

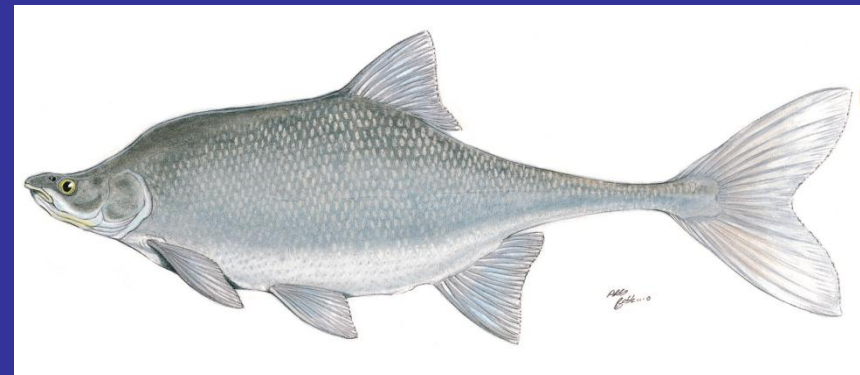
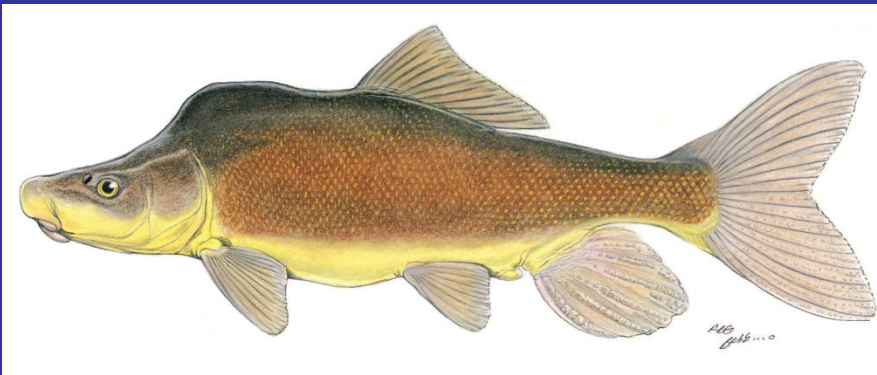
Imperial Ponds native fish off-channel habitat progress and summer telemetry study



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Off-channel habitats

- Conserve genetic viability and prevent extinction
- Increase habitat for endangered native fish
- Study all aspects of native fish life cycle



Conservation Plan Report

Articles

A Conservation Plan for Native Fishes of the Lower Colorado River

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The native fish fauna of the lower Colorado River, in the western United States, includes four "big-river" fishes that are federally listed as endangered. Existing recovery implementation plans are inadequate for these critically imperiled species. We describe a realistic, proactive management program founded on demographic and genetic principles and crafted to avoid potential conflicts with nonnative sport fisheries. In this program, native species would breed and their progeny grow in isolated, protected, off-channel habitats in the absence of nonnative fishes. Panmictic adult populations would reside in the main channel and connected waters, exchanging reproductive adults and repatriated subadults with populations occupying isolated habitats. Implementation of the plan would greatly enhance recovery potential of the four listed fishes.

Keywords: conservation, management, genetics, endangered fishes

Study Area

- Imperial National Wildlife Refuge
- Six pond complex



Stocking

- Nov-Dec 2007
 - Pond 1: 305 Razorback sucker
 - Pond 2: 800 Bonytail
 - Pond 3: 800 Razorback sucker
 - Pond 4: 272 Bonytail
- Dec 2008-Jan 2009
 - Pond 2: 59 Razorback sucker
 - Pond 6: 198 Razorback sucker
- Pond 5 not stocked

The fish story

- Pond 1
 - Razorback sucker post stocking mortality & summer mortality
- Pond 2
 - Bonytail post stocking mortality
 - Razorback sucker most fish survived (45)
- Pond 3
 - Bonytail post stocking mortality

Native fish survival

- Pond 4
 - Razorback sucker first good survival(130), summer mortality second year(40).
- Pond 5
 - Never stocked with native fish
- Pond 6
 - Razorback sucker initial stocking mortality (population stabilize at around 60 fish)

