



# Initial Relative Reproductive Success Results for Broodyear 2007 - Yakima River Spring Chinook Supplementation Program

ILANA J KOCH

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# Acknowledgements

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Bonneville  
POWER ADMINISTRATION

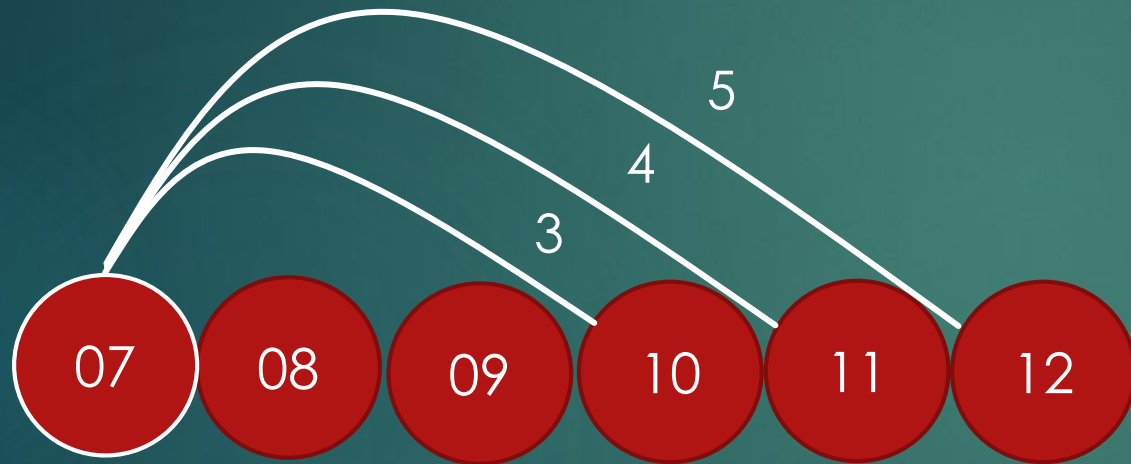


# Objectives

1. Demographic boost provided by the hatchery?
2. Differences in reproductive success between hatchery-reared and natural-origin fish spawning naturally?
  - a. All potential spawners
  - b. Successful spawners
3. Do hatchery-reared fish reduce the fitness of natural-origin fish?

# Methods

Used DNA to reconstruct genetic pedigrees from 3 types of BY2007 matings:



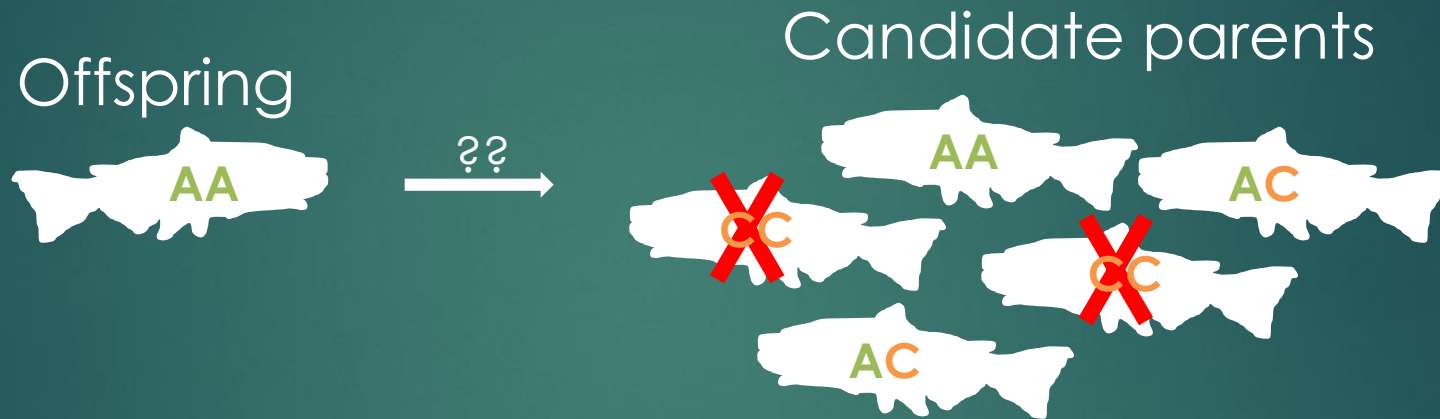
Wild x Wild (WxW)  
Hatchery x Wild (HxW)  
Hatchery x Hatchery (HxH)

Genotyped all individuals at 183 single nucleotide polymorphisms (SNPs)

