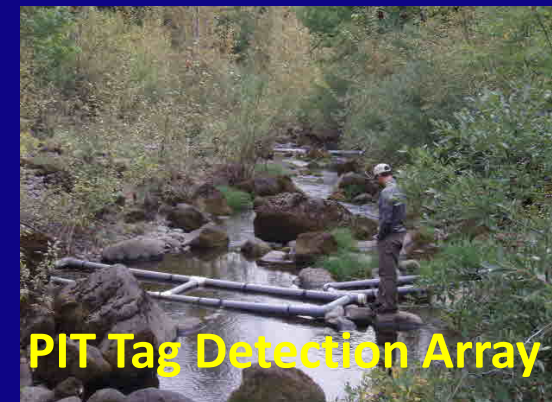
Tagging Sites



PIT Tag Study – Methods



Data Output
| 01 05/12/10 10:11:42 3D9.1C2CBC4456 FF 02
| 01 05/12/10 10:17:32 3D9.1C2CBC4456 FF 04
| 01 05/12/10 10:19:30 3D9.1C2CBC4456 FF 06



Schematic of White Creek PIT Tag Array Configuration



Flow



Antenna #2

Antenna #1

Array A

Antenna #4

Antenna #3

Array B

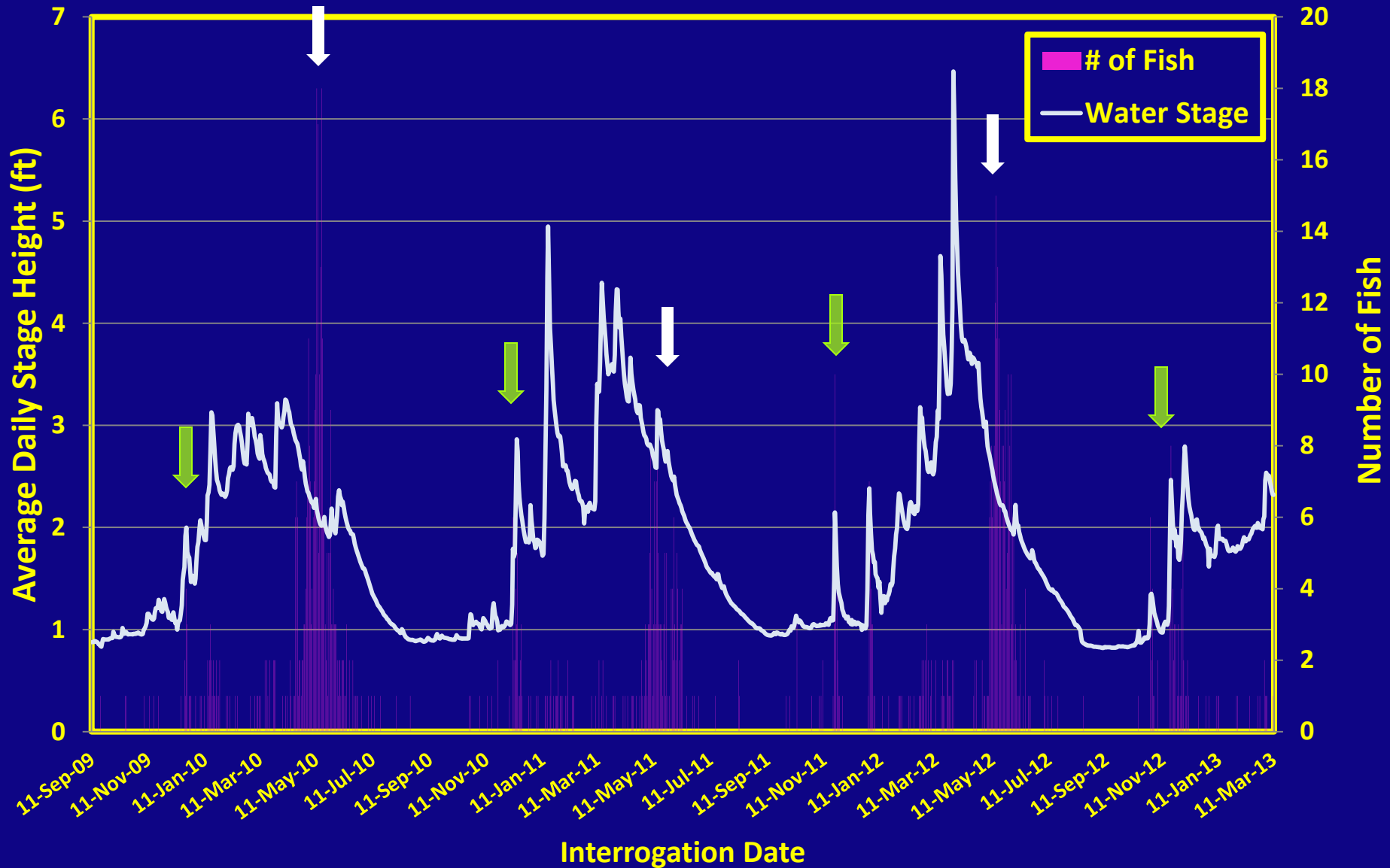
Antenna #6

Antenna #5

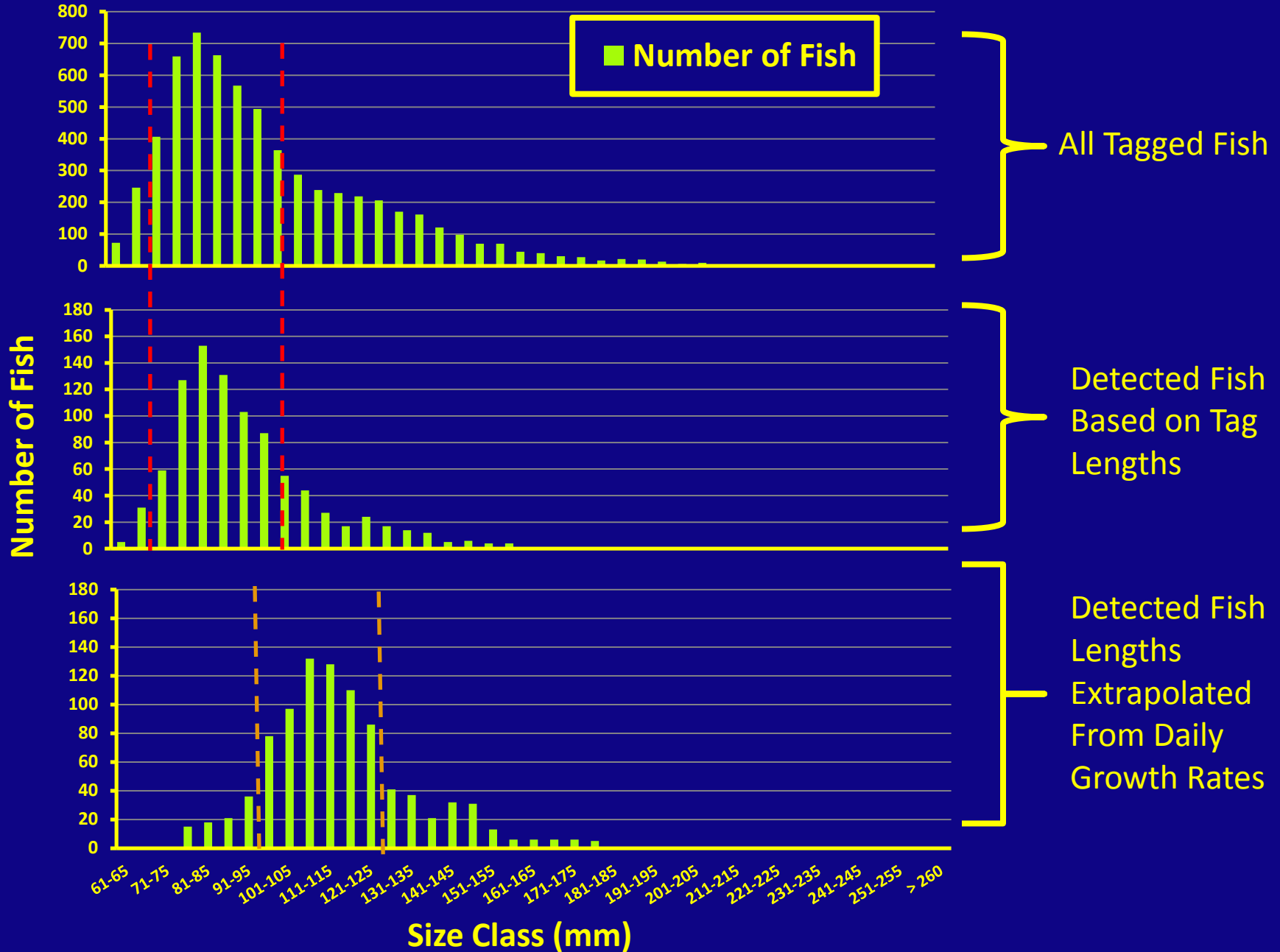
Array C

Results

White Creek *O. mykiss* Out-migrant Timing 2009-2013

