Apr 27th, 1:30 PM - 3:00 PM

Utilizing new PIT tag technology to assess juvenile Chinook migration patterns, residence time, and survival in the lower Green River.

Chris Gregersen

Using New PIT Technology to Assess Juvenile Chinook Use of the Lower Green River

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2022 Salish Sea Ecosystem Conference

Background

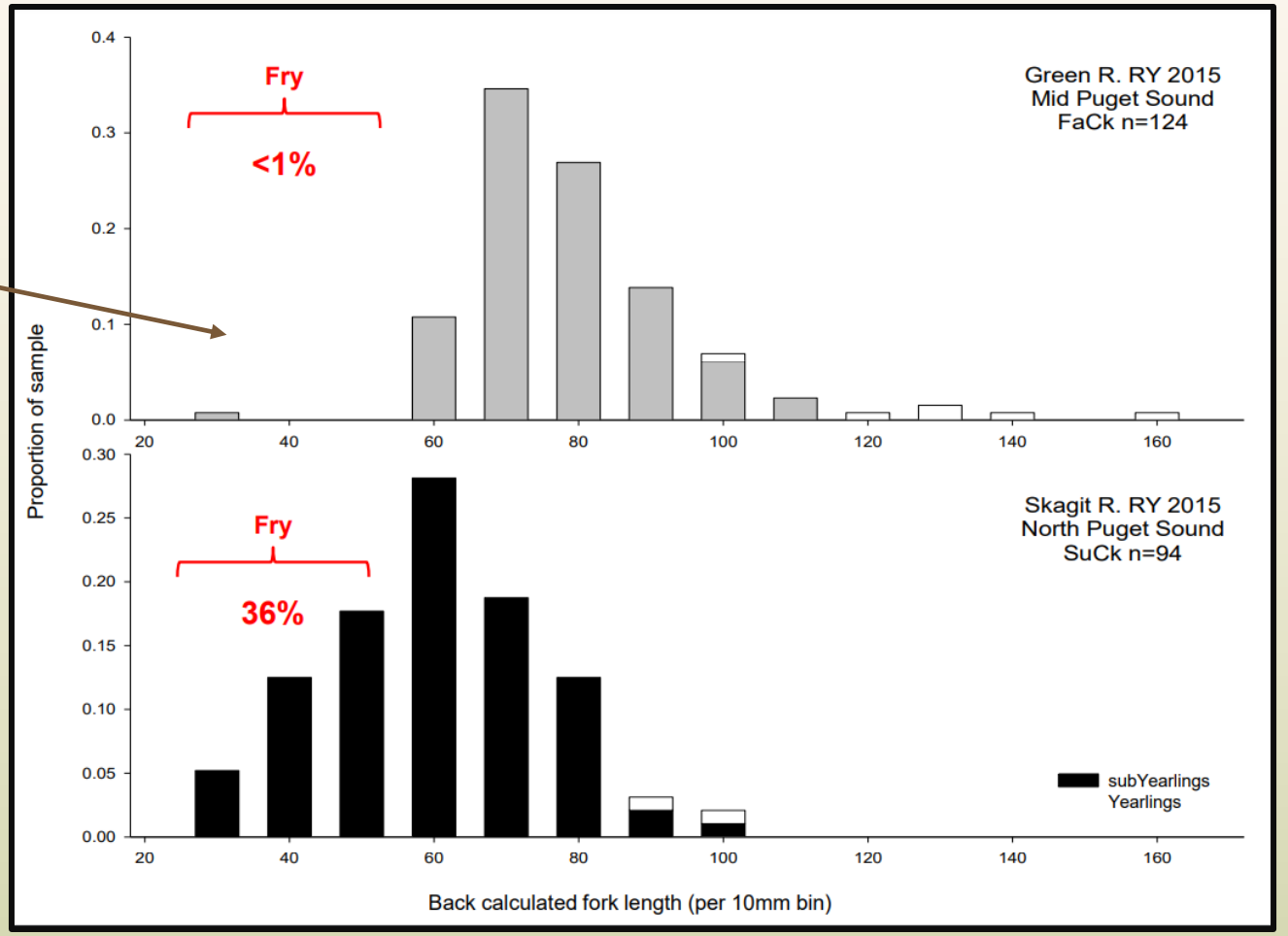
1) Lower Green/Duwamish **highly modified**

2) Estuary **fry migrants not surviving**

3) Parr production **density dependent**.

4) Does the lower Green **provide habitat**?

5) Can restoration **increase habitat**?



