An Investigation into San Marcos salamander reproductive dysfunction

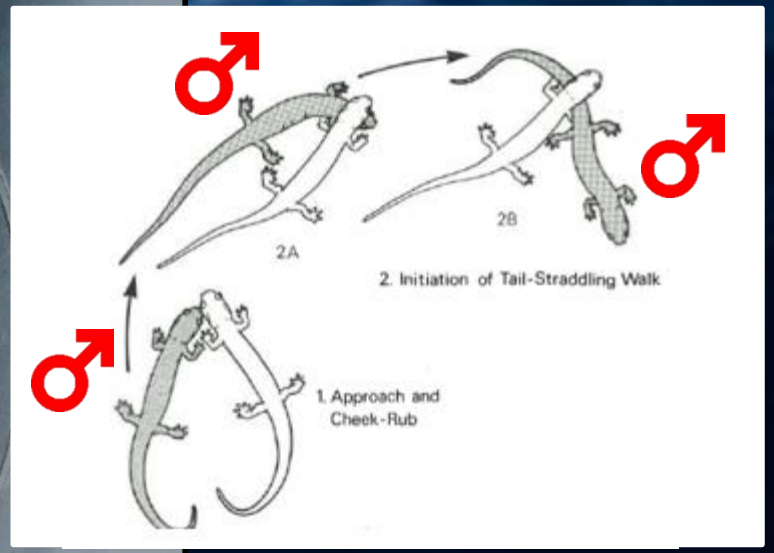
San Marcos salamander Reproduction

- Background (biology, captive reproduction)
- For a fully functioning refugia, we need to be able to:
  - 1) reliably reproduce
  - 2) estimate numbers of offspring we can produce
  - 3) estimate time to production
  - 4) know the effort necessary for production
- 2018 research yielded information about courtship, one viable clutch

San Marcos salamander reproduction

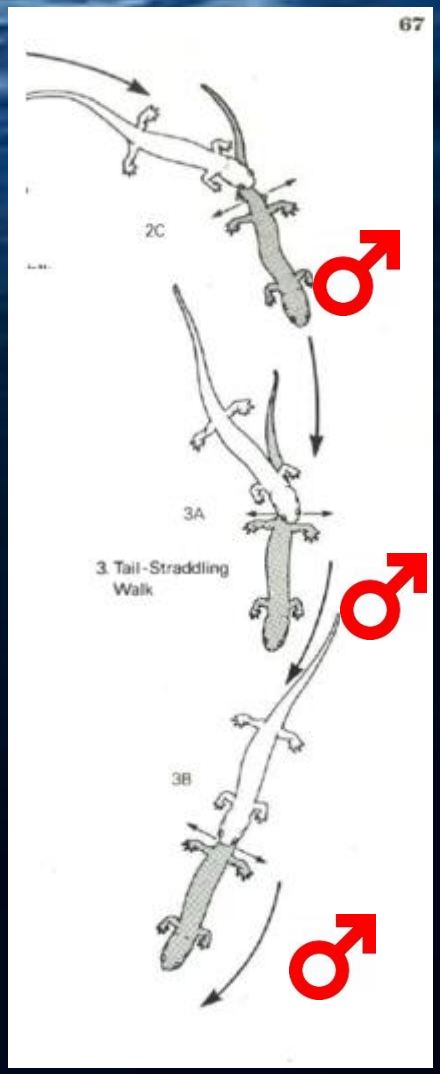
- Groups engaged in courtship behavior more quickly than pairs
- 1/3 of pairs did not court in 48 hours
- Recommend removal of males after 48-72 hours

