

# Successful propagation of imperiled springsnails at the Phoenix Zoo

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Photo by J. Maravi

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# Arizona Mollusks

- >220 species of mollusks
- Hydrobiid springsnails
  - Freshwater seeps and springs

- *Pyrgulopsis*
  - 13 described species
  - 3 undescribed species

- Importance

- Control algae
- Maintain water quality
- Nutrient recyclers



*Sonorella* sp.



*Pyrgulopsis trivialis*



*Anodonta californiensis*



*Oreohelix grahamensis*

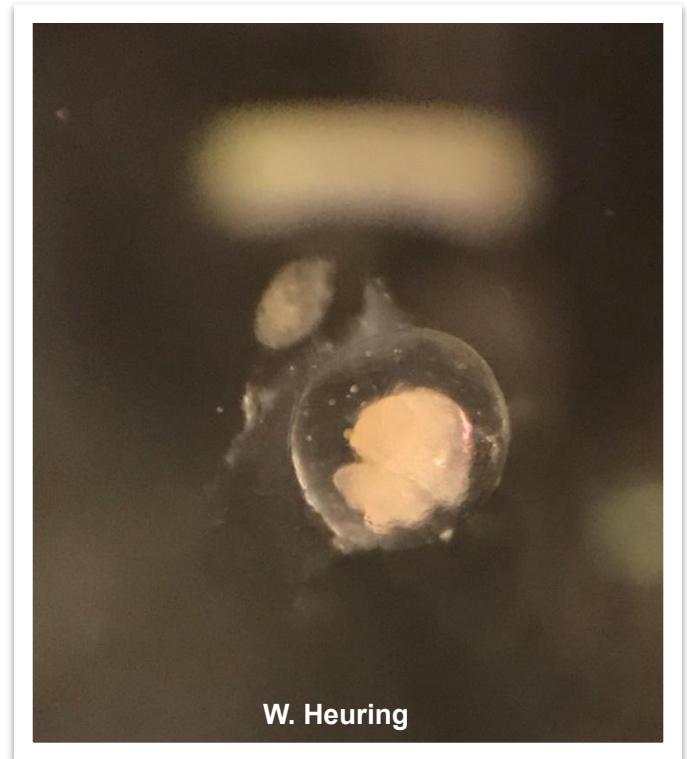


# *Pyrgulopsis* Lifecycle



- Adults: 2 - 8mm
- Juveniles: ~200 microns
- Gill-breathing
- Operculum

- Dioecious
- Females lay individual eggs
- ~1 year lifespan







# *Pyrgulopsis* Habitat



AZGFD



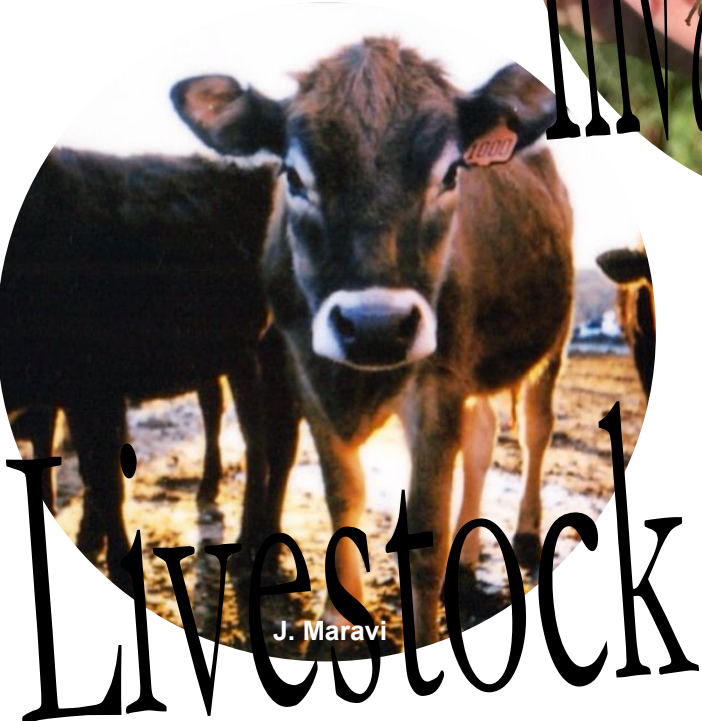
AZGFD





# Threats

- Reduced groundwater
- Water pollution
- Sedimentation
- Habitat loss





# Springsnail Program

- Initiated in 2008
- Goals
  - Assurance populations
  - Develop husbandry methods
  - Inform field biologists
  - Propagation
  - Release
- 4 species of *Pyrgulopsis*



