

Reproductive success of Bonytail (*Gila elegans*) reared in off-channel habitats

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Bonytail Background

- *Gila elegans*
- Historically, a prominent member of Colorado River's large-bodied, "big river" fishes
- Has experienced drastic declines
- Bonytail is endangered and considered functionally extinct



Bonytail Background

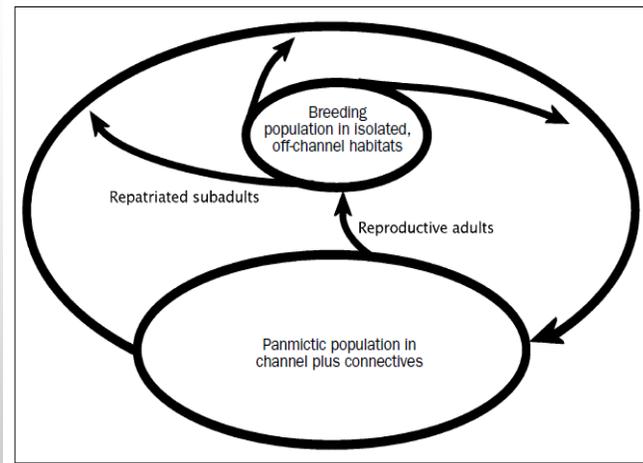


Alternative Strategy

- Minckley et al. (2003)
- Stock adult bonytail and razorbacks into off-channel ponds
- Able to mate naturally
- Absence of non-native species
- Subject to selection
- Still exposed to some predation

A Conservation Plan for Native Fishes of the Lower Colorado River

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Variance in Reproductive Success



- Highly fecund
 - Eg. 2 yr old female ~1000-10,000 eggs
 - Aggregate spawning
 - All individuals have the opportunity to mate, only few may be successful
 - Can lead to small values of effective size
 - Increase risks of adverse genetic effects like inbreeding depression
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Objectives

1. To determine if genetic diversity is maintained from the parental to the offspring generation
2. Determine the contribution of males and females to larval production
3. Determine if variance in reproductive success differed by backwater and/or by males and females.

Larval Collection

- Collected larvae and age-0 offspring throughout the spring and summer and fall
 - Capture reproductive season
 - Measured standard length and total length
 - Identified larval stage
- Perennial ponds



