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Transition to a locally adapted steelhead stock at Winthrop NFH

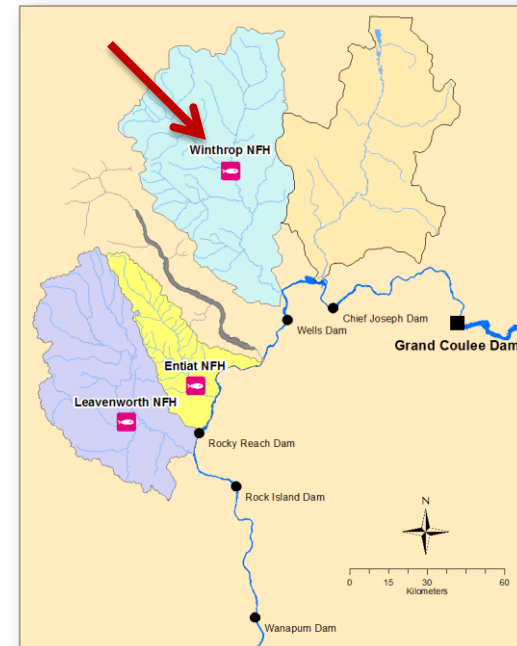
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Larsen, Matt Cooper*, Chris Pasley*, and Barry
Berejikian



63rd Annual NWFCC
December 11-13, 2012

Steelhead program at WNFH

- Location: Winthrop, WA on Methow River
 - 54 miles from Columbia Confluence
 - 524 miles from Pacific Ocean
 - Nine Columbia River dams
- Purpose
 - Mitigation for Grand Coulee Dam
 - Recover threatened upper Columbia River steelhead

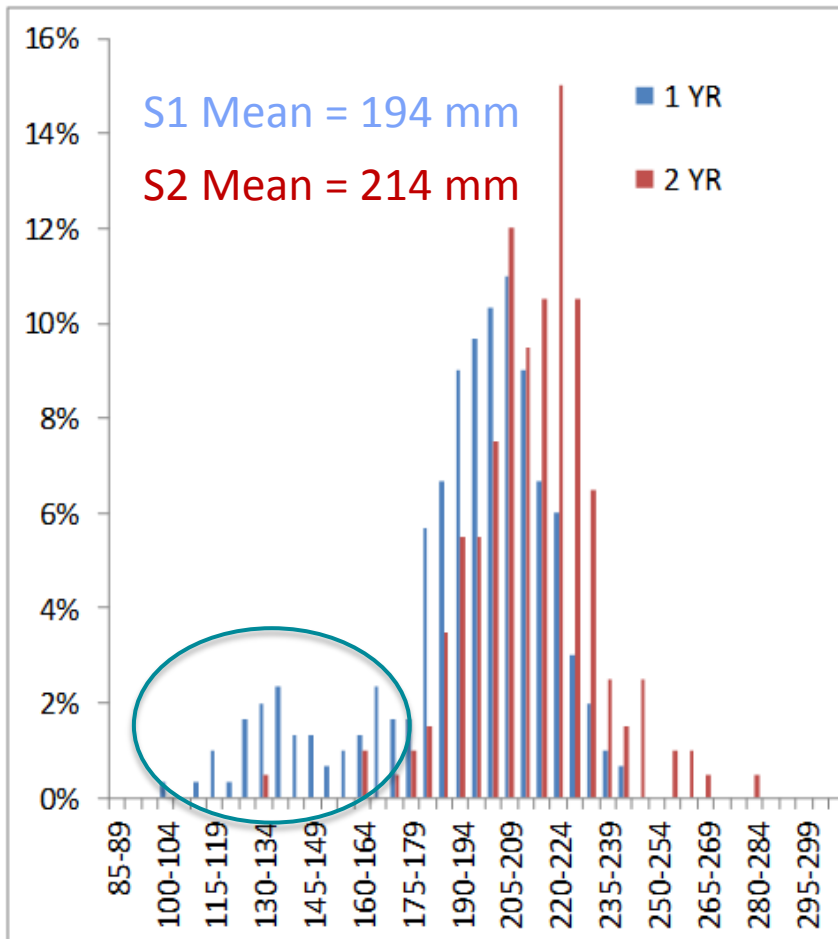


Recovery actions for upper Columbia steelhead

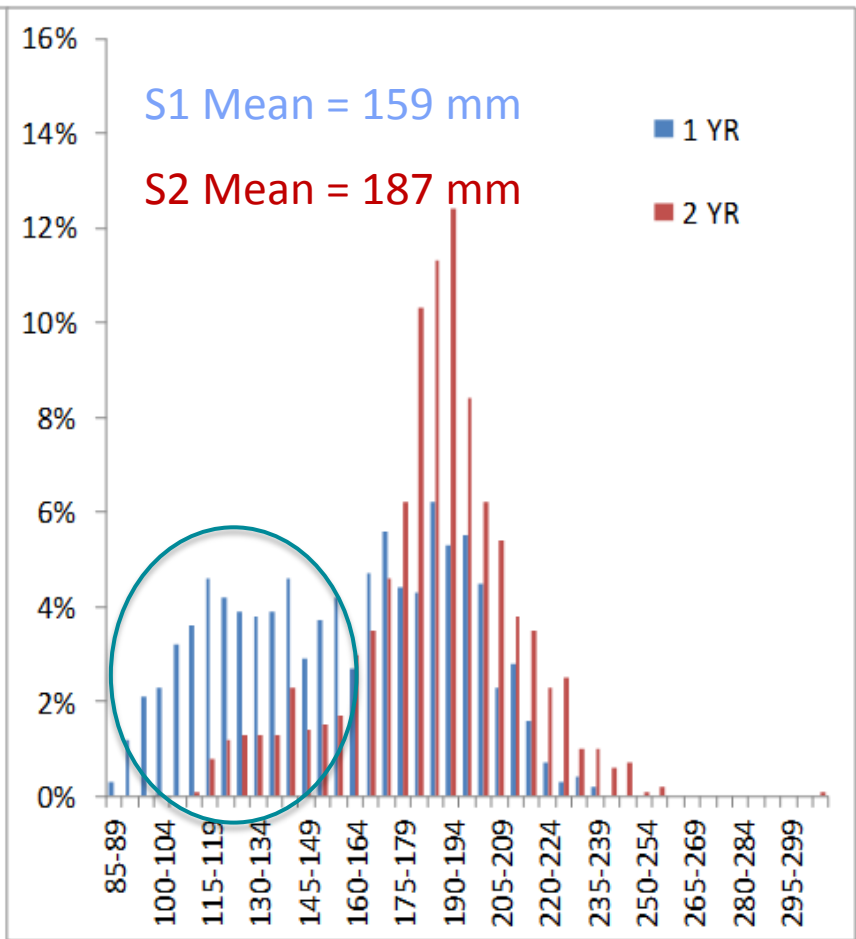
- Past program: Wells yearling smolts (S1)
- Switch to local Methow River broodstock
 - Requires change to the culture regime
 - Late spawn timing of Methow broodstock
 - Cold water temperatures at Winthrop NFH
 - **Two year smolt rearing (S2)**
- Compare S1 and S2 strategies to determine viability of switching to local broodstock.

