

Dworshak National Fish Hatchery Spring Chinook Salmon Density Study

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Dworshak National Fish Hatchery Spring Chinook Salmon Program

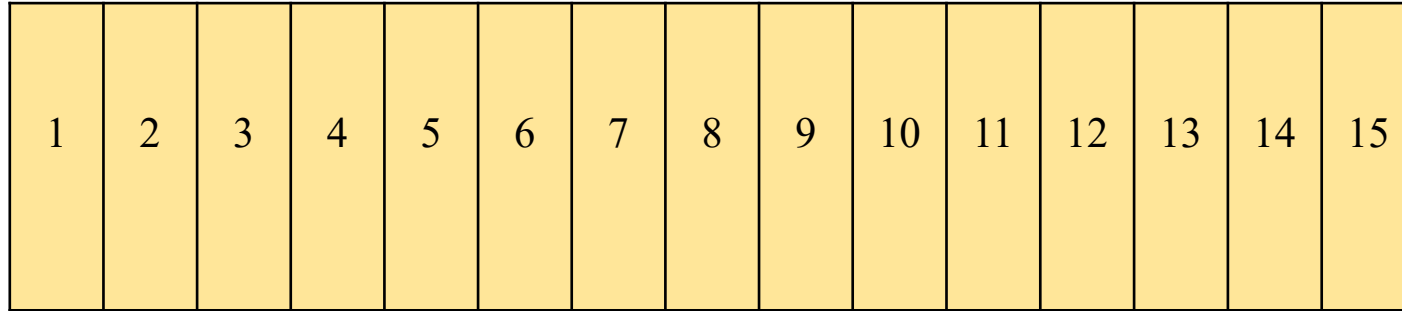
- LSRCP mitigation goal
 - 9,135 adults above Lower Granite
 - SAR = 0.87
- Current program release goal of 1.35 million smolts at 20 fpp
- 30 raceways @ 45,000 smolts/raceway
 - Final rearing density = 0.25

Objectives

- Determine if the higher smolt densities in the spring Chinook salmon raceways results in increased adult returns.
 - Increase juvenile production
 - Achieve LSRCP mitigation goals through increased adult returns
 - Utilize existing rearing space and water