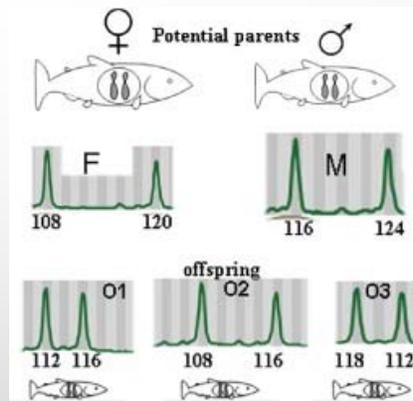
Nevada Egg

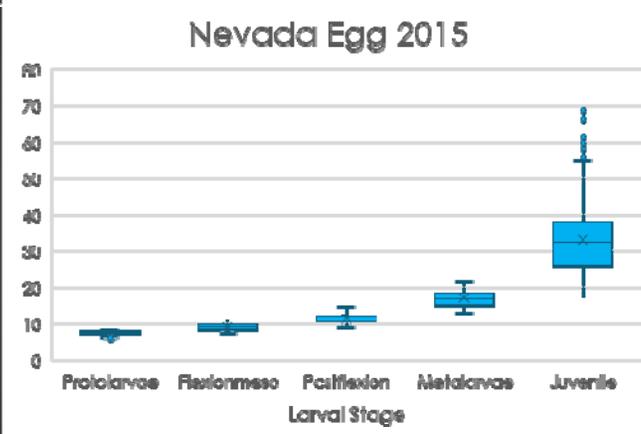
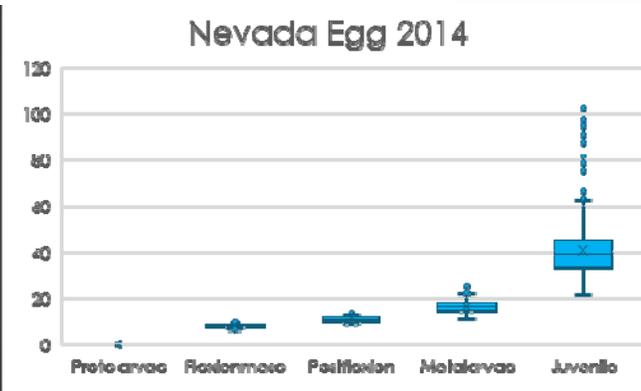
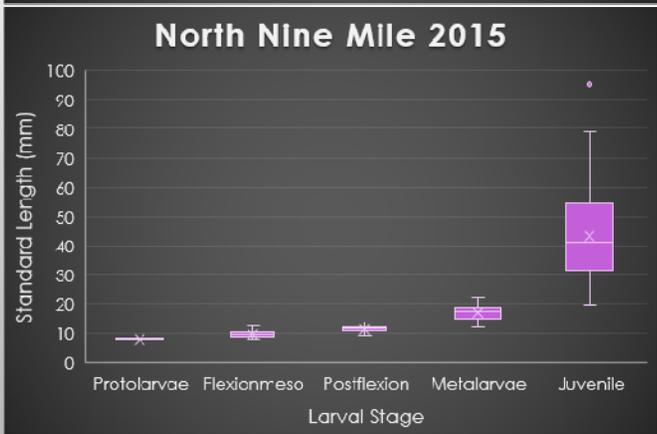
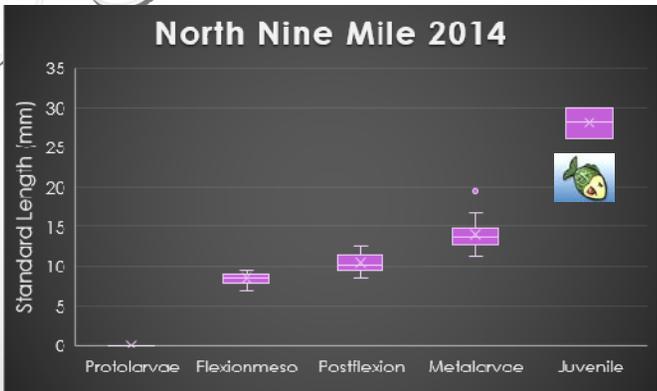
North Nine Mile



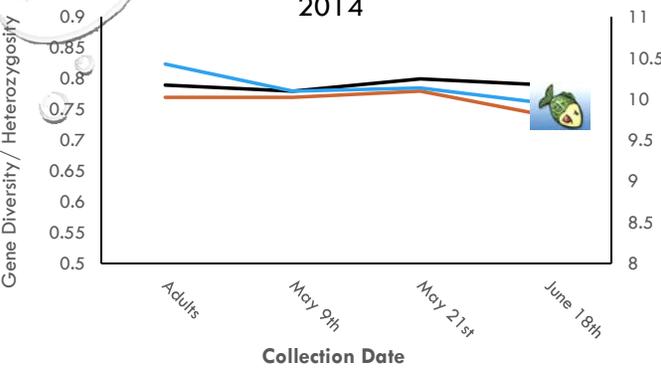
Molecular Methods

- Isolated DNA from all individuals
- Used PCR to genotyped all individuals for 18 microsatellite loci
- Sufficient to determine parentage analysis
- Parentage analysis using mykiss and colony

