

# A CLOSER LOOK AT NATIVE APPLE SNAIL HYDROLOGY IN WATER CONSERVATION AREA 3A

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# Overview

- This data and presentation was funded by Army core of engineers with a contract through Avian Research Conservation Institute (ARCI).
- Referencing population studies of native apple snails (*Pomacea paludosa*) in WCA3A South from 2017-2021.
- Focus of this presentation is based on years of established research on the native snail, with a new consideration for water management in different elevation zones in WCA3A South.

# NATIVE APPLE SNAIL LIFE CYCLE



Photo: Kevin Barry

- Diet of periphyton, detritus, and occasionally plants
- Main reproductive effort is in late spring/early summer; typically after the steepest drop in water level.
- Lay eggs on emergent vegetation, white in color
- Continue to lay throughout the summer, and experience a post reproductive die off in the fall. Life span 1-1.5 years
- **Very sensitive to hydrology**
- Will estivate at less than 10 cm water and seek shallower water at more than 50 cm. (Darby et al, 2002).



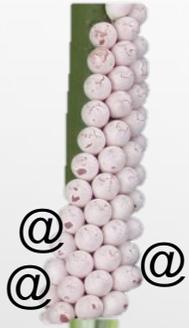
Photo: Wikipedia.com



Photo: David Chelmick

# NATIVE APPLE SNAIL DEPENDENCE ON HYDROLOGY

**Ideal Scenario**



**Neonates Live!**

**Dry Conditions Persist**



**Neonates fall to dry ground and die**

**Premature Flooding**



**Egg clutch is flooded and neonates never hatch**

# MSTS Specific Water Level recommendations

Uses Staff gauges 63, 64, and 65

## Apple Snail

### Pre-Breeding Season (Jan 1)

- Water Depths between 9.65-10.31 ft NGVD (40-60cm)
- Slow recession rate; approximately 0.05 feet (1.5 cm) per week (from January 1<sup>st</sup> to June 1<sup>st</sup>) to get water depth at or below 40cm by the beginning of March. This equates to a stage difference of 1.0 between January 1<sup>st</sup> and the dry season low.
- Rapid recession rates may cause neonates to land on dry ground and die. If water levels rise to high too fast, clusters may drown (page 14).

### Dry Season (May 1-30)

- Egg production is maximized when levels are <9.65ft but > 8.67 ft NGVD (water levels less than 40 cm but greater than 10cm)
- Maximizing egg cluster production contributes to increased snail density the following year. As we've seen in other publications, lots of egg clusters does not necessarily reflect current high snail populations.

