

# Wenatchee Summer Steelhead Release Evaluation



Chris Moran, Washington Department of Fish and Wildlife  
McLain Johnson, Washington Department of Fish and Wildlife  
Catherine Willard, Chelan County PUD

# Outline

- Background
- Release Evaluation Objectives
- Methods and Results
- Preliminary Assessment of Residualism
- Summary/Discussion



# Wenatchee Summer Steelhead

## Background

- ESA listed in 1997 Endangered, 2009 Threatened
- Chelan PUD hatchery program
  - NNI for Rock Island hydro-project
- 247,300 supplementation
  - 123,650 WxW & HxH each
  - 1 year smolt

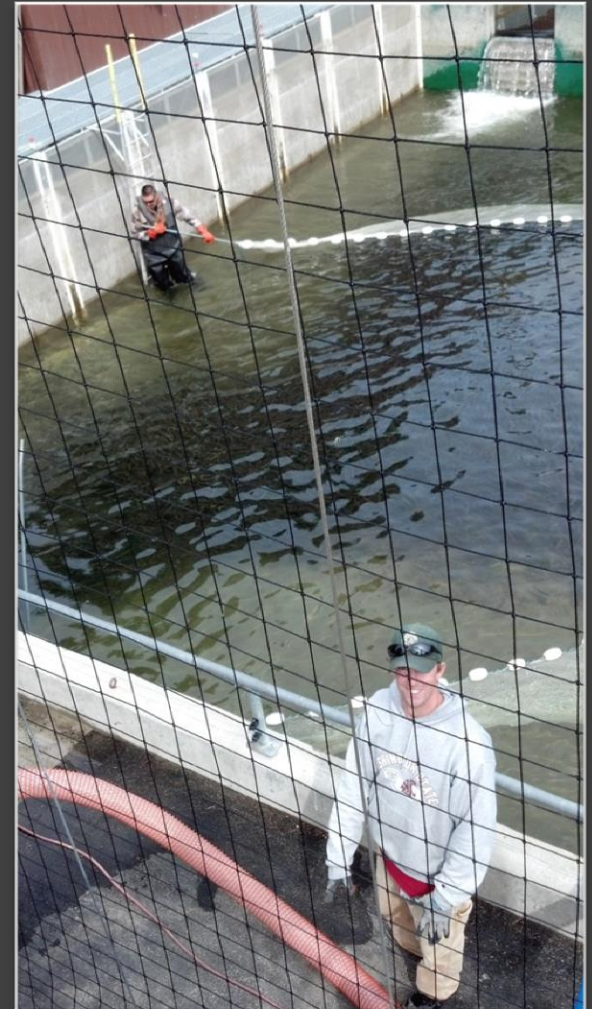


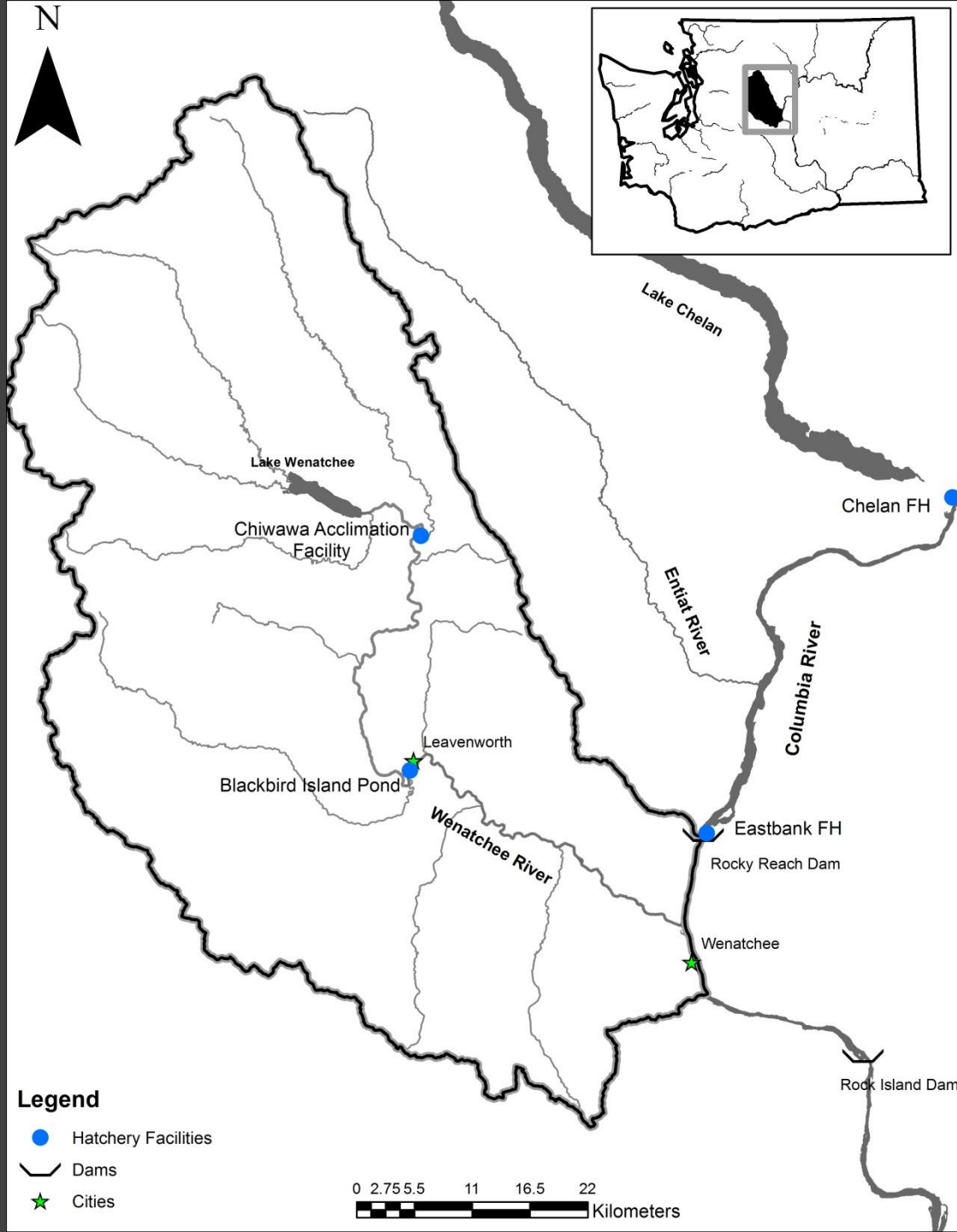


# Wenatchee Summer Steelhead

## Acclimation

- Overwinter at Chiwawa Acclimation Facility (2011 BY)
- Spring acclimation at Blackbird Island Pond (2009 BY)
- Releases start on April 20<sup>th</sup>





# Definitions

## Non-migrant (NM)

- Hatchery steelhead failing to emigrate from acclimation sites

## Residual

- Hatchery steelhead failing to out-migrate with cohort
  - Undersized
  - Precocial

# Federal Fun

## Release Guidelines

Old Permit 1395 (10/2/2003):

- *Uniform size and state of smoltification that ensures fish migrate seaward without delay*

Current Permit Consultation - BiOp (7/20/2016):

- *Develop methods to evaluate or measure residualism*
- *Develop a residual management plan to minimize the number of residuals produced and identify an acceptable rate of residualism*

# Previous Research

- Volitional releases can segregate NM fish -Viola and Schuck (1995)
- Additional evaluation considerations with natural origin brood -Hulett et al. (2004)
- WxW residualized an order of magnitude greater than domestic stock -Sharpe et al. (2007)
- Most residuals come from NM
- NM had significantly lower survival
- Not releasing NM had little effect on adult returns -Snow et al. (2013)





# Objectives

- Assess capacity to conduct volitional releases
  - Size through release period
  - Smolt index & Precocity
  - 2014 and 2015 BY
- Assess survival and travel time
  - PIT tags (20k)
  - 2012 through 2015 BY
- Evaluate potential residual rate
  - 2012 through 2015 BY



# Chiwawa Acclimation Facility



Pond 1 & 2:

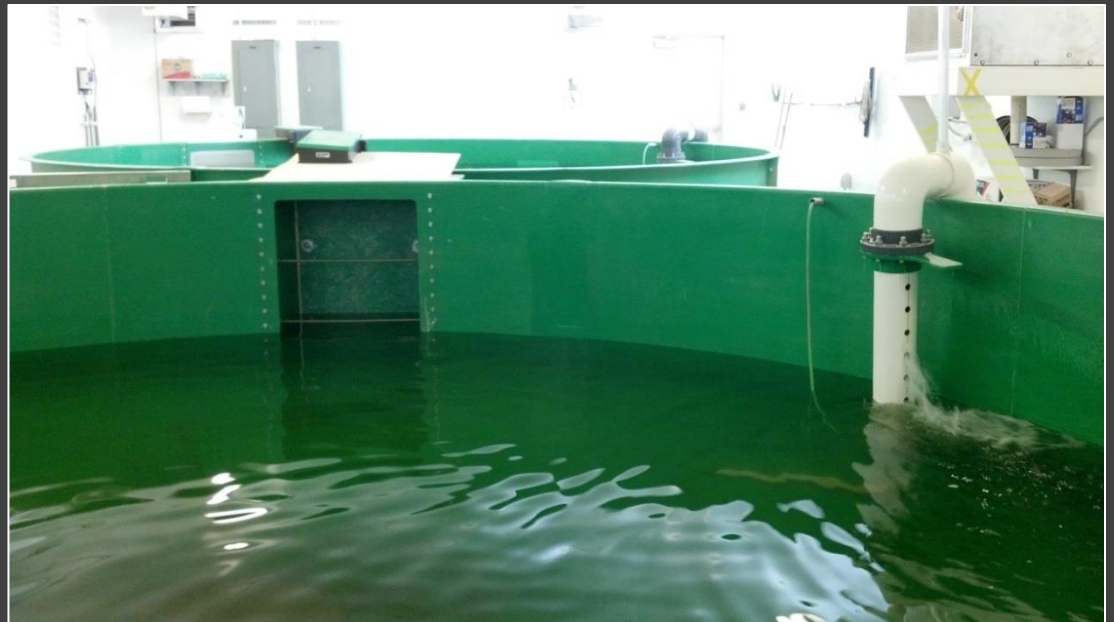
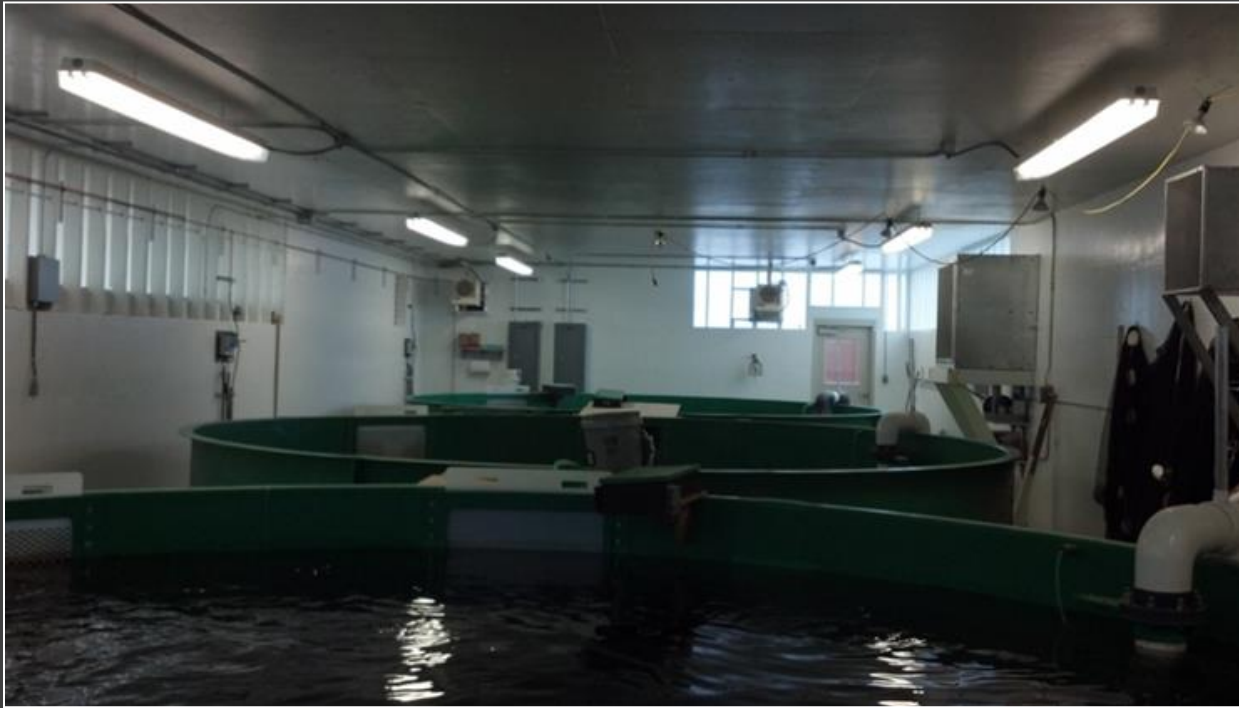
- 123' L x 50' W x 6' D