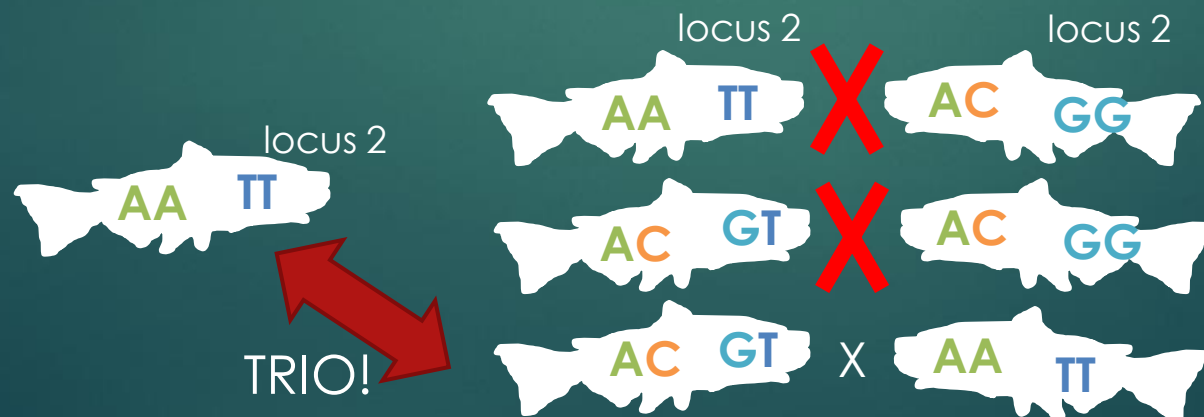
# SNPPIT

A parentage analysis program that uses an exclusion of trios based on Mendelian incompatibility.

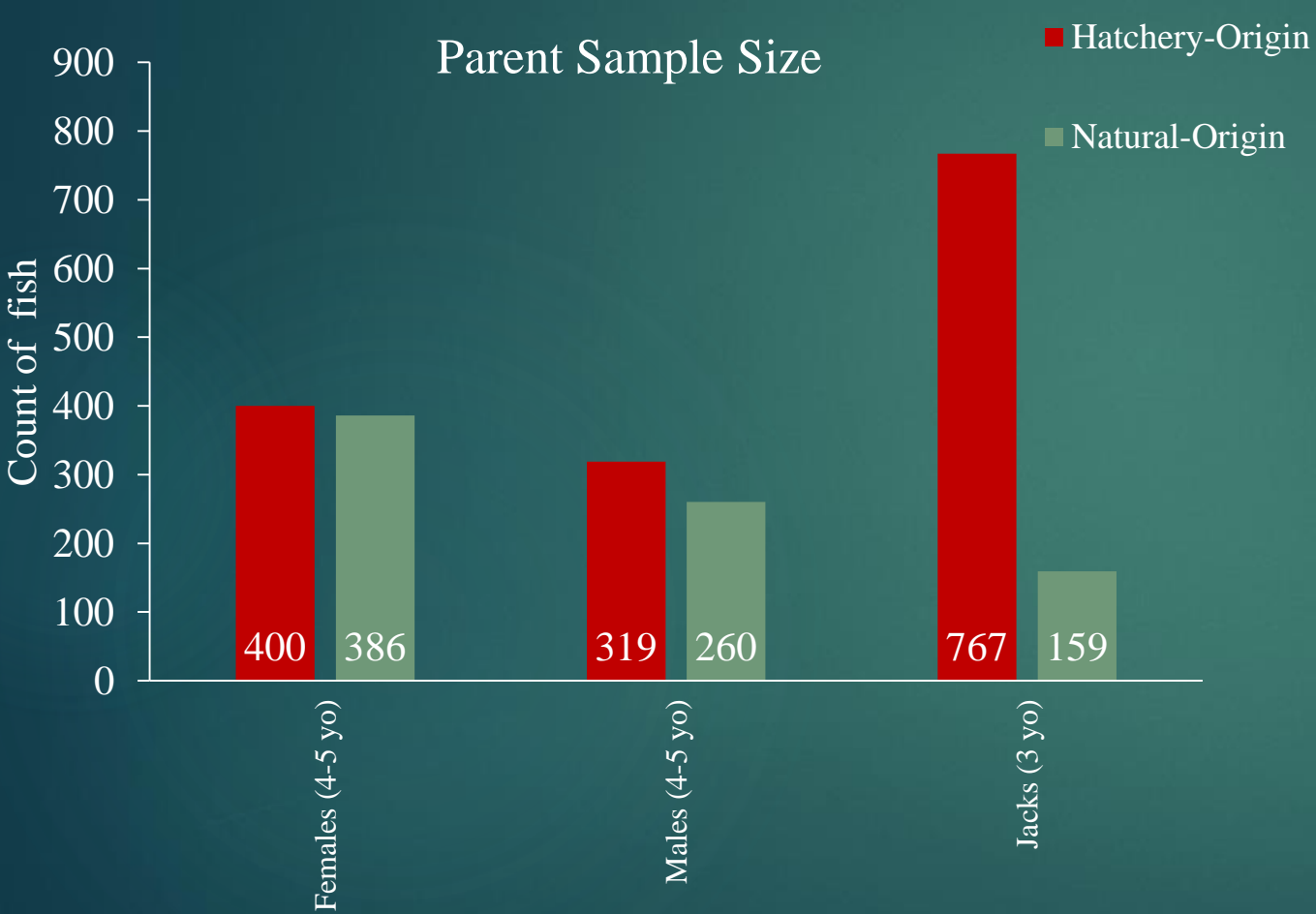
## 1.) Exclude individual candidate parents