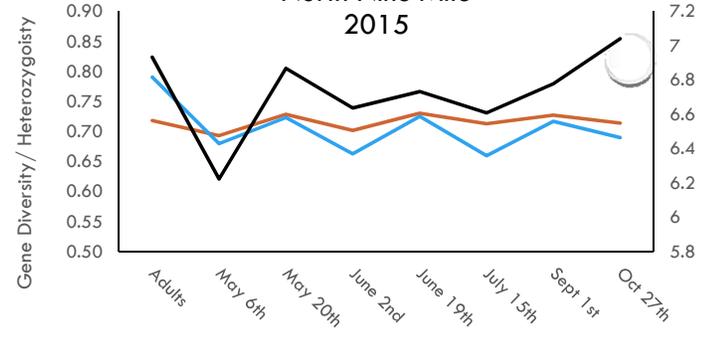




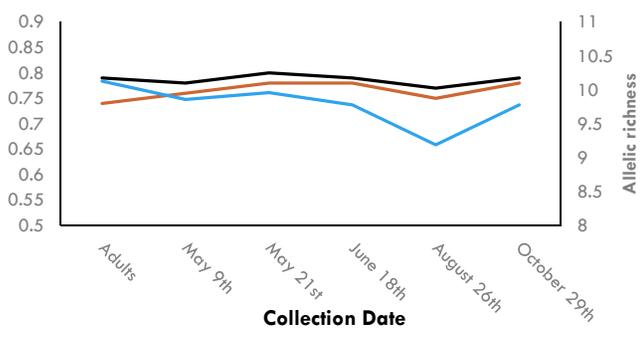
North Nine Mile
2014



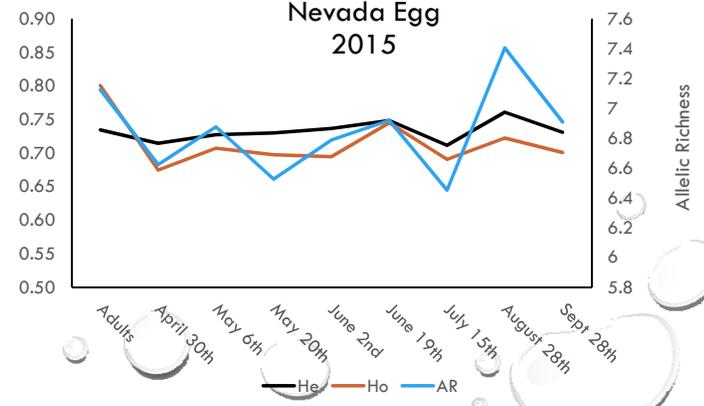
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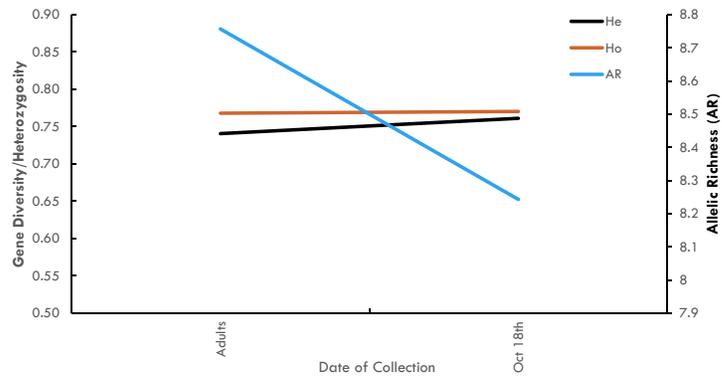
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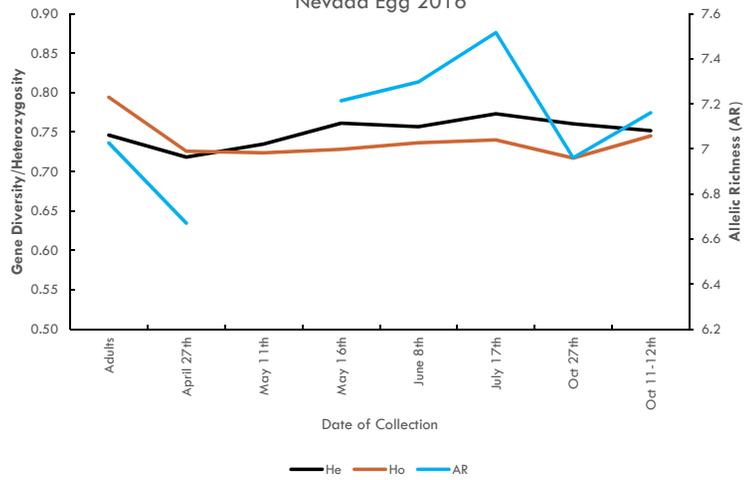
Nevada Egg
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North Nine Mile 2016