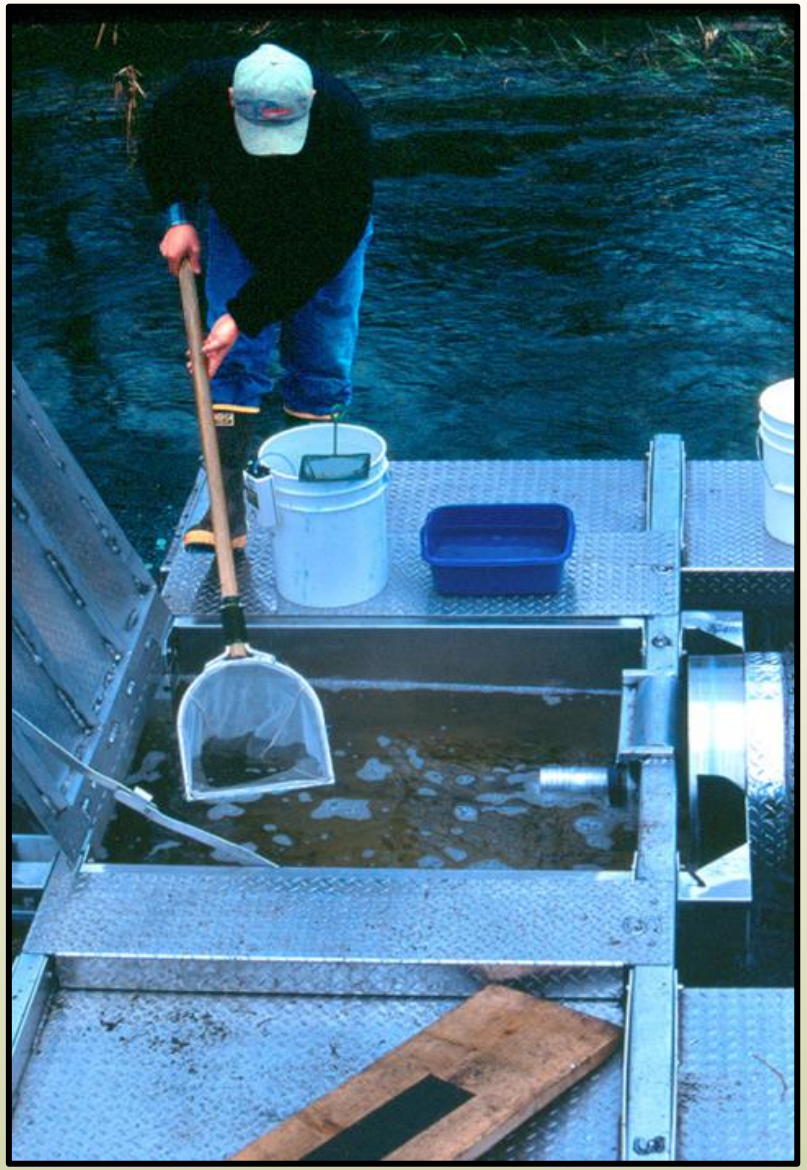
Adult Chinook otolith analysis by WDFW

The Problem

Population monitoring difficulties

- Screw traps **inefficient** in slow/low gradient rivers
- Fish sampling only provides a **snapshot**
- Standard antennas **variable effectiveness**
- Standard 12mm tags only for **fish >60mm**.