## 2.) Compare non-excluded candidates as parent pairs & exclude



# Sample Information

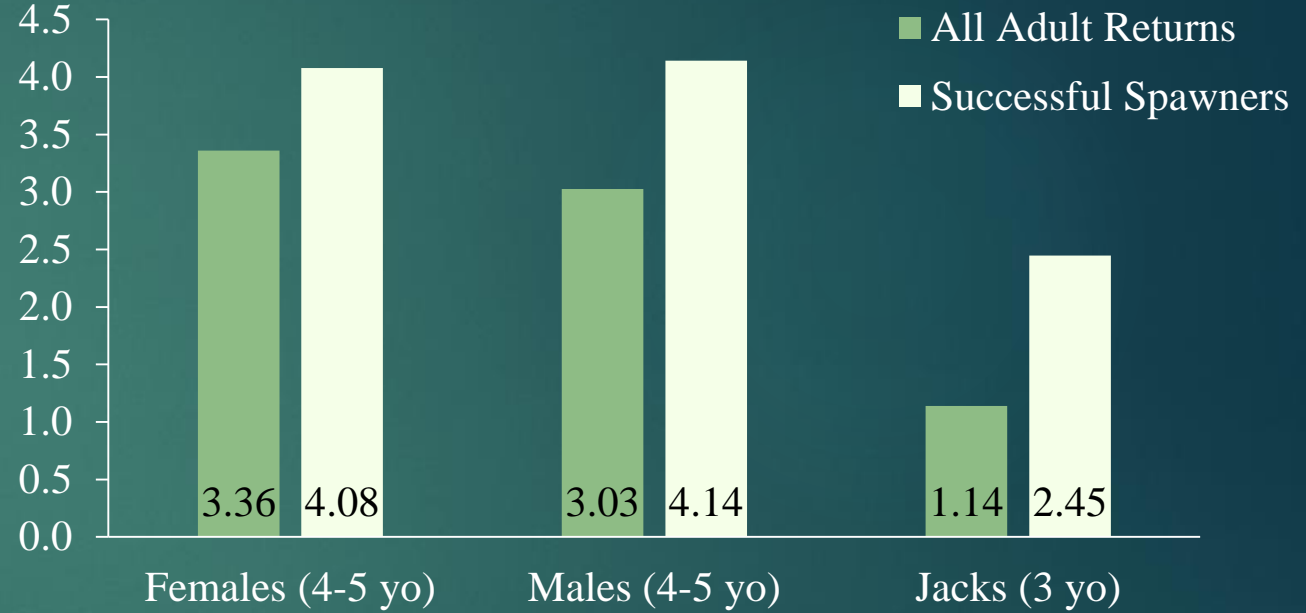
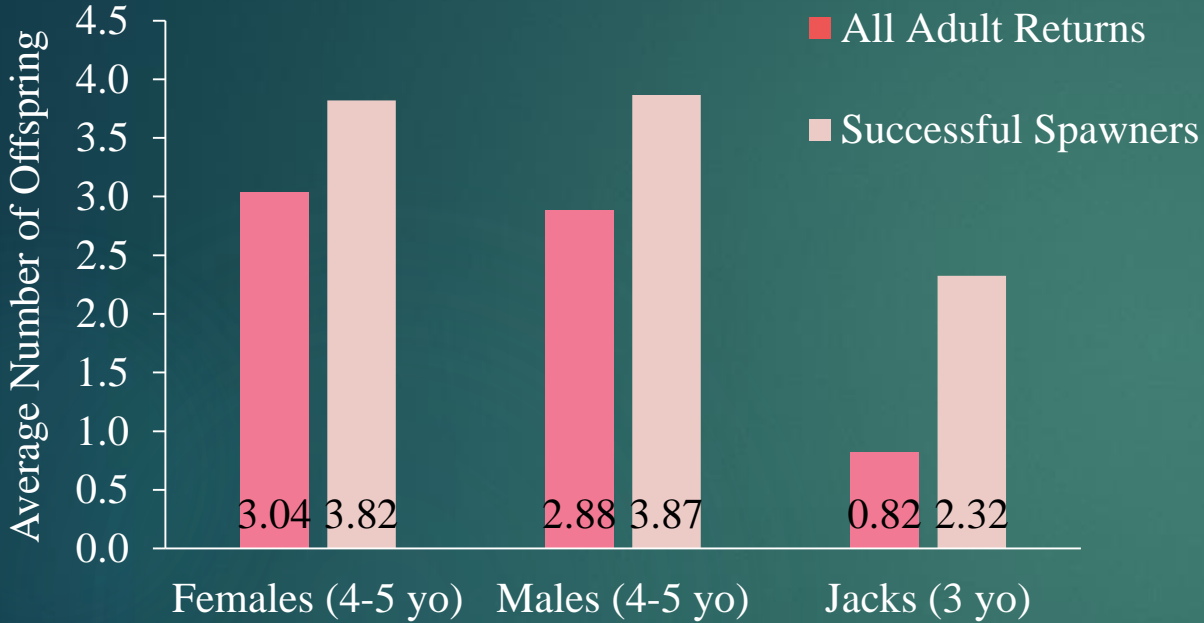