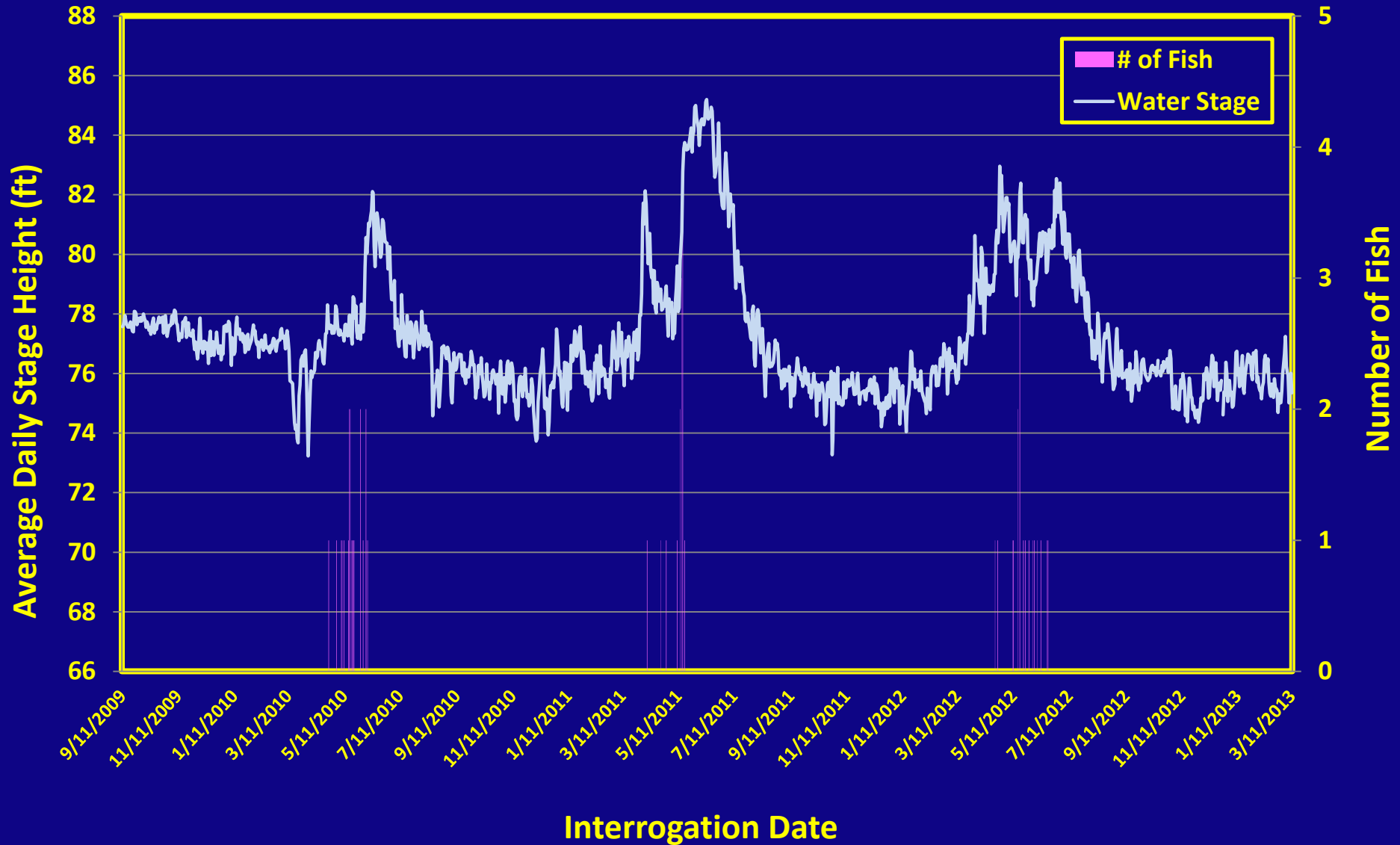


Length Frequency Histograms



Results

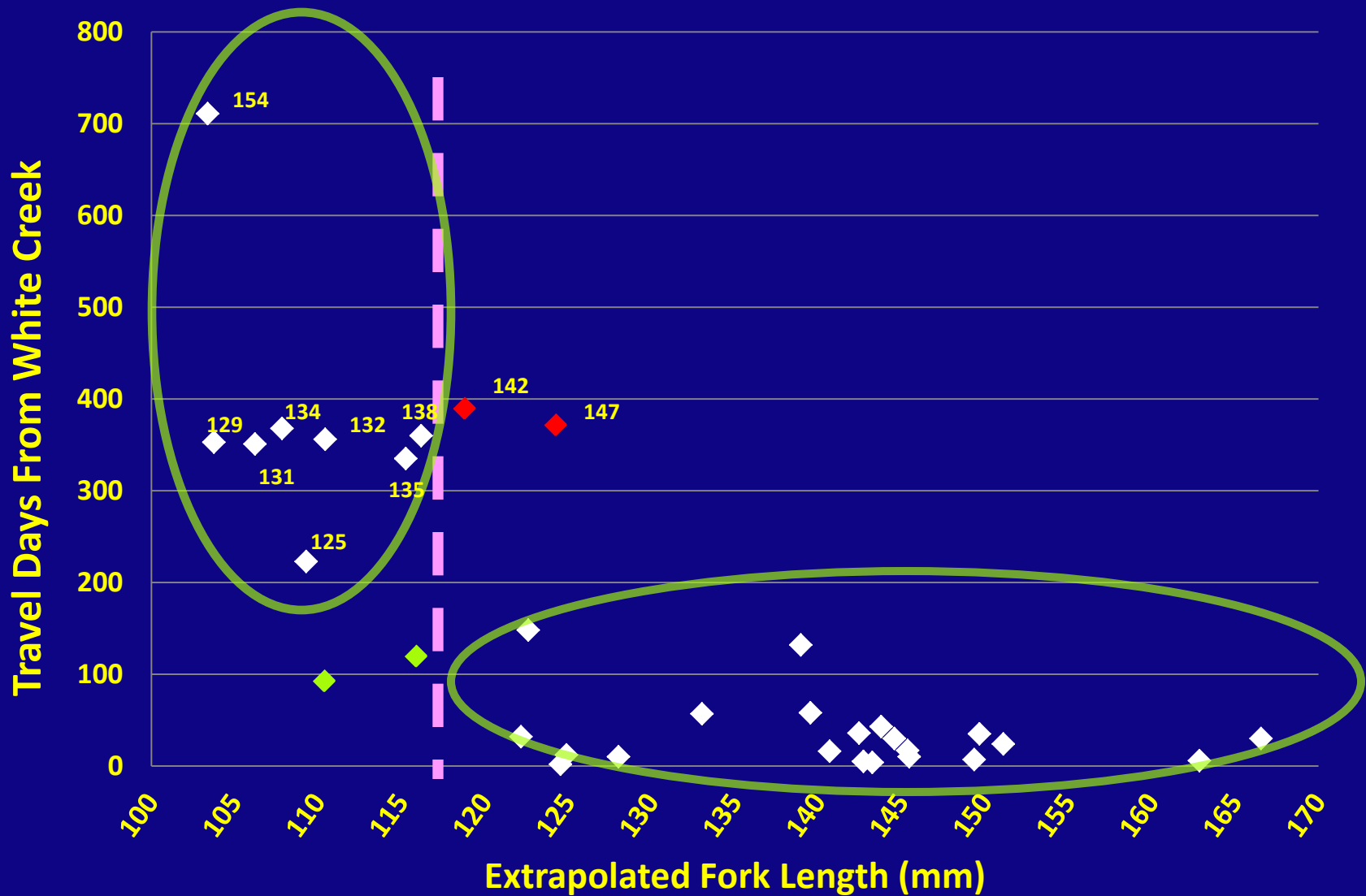
Bonneville O. mykiss Out-migrant Timing 2009-2013