Winthrop NFH steelhead smolt size at release

2010

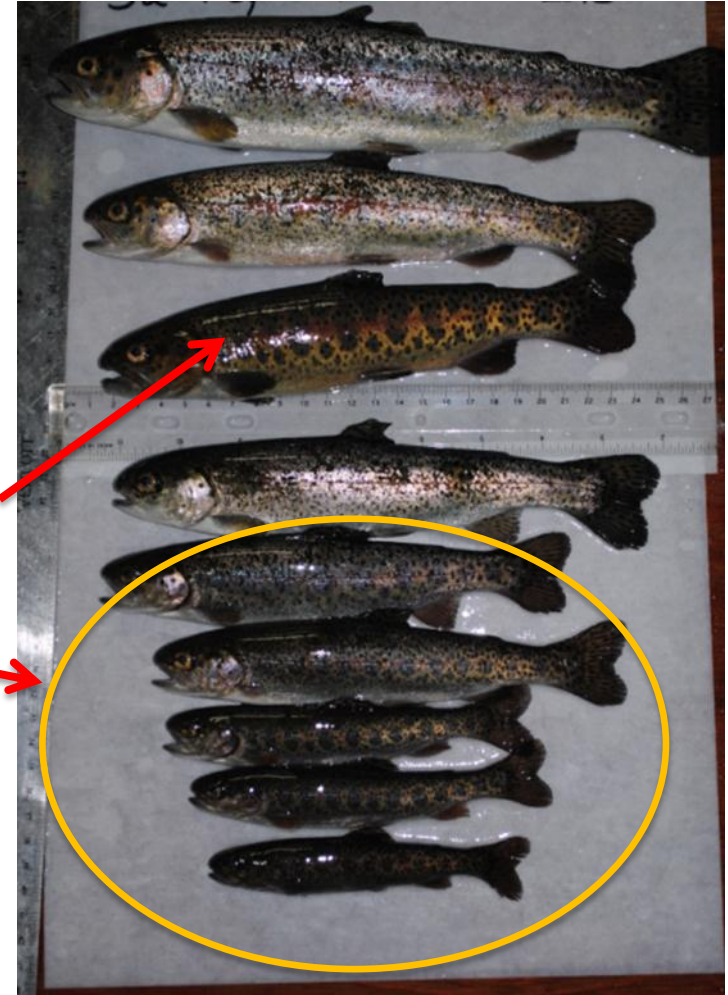


2011

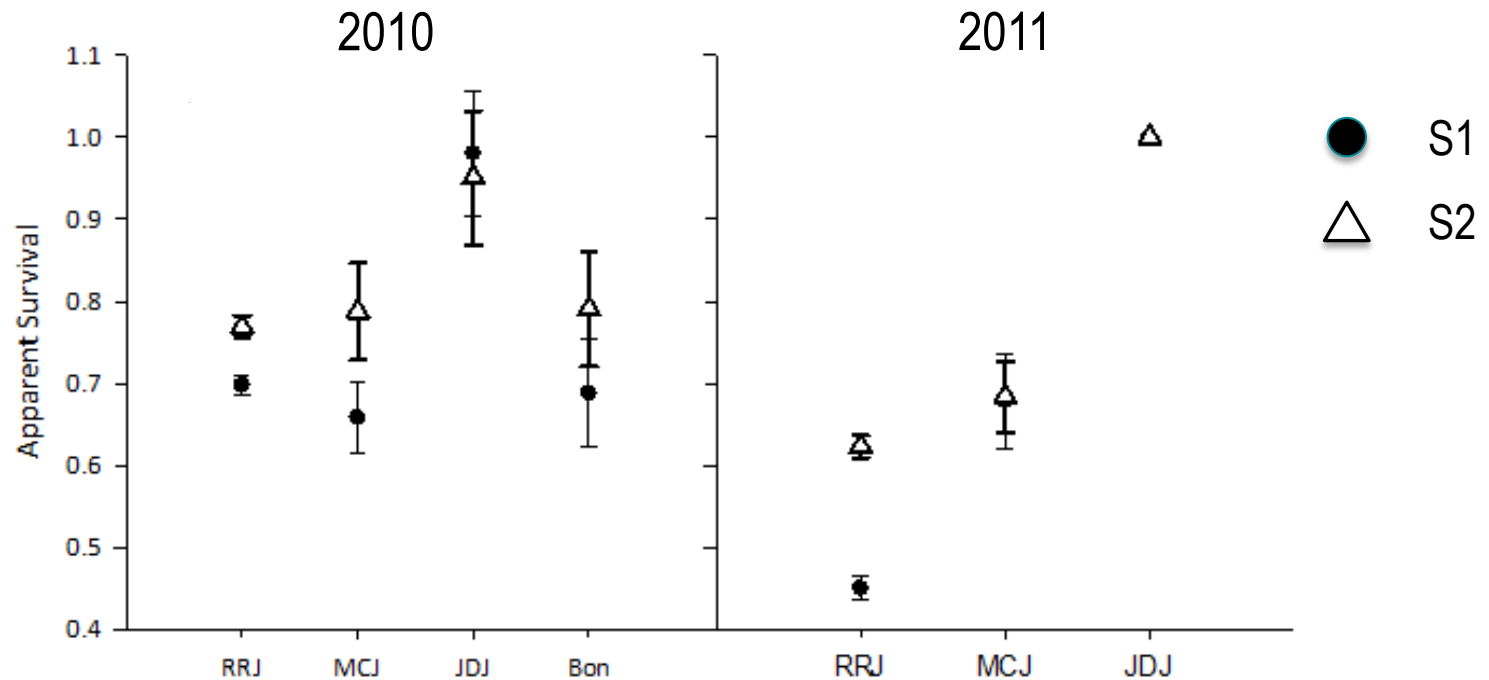


Evaluation of S1 and S2 steelhead smolts

- Outmigration (PIT tag data)
 - Survival
 - Travel time
- Residualism
 - Precocious male maturation
 - Too small to smolt
- Prerelease sampling
 - FL, WT, Sex, SI, tissues

