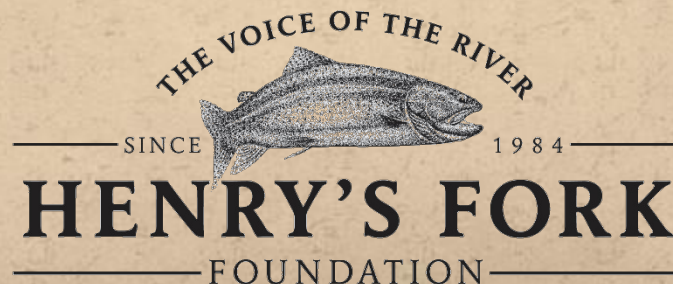


HFF Fish Passage Monitoring Efforts

Henry's Fork Watershed Council
March 9, 2016

Jamie Laatsch, Conservation & Outreach Coordinator
Christina Morrisett, Research Assistant
Dr. Rob Van Kirk, Senior Scientist



Outline

1. Chester Fish Ladder

- Project history
- Monitoring progress

2. Buffalo River Fish Ladder

- Project history
- Monitoring update
- Genetics and life history

Chester Dam Fish Ladder



History

- Chester Dam was constructed in 1938
- In 2004, Symbiotics filed an application for an original 40-year license for a Hydroelectric Project
- FERC license issued in 2008



Fish Ladder



- Outside of the FERC requirements, a Settlement Agreement was reached regarding a fish ladder
- Symbiotics, IDFG, IDPR, USFWS, USFS, TU, HFF, GYC
- Symbiotics agreed to design and construct an upstream fish passage facility and the conservation groups agreed to secure the funding



Responsibilities

- IDFG agreed to take ownership of the fish ladder for the first 5 years of its operation and evaluate its effectiveness during that time.
- Symbiotics agreed to inspect the ladder daily, remove debris, and conduct maintenance and repairs as needed.
- Agencies will provide technical assistance.
- In 2009, the license was transferred to Fall River Electric.

Today

- Monitoring has begun w/ Axis P1355 underwater camera
- We've learned that monitoring is very difficult in this location and at this scale due to size of the project and significant macrophyte growth upstream
- Live View



Live View

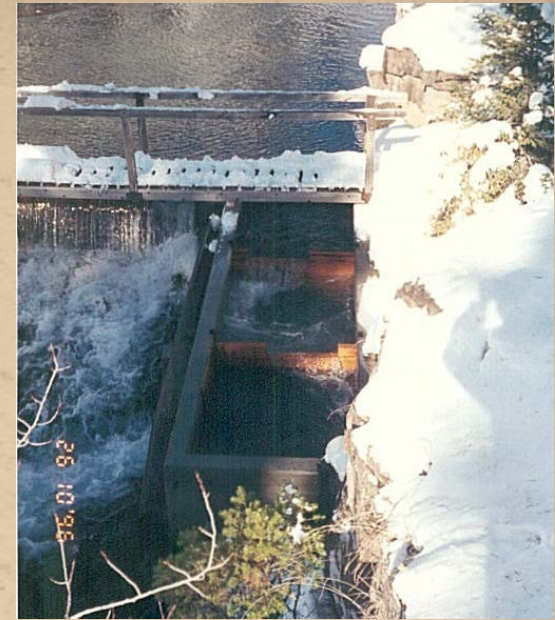




Buffalo River Fish Ladder

Project History

- 1938: Hydroelectric project construction
- 1996: Fish ladder installed
- 2005: Fish ladder improved



Project History

- 1938: Hydroelectric project construction
- 1996: Fish ladder installed
- 2005: Fish ladder improved



Project History

Downstream Trap:

- 2009: Downstream trap re-construction
- 2015: Removed downstream trap



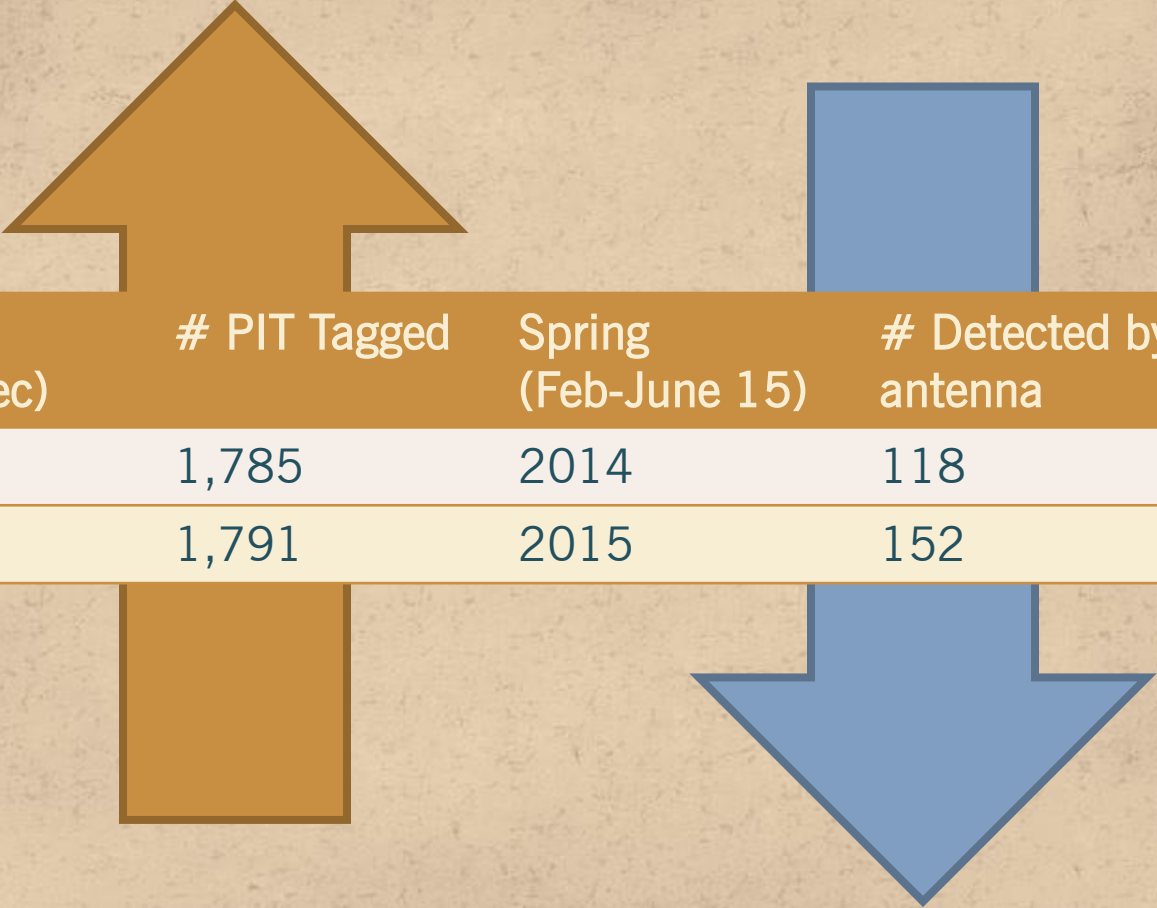
Project History

Monitoring Objectives:

- 2006: Began monitoring continuously
- 2013: Began PIT tag/genetics study, reduced monitoring efforts
- 2014: Antenna installed
- 2015: Concluded tag/genetics study, further reduced monitoring efforts