# Adult Recruits per Spawner



## Hatchery-Origin

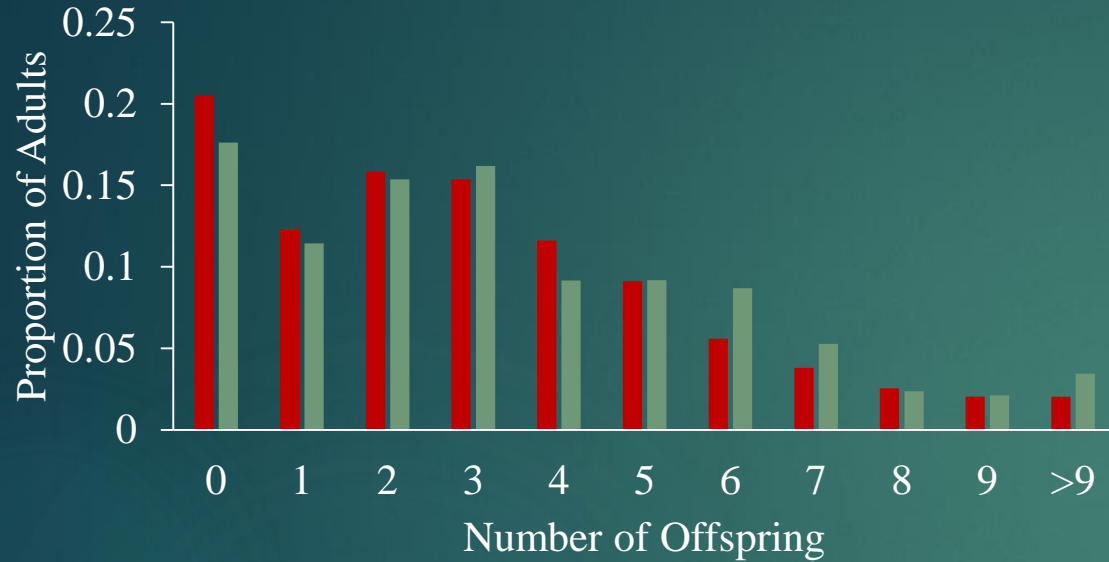
## Natural-Origin



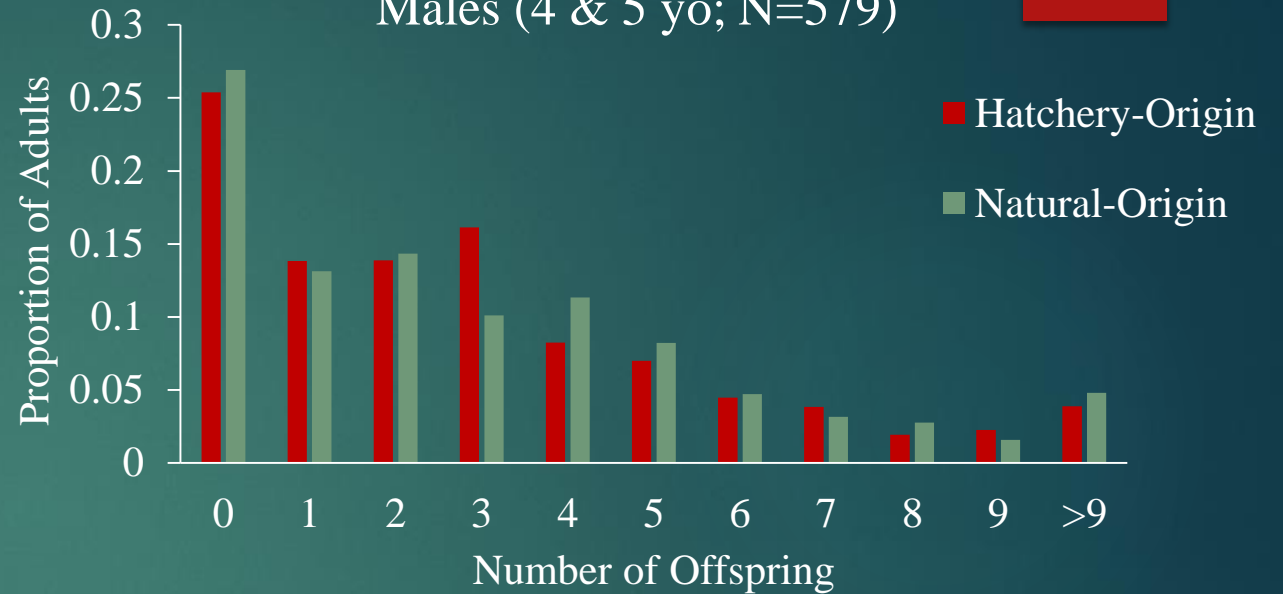


# Offspring Counts

Females (N=786)

