

# Steelhead Escapement to Upper Columbia in (near) Real Time

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[https://apps.wdfw-fish.us/escapement/uc\\_steelhead\\_escapement](https://apps.wdfw-fish.us/escapement/uc_steelhead_escapement)

# Motivation

- To provide tools and information to manage steelhead fisheries in the Upper Columbia
- Near real-time estimates of escapement, by origin and spatial area
- Accessible via online WDFW app



# When Can We Fish?



## Mainstem fisheries

- 9,550 steelhead over Priest Rapids
- Min. 1,330 natural origin

## Tributary fisheries

- Meet escapement targets
- Closed when hit take limit



# Outline for Today

## Basis for this tool

- Data
- Analysis

## Results

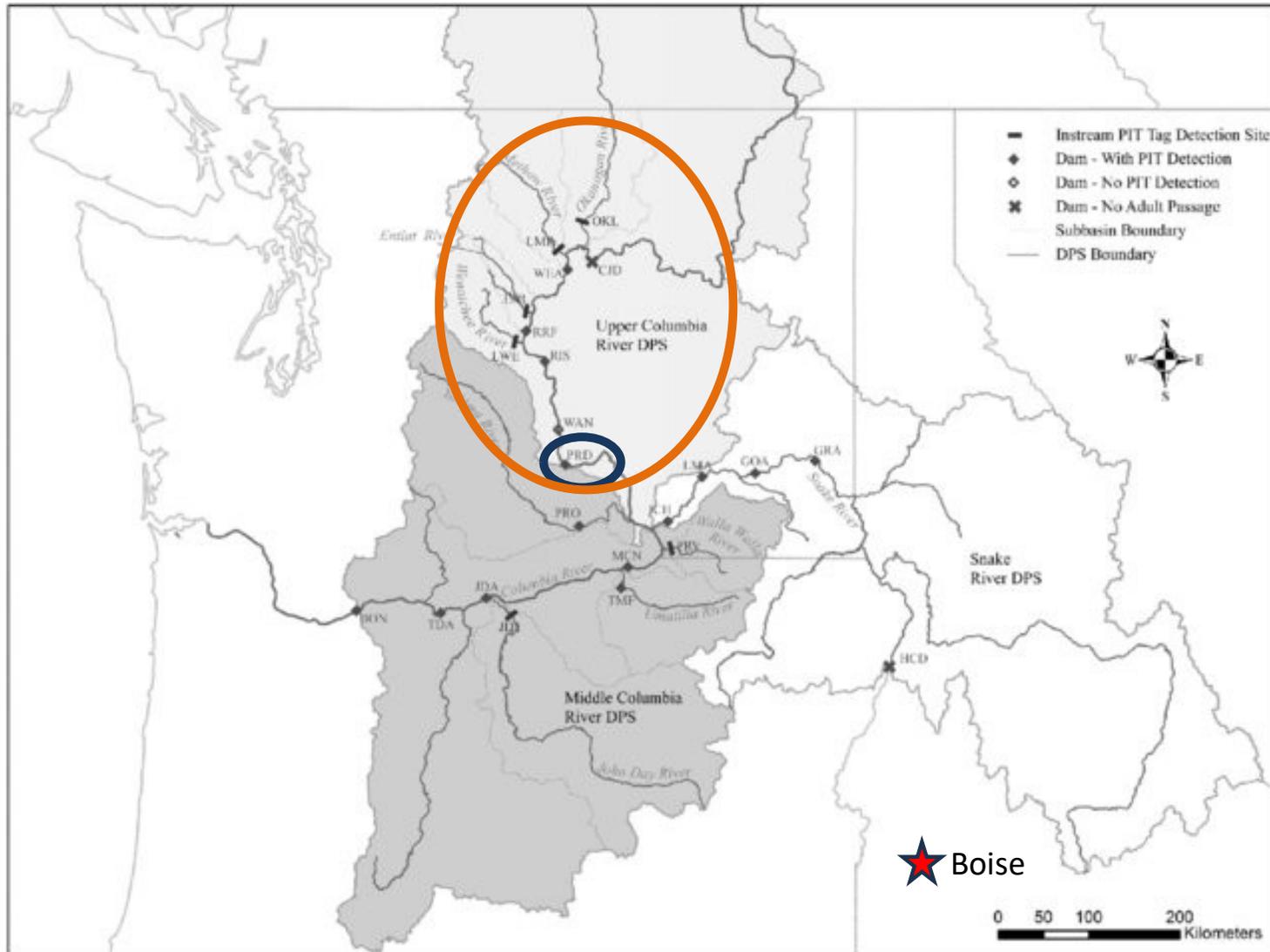
- Tour of app

## Questions / Suggestions





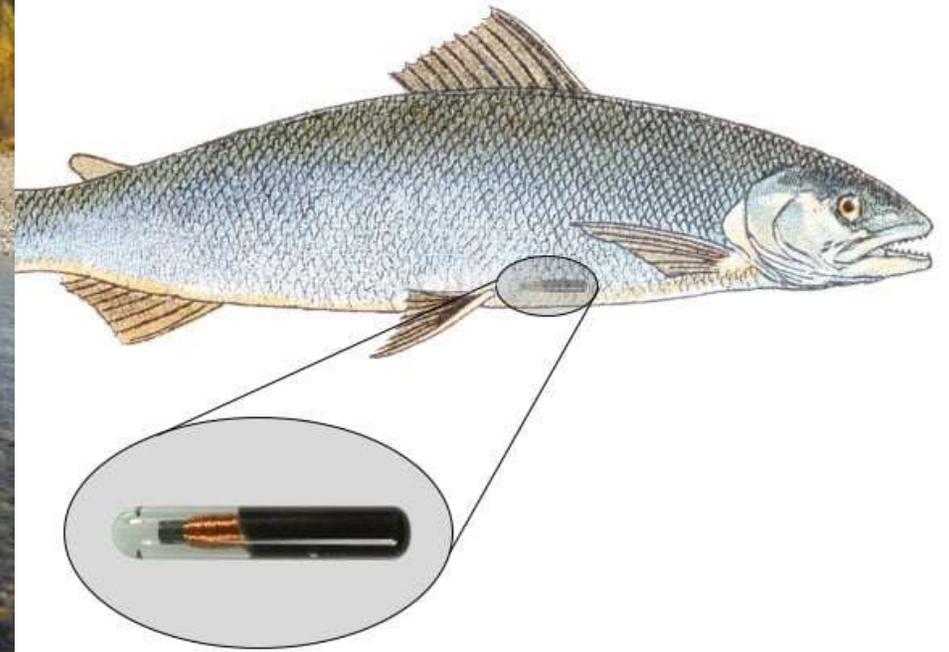
**DATA**

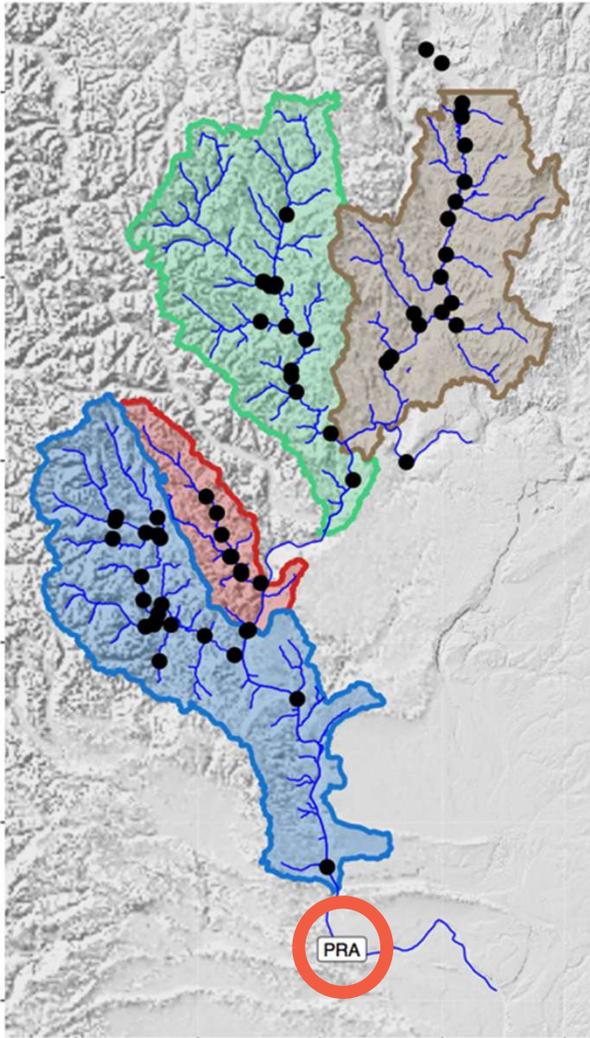


# PIT Tagging at Priest Rapids Dam

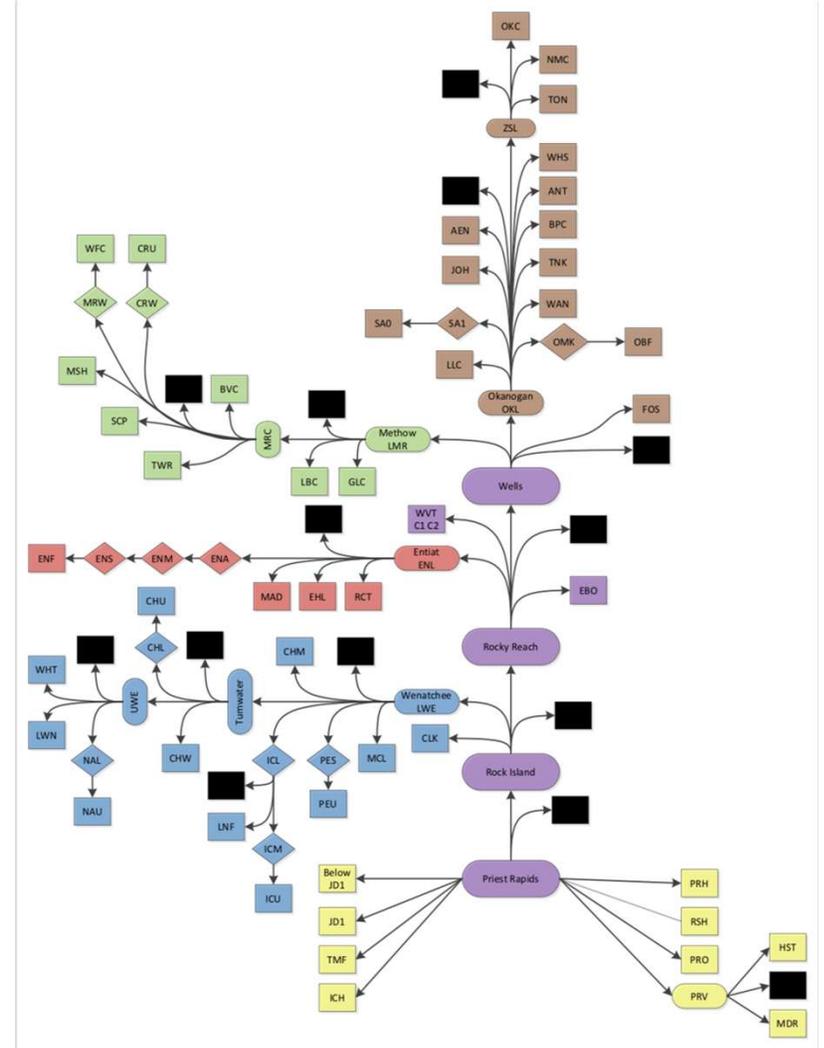


# Detections Upstream





Population  
 ■ Entiat River  
 ■ Methow River  
 ■ Okanogan River  
 ■ Wenatchee River



# Detections Database



COLUMBIA BASIN RESEARCH



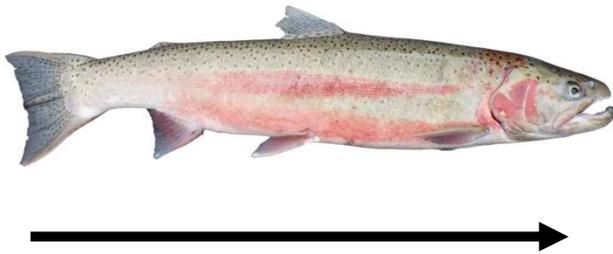
- Online API query
- Set up through DART (Data Access in Real Time)
- Queried through R script





# ANALYSIS

# Estimate Tags at Each Site



**1<sup>st</sup>**    **2<sup>nd</sup> +**



## Treat detections like mark-recapture data

- Tags detected on 1<sup>st</sup> array are mark group
- Tags detected on 2<sup>nd</sup> array (or upstream) are second capture group
- Some of those "captured" will be recaptures