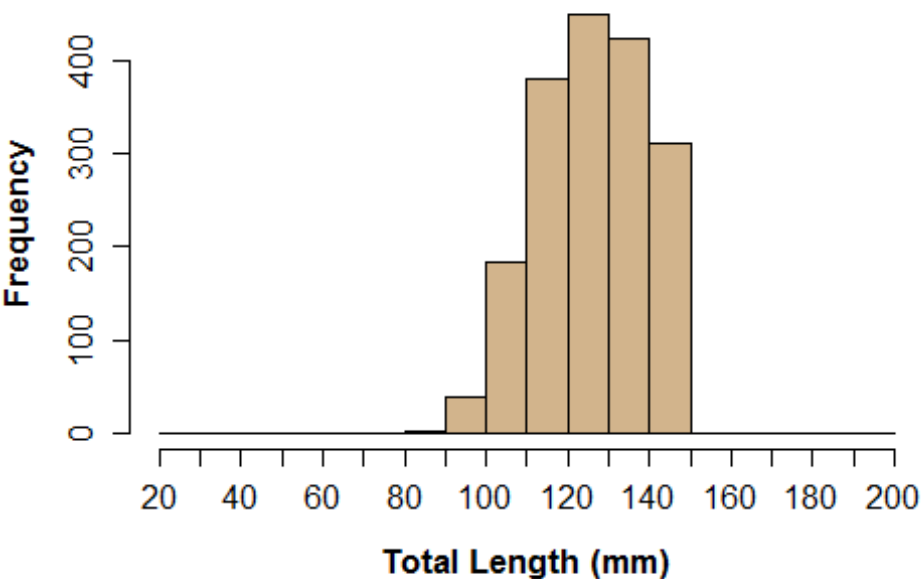
Monitoring Update



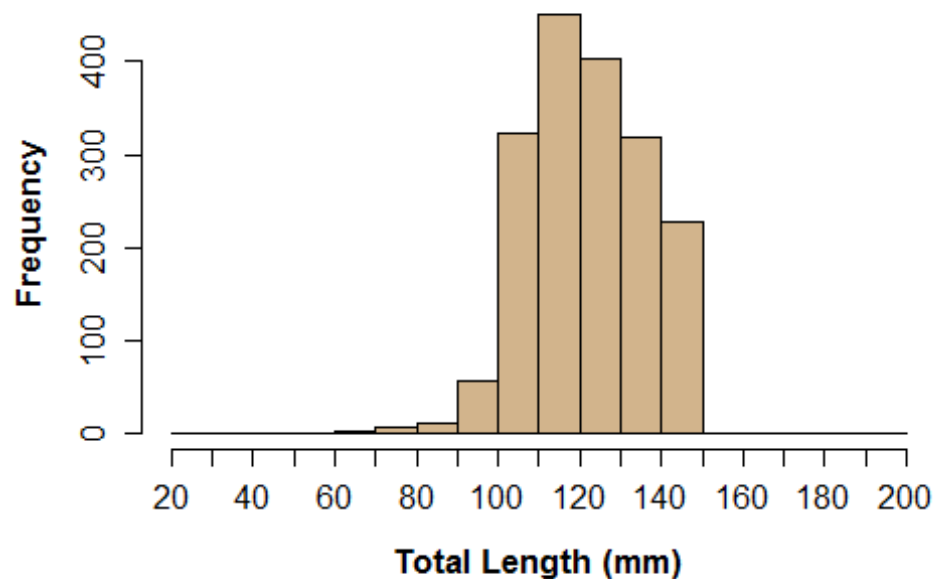
Fall (Sep-Dec)	# PIT Tagged	Spring (Feb-June 15)	# Detected by antenna
2013	1,785	2014	118
2014	1,791	2015	152