Initial observations

- Reason for decline?
 - Low production and low recruitment
 - No replacement
 - Non-native fish present
 - mosquitofish
 - bluegill sunfish, redear sunfish, warmouth
 - threadfin shad
 - black crappie

Renovation

- Pond 1
 - Dewatered and treated with rotenone
 - April 2009 and July 2009
 - Full pool treatment
 - April 2010 (mosquitofish persist)
- Pond 3
 - February 2010
 - Complete kill
 - Autumn 2011 (bluegill sunfish)

Consolidated native fish Pond 1

- Pond 2
 - 112 bonytail
(all unmarked)
 - 49 razorback
- Pond 4
 - 26 razorback
- Pond 6
 - 49 razorback



Total 124 razorback sucker & 112 bonytail

Pond 1 Timeline

- April 2011
 - Well water
- 2011 Larval season
 - 60 razorback larvae (51 > 20mm)
- Autumn Sampling 2011
 - 32 bonytail
 - 34 razorback suckers
 - (28 recruits & 6 adults)



Razorback recruitment



Pond 1 Status

- Population Estimates July-Sept. 2011
 - Razorback sucker
 - 94 razorback sucker
 - »Confidence Interval 74-117
 - Bonytail
 - 64 bonytail
 - »Confidence interval 34-112*

Acoustic telemetry study

- Remote sensing contacts drop precipitously during summer months.
- Where are all the fish?
- Hypothesis: Native fish seek refuge in deeper cooler water during summer months.

Methods

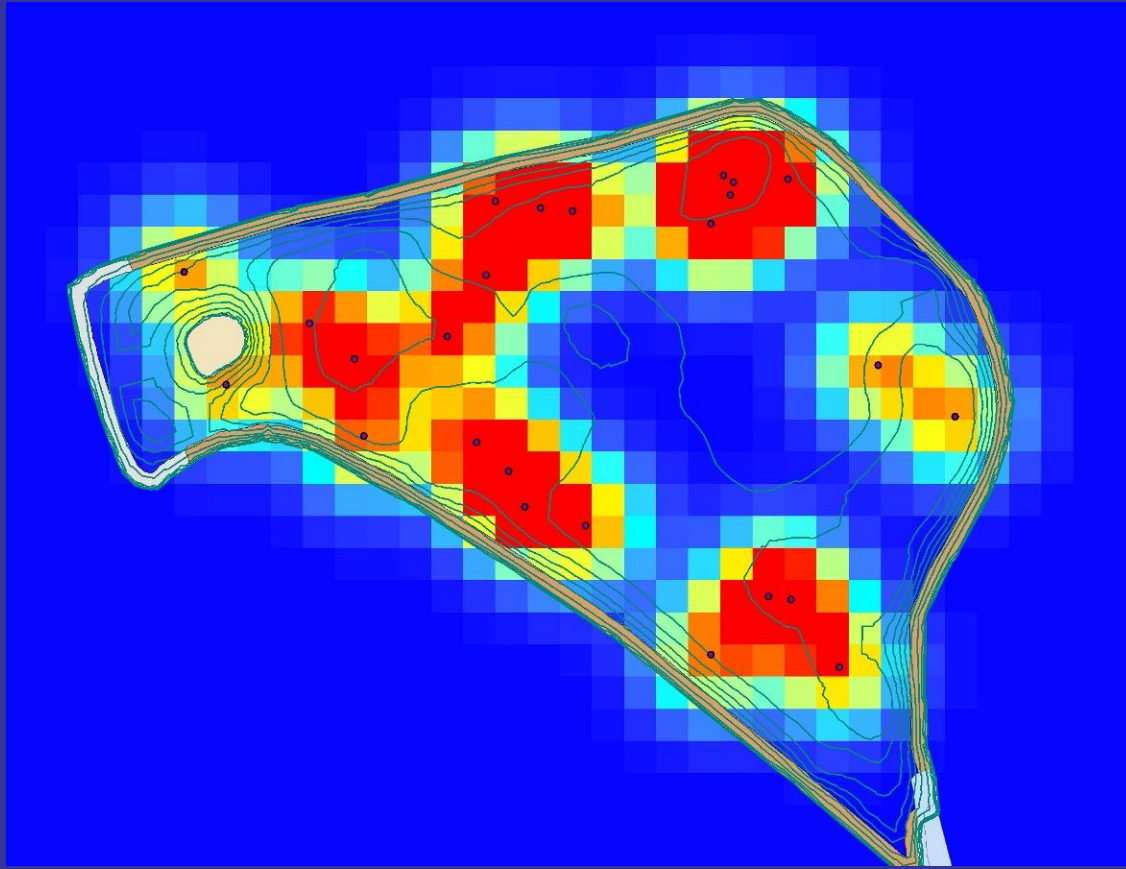
- Implanted acoustic tags (6 month battery)
 - 10 razorback sucker
 - 4 bonytail
- Sampled every trip
 - Once during daylight hours
 - Once during night time hours
- Used Underwater Diving Receiver (UDR)
 - 00 gain