Circulars:

- 20' diameter x 4' D









# Methods

## Release Sampling

- FL
- Weight
- Smolt Index
- Precocity; freely expressing milt

## Sample Size

### Pre-release :

- Raceway: 200 each WxW & HxH
- Circulars: 200 WxW

### During release:

- Raceway: 100 each WxW & HxH
- Circulars: 100 WxW

### Post release:

- Same as pre-release



Photo: M. Humling, USFWS



# Methods

## Survival and Travel time

- Cormack/Jolly-Seber survival model
- Release to McNary Dam
- 2012-2015 BY

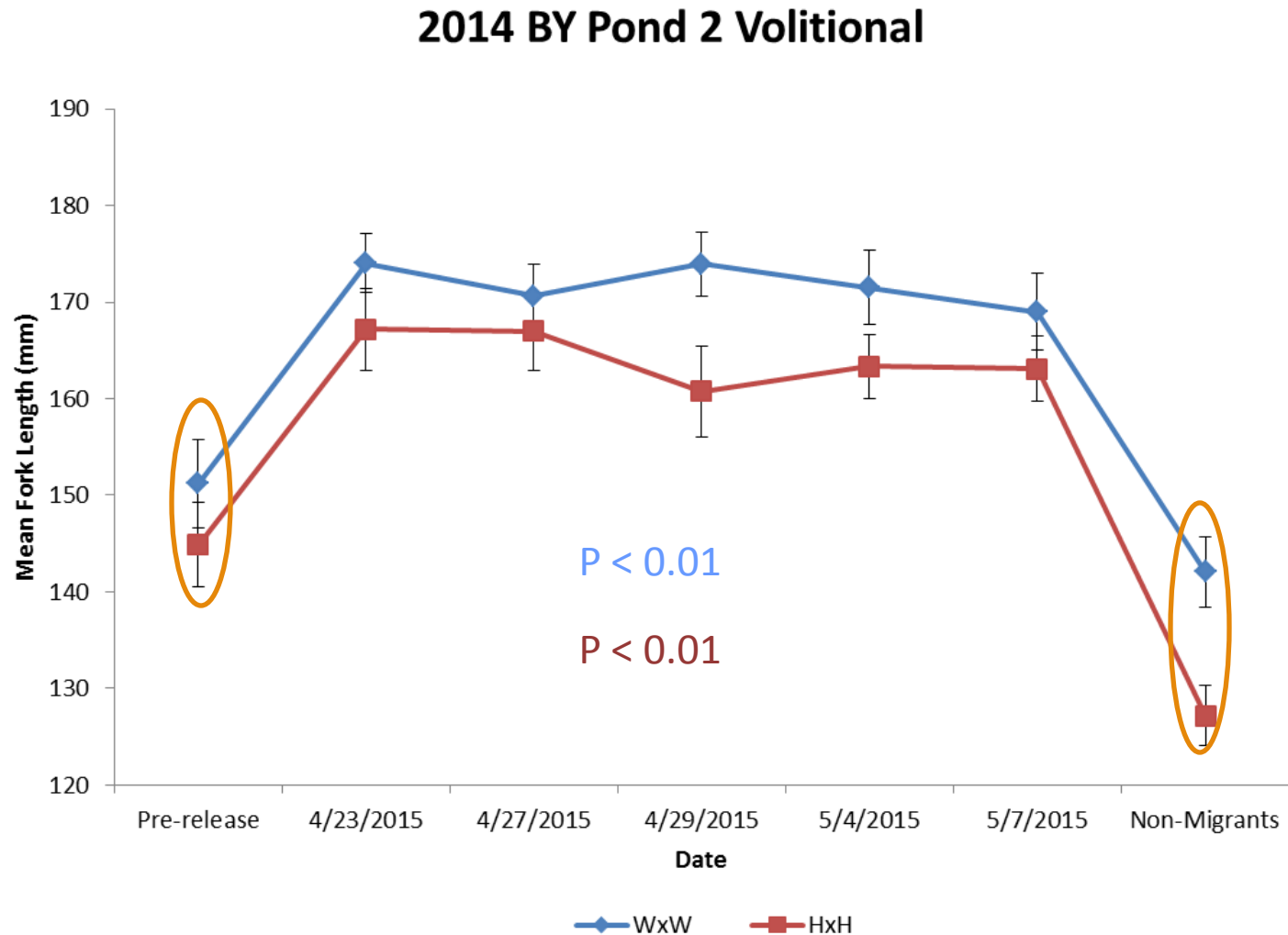


## Potential Residualism

- PIT tag detections after July 1<sup>st</sup> year of release
- In stream antennae arrays
- 2012-2015 BY