A-bank



750 gpm flow

750 gpm
reuse water

500 gpm
new water

1,250 gpm flow

B-bank



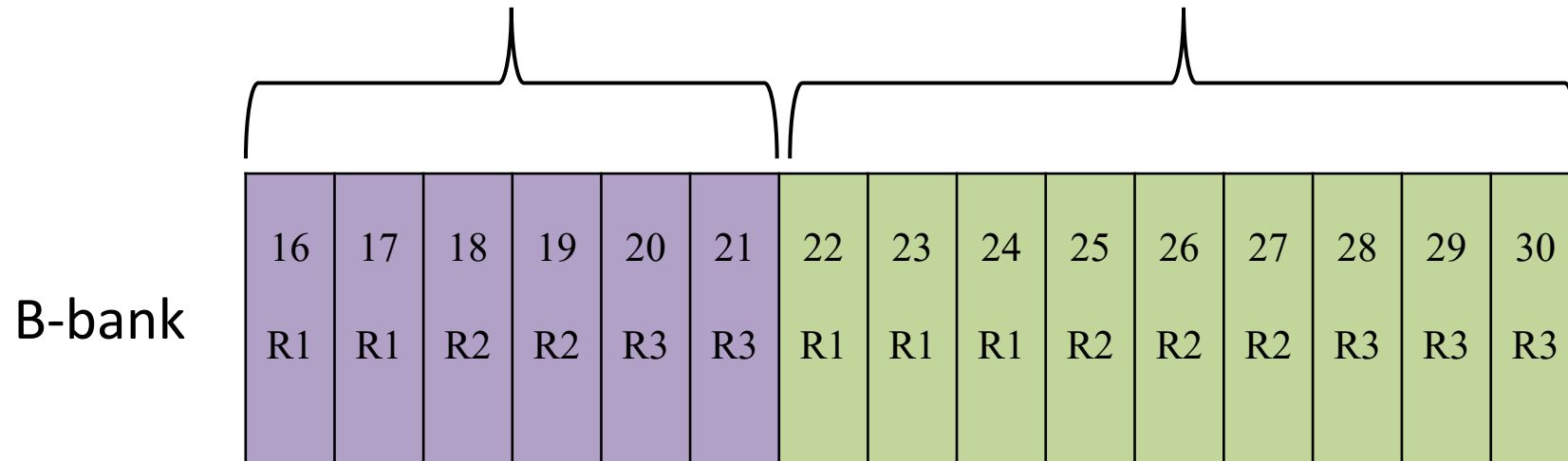
Study Design

Treatment – High-Density

- 65,000 juveniles/pond
- 2 ponds/replicate
- Density index ≈ 0.35
- Flow index ≈ 0.28

Control – “normal” Density

- 45,000 juveniles/pond
- 3 ponds/replicate
- Density index ≈ 0.25
- Flow index ≈ 0.19



Study Design

- Three-year study – Brood years 2012 – 2014
- Evaluate relative performance of control- vs high-density rearing
 - Juvenile release years 2014 -2016
 - Metrics
 - Size at release
 - Fish health
 - Hatchery juvenile mortality
 - Emigrant survival to Lower Granite Dam

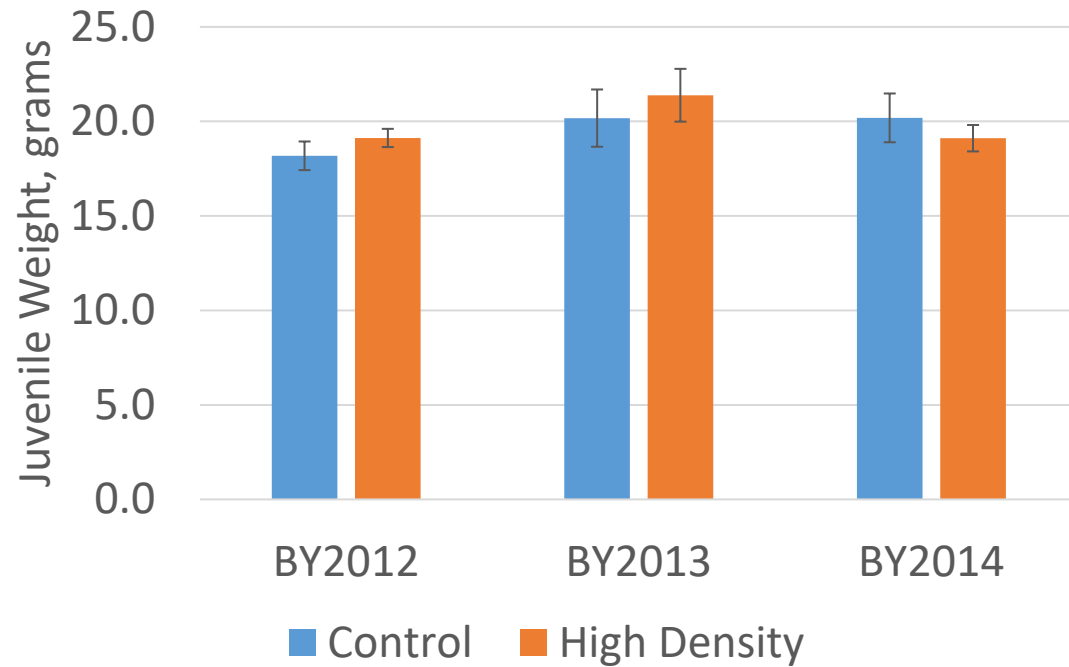
Study Design

- Adult returns from 2015 - 2019
 - Metrics
 - Adult abundance
 - Lower Granite Dam
 - IDFG sport harvest
 - Hatchery rack
 - Age-at-return
 - Sex ratio
- Cost-benefit analysis