# Three Forks Springsnail

*Pyrgulopsis trivialis*

## LOCATION

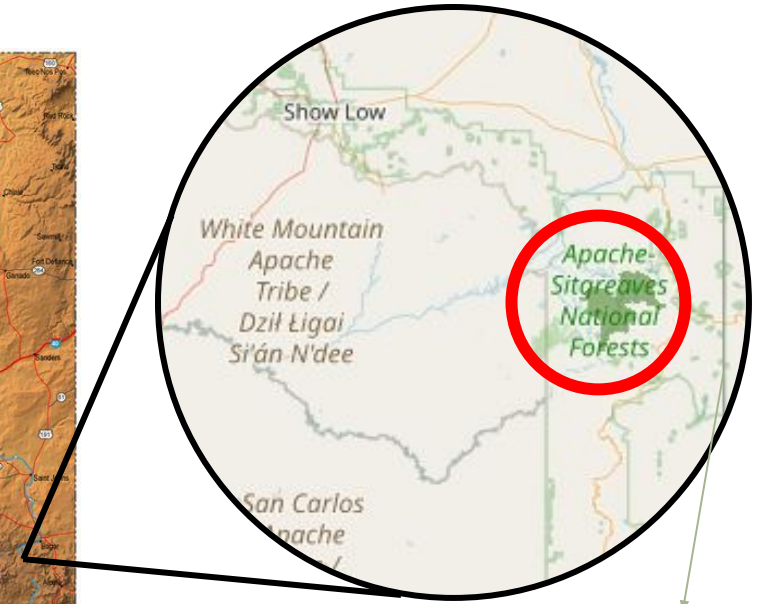
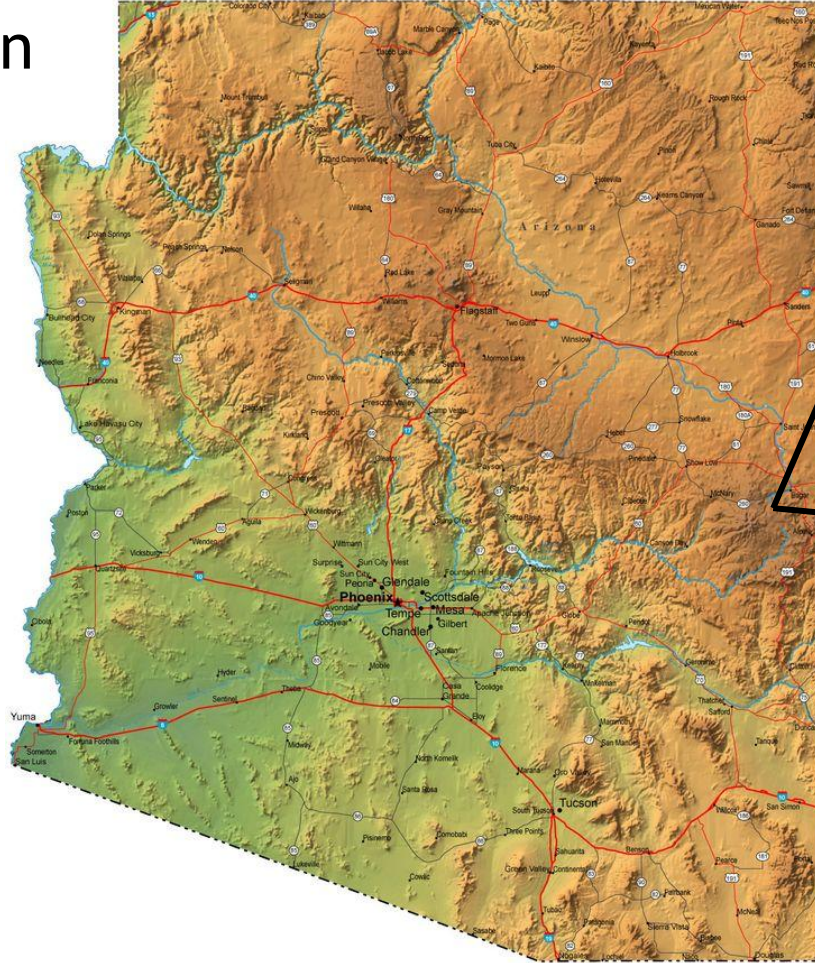
- Endemic to the Black River in the White Mountains

## STATUS

- US - Endangered

## THREATS

- Wildfire
  - Fire retardants
  - Vegetation removal
- Invasive crayfish
- Elk wallowing