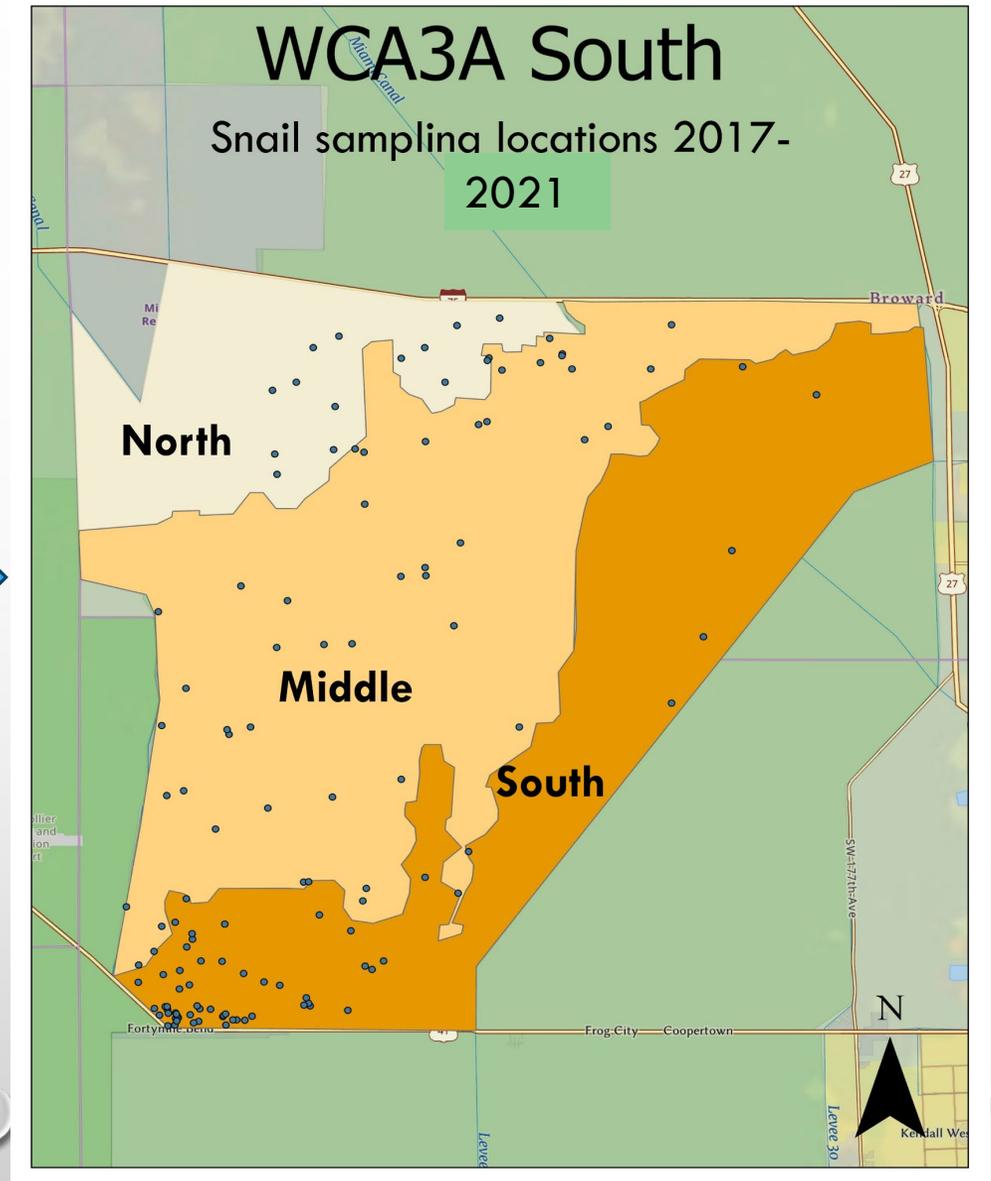
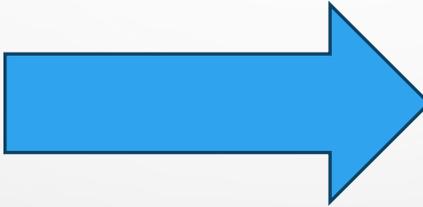
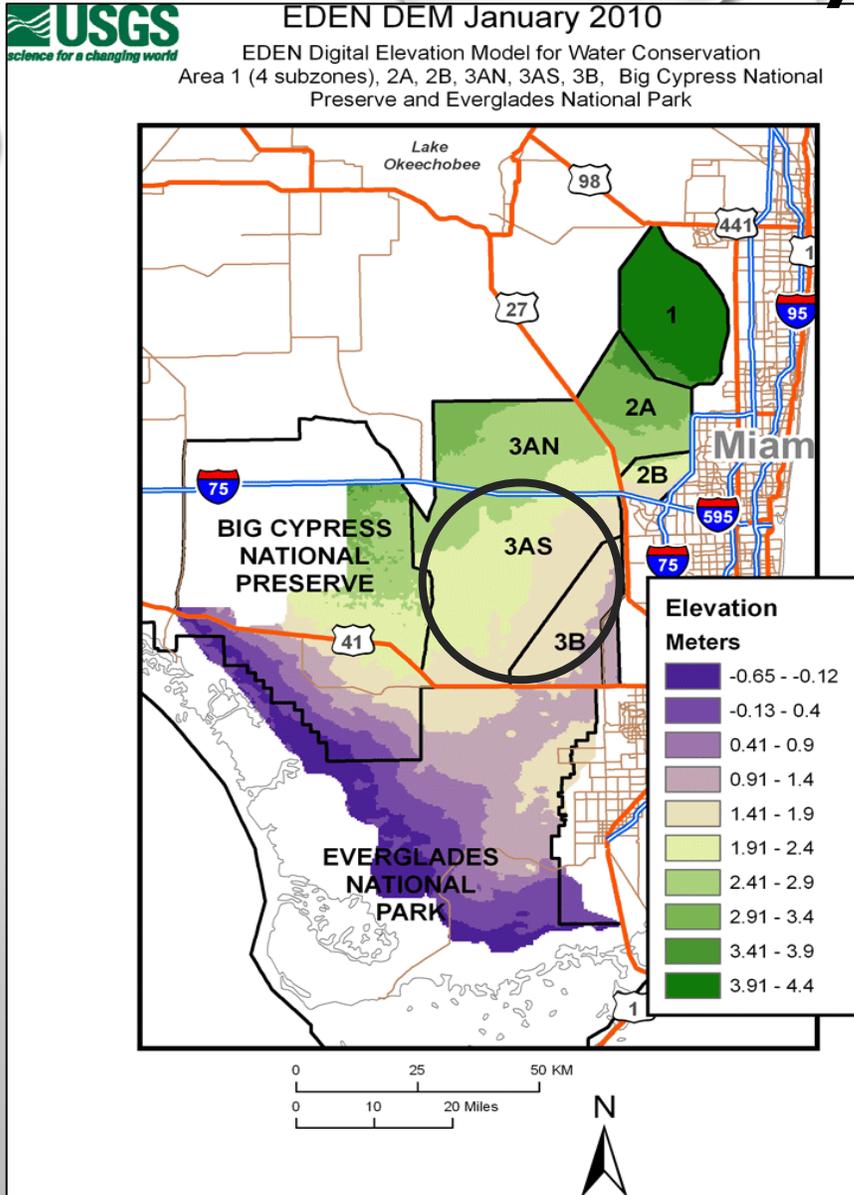
### Wet Season height (Sep 15 – Oct 15)