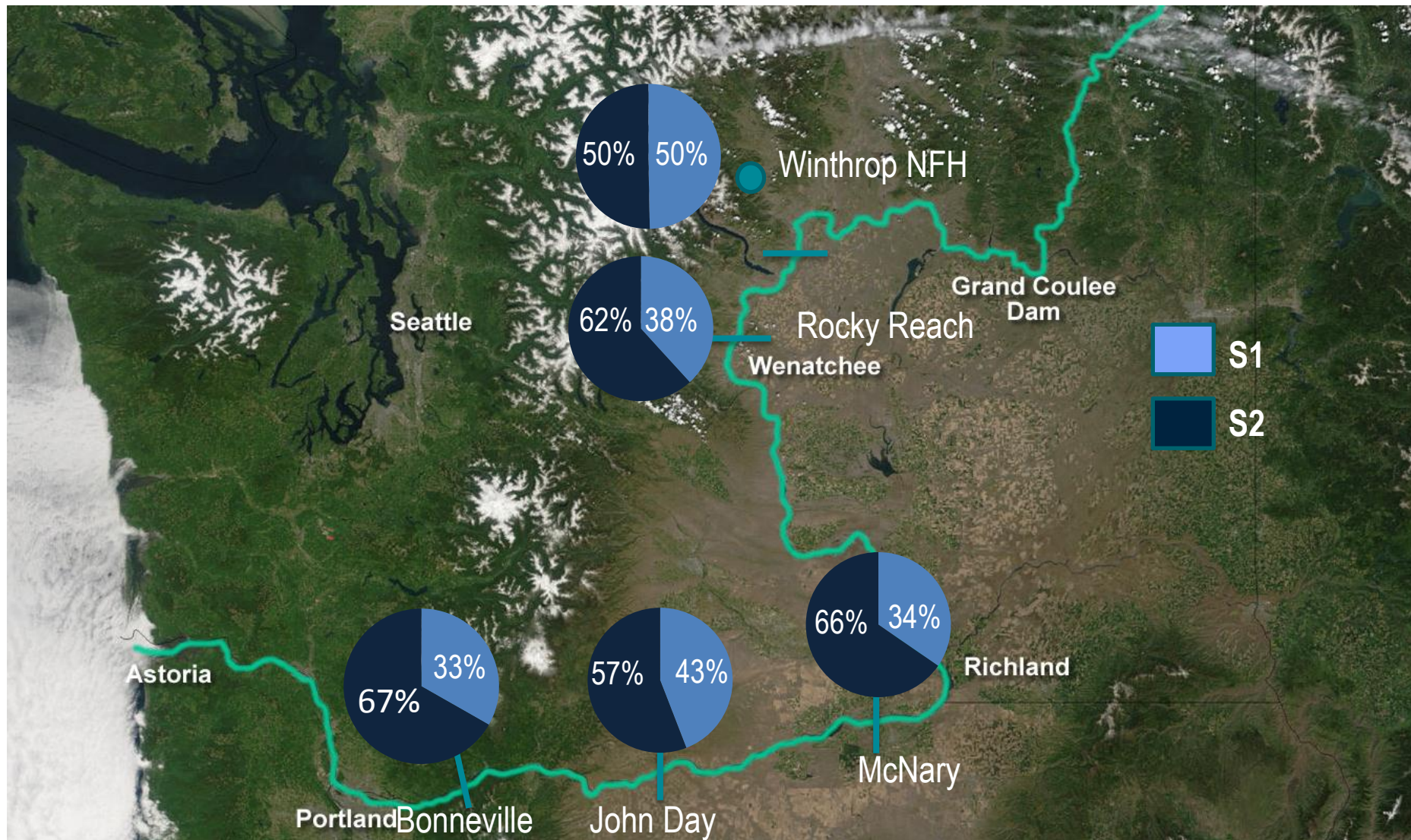


Outmigration Survival

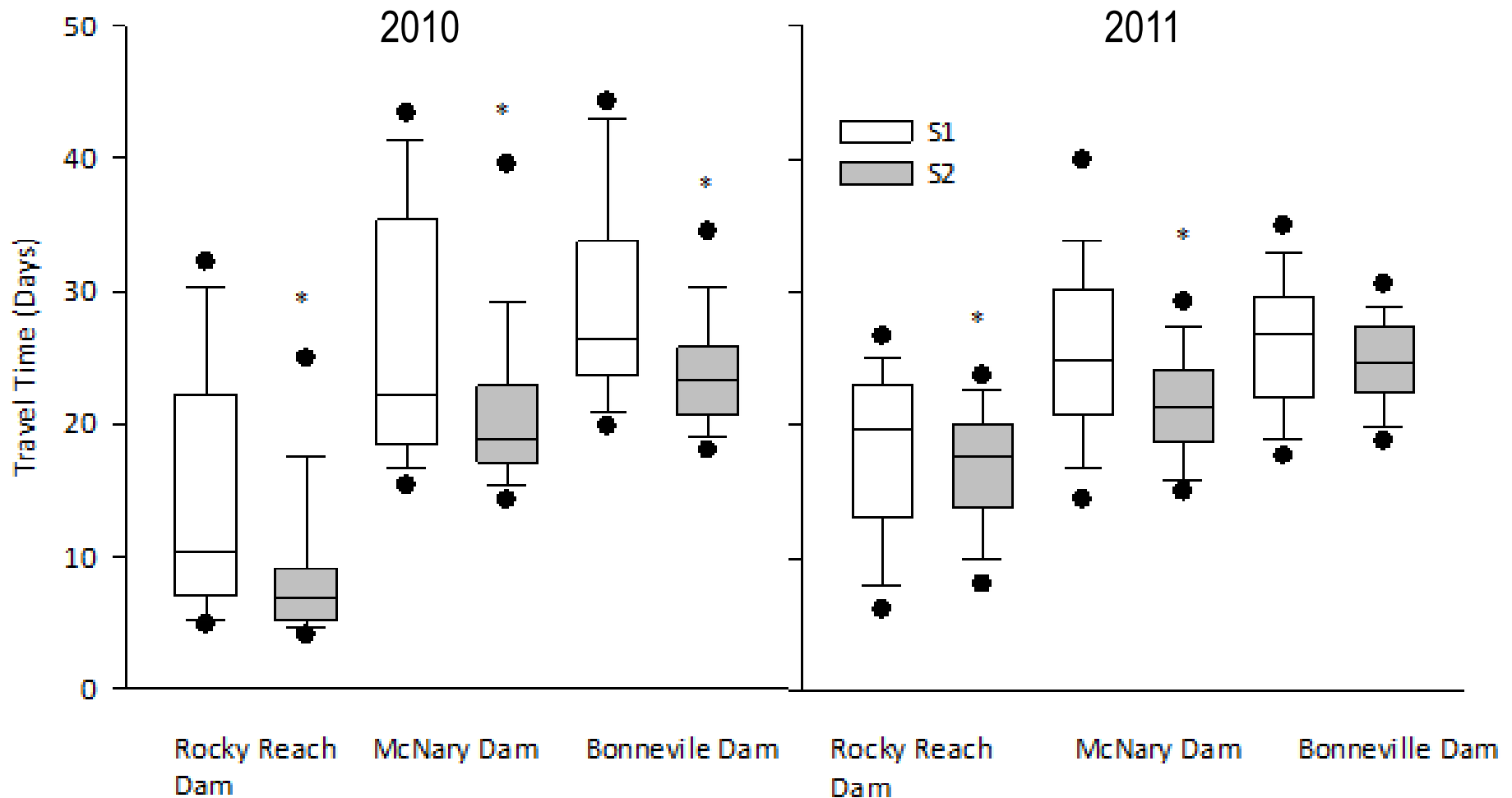


| RELEASE YEAR | GROUP | # PIT TAGS RELEASED | SURVIVAL RELEASE-RR | SURVIVAL RR-MCN | OVERALL (JOHN DAY) |
|--------------|-------|---------------------|---------------------|-----------------|--------------------|