Border of NM



# Three Forks Springsnail Field Work



(1) Boneyard Bog, 2022



(2) Population count/collection



(3) *Pyrgulopsis trivialis*

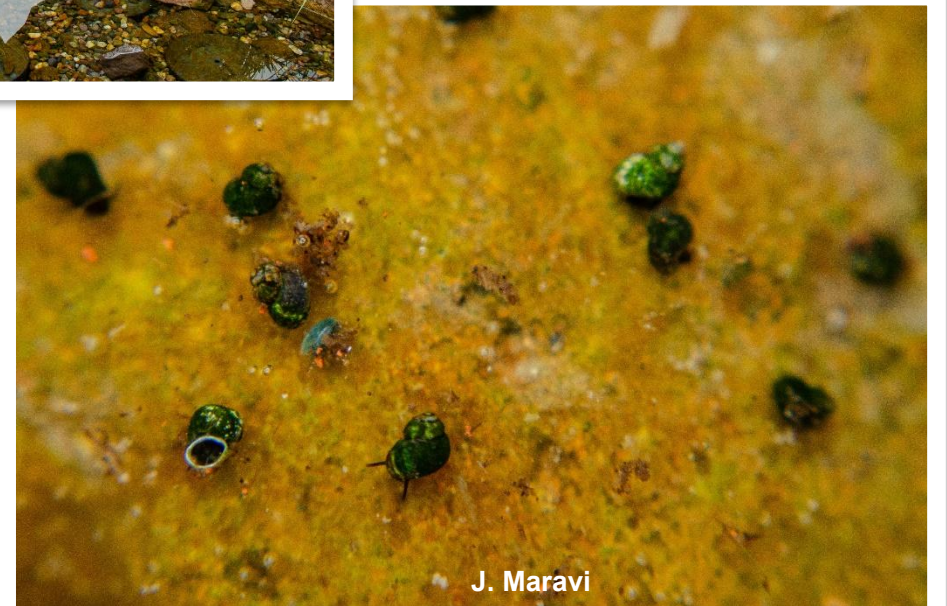


# Three Forks Springsnail Field Work



Tempering water

Modified spring box  
repatriation site





# Huachuca Springsnail

*Pyrgulopsis thompsoni*

## LOCATION

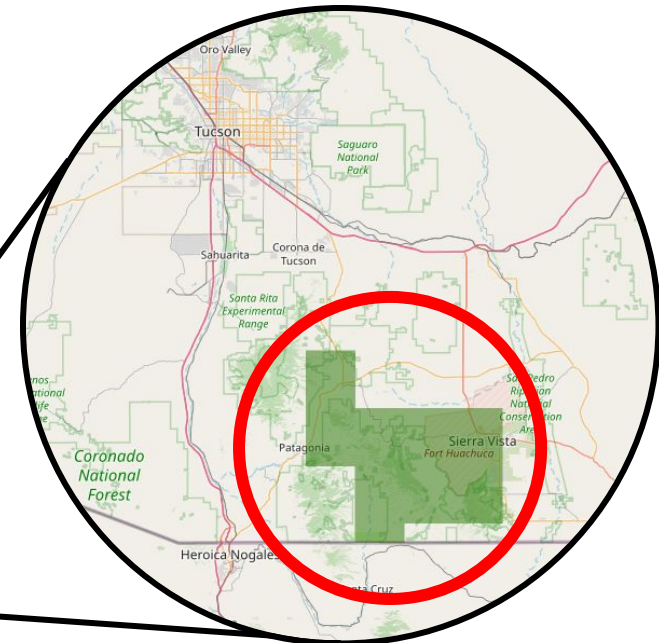
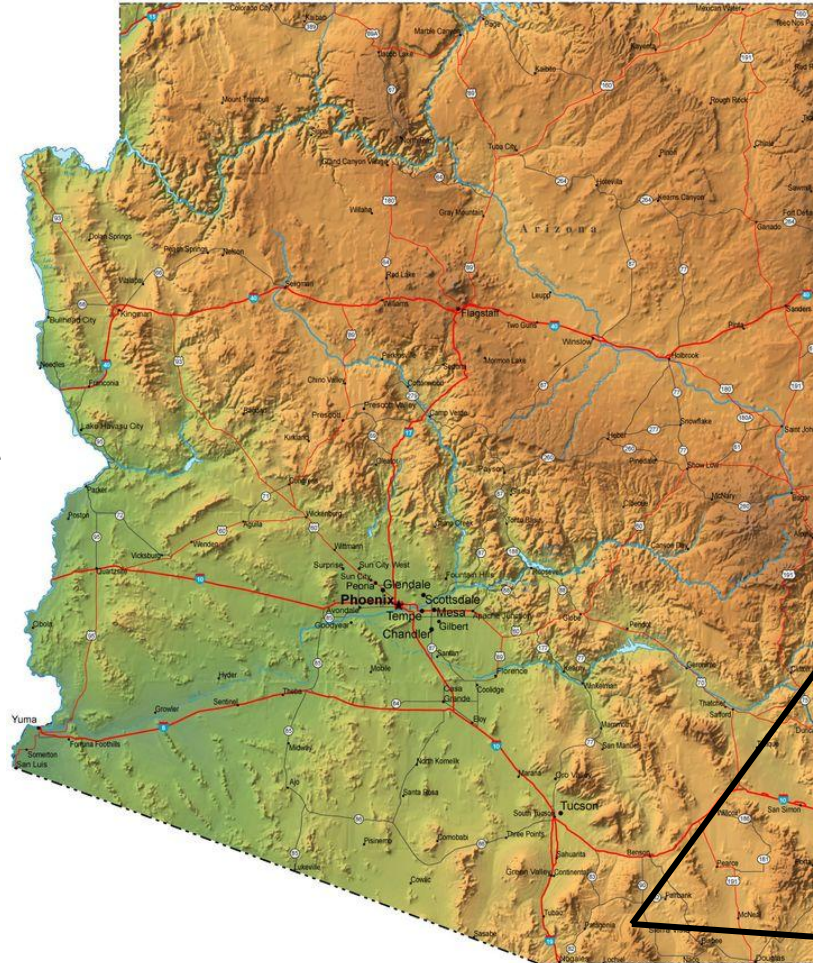
- Endemic to southern Arizona and northern Sonora, Mexico