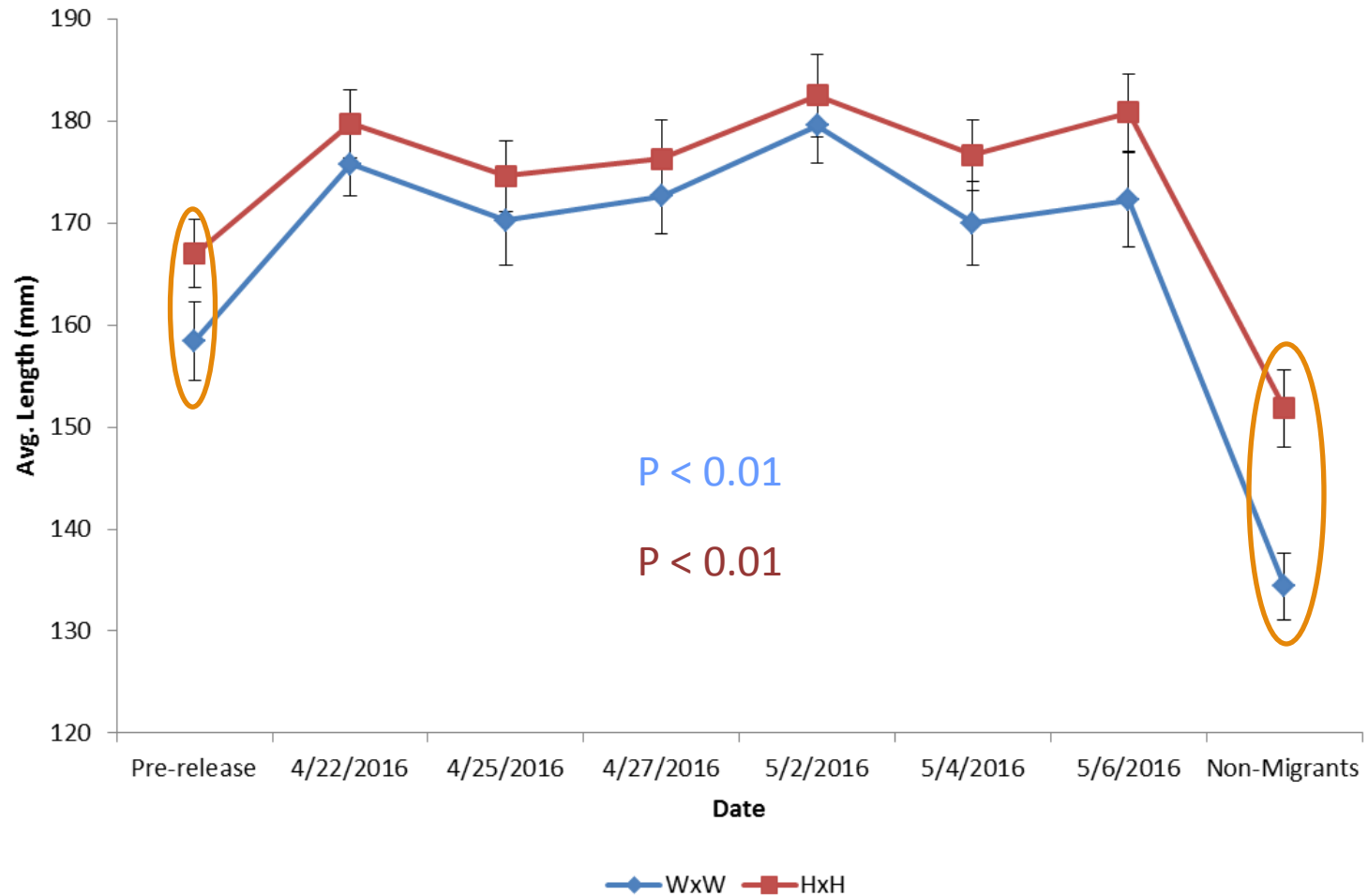


# Results: 2015 Release



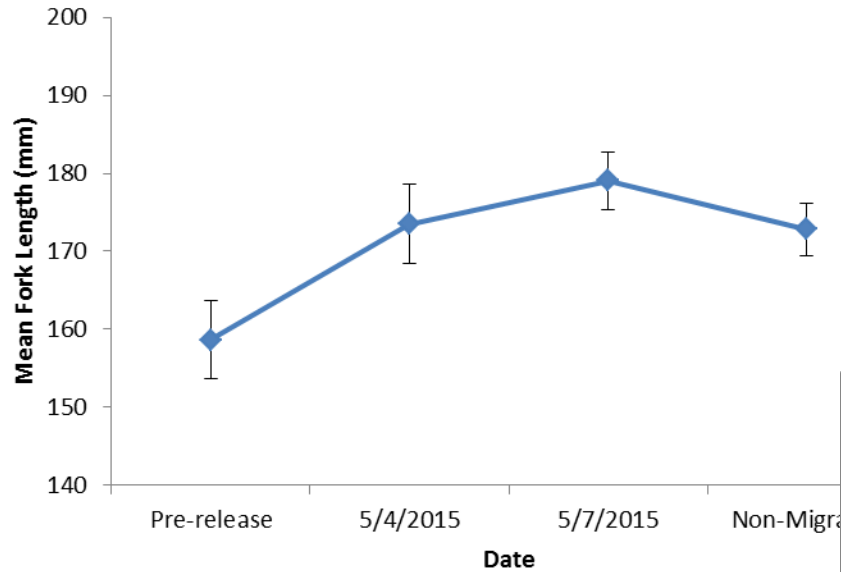
# 2016 Release

## 2015 BY Pond 2 Volitional

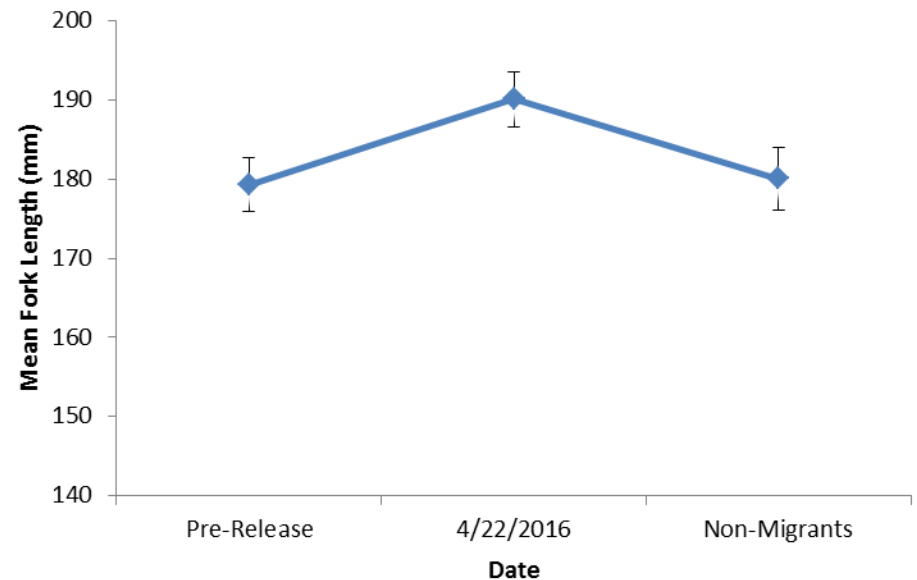