| 2010 | S1 | 14,841 | 73.7 (2.4) | 55.4 (10.1) | 40.8 (7.3) |
| | S2 | 14,756 | 81.5 (3.0) | 64.9 (12.7) | 52.9 (10.2) |
| 2011 | S1 | 14,907 | 45.8 (1.8) | 55.9 (5.3) | 25.6 (2.2) |
| | S2 | 14,945 | 69.5 (2.1) | 57.4 (4.3) | 39.9 (2.7) |

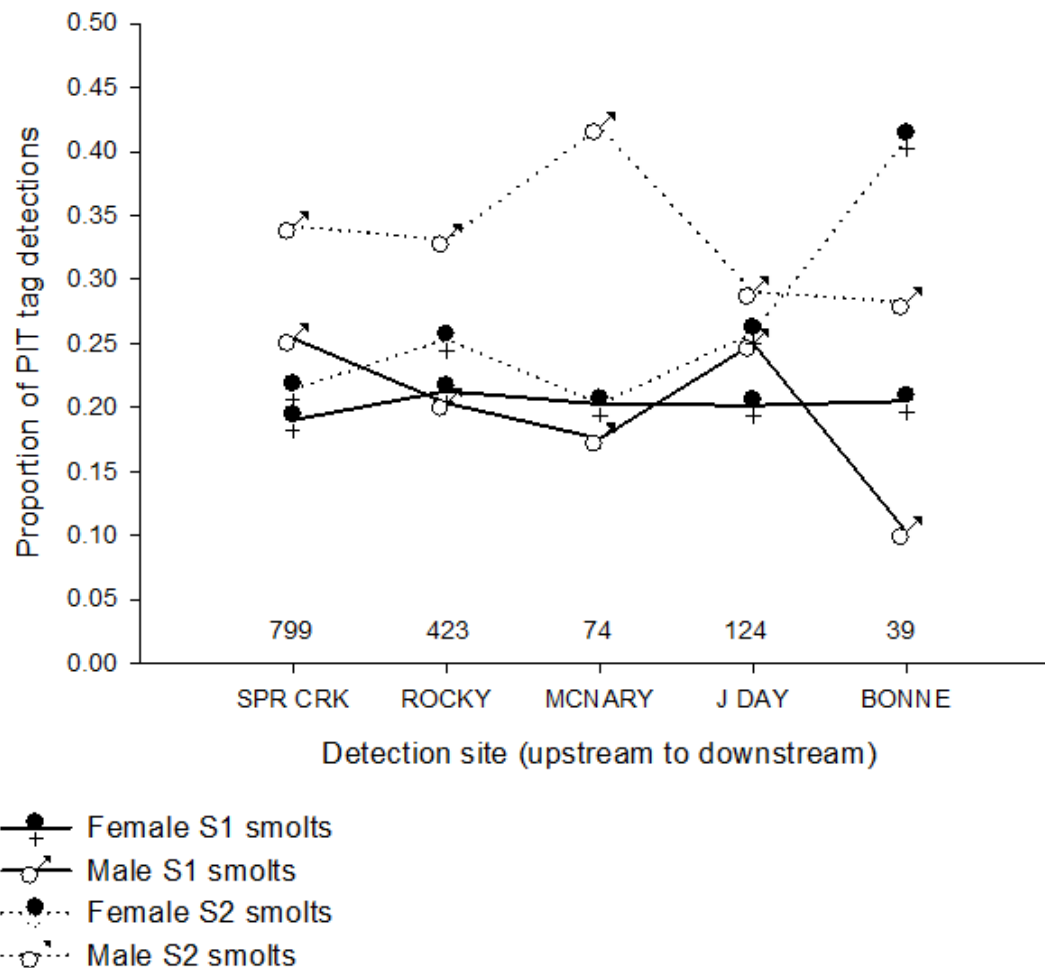
S1 vs S2 PIT-tag detections (2011 release)