30,000 – 70,000
Estimated outmigrants / year

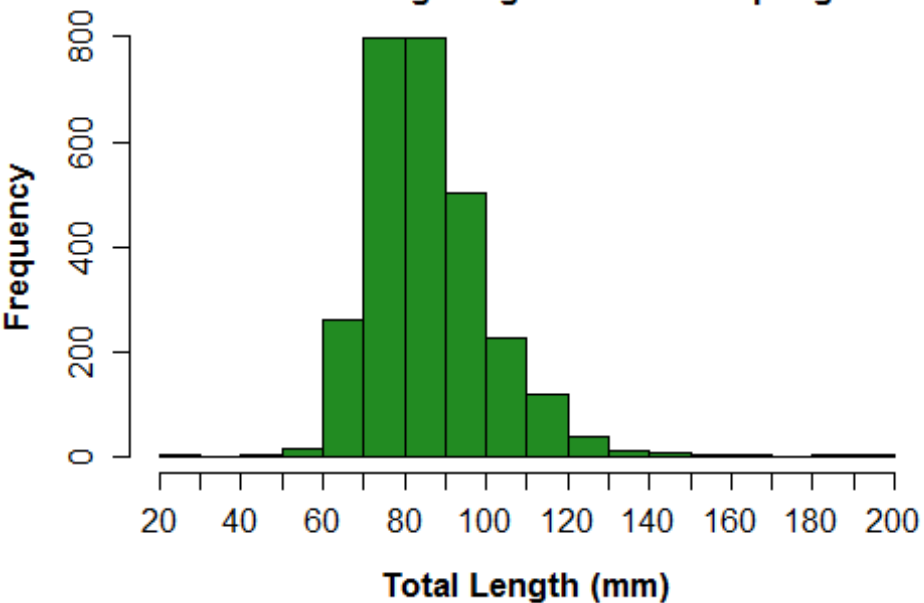
Age-0 RBT Migrating Upstream Fall 2013



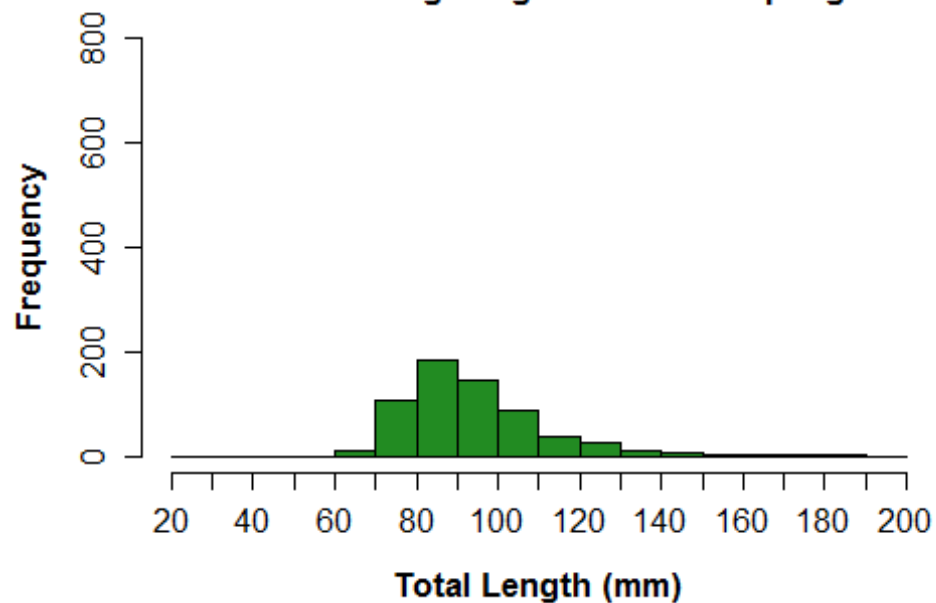