- No specific recommendations for this period. Water levels should begin receding in October and November to fall within pre-breeding season recommended levels.

\*Maximum ascension rate of  $\leq 0.25$  feet per week (7 cm) between June 1<sup>st</sup> to Oct 1<sup>st</sup>. \*

Wet prairies require a minimum of dry-down frequency once every 4 years (8.0 – 8.47 NGVD).

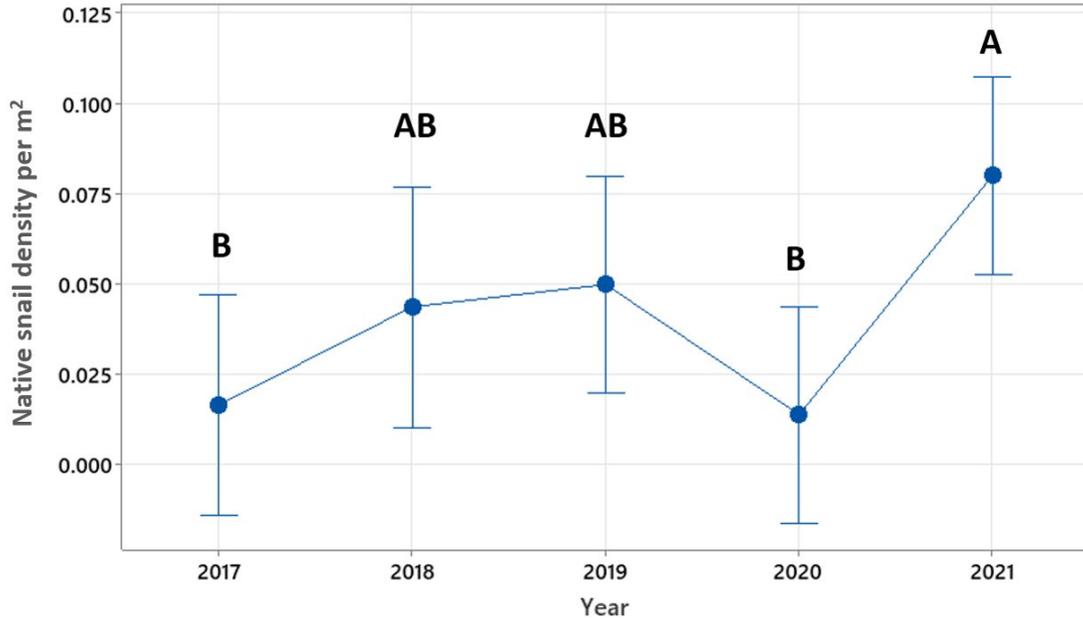
# Study Area WCA3A South



Site sampled with method described in Darby, et al 1999. North zone could not be sampled in years 2018 and 2019.