Travel time by reach



Gender-biased outmigration (2011)

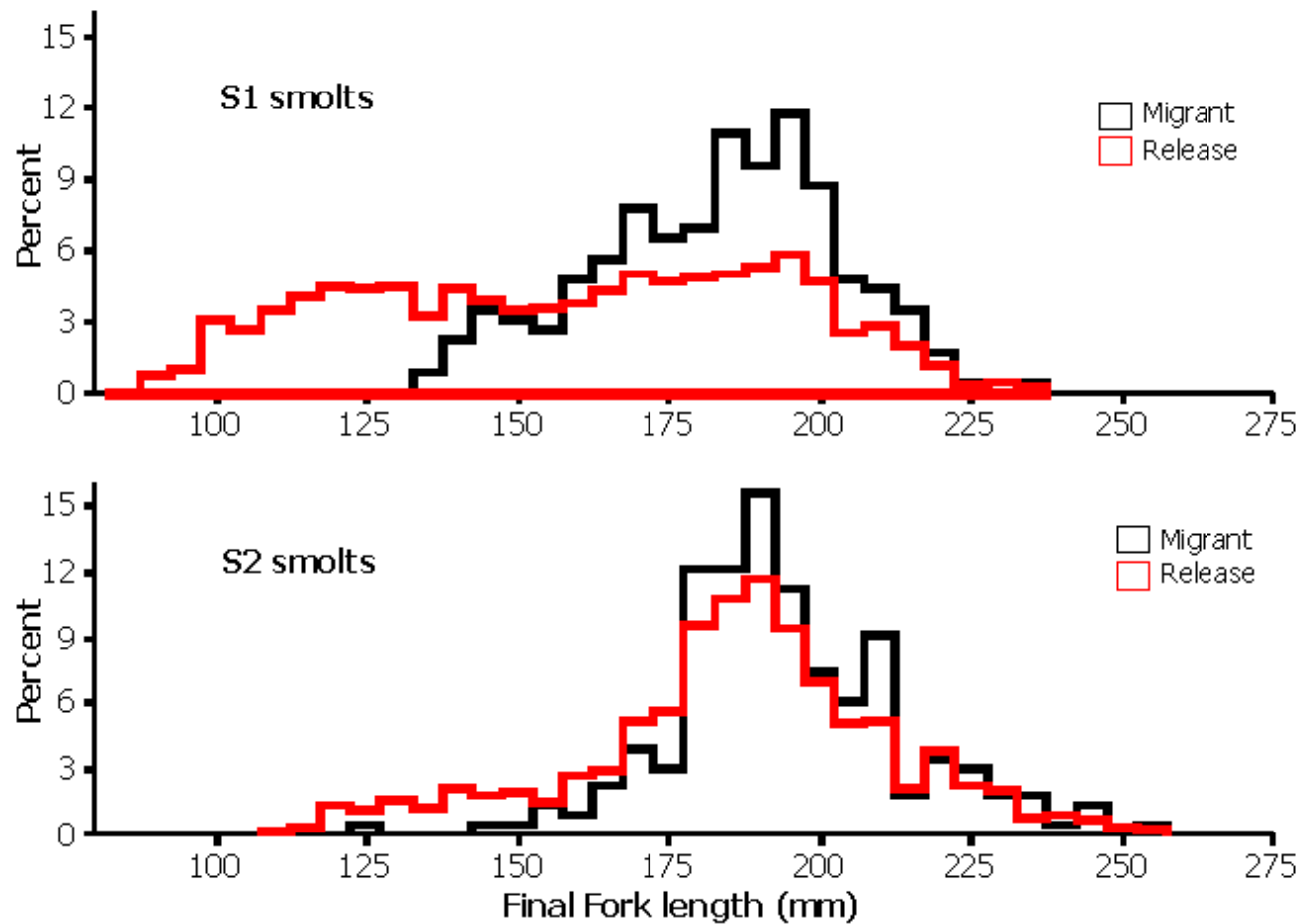


Evaluating Residualism I

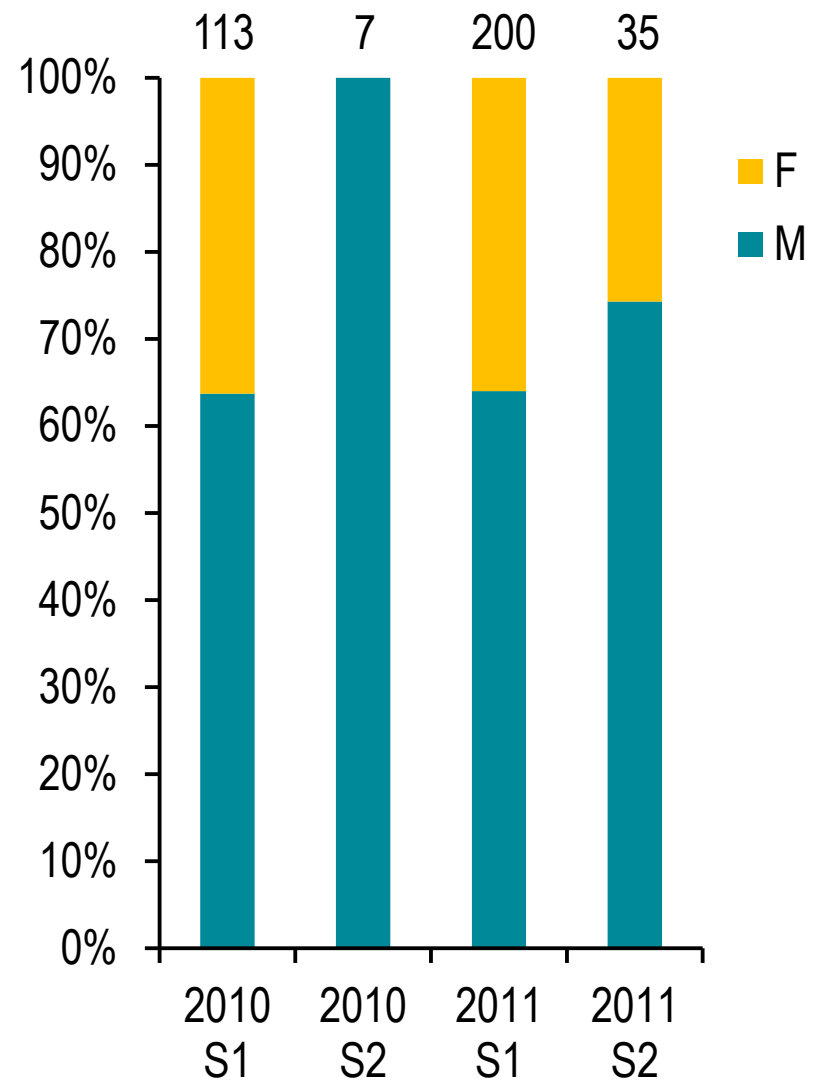
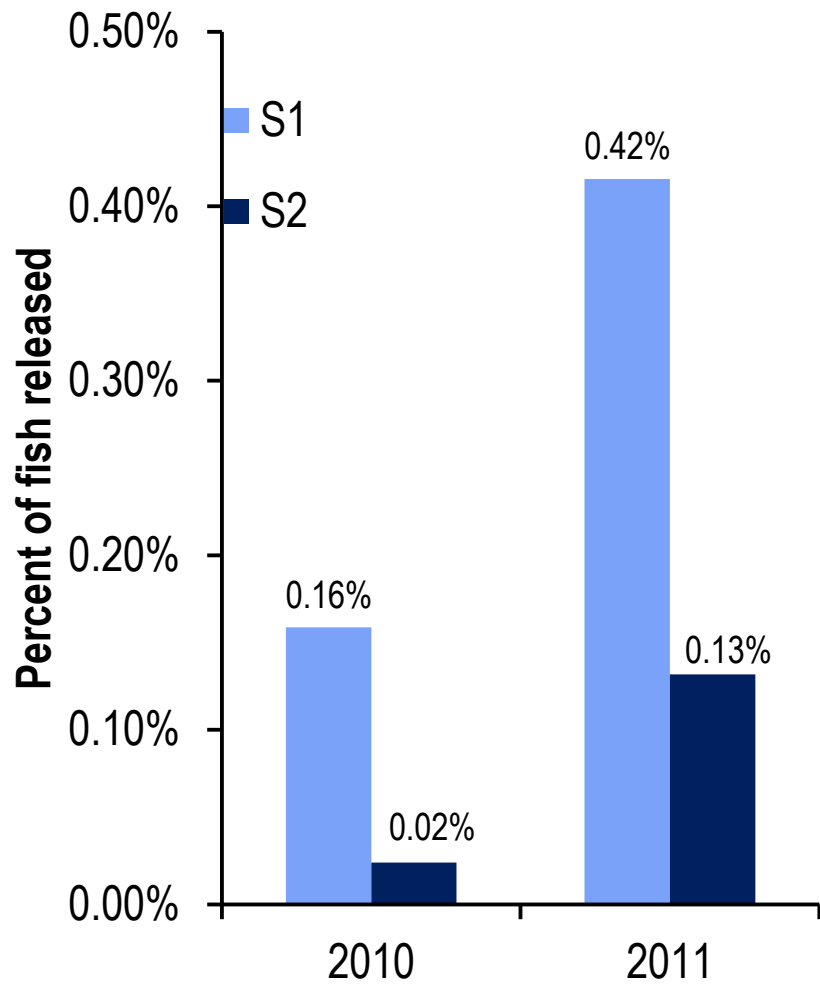
- PIT tag data
 - Compare size & sex of released and detected S1 & S2 populations
- Annual field sampling (August and September)
 - Electrofishing, seining, angling
 - Outfall of WNFH
 - Downstream reference reach of Methow River



Selection on body size after release (2011)