## Use standard mark-recapture estimators of abundance to estimate # tags at 1<sup>st</sup> array

- May be more than # detected tags



## Translate to Abundance

- # Tags or detection probability at each site
- Expand by tag rate at Priest Rapids
- Total escapement
  - Past each detection point
- Separate by origin based on proportion of HOR/NOR tags detected at or upstream of each site



# Caveats

- Assumes fish make a “one-way trip” upstream
  - Leads to some detections being ignored / filtered
- A little crude, but fairly accurate
  - Goal was automation
  - End-of-season estimate uses more sophisticated model
  - Can depend on sample size





# RESULTS

# WDFW Fish App

Code runs twice a week (Mon / Thurs) and updates estimates

Need WDFW permissions (not for public)

UC Steelhead app:

[https://apps.wdfw-fish.us/escapement/uc\\_steelhead\\_escapement](https://apps.wdfw-fish.us/escapement/uc_steelhead_escapement)



## Upper Columbia Steelhead Escapement

Explorer UC Steelhead  
Escapement

→ Explorer



# Potential Improvements

- Add counter on the top of total steelhead (by origin) past Priest Rapids Dam
- Improve map
- Explicit estimate of HOR/NOR ratio?
- Remove some areas from table?



# Questions?

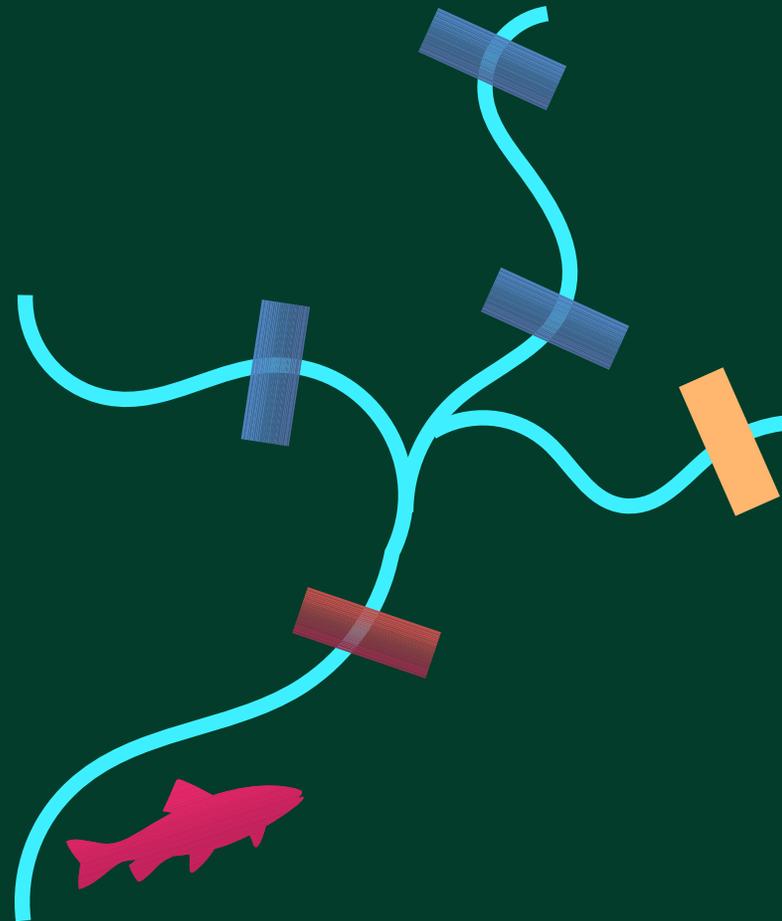


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Department of Fish and Wildlife

# Dam Adult Branch Occupancy Model





## Upper Columbia Steelhead Escapement Explorer

Date	Hatchery Type	Areas
2025-12-01	All Fish	Above Zosel Dam, Chewuch River, Chiwawa River, Chumstick, D...

Current Status

Trends

Map



## Upper Columbia Steelhead Escapement Explorer

Date: 2025-12-01  
Hatchery Type: All Fish  
Areas: Lower Entiat, Lower Methow, Lower Okanogan, Lower Wenatch...