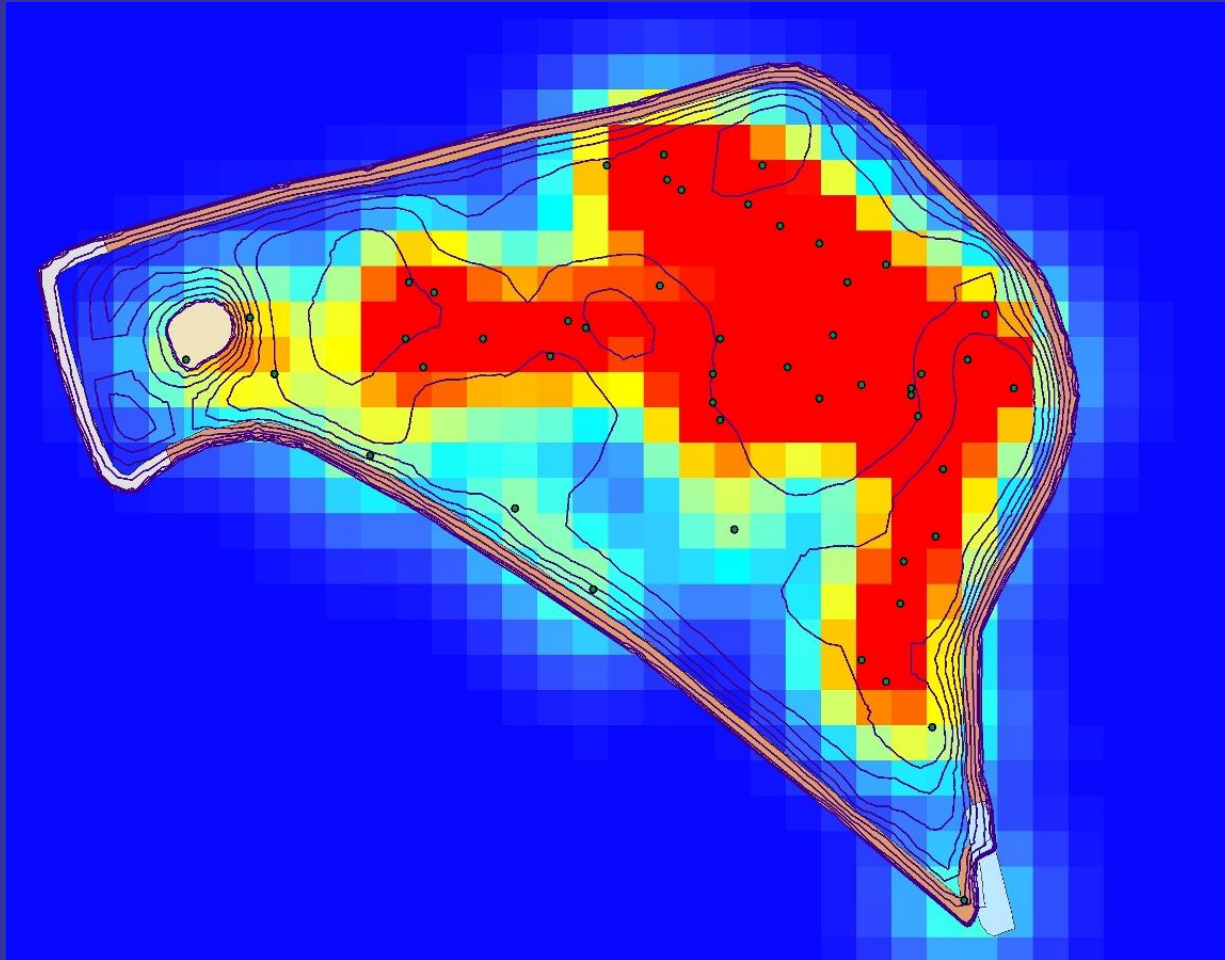
Results

- Study length May-Aug 2011
 - Bonytail
 - 27 daytime bonytail locations
 - 20 of night time bonytail locations
 - Razorback
 - 51 of daytime razorback locations
 - 42 of night time razorback locations
- Fixed Kernel Density Estimate (KDE)
- Hawth's Tools
 - Animal Space Use (K-smoothing factor)