## STATUS

- Arizona - Species of Greatest Conservation Need

## THREATS

- Sedimentation from overgrazing
- Drought





# Huachuca Springsnail



- Lighting
- Natural substrate
- Cold water
- Water flow
- Water quality
- Algae/diatoms





# Reconstituted Water



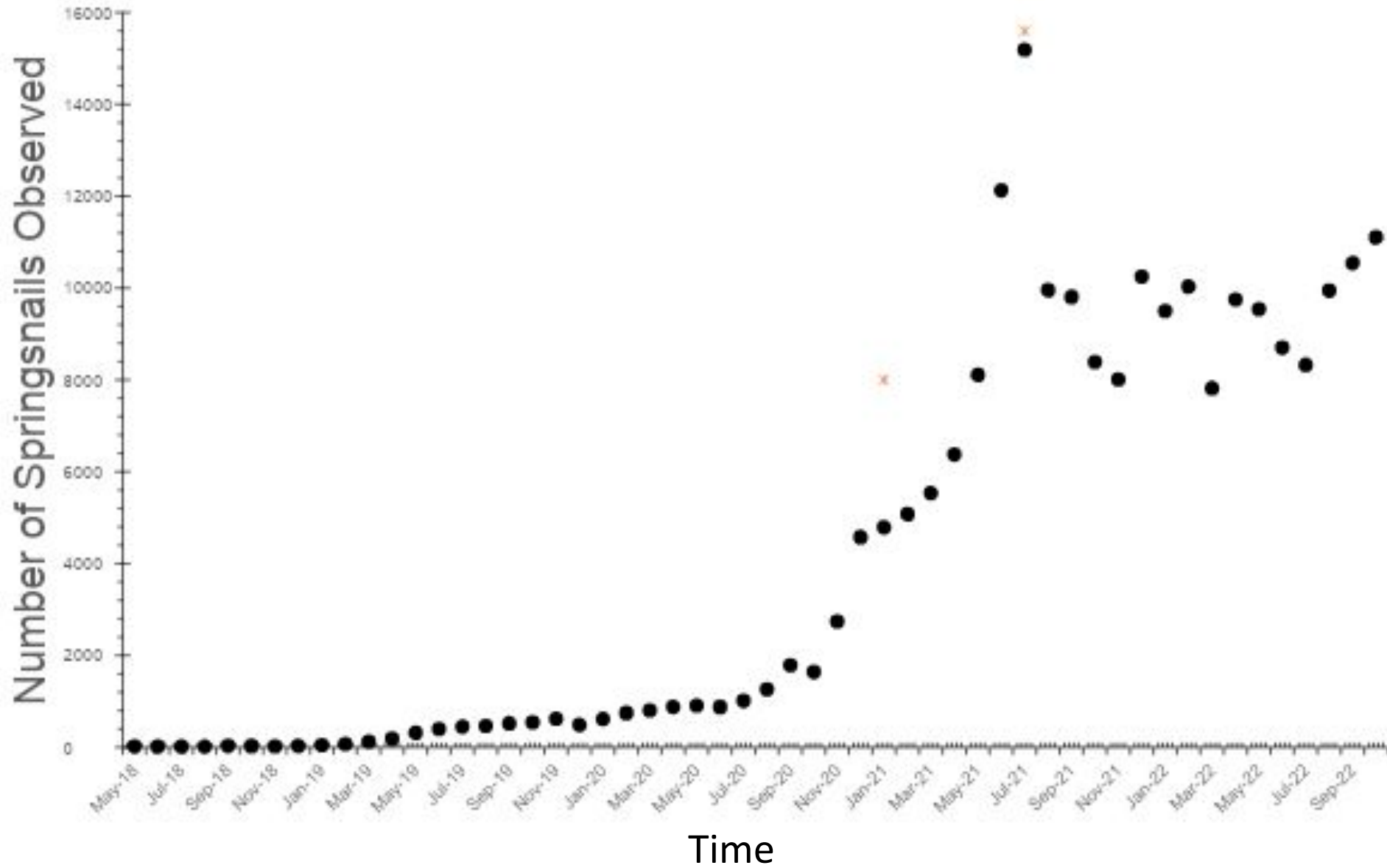
Spectra Pure Performance Plus 100  
GPD Ultra-High Efficiency RO/DI