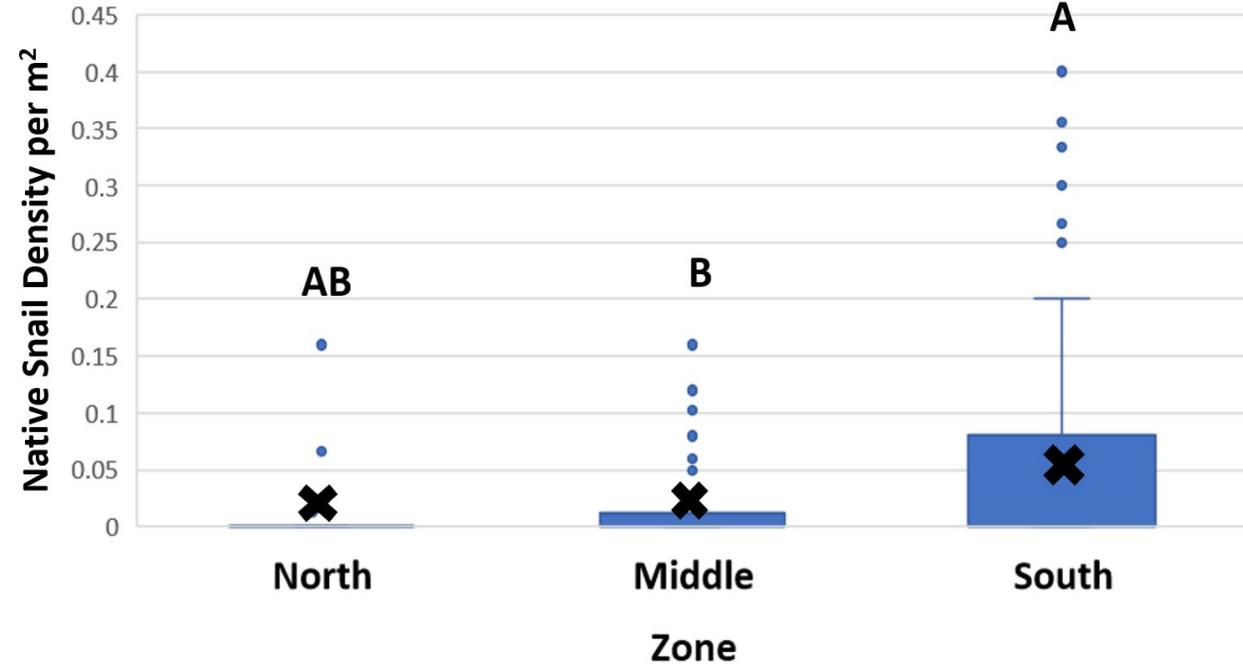
# Overall Results from 2017 - 2021

Interval Plot of Native Snails vs Year  
95% CI for the Mean



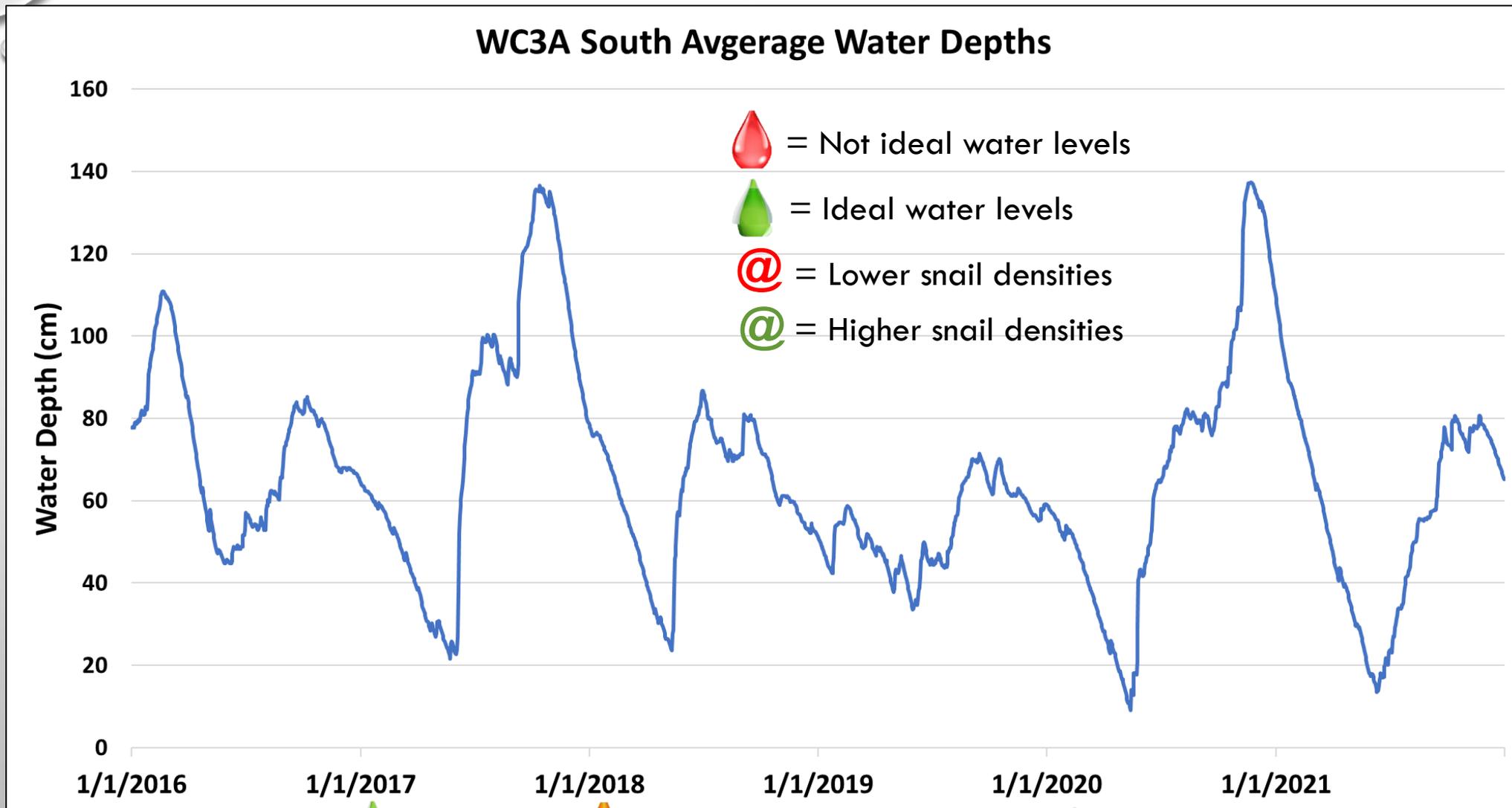