Spatial Locations of Bonneville Detections (n=56) From 2009 Tagging Cohort

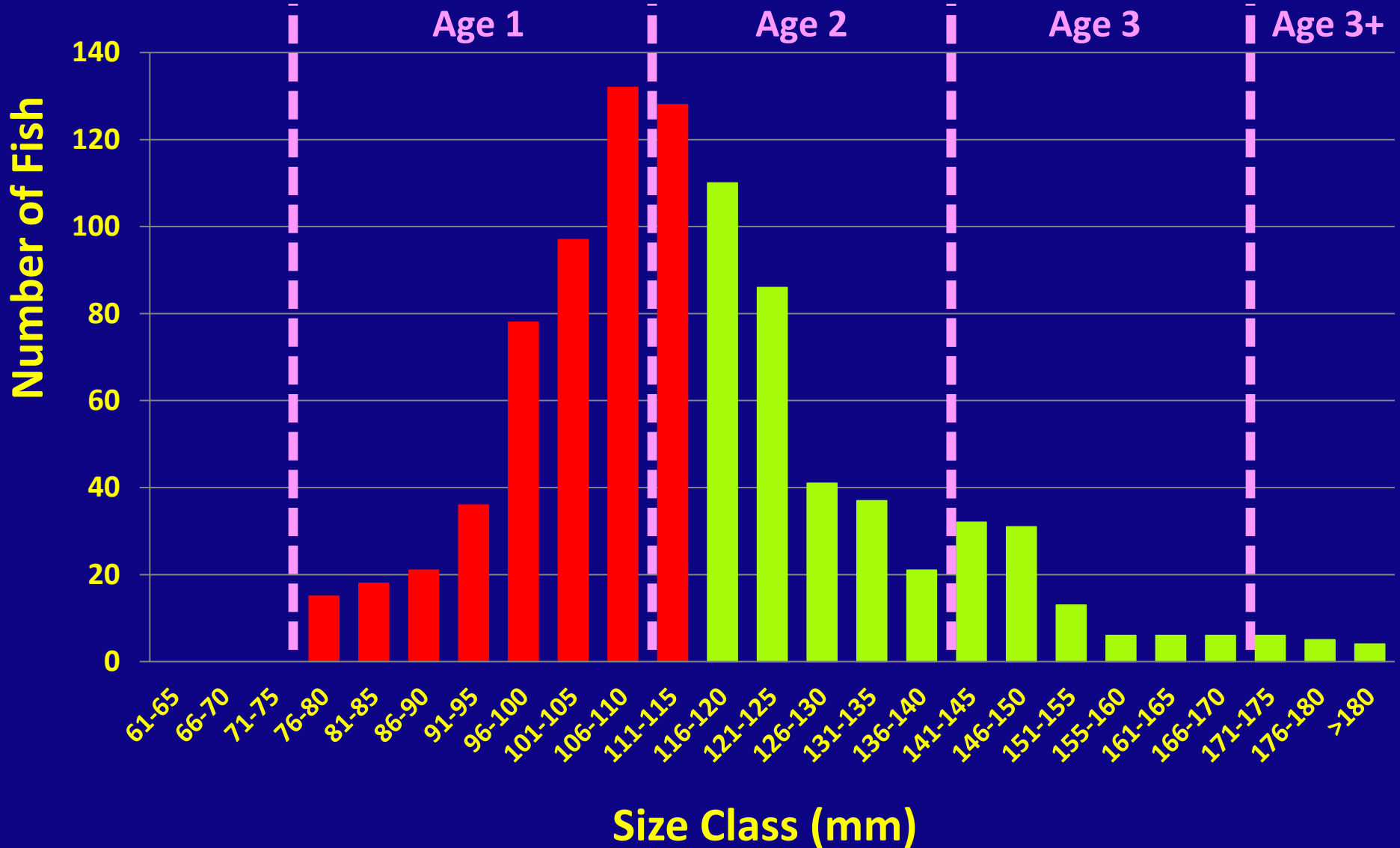


Relationship Between Extrapolated Fish Length and Travel Time to Bonneville (n=33)



Length Frequency of Fish Detected at the White Creek Array from Extrapolated Lengths and Rearing

White and Klickitat Rearing
White Creek Rearing



Juvenile Steelhead Life History



Juvenile Steelhead Life History



Juvenile Steelhead Life History



What would the “Oracle” do?