Juvenile Metrics

Size at Release

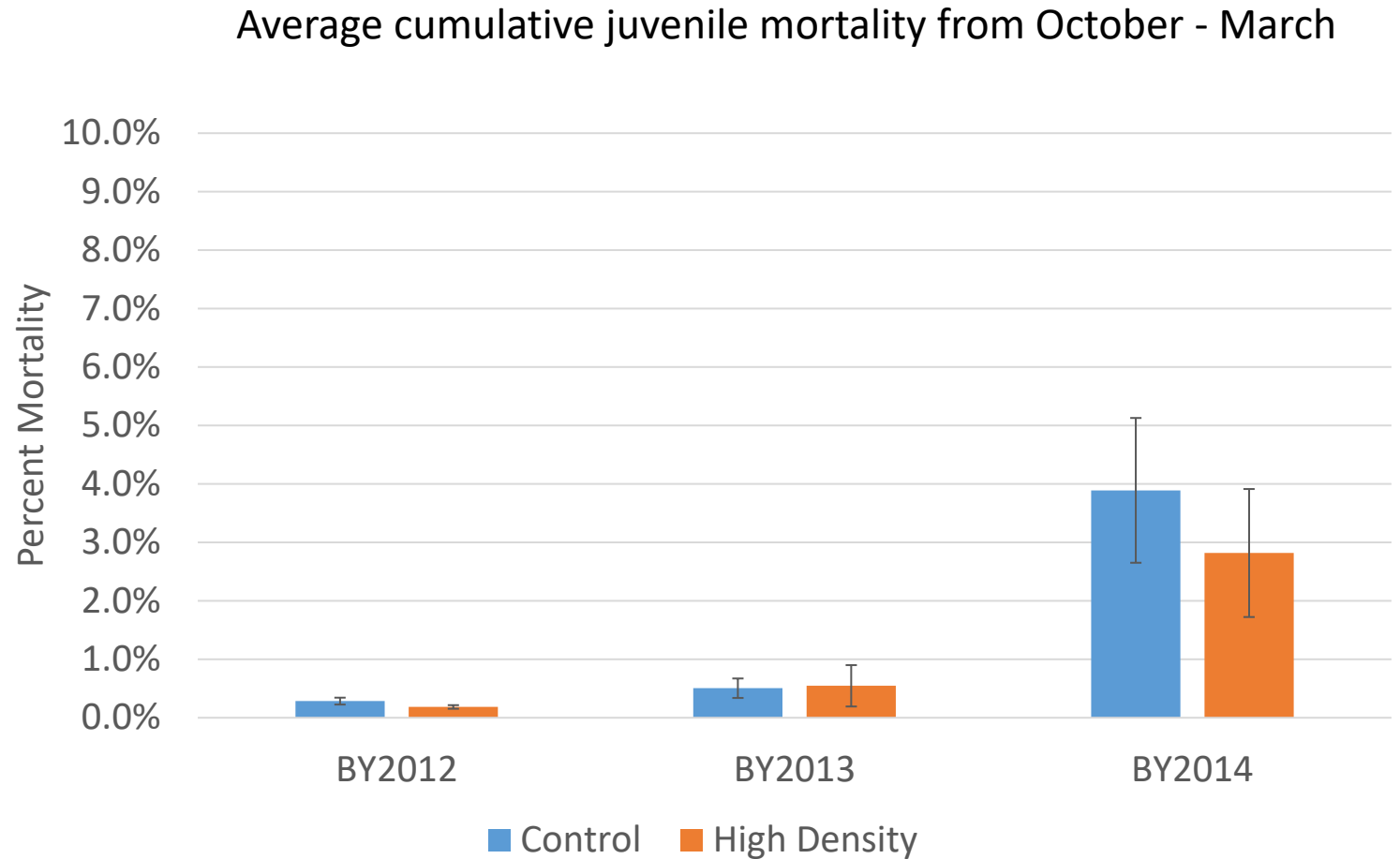


	FPP	Density Index
Control (I)	23	0.24
High Density	23	0.36

Juvenile Metrics