Nevada Egg 2016





Objective 1

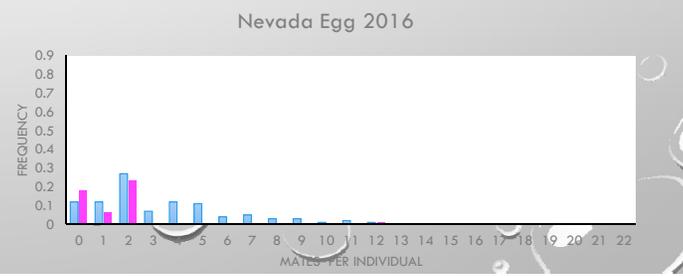
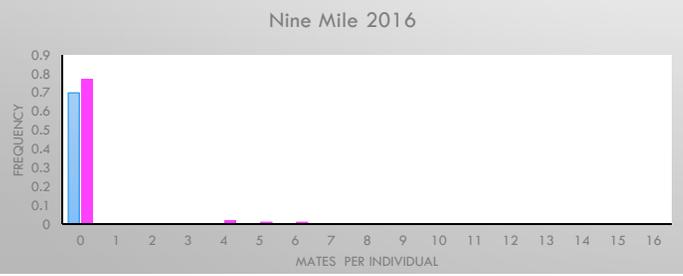
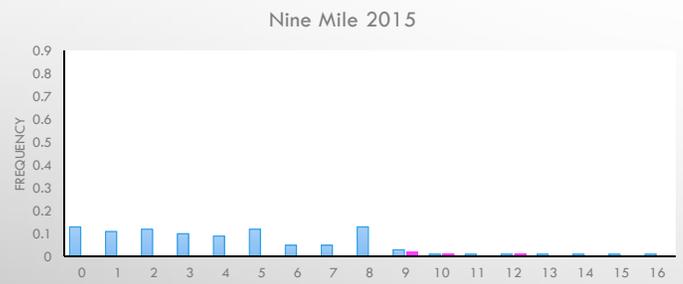
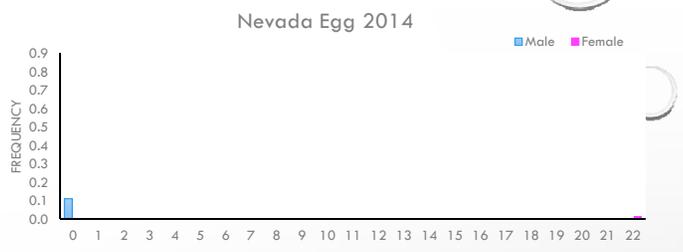
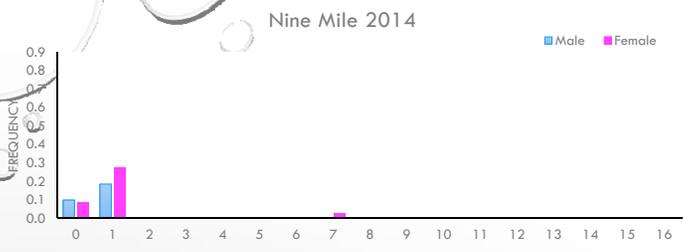


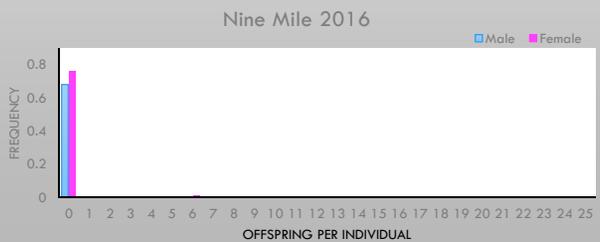
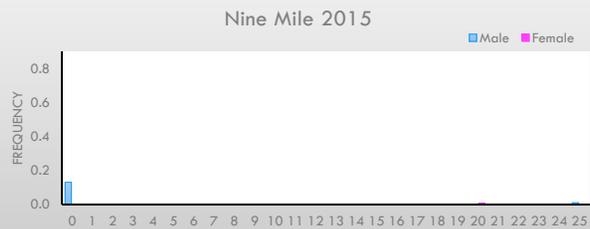
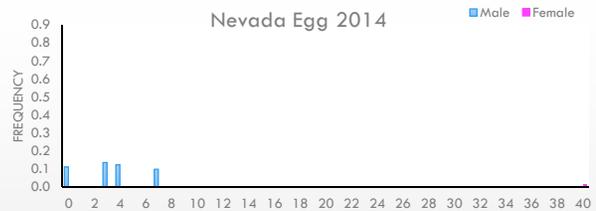
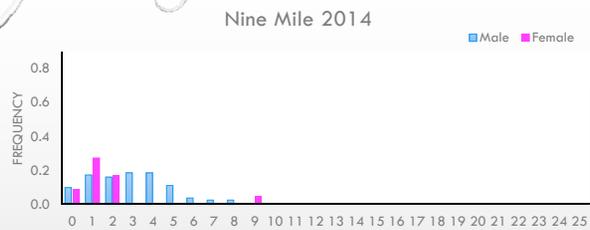
Determine if genetic diversity is maintained from parents to offspring:

- There are fluctuations between collections and years
- Diversity is ultimately determined by the broodstock used

Overall, there is no significant difference in diversity metrics between parents and progeny









Summary



- Genotyped bonytail from 2 ponds across 3 years (3694 individuals)
 - Genetic diversity is maintain from parents to progeny
 - 23-97% of adult individuals contributed
 - Will be continued in 2017 in imperial ponds
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