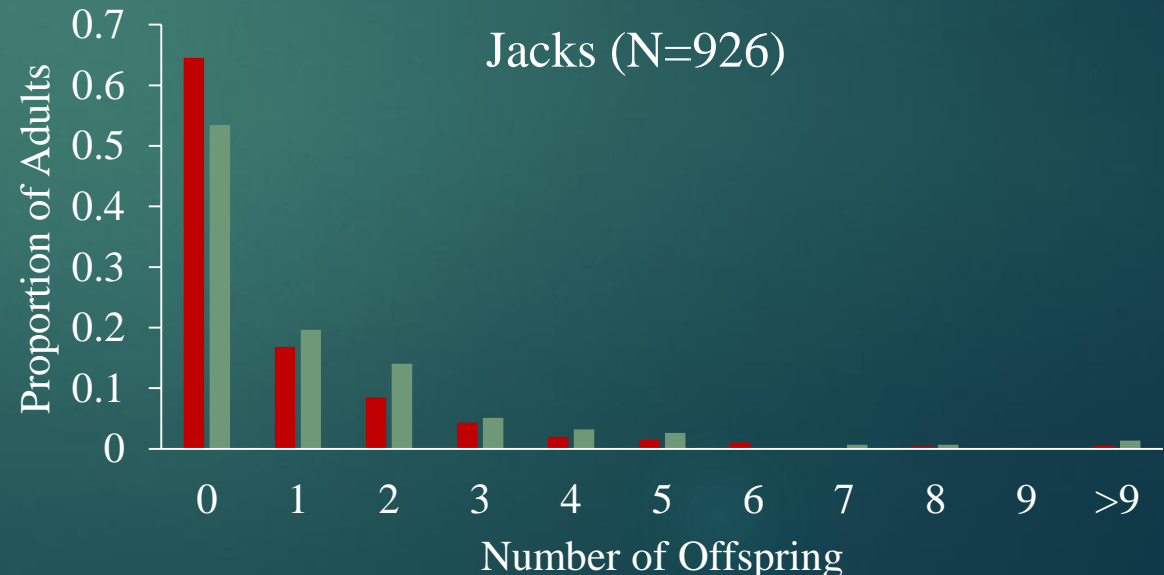


Males (4 & 5 yo; N=579)



**\*\* Note:** Estimates do not include single-parent assignments.

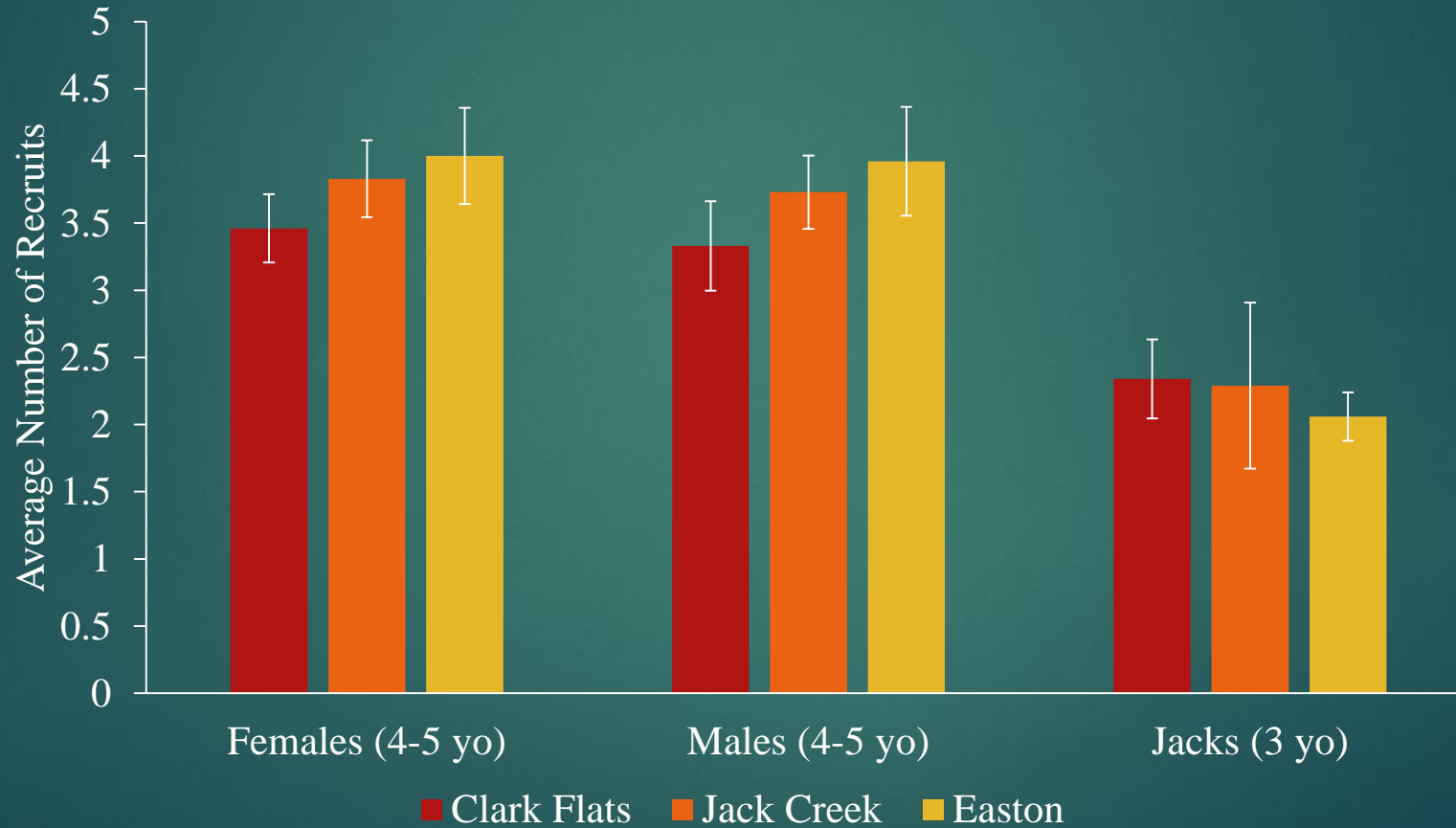
Jacks (N=926)