Reconstitution minerals



# Huachuca Springsnail



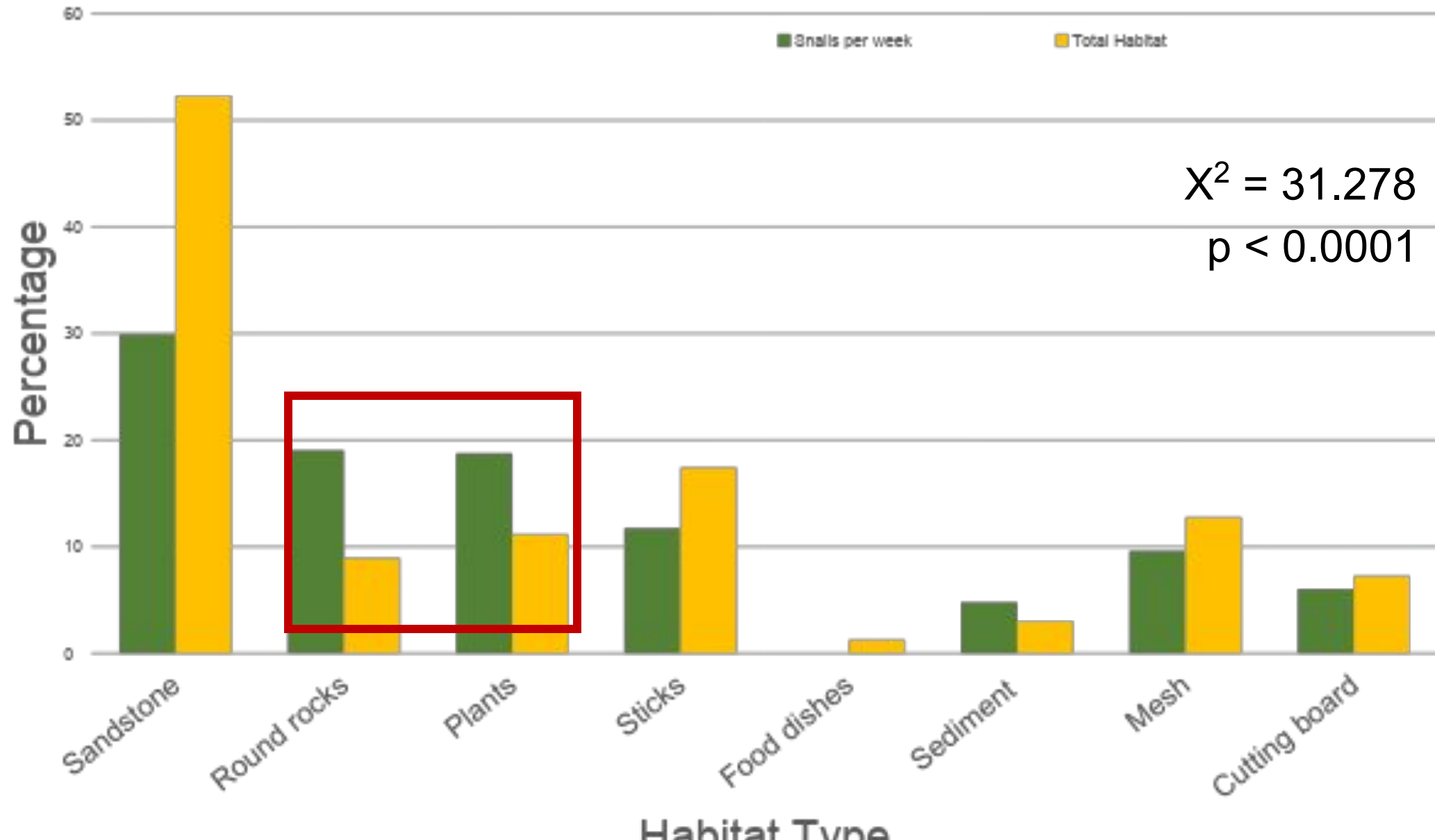


# Habitat Study





# Habitat Study

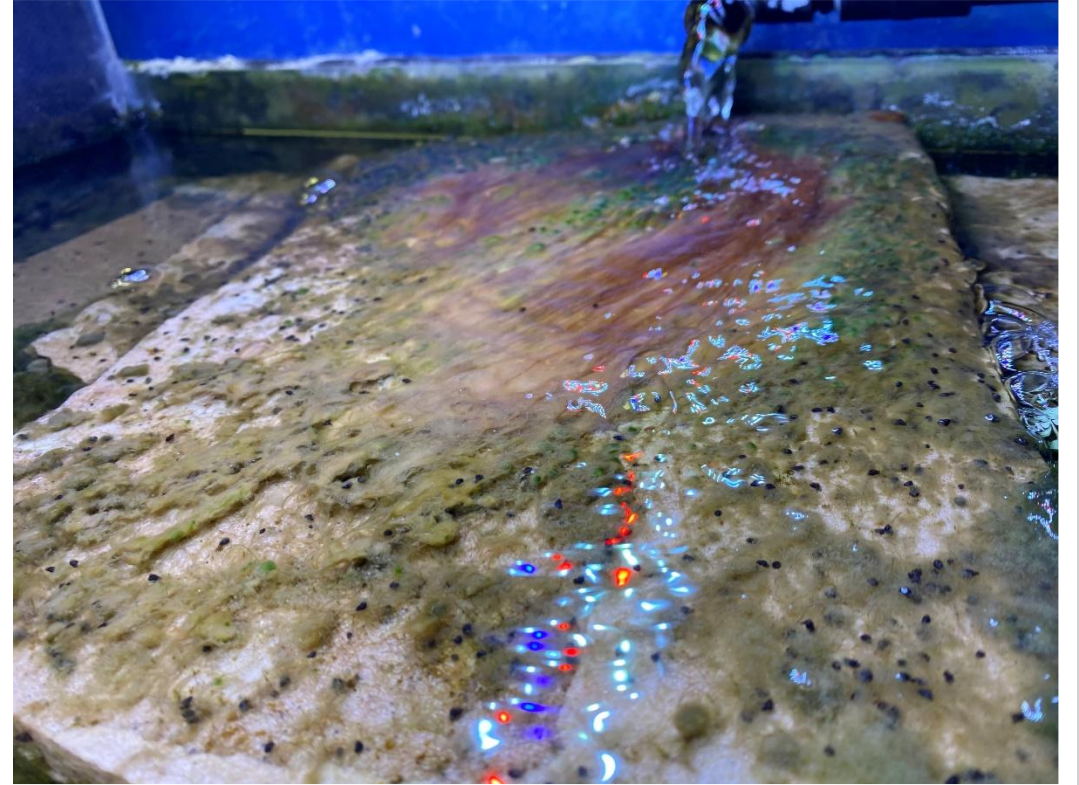




# Habitat Study



- Clumped dispersion
- No effect of depth