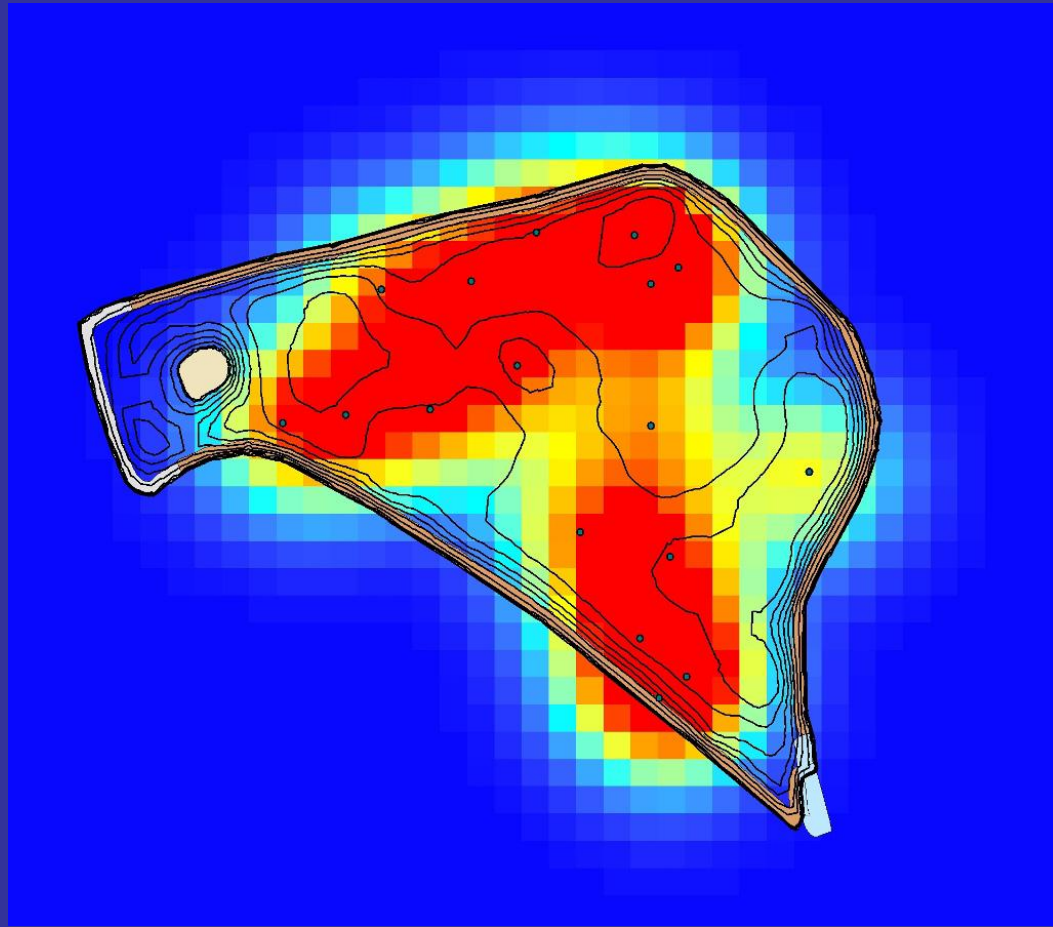
Bonytail Day KDE



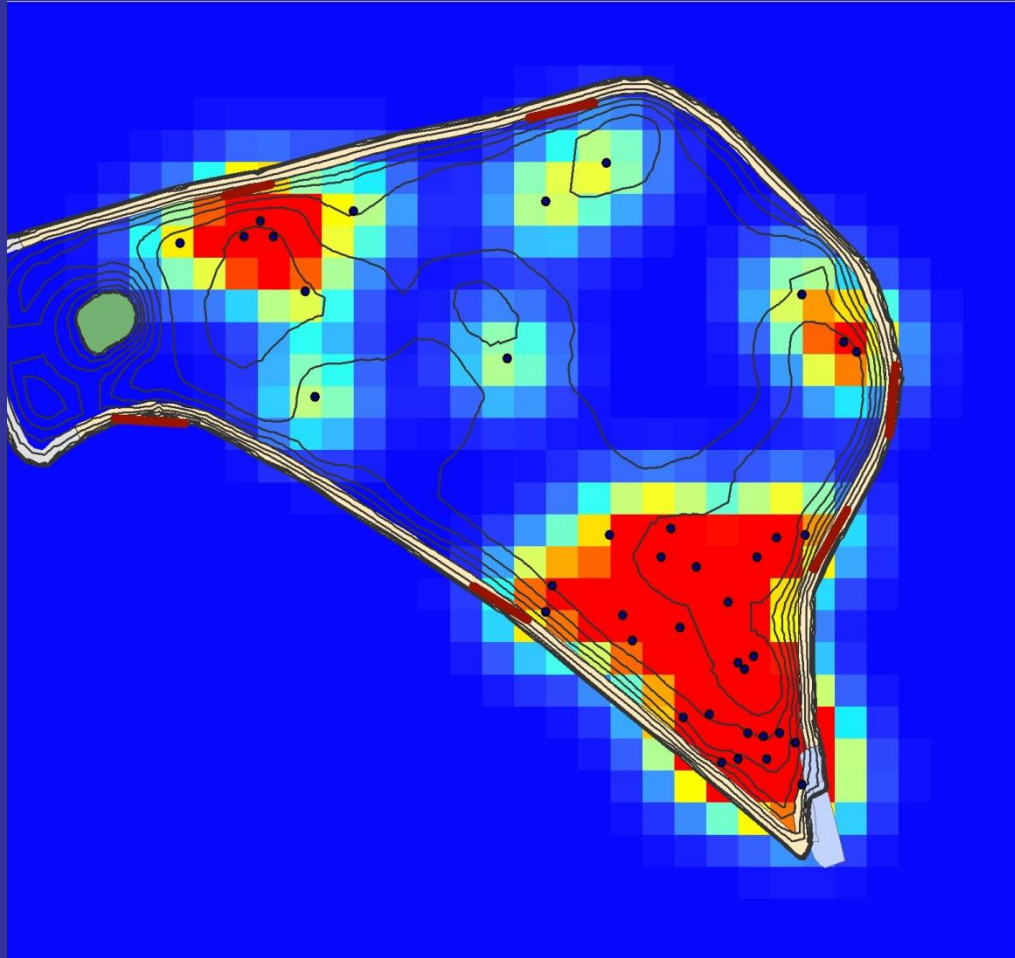
Razorback day KDE



Bonytail night KDE



Razorback night KDE

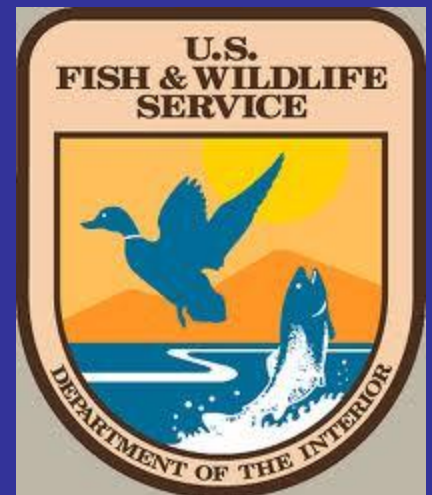


Conclusion

- Razorback sucker recruited in Pond 1
 - Despite presence of mosquitofish
- Bonytail
 - distribution during daytime associated with shorelines
- Razorback sucker
 - Distribution daytime associated with open water near deeper areas of the pond
 - Razorback sucker utilize gravel substrates during night time