# Productivity of successful supplementation hatchery (SH) smolts from 3 sites

Adult Recruits Per Successful Spawner At Each Acclimation Site



# Productivity of successful supplementation hatchery (SH) smolts from 3 sites

## ➤ Relative Reproductive Success

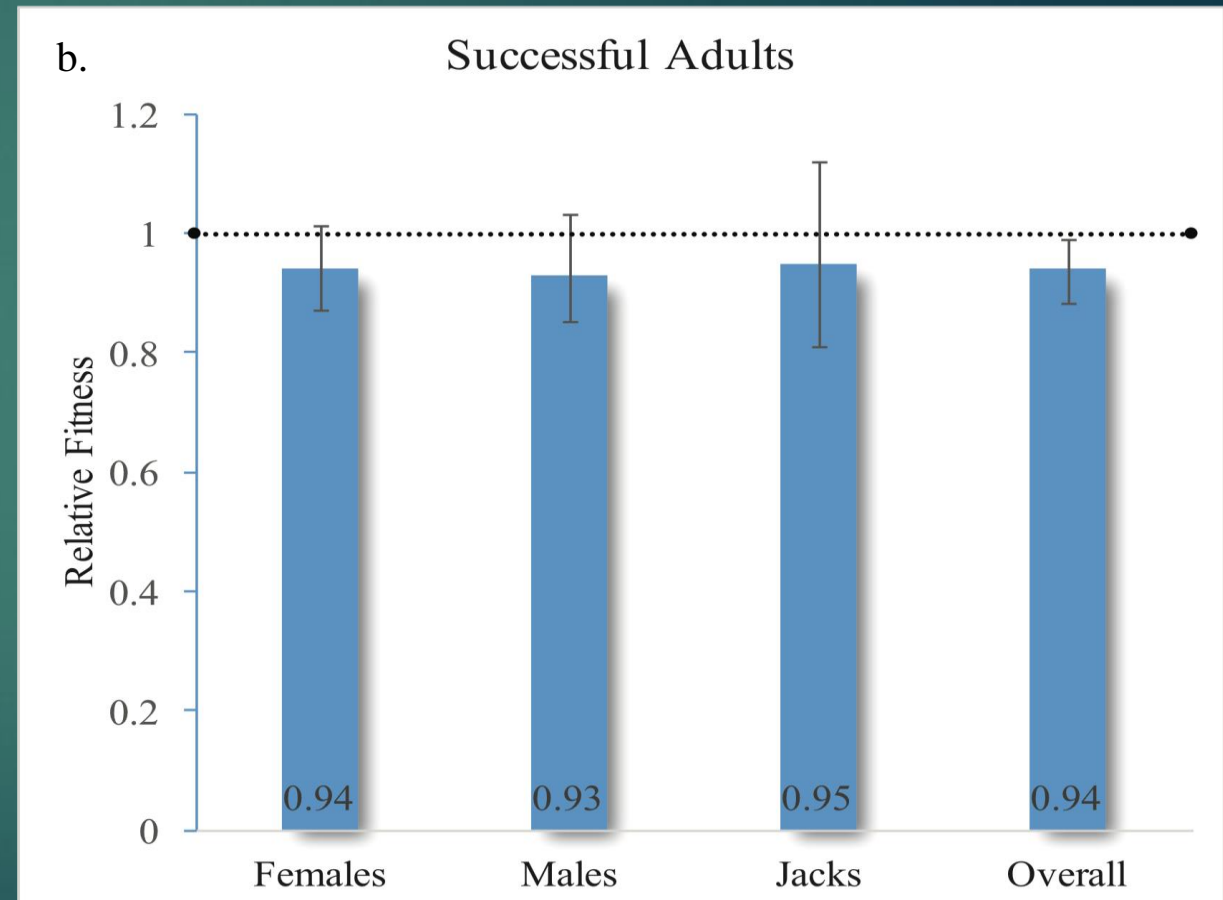
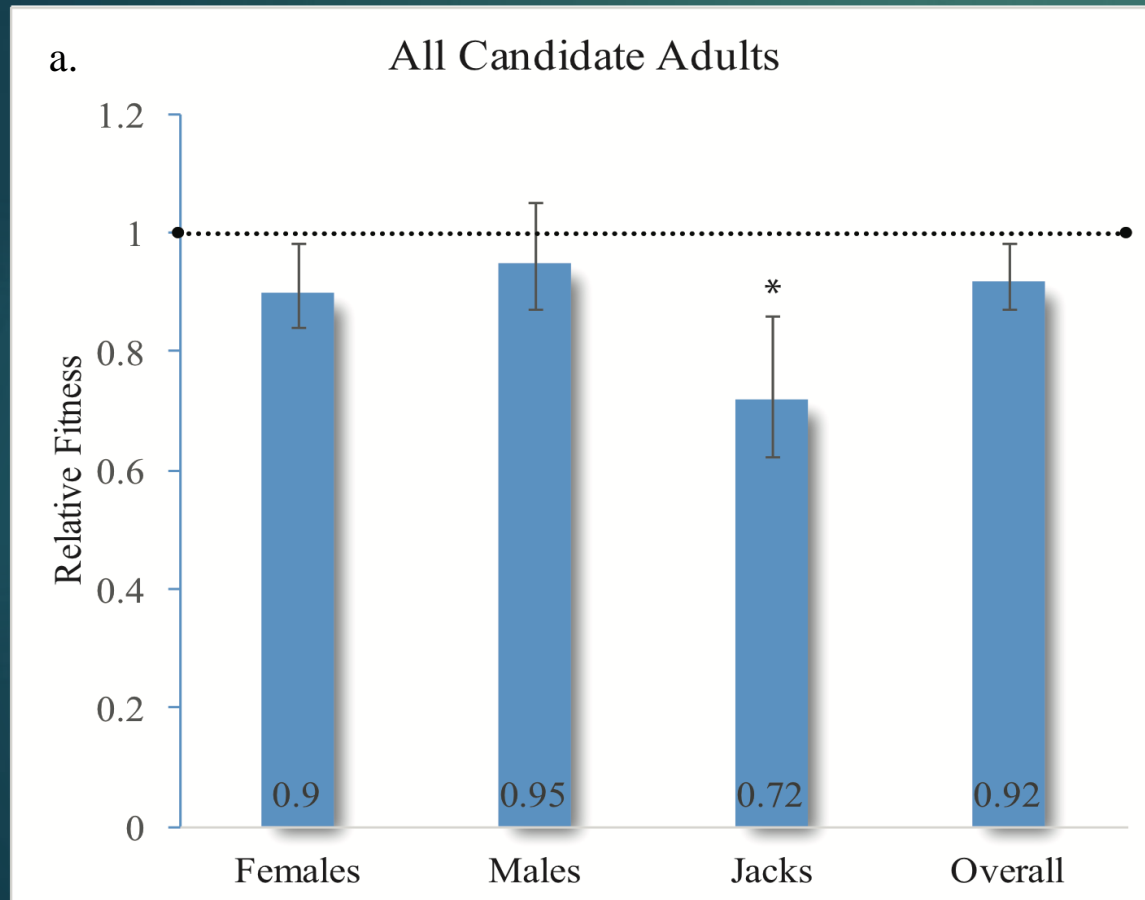
$$RRS = \frac{\text{Avg \# offspring produced by a hatchery fish}}{\text{Avg \# offspring produced by a natural fish}}$$