Fish Health and Hatchery Mortality

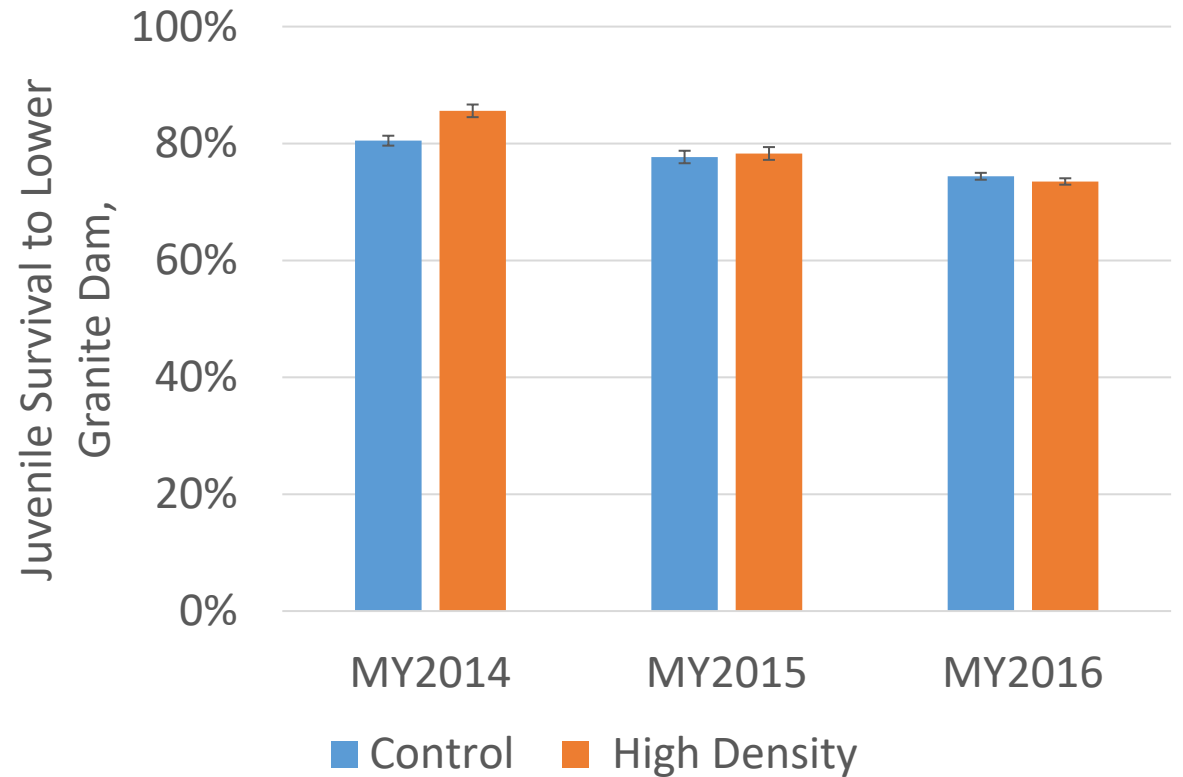
No significant fish health issues or disease outbreaks at control or high-density treatments