Approach and chin rubbing

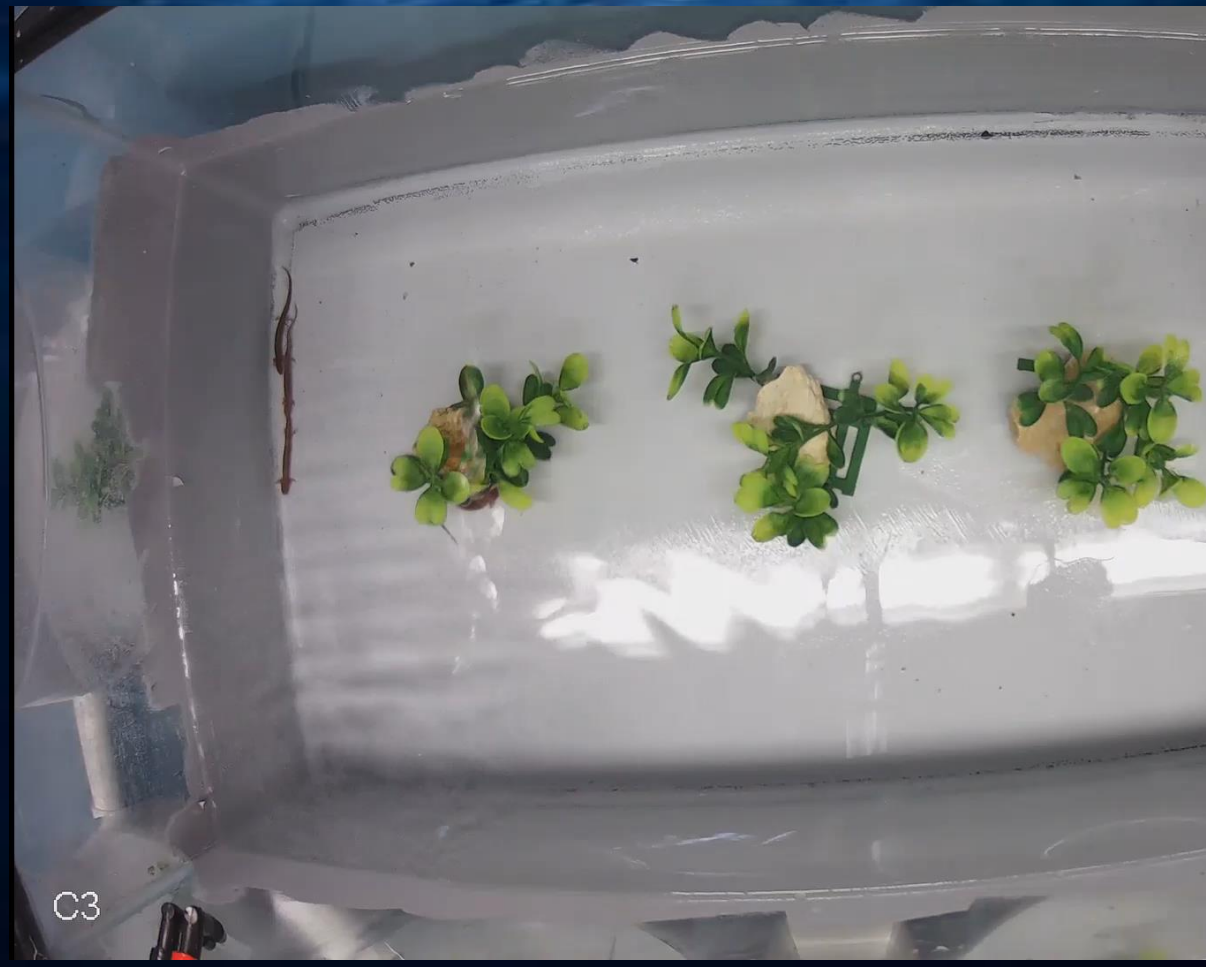


Aggressive Males

Tail Straddle Walk (TSW)



Salamander group courtship



Egg development

Why not more egg clutches?

- No clutches produced by standing stock in 2018
- Females have too much stress?
  - Non-reciprocated courtship
  - Too high a density for reproduction
- Sickness?
  - Microsporida of ovaries
  - Mycobateria infection
- Inappropriate habitat?
  - Different plant material
  - Live plants
  - More rocks or gravel

Modified reproduction trial

- Younger salamanders, but still mature
- Group tanks
- Remove males
- Watch for same sex courtship
- Film a tank from multiple sides for spermatophore deposition

Egg Quality

- Samples from hatchery females and fresh wild females
  - Three of each sacrificed
- Send off for analysis of egg composition
- Compare pathogens in both groups
- Check preserved ruptured females for egg fertilization

Egg Rupture

- Unable to lay or absorb eggs
- 50% of adult mortalities in 2017, 34% in 2018
- We have not seen in other species

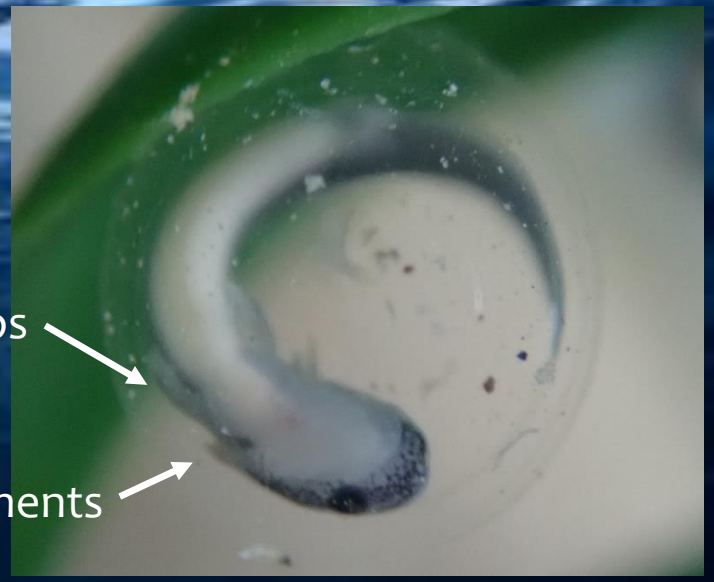
Water quality

- Test water in tank systems
- Compare to tests taken at wells
- Screen for endocrine disruptors

- Add UV sterilization to systems

The waiting game…

- Much depends on findings from egg analysis and water quality analysis
- We will continue to enhance husbandry and reduce un-due stress to salamanders
- Potentially we will add supplements to diet items or add in another food item(s)
- May have to alter reintroduction approach to build F1 population over several years instead of all at one time



Questions & Comments

Thank you to all the Refugia Team and all SMARC staff who helped with this project and continue to support our research efforts.