Site	Clark Flats	Jack Creek	Easton
Females	0.85	0.94	0.98
Males	0.80	0.90	0.96
Jacks	0.96	0.94	0.84

# Objective 1: Demographic boost provided by hatchery

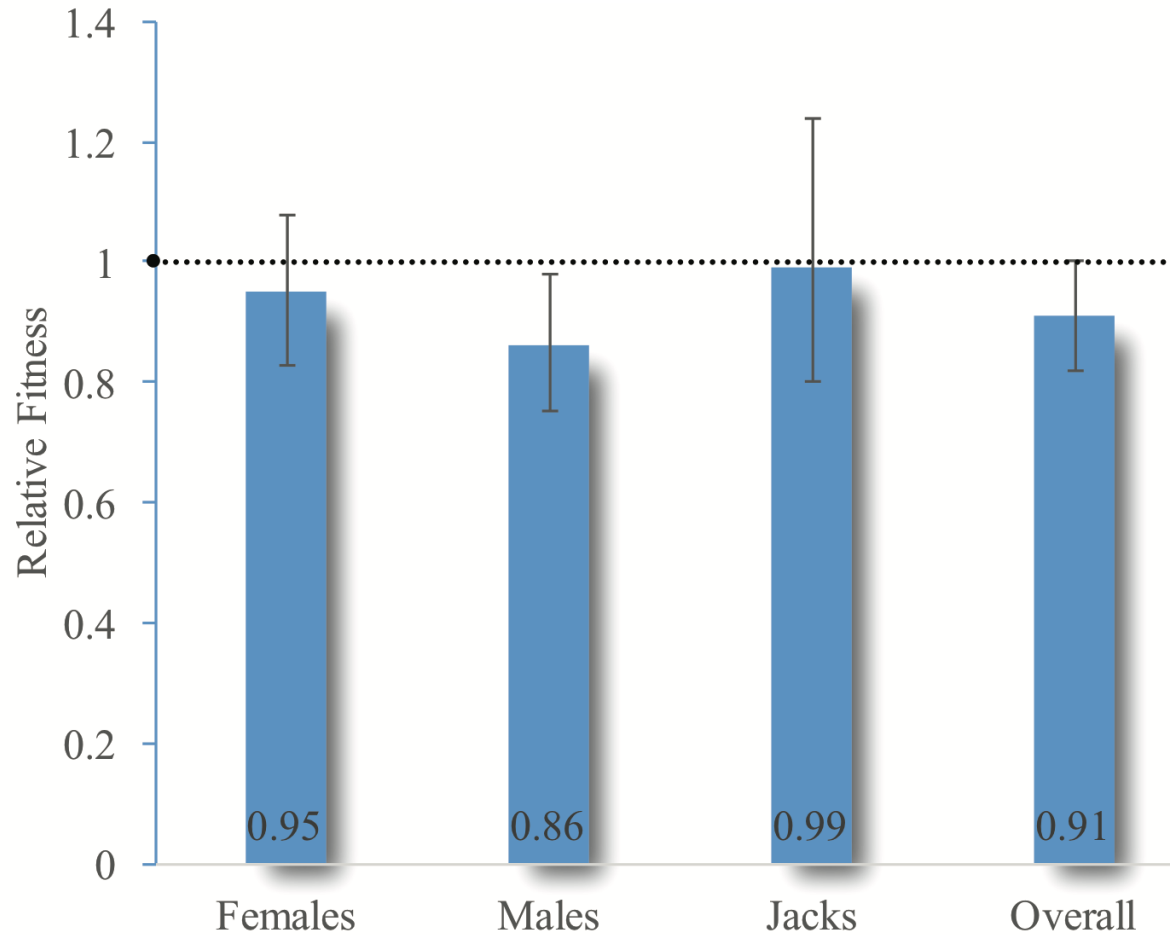
Number of Broodstock Parents	Number of Broodstock Offspring	Number of Offspring/Broodstock Parent	Number of Non-Broodstock (NOR) Parents	Number of Non-Broodstock (NOR) Offspring	Number of Non-Broodstock Offspring/Non-Broodstock Parent	Demographic Boost Provided By Hatchery
365	1123	3.08	805	1134	1.41	<b>2.18</b>