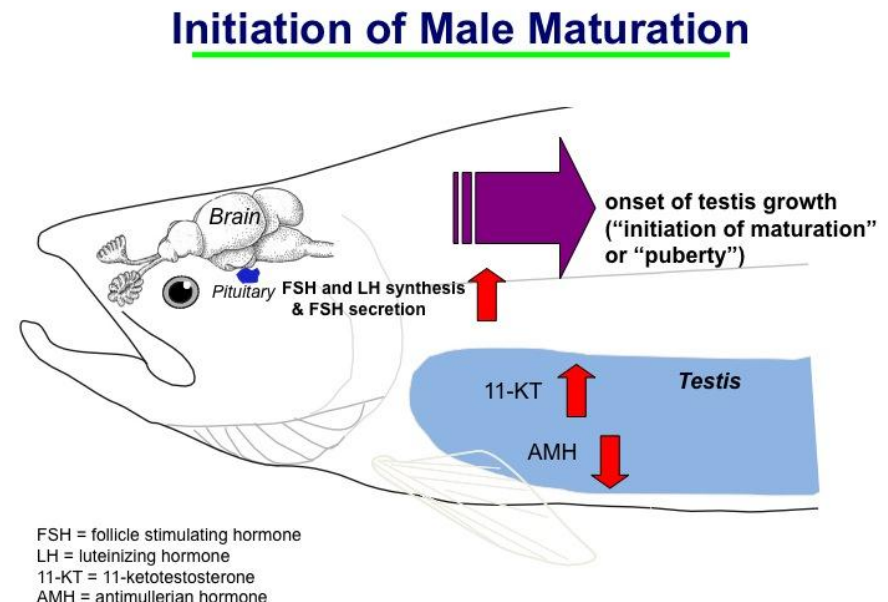


Characteristics of Residuals



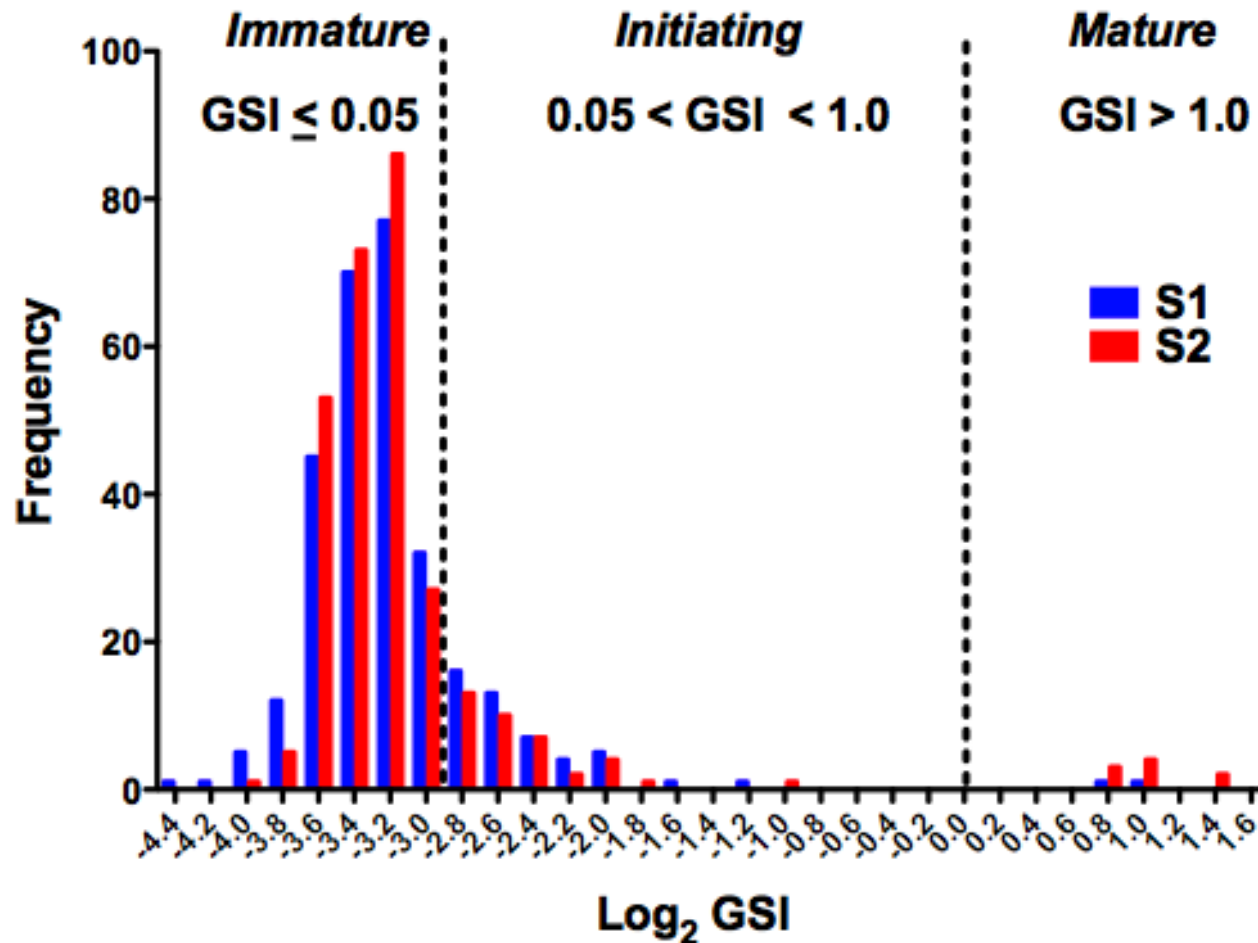
Evaluating Residualism II (male maturation)

- Annual lethal sampling of 600 S1 and 600 S2 smolts last week of March
 - Fork length, Weight, Smolt index, Sex
 - Blood, Testes, Pituitary gland, Gill tissue
- Male Maturation
 - GSI
 - Plasma 11-KT
 - Histology
 - Pituitary LH and FSH
 - Testis AMH