Age-0 RBT Migrating Upstream Fall 2014



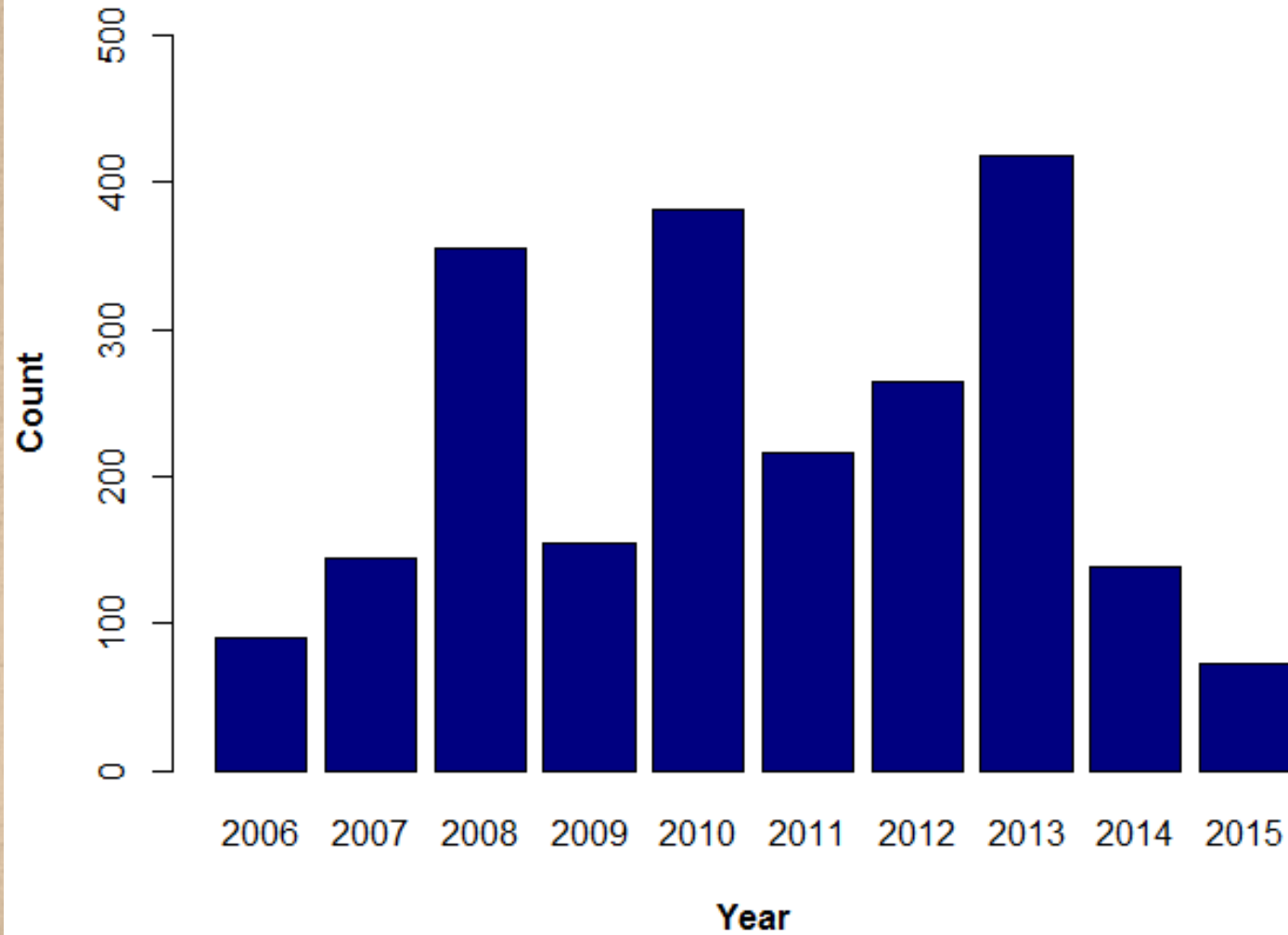
RBT ≤ 200 mm Migrating Downstream Spring 2014