Juvenile Metrics

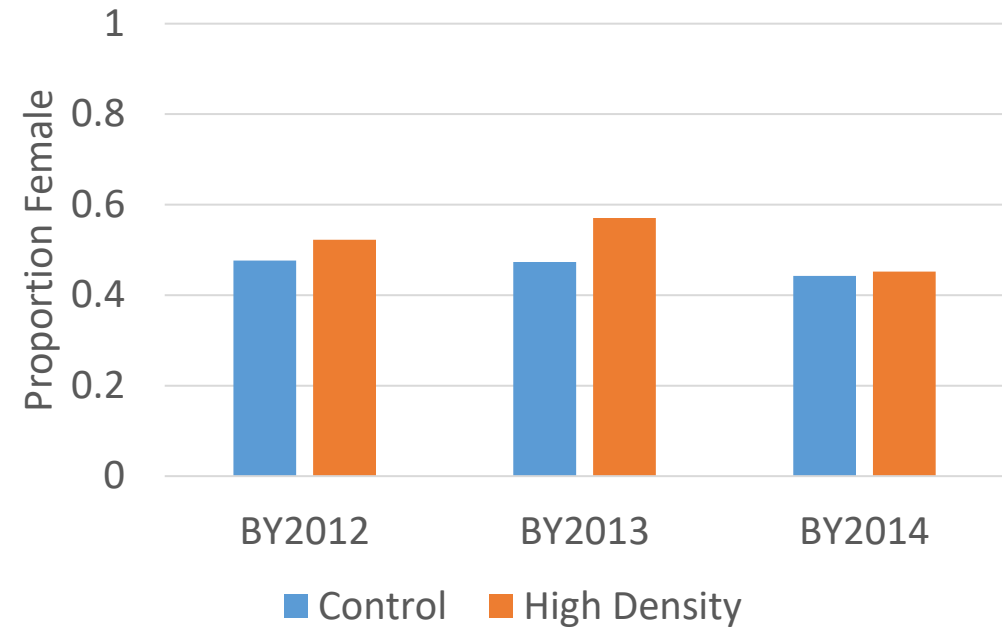
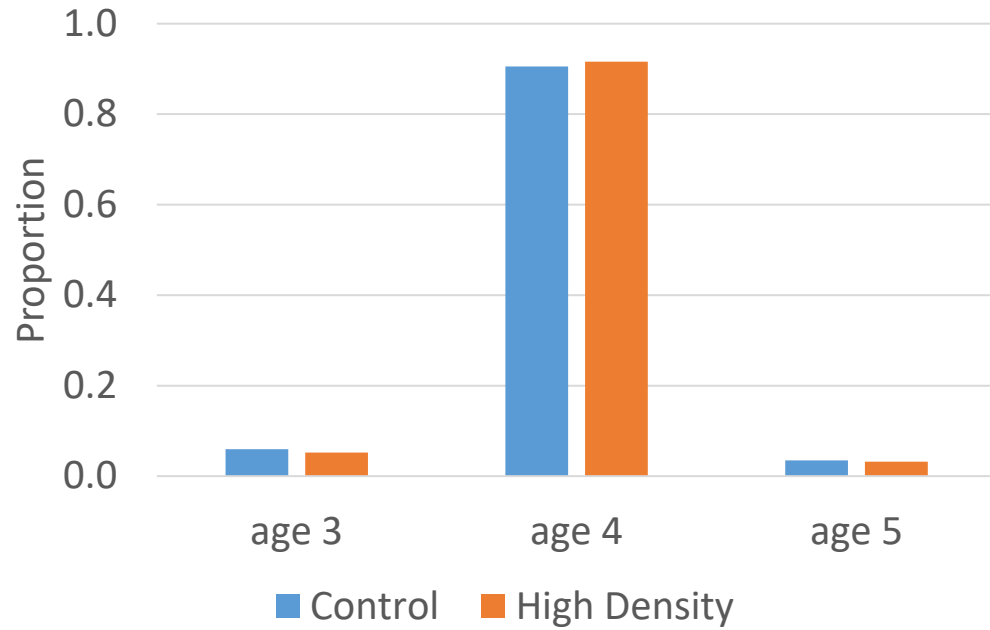
Survival to Lower Granite Dam

Treatment	Number of PIT tags	Number of raceways
Control	5000 – 7,000	2 or 3
High Density	5000 – 7,000	2