Acknowledgements

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Razorback sucker survival

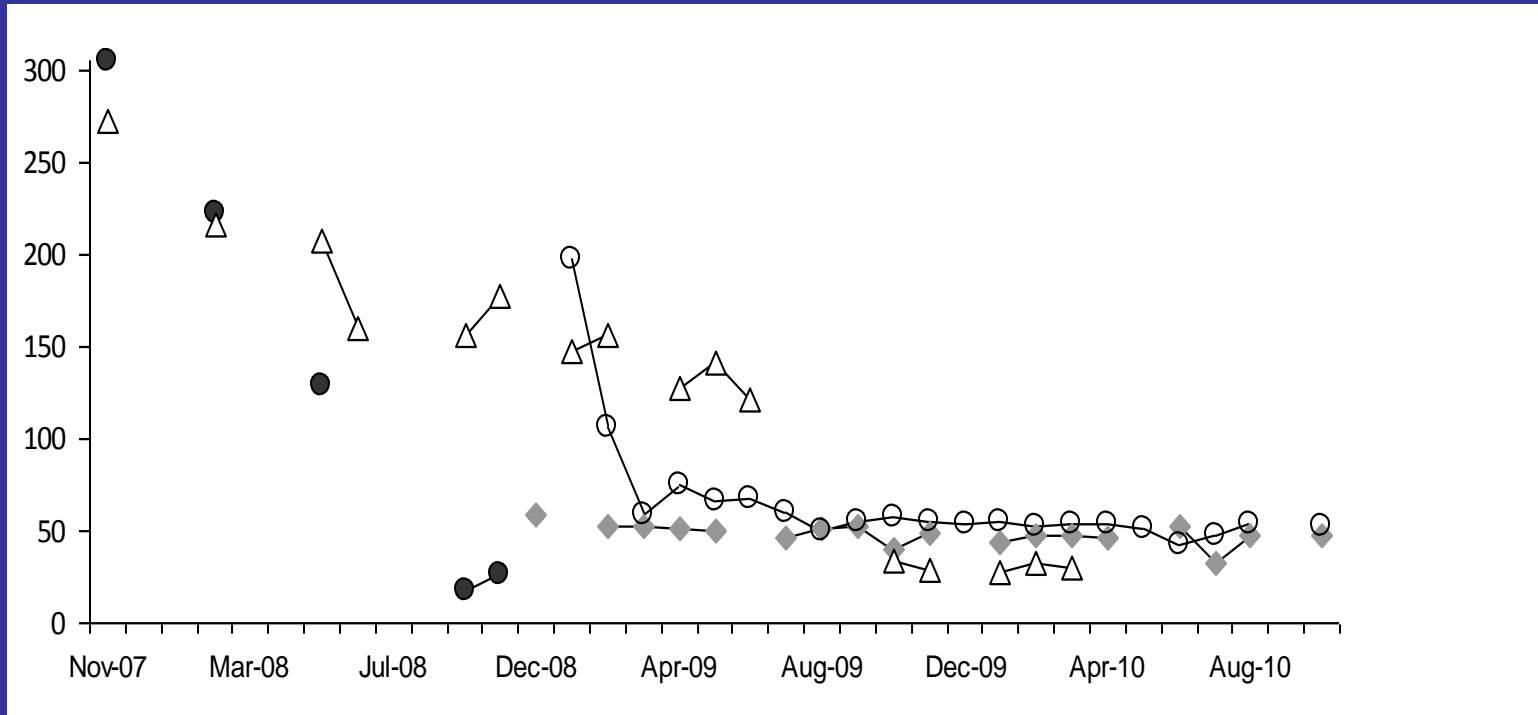


Figure 1. Population estimates for all razorback sucker stocked at Imperial Ponds. Pond 1 (solid circles) and 4 (open triangles) were stocked in November 2007. Pond 2 (closed diamonds) and 6 (open circles) were stocked in December 2008 and January 2009 respectively.