- Diversify
- Hedge Bet
- Spread Your Risk



Juvenile Steelhead Life History

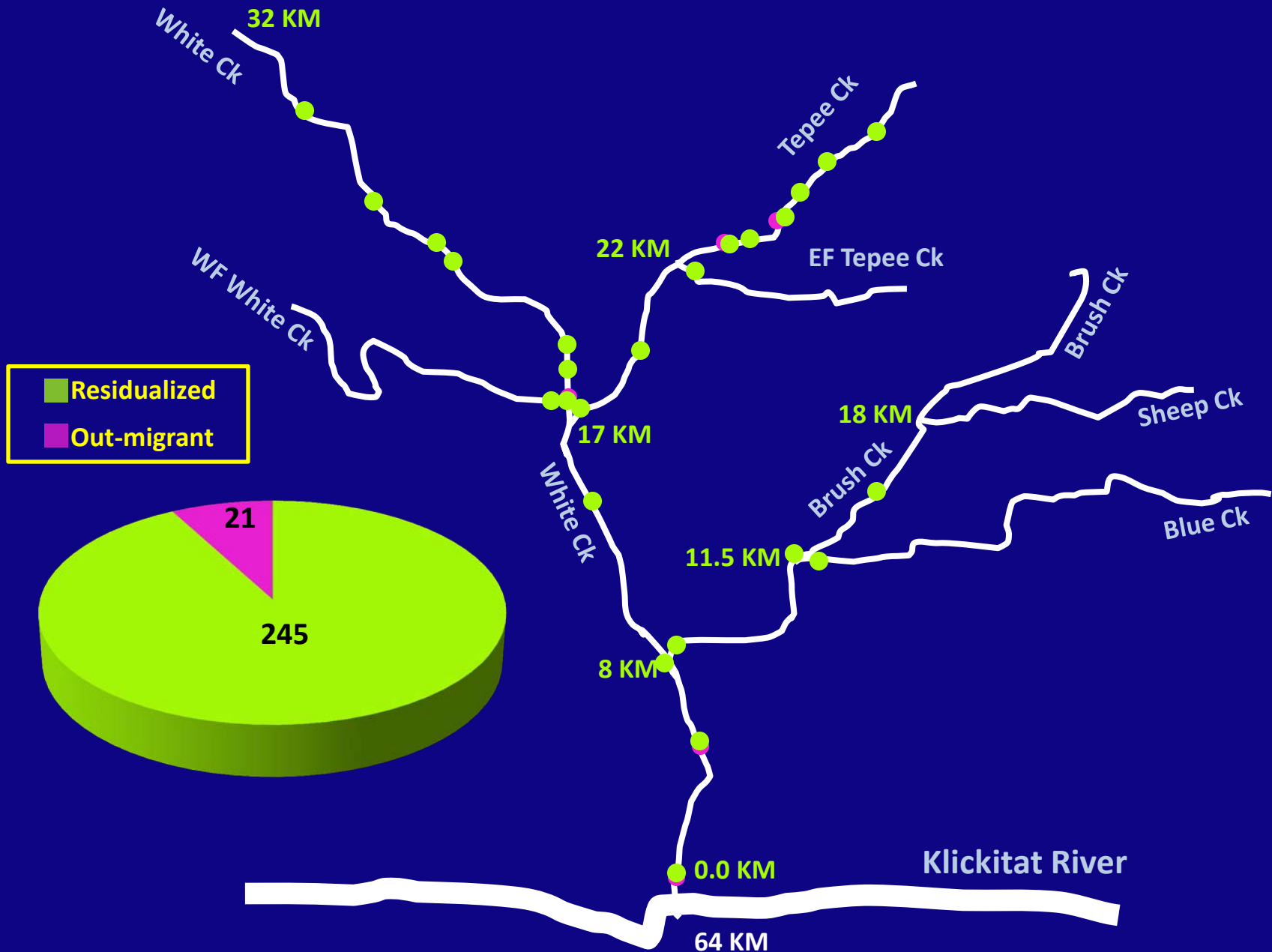
Big Muddy Creek



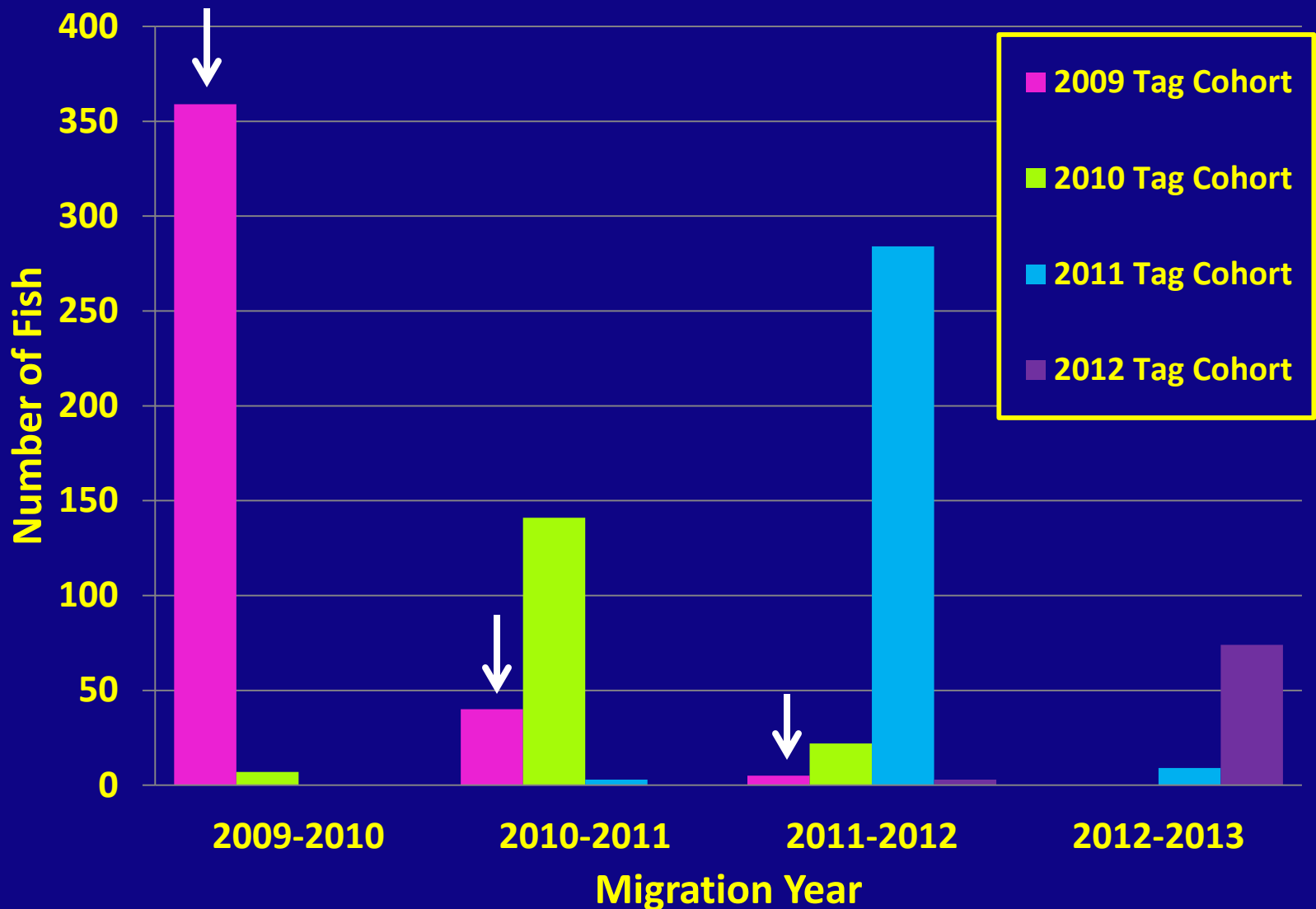
Klickitat River



Spatial Distribution of Recaptured Fish



Out-migration Detections at the White Creek Array by Annual Tagging Cohort and Migration Year



Percent Steelhead Out-migration by Area for 2009 Tagging Cohort



Moving Forward

- **Continue Monitoring at Current Level**
- **Quantify Adult Steelhead Emigration**
- **Genetic Analysis**

Conclusions

- **Bi-modal juvenile out-migration pattern.**
- **Juvenile steelhead migrate down Columbia at or near peak of the hydrograph**
- **Two life history forms exhibited by juvenile steelhead**
- **Residualized fish constitute the dominant life history**
- **Steelhead production occurs throughout the basin**

Acknowledgements

- **Funding:**

- BPA (Bonneville Power Administration)

- **Materials:**

- USGS (United States Geological Survey)
- Yakama Nation

- **Contributing Personnel:**

Sandy Pinkham, Roger Begay, Jeremy Takala, Jacob Richards, Roger Stahi, David Lindley, Joe Zendt, and Shane Keep