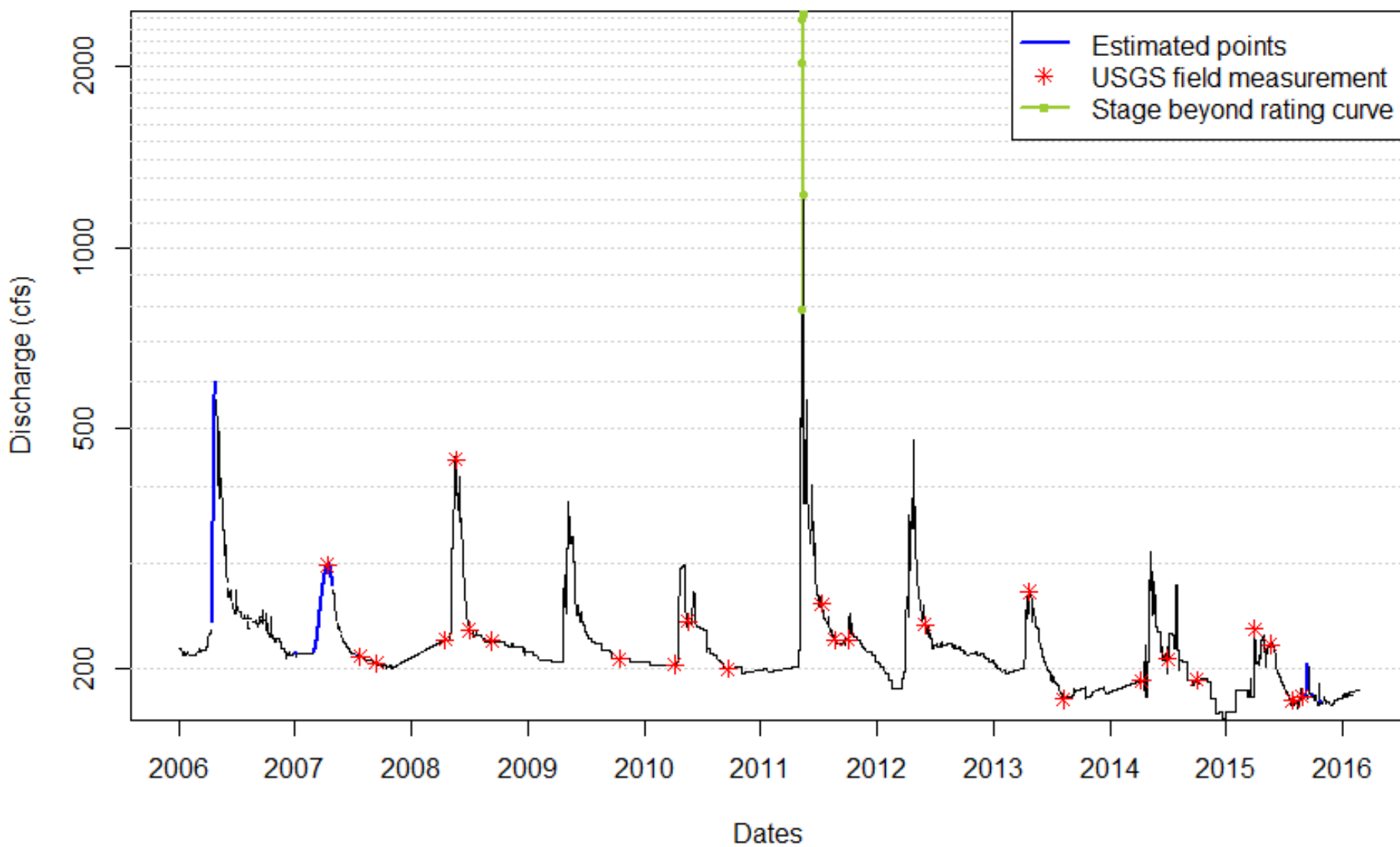
RBT ≤ 200 mm Migrating Downstream Spring 2015



