San Marcos Salamander Propagation Refinement

USFWS Staff
San Marcos Salamander Reproduction

- Gonads evaluated by Tupa & Davis 1976
  - Males mature at 35 mm TL

  - Separated by gravid or not
  - 24 pair observed for 10 months
  - 7 clutches of eggs

- Flow preferences in regards to tank position (Fries 2002)

- Cohabitation preferences (Thaker et al 2010)
San Marcos Salamander Reproduction

- Opportunistic

For a fully functioning refugia, need to be able to reliably reproduce the species

- Estimate of numbers that can be produced
- Estimate of time it would take to produce for reintroduction
- Need to know the effort involved to be able to reproduce large numbers for reintroduction
Introduction

Objectives

The main goal of this research is to test if reproduction can be reliably triggered by the separation/combine technique.

1. Average time to courtship behavior once combined
2. Average days to oviposition to occur after sexes combined
3. Average clutch size
4. Survival rate to hatch of eggs
5. Document egg developmental stages
6. Test for differences between pairwise vs group mating
Expected Benefits to Refugia

- Potential reliable reproduction technique
- Quantifying egg production and survival
- Documenting egg development

Barton Springs salamander eggs
Methods

Separation Trigger

- Non-invasive methodology that has worked with Barton Springs salamanders

Steps:

1. Separate the sexes completely
2. Introduce with physical separation
3. Combine pairs or groups
Candling (Gillette & Peterson 2001)
Methods

Separation

First: males and females in different tanks systems
- No shared water
- One month

Male Tank System
- 78 individuals

Female Tank System
- 78 individuals
Separation

- Second: males and females in same larger tank, but no physical access to each other
  - Shared water so pheromones can circulate
    - Males have mental glands (Sever 1985)
  - Can see through perforated divider
  - Three tank systems
  - Two week separation

- 26 Females
- 26 Males
Combining

- Pairs and group tanks
  - Group tanks four females, four males
- Three tank systems
  - Tanks painted on outside so salamanders can not see into other tanks
  - Well water and re-circulating water
- 12 Single pairs, 3 tanks with 4 pairs (72 total pairs)
- Habitat items for courtship and egg deposition
- Quieter room, less vibrations

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Combining

- Pairs will be randomly selected
- Filmed for courtship behavior analysis
Cheek rubbing

Tail fanning and Spermatophore Deposition

Tail-Straddling walk
Combining

- Pairs will be randomly selected
- Filmed for courtship behavior analysis
- Tanks checked daily for egg oviposition
  - Eggs removed to nursery system
- Trial runs for at least 3 months for adults
Eggs

- Clutch size documented
- Eggs in individual tanks on nursery system
- Data recorded on visible stage development
- Photograph egg development (time-series)
- Hatch rate calculated
Expected deliverables

- Report to EAA on the results of experiment
- Update to *Eurycea* Captive Propagation manual
- Journal article
Comments & Questions