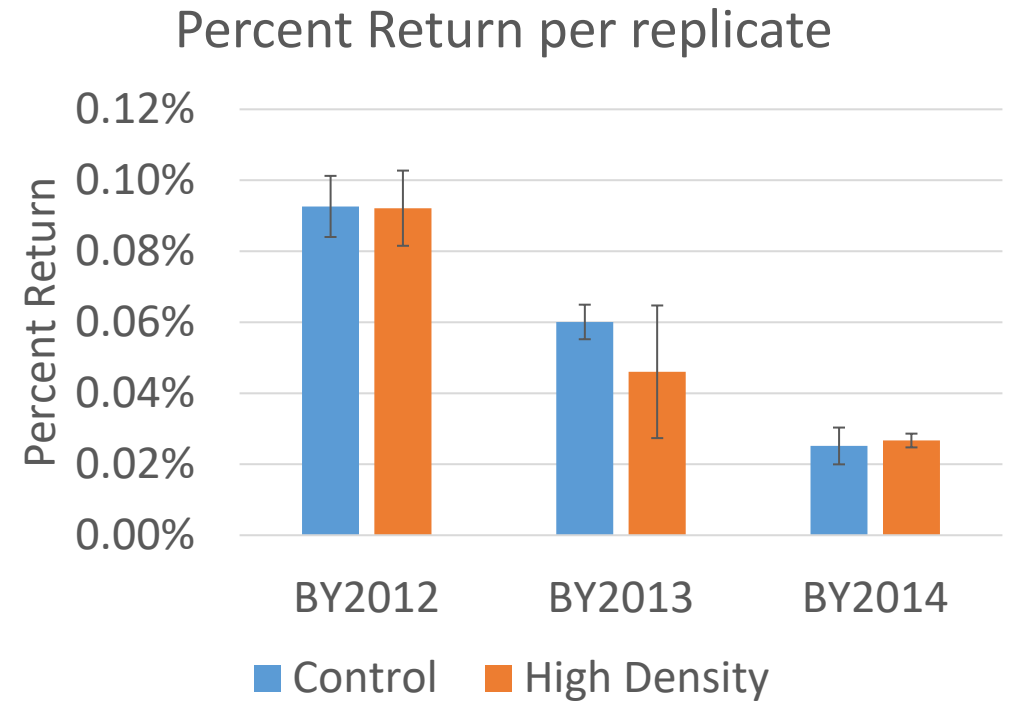
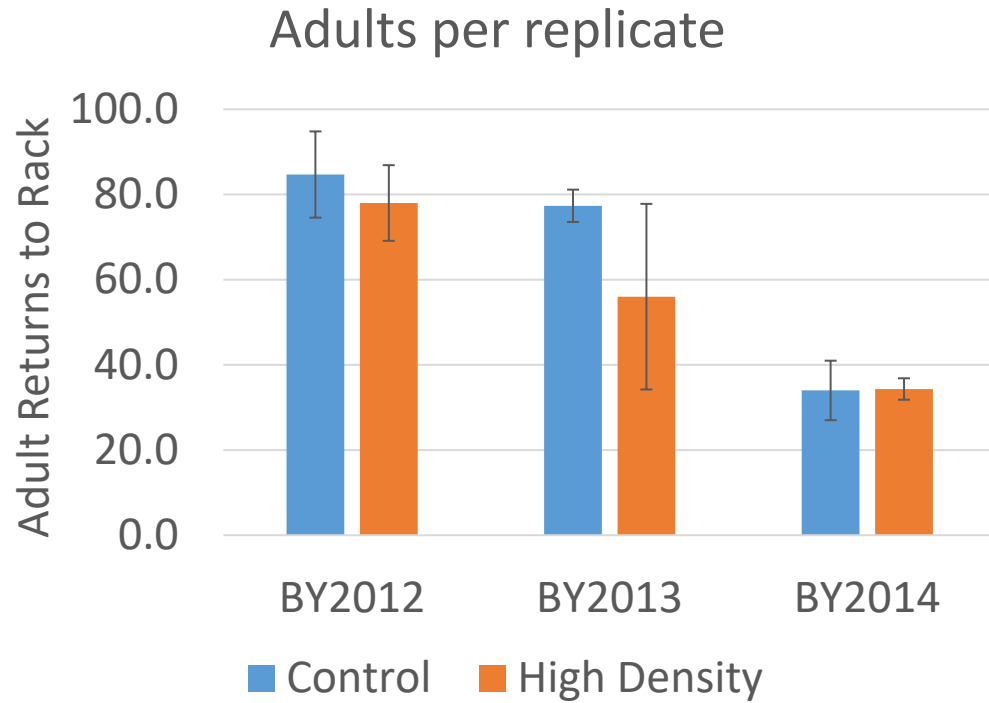
Adult Metrics

Adult Returns – age structure and sex ratio



Adult Metrics

Adult Returns



Cost/Benefit Analysis

7 females  20,000 smolts/raceway

20k smolts

Staff time (spawning, egg care, ponding)

Fish Health screening

Feed

Marking

Cost

=

80 adults (0.4 SAR)