# 2015 and 2016 Circular Release

**2014 BY Circular 1 Volitional**



**2015BY Circular 1 Volitional**



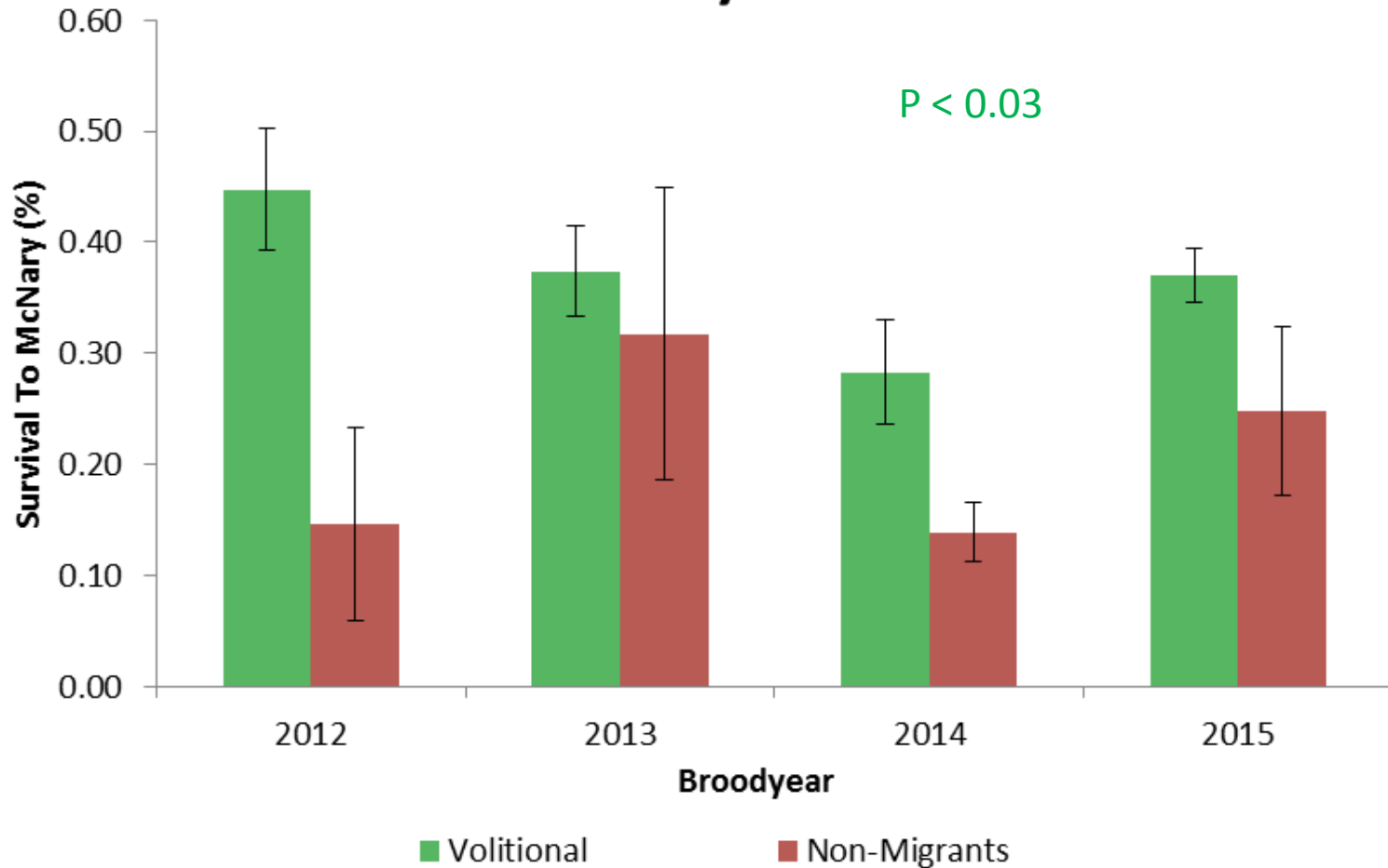
# Smolt Index Pond 2

Broodyear	Sample Type	Smolt Index			
		P	T	S	Precocial
2014	Pre-Release	8.0%	88.3%	2.5%	1.3%
	Volitional	0.6%	98.1%	0.6%	0.8%
	Non-Migrants	4.8%	92.5%	0.3%	2.5%
2015	Pre-Release	17.5%	76.5%	4.0%	2.0%
	Volitional	3.6%	81.1%	14.1%	1.2%
	Non-Migrants	23.0%	76.5%	0.3%	0.3%