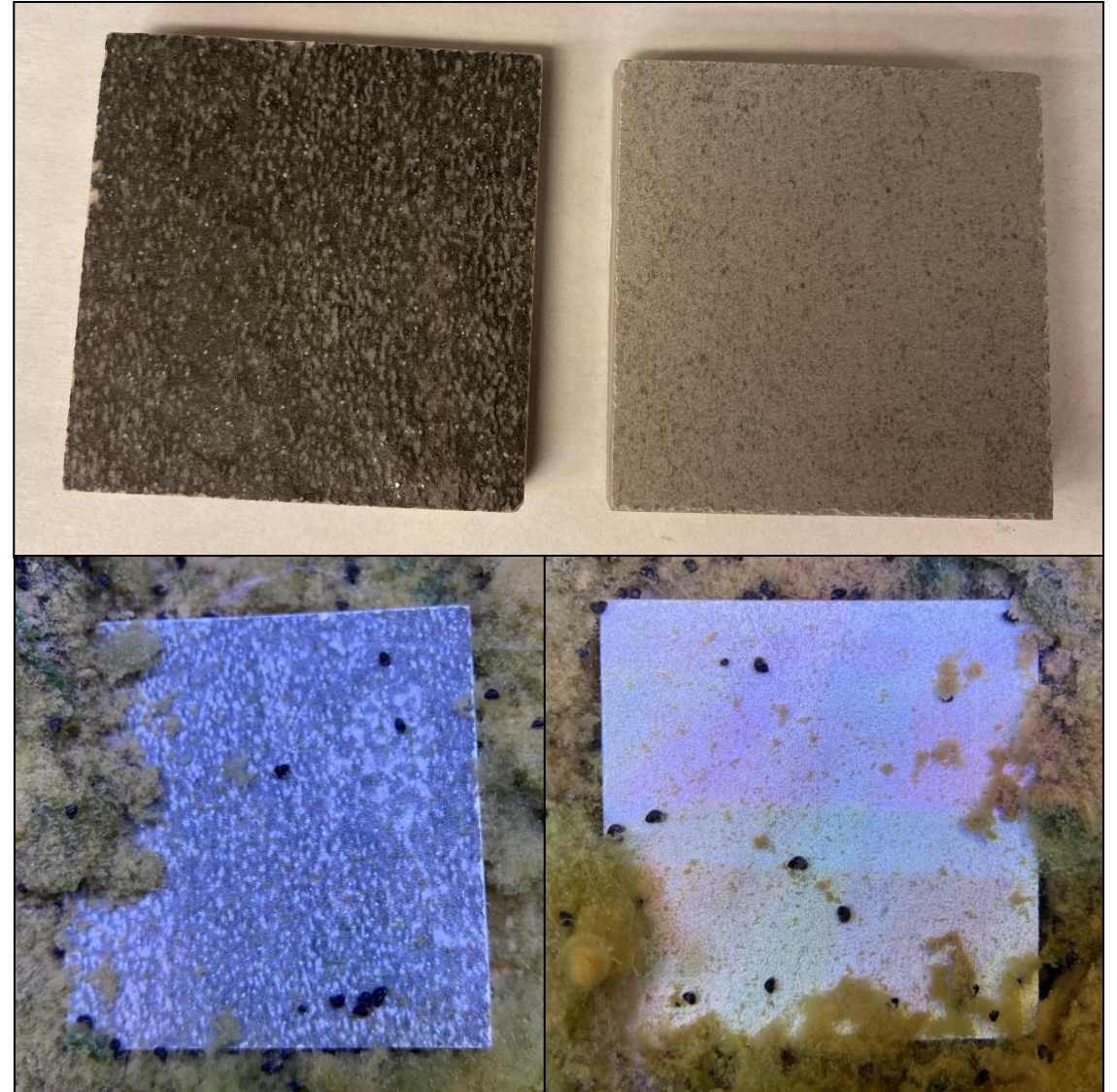


- Simulated springhead



# Huachuca Springsnail

- Temporal activity patterns
- Light and dark tiles
- Photos taken every 30 min for 24 hours
- Field surveys—is night better?