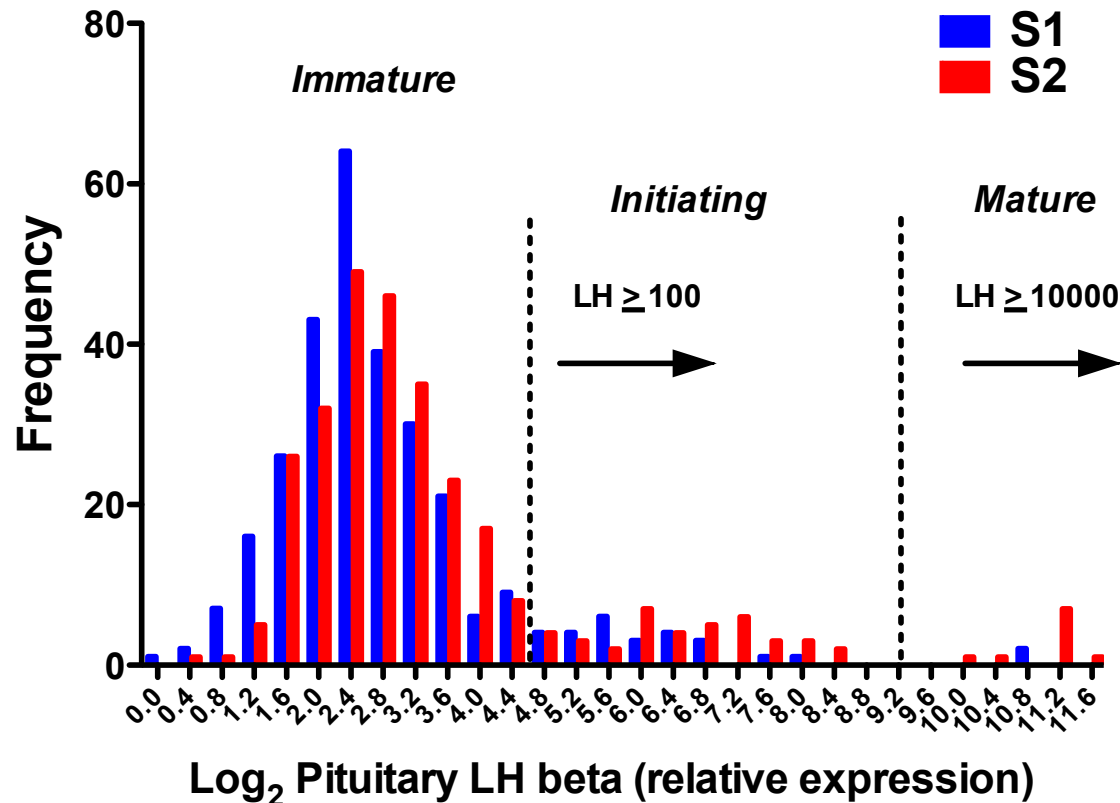
GSI of Male WNFH Steelhead

March 2012

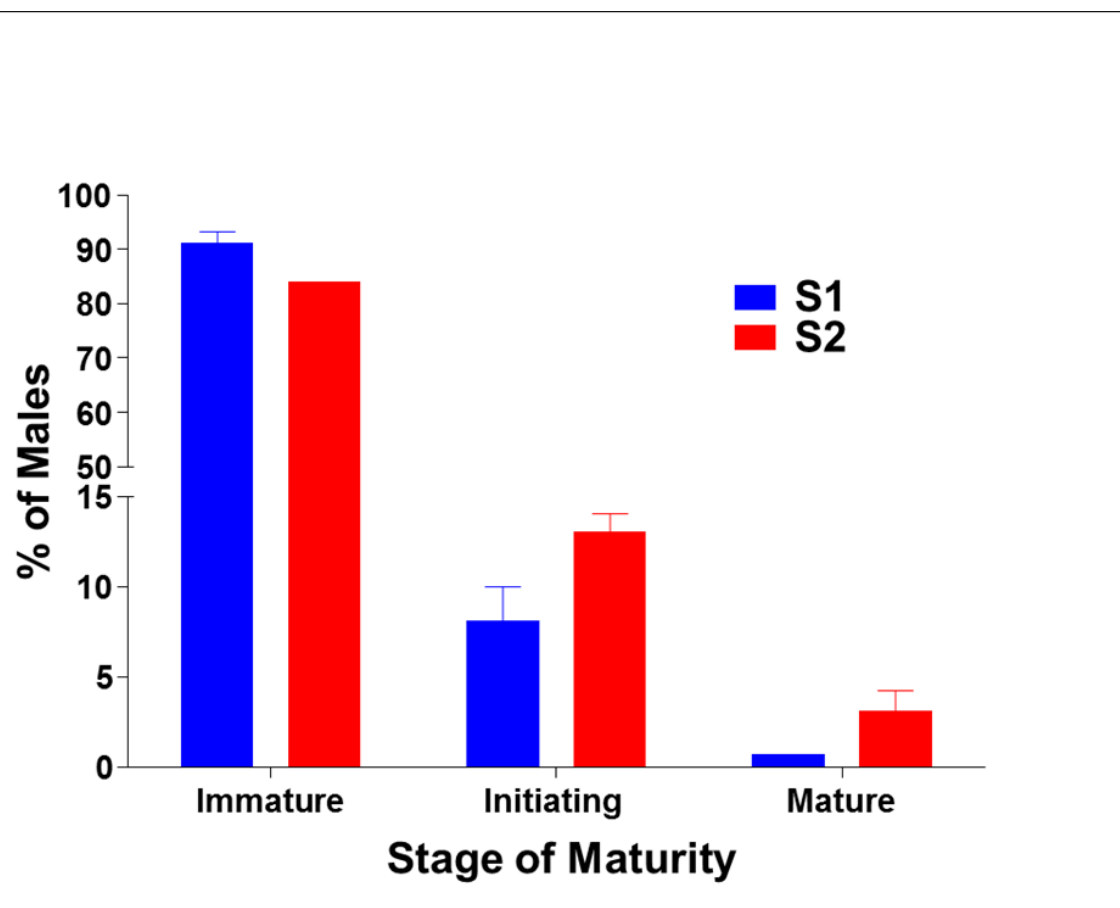


Pituitary LH beta mRNA in Male WNFH Steelhead

March 2012



Classification & male maturation status



Immature: $GSI < 0.05$

Initiating: $GSI \geq 0.05$
 $LH \geq 100$

Mature: $GSI > 1$

Conclusions from first two years

- Outmigration
 - Survival: $S2 > S1$
 - Travel time: $S2 < S1$
 - Greater post-release size selection on S1
 - Outmigration of S1 & S2 is gender biased
- Residualism
 - Recaptures: $S1 > S2$
 - Both S1 & S2 residual populations male biased
- More S1 grow too slowly to smolt
- Some male S2 mature or initiate maturation

Acknowledgements

- Collaborators
 - USFWS – staff of WNFH and Mid Columbia FRO
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 - UW
 - USGS
 - WDFW
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