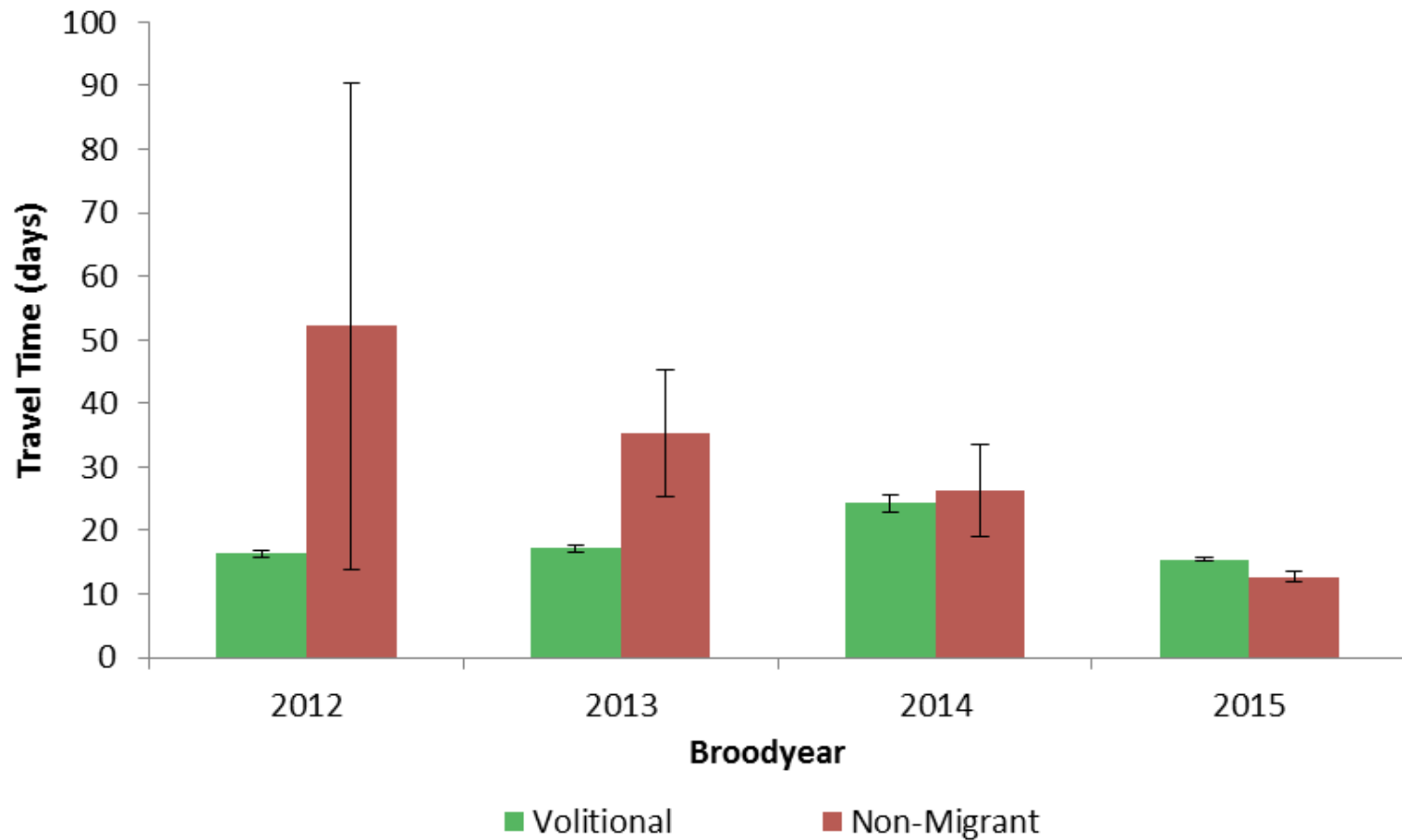
# Survival

## Raceway Releases



# Travel Time

## Raceway Releases



# Potential Residuals...a relative examination

Brood Year	Release Group					
2012	Volitional Non-Migrant					
2013	Volitional Non-Migrant					
2014	Volitional Non-Migrant					
2015	Volitional Non-Migrant					

# Potential Residuals

Broodyear	Release Groups	Fish Released	Proportion Residual	Residuals (expanded)	<i>G</i>	<i>P</i>
2012	Volitional	100,666	0.0026	259	191.0	< .01
	Non-Migrants	34,062	0.0086	292		
2013	Volitional	160,049	0.0020	327	508.4	< .01
	Non-Migrants	45,041	0.0105	471		
2014	Volitional	82,348	0.0028	231	33.8	< .01
	Non-Migrants	49,009	0.0056	276		
2015	Volitional	89,550	0.0005	42	27.9	< .01
	Non-Migrants	35,117	0.0014	51		

# Summary

## Volitional Releases

- Size difference between prerelease and NM
- More parr observed in NM than volitional releases
- Volitional greater survival and faster travel times
- More potential residuals detected in NM





# Discussion

Build the  
non-migrant  
wall!!?

- Yes, volitional releases can be conducted at Chiwawa Acclimation Facility
- Circulars look promising
- Consider alternative smolt index
- Further Evaluate differences in HxH and WxW
- Currently exploring PIT tagging rate and experimental design to assess residualism
- Non-migrants?





# Acknowledgements



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**Chelan Fish Hatchery Staff**