# Objective 2a. RRS All Candidates & b. RRS Successful Adults

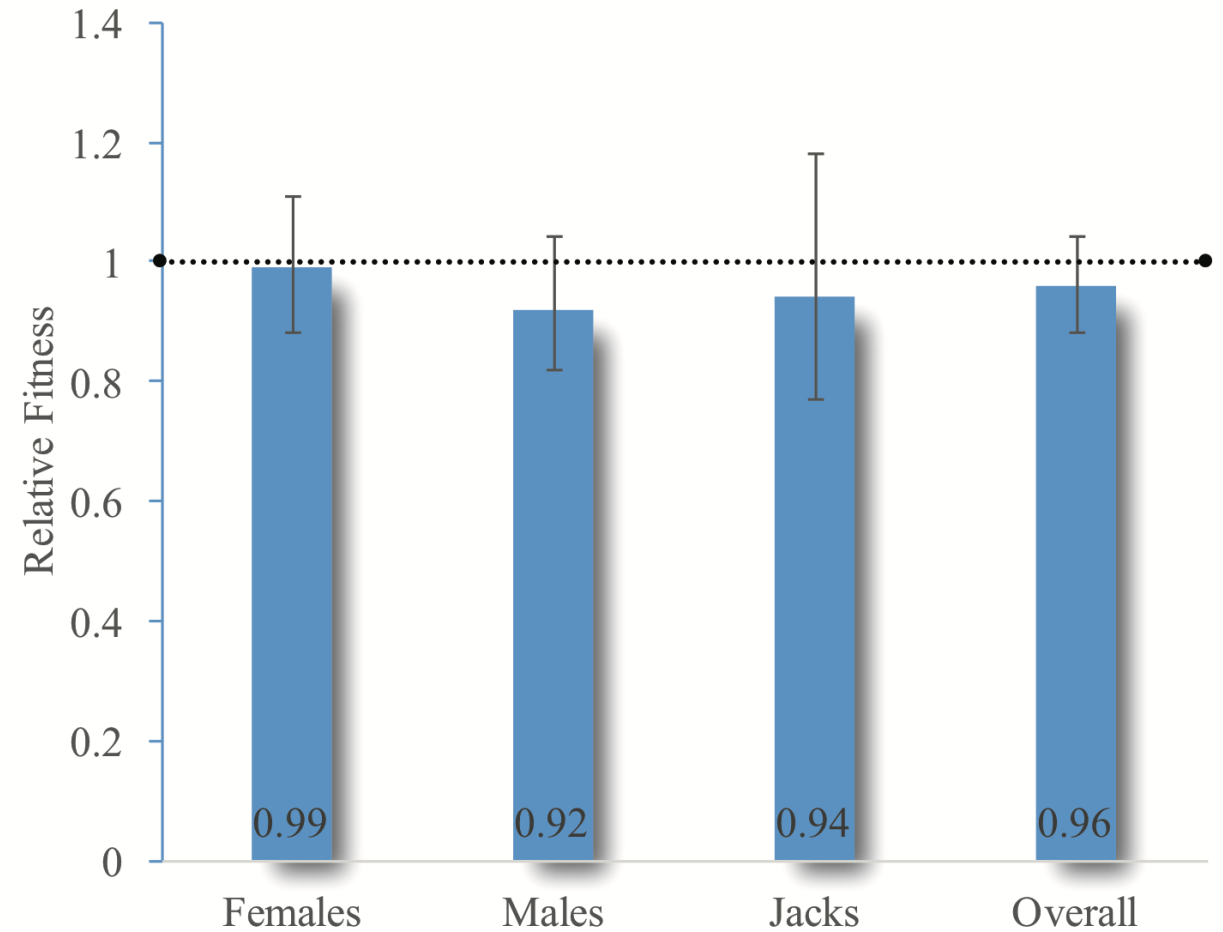


# Objective 3: RRS Crosses of mating pairs

HxH Vs. NxN



HxN Vs. NxN



# Preliminary Conclusions

1. Demographic boost provided by hatchery supplementation? **YES, 2.2X**
2. Differences in reproductive success between hatchery-reared and natural-origin fish spawning naturally?
  - a. All potential spawners: **Only jacks were statistically significant ( $p < 0.05$ )**
  - b. Successful: **No statistically significant differences**
3. Do hatchery-reared fish exhibit reduced fitness relative to natural-origin fish? **No statistically significant differences**

# In The Near Future...

- ▶ These results represent one broodyear (BY2007).
  - ▶ Analyses of additional years are ongoing.
- ▶ BY2007 analyses will be redone using larger SNP panel (298 + sex marker).
  - ▶ Increased confidence for single-parent assignments.