15 raceways = 1,200 adults/year

Benefit



LSRCP
mitigation
goals

15 raceways = 1,200 adults/year

Relative Performance

Juvenile growth

Juvenile health

Juvenile survival

Control: 45k = High Density: 65k

Adult age composition

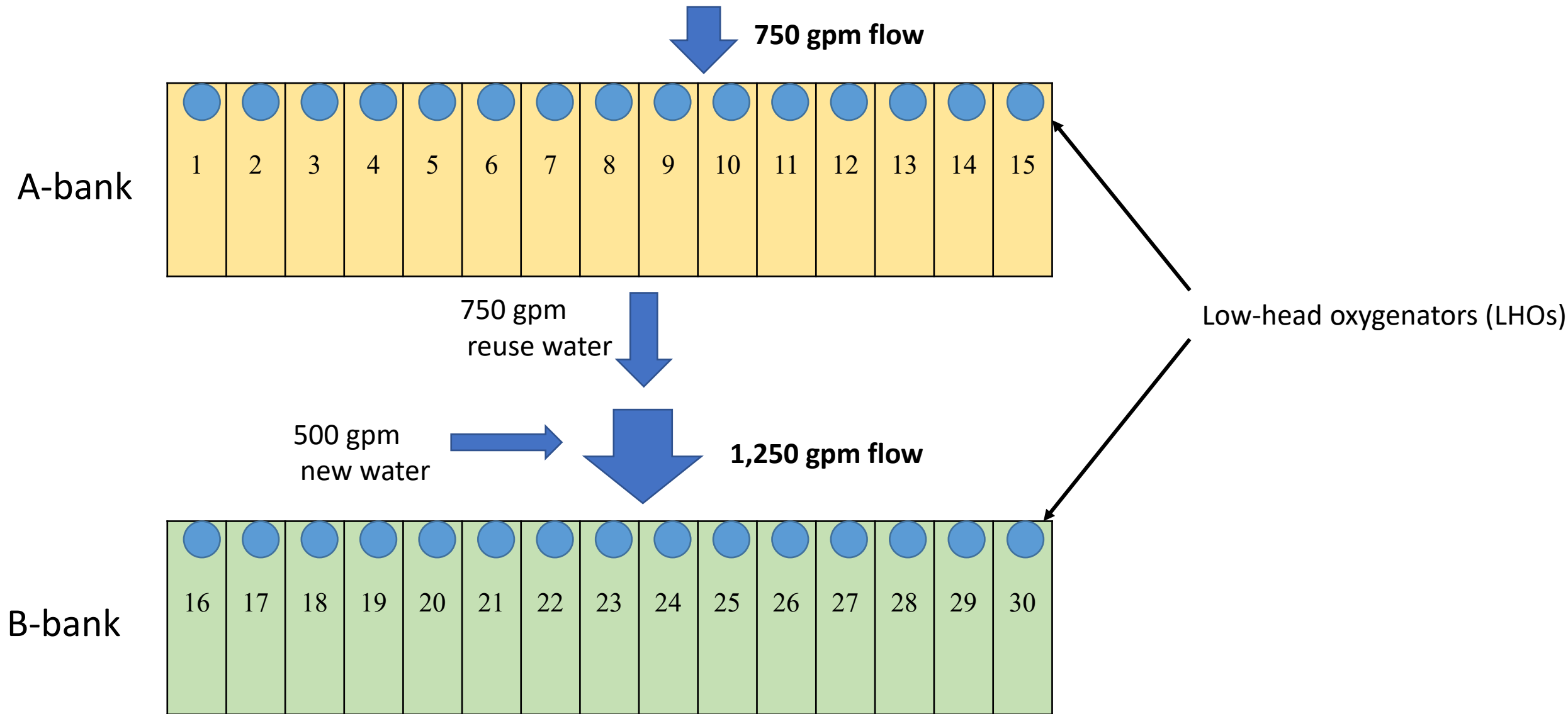
Adult sex ratio

Adult returns

Cost/benefit

Conclusions

- Relative performance was similar between the control and high density treatments
- Supports decision to increase production from 45k to 65k
 - 44% increase of production from the B-bank
- Utilized new marking technologies = PBT
 - Little to no increased marking/tagging costs
 - Utilized existing tag recovery infrastructure



Next steps.....

- Current Production

- Following positive results all B-bank raceways could produce 65k smolts
- What is the production limit in A – bank raceways?
- Effects of the LHO?
- Are relatively high densities negatively affecting production

- B-bank – 15 raceways at 55k/raceway
- A-bank – 15 raceways at 55k/raceway

Questions?