King County Cataraft Electrofisher



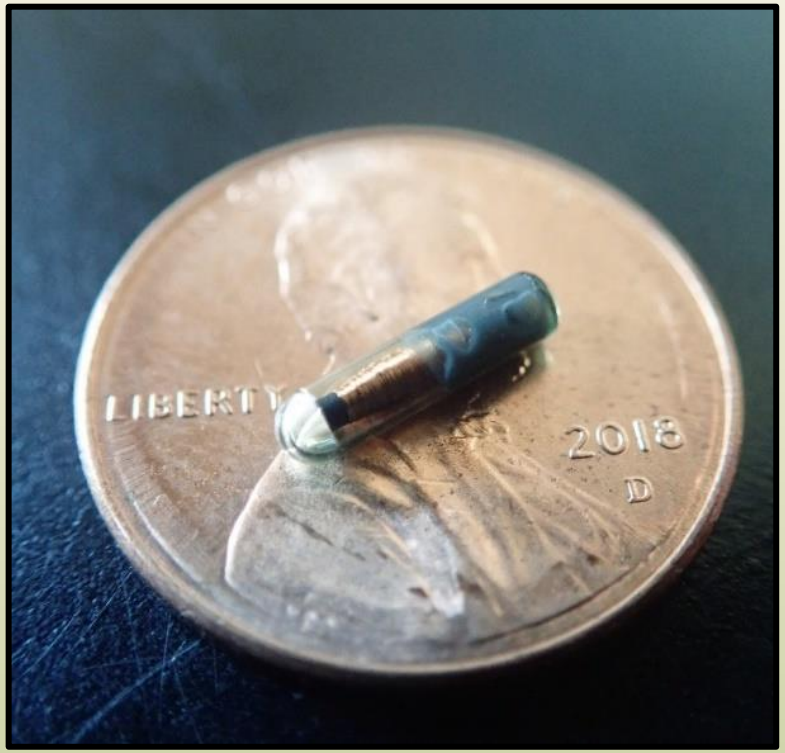
Screw Trapping in the Lower Green

The Solution?

New PIT technology

Biomark 9mm FDX-B tag

Tag fish down to 45mm



West Fork FIN Array in the Lower Green

Function at a range of flows, shed debris

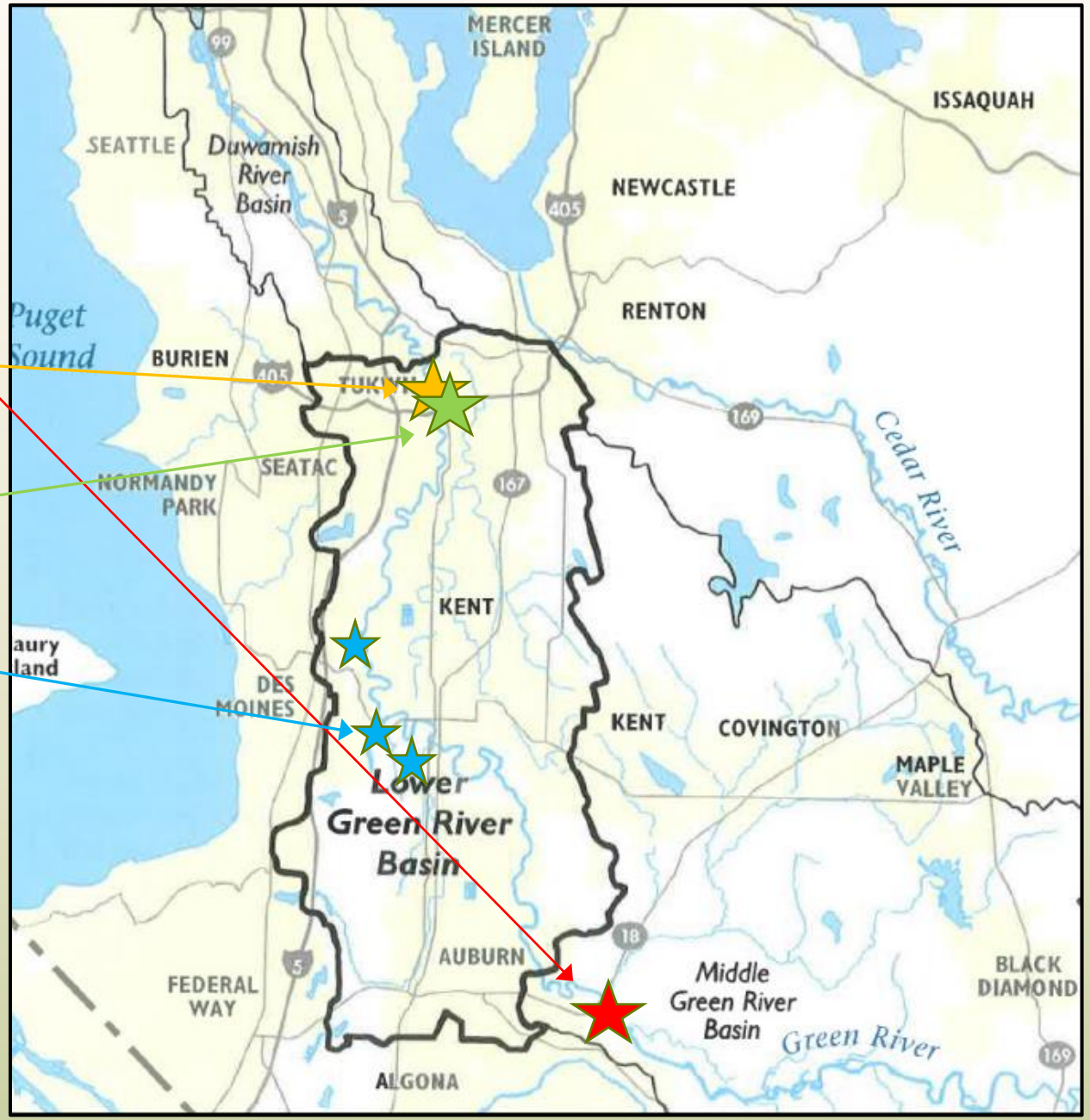
Study Questions

1. **Is this technology effective** for a low gradient Puget Sound River?
2. **Are juvenile Chinook rearing** in the lower Green or passing through?
3. **Are juvenile Chinook surviving** the journey through the lower Green?