Rainbow Trout $\geq 300\text{mm}$, 1 Jan - 1 Jul



Streamflow in the Buffalo River, January 2006 - February 2016



Field Notes

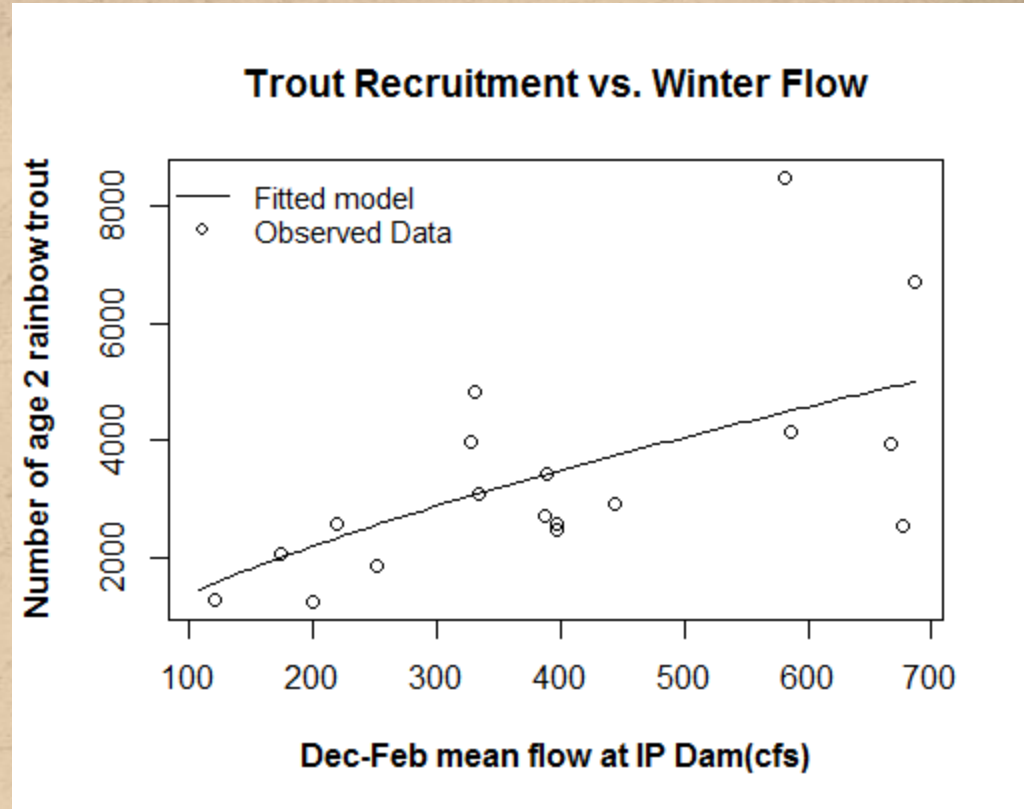




Genetics & Life History

Why is this even important?

- Recruitment of age-2 rainbow trout into population downstream of IP Dam is limited by winter habitat for juveniles (flow-dependent).
- New fish ladder was designed so that juvenile fish could access Buffalo R., where winter survival is higher.
- Spawning is not limiting, but why put all eggs in one basket?
- QUESTIONS:
 - Does Buffalo River contribute to HF fishery?
 - If so, how? Spawning? Rearing? Winter habitat for juveniles?
 - Can recruitment from Buffalo R. explain variability in this graph?



Possible life histories of rainbow trout in Henry's Fork downstream of IP Dam

1. Spend entire life in HF
2. Born in HF, spend first summer in HF, migrate upstream into Buffalo R. during autumn as age-0 fish, spend winter in Buffalo R., return to HF in spring
3. Born in Buffalo R. from HF fish that migrated upstream to spawn in Buffalo R., spend first 9-12 months in Buffalo, migrate downstream to HF in spring
4. Hatch in Buffalo R. from resident Buffalo R. fish, spend 9-12 months there, migrate downstream to HF in spring
5. Combinations of 2, 3, and 4, e.g., a fish spawned from a Buffalo R. resident and a HF migrant that spends 9 months in the Buffalo, out-migrates in the spring, and migrates back upstream in to the Buffalo R. to spend the winter.

How do we distinguish these?

- PIT-tag juvenile fish as they migrate upstream and downstream.
- Detect previously tagged fish as they migrate downstream.
- Collect genetic samples from:
 - all upstream-migrating spawners (2014 and 2015)
 - a sample of downstream-migrating juveniles (2015)
 - a sample of fish of all ages in HF population (2015)
 - a sample of age-2 fish in the HF population (2016-17)
- Use these samples to infer parentage
- Analysis of other factors: fish size, flows, migration timing

What have we learned so far?

- ✓ Spend entire life in HF: **genetic distance between HF & Buffalo fish**
- ✓ Born in HF, spend first summer in HF, migrate upstream into Buffalo R. during autumn, spend winter in Buffalo R., return to HF in spring: **7-8% of fish tagged moving upstream in fall were detected moving downstream in spring (but were they born in HF?)**
- ✓ Born in Buffalo R. from HF fish that migrated upstream to spawn in Buffalo R., spend first 9-12 months in Buffalo, migrate downstream to HF in spring: **9% of sampled Buffalo R. downstream migrants in 2015 were offspring of HF fish that migrated upstream (in 2014)**
- ✓ Hatch in Buffalo R. from resident Buffalo R. fish, spend 9-12 months there, migrate downstream to HF in spring: **80% of downstream migrants were NOT offspring of HF fish that migrated upstream**
- ✓ Combinations of 2, 3, and 4:
 - **11% of downstream migrants had only ONE migratory parent**
 - **1 fish we captured moving upstream in fall 2015 had been tagged moving downstream in spring 2015**

Conclusions

- Rainbow trout of all ages and at least five different life histories use the Buffalo River fish ladder.
- Buffalo River spawning run produces 8,000 – 30,000 fry each year (hedges against spawning failure in HF)
- 80-95% of juvenile rainbow trout that migrate downstream out of Buffalo River each spring were born in the Buffalo River, most to resident Buffalo fish.
- Buffalo River provides over-winter habitat for 100-150 “HF” fish each year, but at least some of these are 1-year old (not age-0) fish born in the Buffalo River!
- Still unknown: How many age-2 fish that recruit into the HF fishery use the Buffalo River at some point in their life history?

Questions?