### Current Status

Area	Group	Estimate (SE)
Priest Rapids to Rock Island Dam	All	951 (4.03)
Rock Island to Rocky Reach Dam	All	434 (27.77)
Rocky Reach to Wells Dam	All	1,219 (5.17)
Wells to Chief Joseph Dam	All	3,104 (16.62)
Lower Wenatchee to Tumwater Dam	All	397 (81.54)
Lower Entiat	All	83 (4.63)
Lower Methow	All	767 (10.67)



## Upper Columbia Steelhead Escapement Explorer

Date

2025-12-01

Hatchery Type

Hatchery / Wild

Areas

Lower Entiat, Lower Methow, Lower Okanogan, Lower Wenatch...

### Current Status

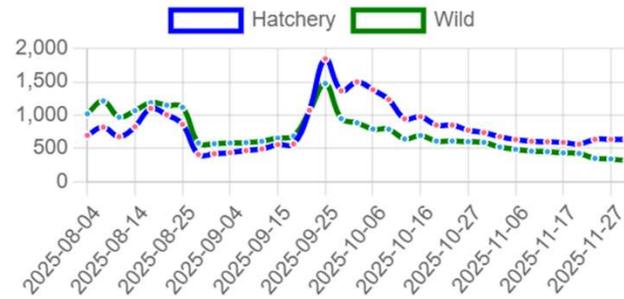
Area	Group	Estimate (SE)
Priest Rapids to Rock Island Dam	H	637 (44.17)
Priest Rapids to Rock Island Dam	W	314 (44.11)
Rock Island to Rocky Reach Dam	H	184 (32.04)
Rock Island to Rocky Reach Dam	W	250 (33.84)
Rocky Reach to Wells Dam	H	905 (46.57)
Rocky Reach to Wells Dam	W	314 (46.43)
Wells to Chief Joseph Dam	H	2,238 (76.77)



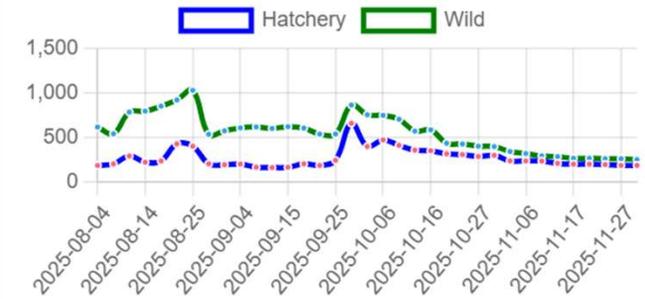
Lower Wenatchee to Tumwater Dam



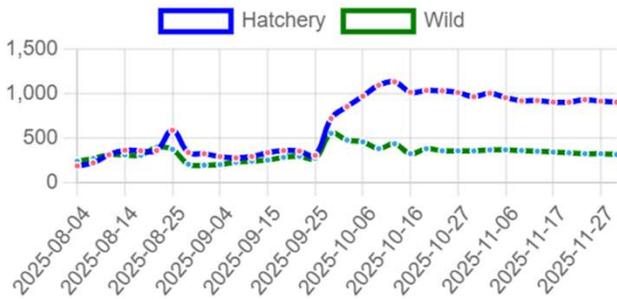
Priest Rapids to Rock Island Dam



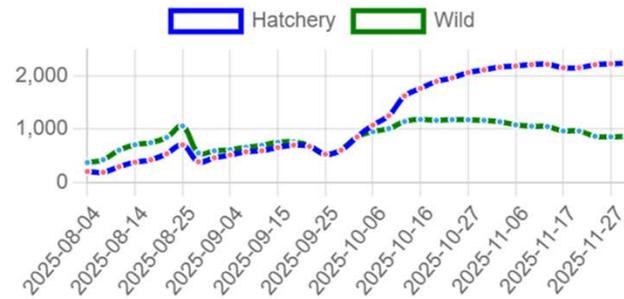
Rock Island to Rocky Reach Dam



Rocky Reach to Wells Dam



Wells to Chief Joseph Dam



# Map

## Upper Columbia Steelhead Escapement Explorer

From: 2025-12-01 Hatchery / Wild Lower Entail, Lower Melrose, Lower Okanogan, Lower Wenatch...

Current Status

Trends

Map