Lower Green Chinook Parr

Methods

- Tag Chinook at WDFW screw trap
- Anchor barge 22 miles downstream
- Perform weekly efficiency trial releases
- Tag & Track Chinook in tributaries



Implementation

Barge Deployment

- Assembled in Seattle
- Pushed 9 miles upstream
- Anchored to bridge piers
- Solar powered
- Cellular data download

PIT Antenna Barge setup in Tukwila

Implementation

Capture → **Tag injection** → **Assess Tagging Mortality**

What have we learned?

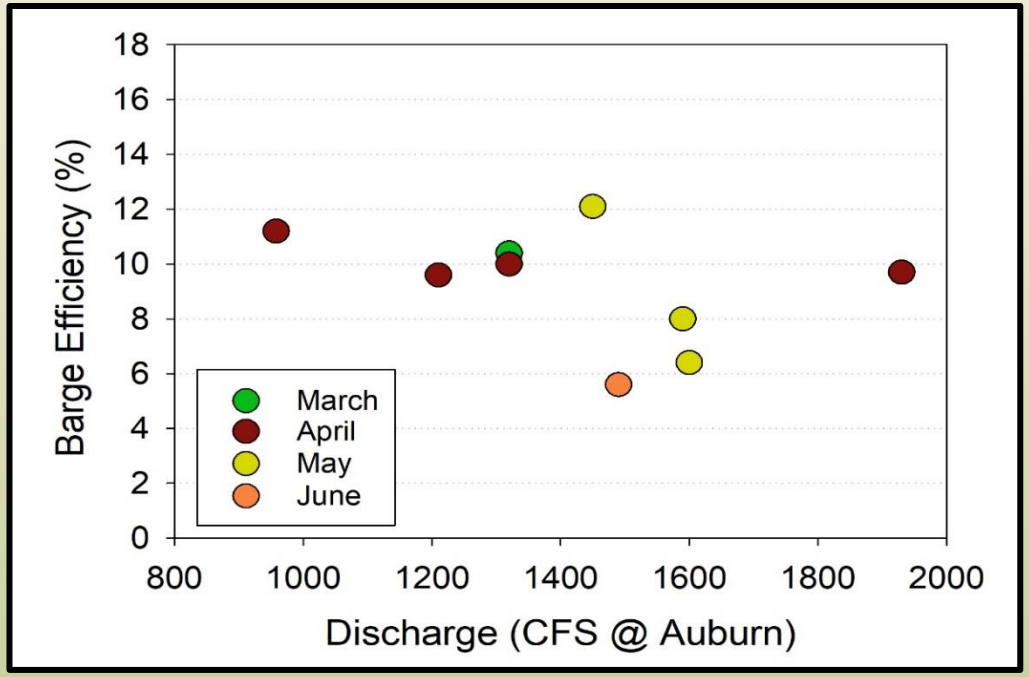
Tagging and Mortality

- **863 Natural Origin** released at screw trap
- **93 Natural Origin** released in tribs
- **717 Hatchery Origin** released at screw trap
- **2474 Hatchery Chinook** released for efficiency
  - Fish held 3 days without feed prior
  - Held 24 hours to assess mortality
- 6 tagging morts= **99.8% survival rate**
- Recommended min size: **47mm**

What have we learned?