Bonytail Survival

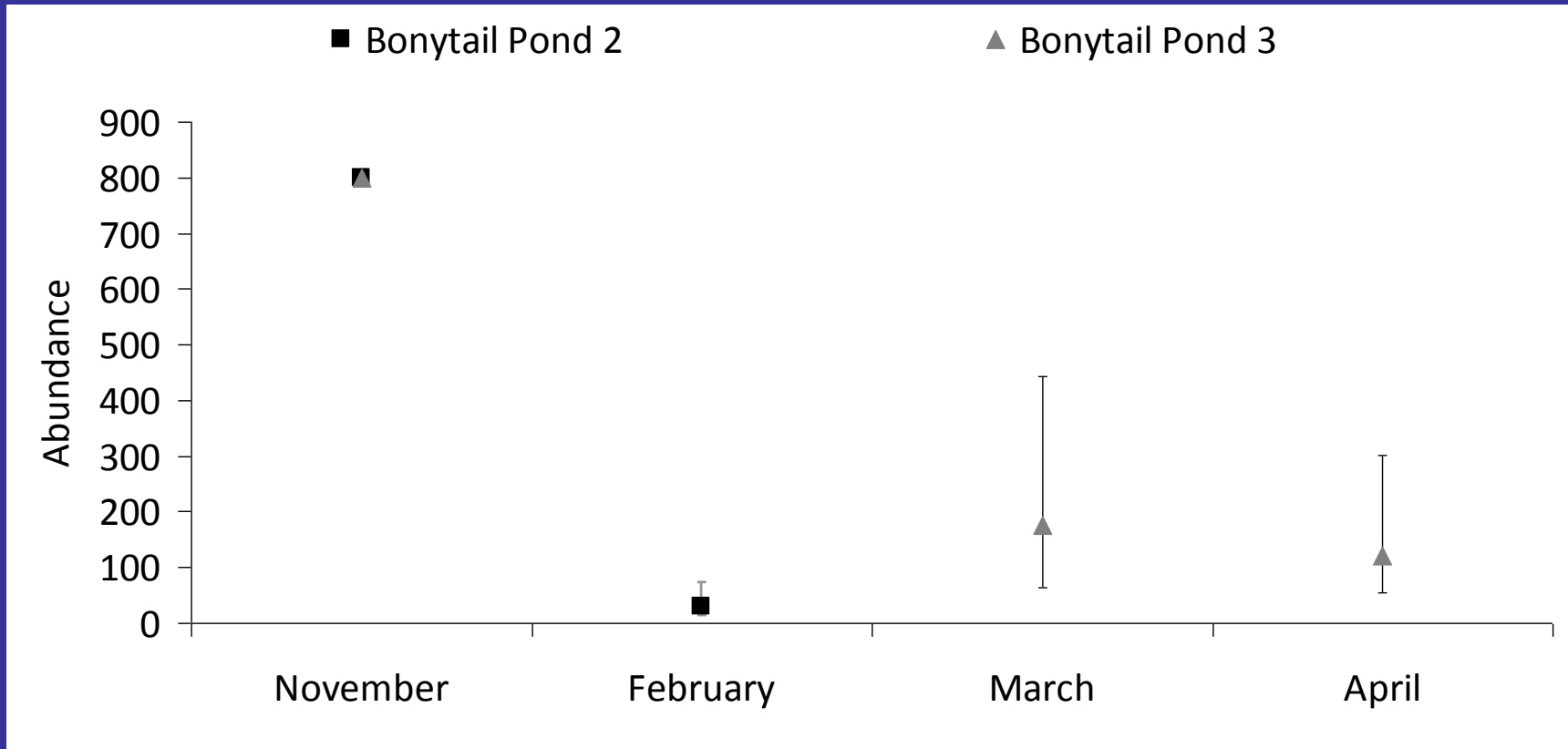


Figure 2. Population estimates for Bonytail stocked at Imperial Ponds. Pond 2 (grey triangles) and Pond 3 (black squares). Bonytail were stocked in November 2007.