# Huachuca Springsnail Releases





# San Bernardino Springsnail

*Pyrgulopsis bernardina*

## LOCATION

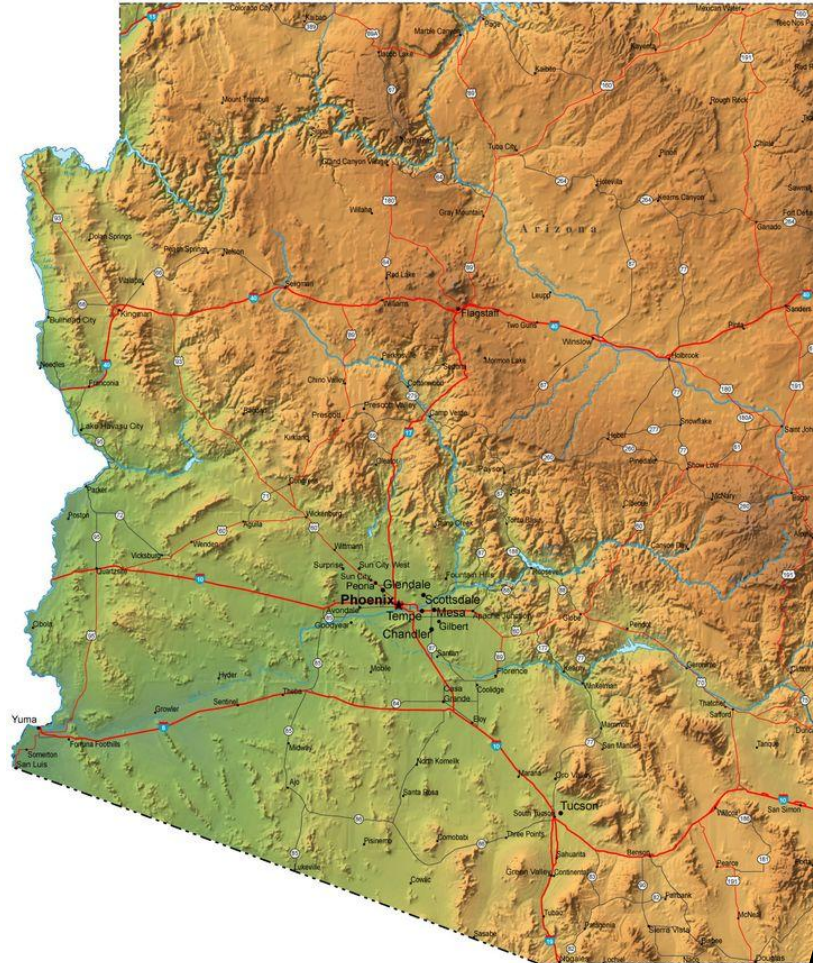
- Endemic to southern Arizona and northern Sonora, Mexico
- 1 remaining site in U.S.