Barge Efficiency

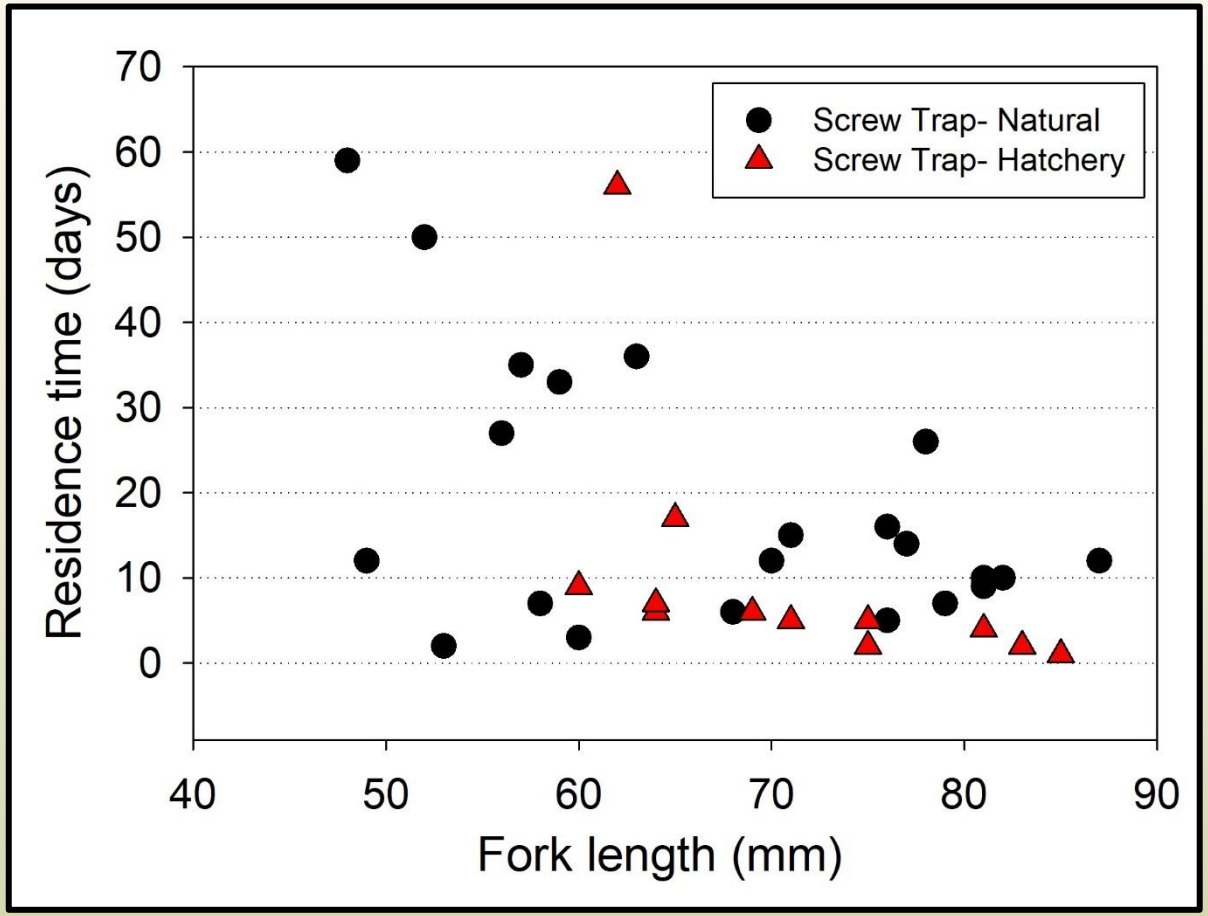
- 250 fish released 0.4 miles upstream weekly
- Mean barge efficiency **9.2%** (5.6-12.1%)
- **94%**- mean 3 hours. **6%**- mean 46 days
- **Caveat**: fish behavior



What have we learned?

Residence Time

- Average **19 days** (2-59) for natural origin!
- Smaller Chinook (<65mm) mean **28 days**
- Larger Chinook (>65mm) mean **11 days**
- Last detection **July 7th**



Detection & Survival

- Survival **28%** for hatchery and natural
- Survival **78%** in tributary
- Survival increased later in the season
- **Caveat**- estimated from barge efficiency

What have we learned?

Barge Operation

- **Required regular maintenance**
  - Biweekly for normal flows
  - Weekly for high flows
  - Considerable amounts of trash
- **Very Robust**
  - Held logjam at 7000cfs
- **Logistically challenging**
  - 2 tons of equipment
  - Requires prop boat to push
  - Navigating debris and flows

Salmon Recovery Implications

In summary

- **PIT antenna barge a success**
- **9mm tags effective for smaller fish**
- **Firsthand proof of lower Green rearing**
- **Habitat restoration worthwhile**
  - More important for smaller chinook
  - Improve migration pathway for parr
- **Potential survival issues for all fish**

Lower Russel Construction in 2021

King County

Big thanks to:

- Grant team- DNR, WDFW, PSP
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- King County Science Section
- WRIA 9
- City of Tukwila
- Muckleshoot Tribe
- West Fork Environmental

Thank you.

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