## STATUS

- US - Threatened

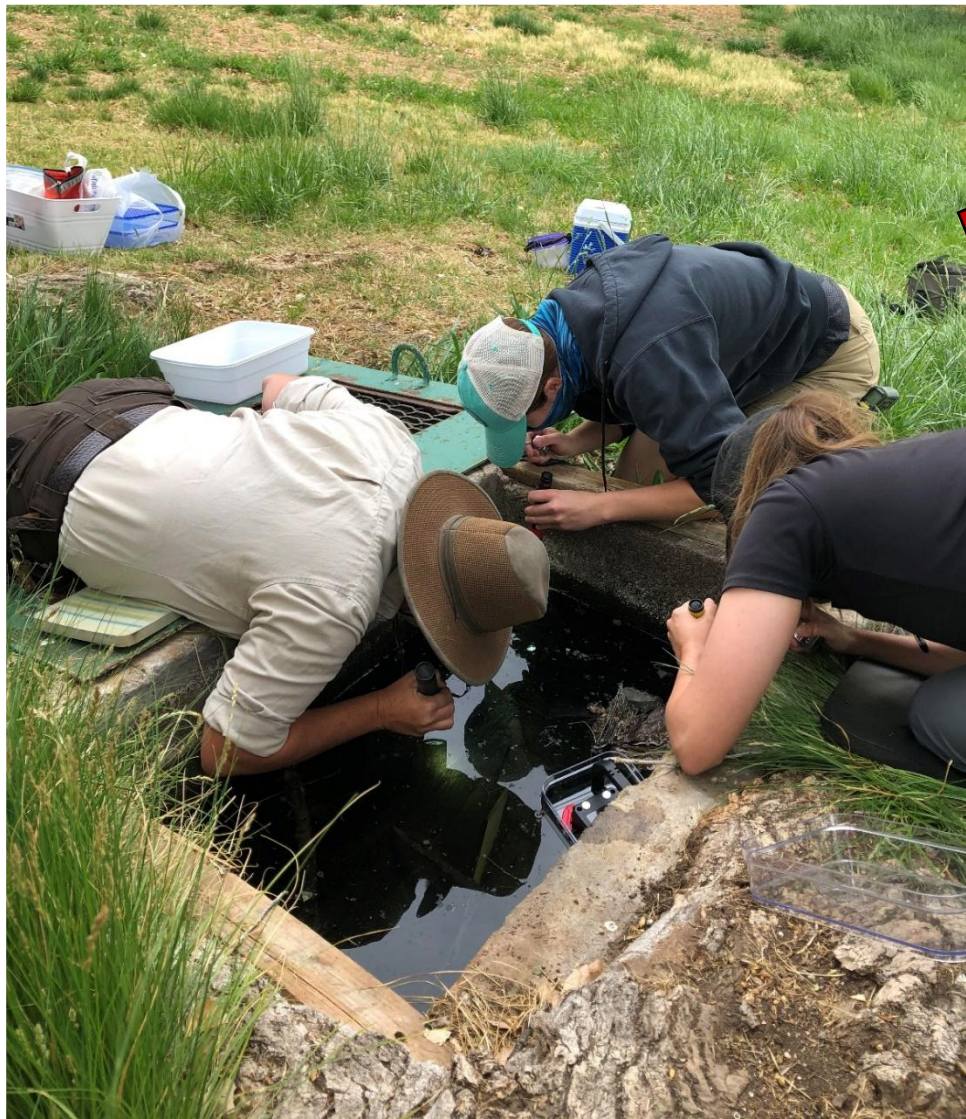
## THREATS

- Habitat loss
- Groundwater depletion
- Water pollution





# San Bernardino Springsnail



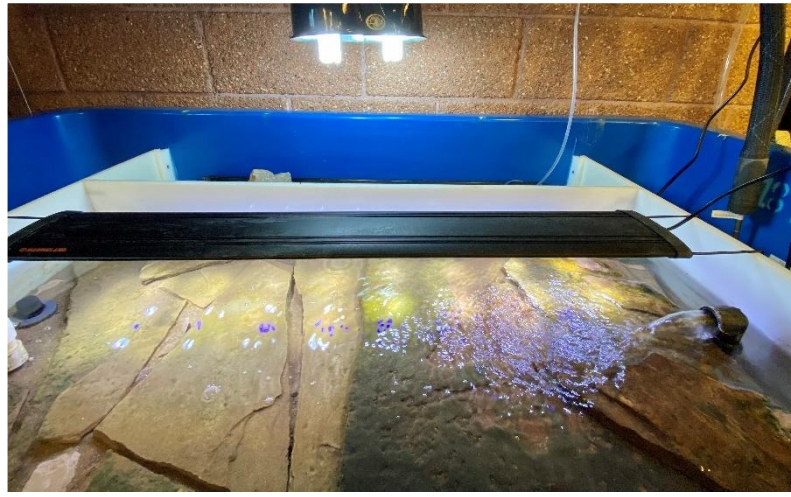


# San Bernardino Springsnail





# San Bernardino Springsnail





# San Bernardino Springsnail





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