The pooled standard deviation is used to calculate the intervals.

Snail Density Among Zones

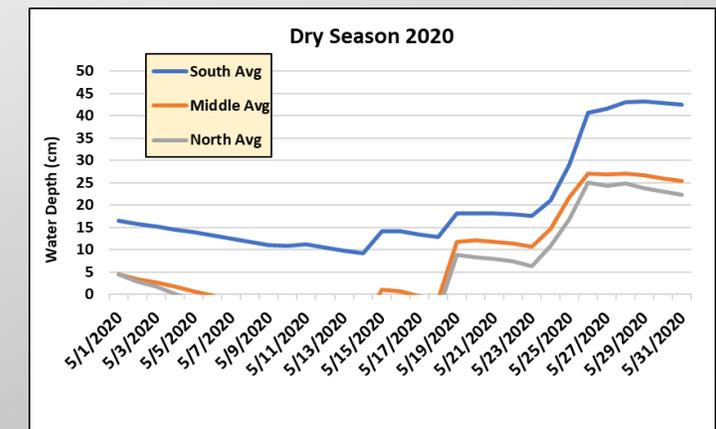
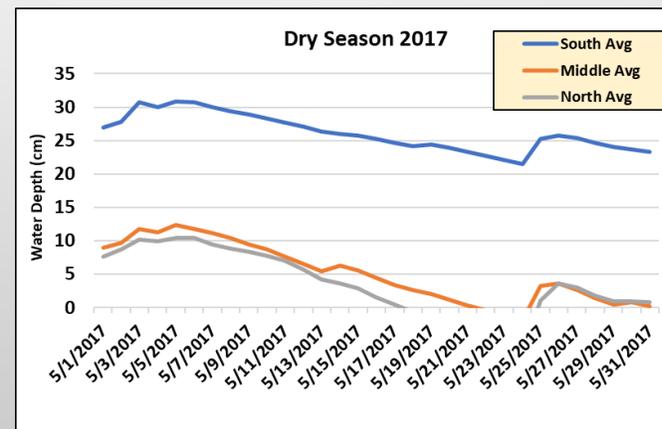
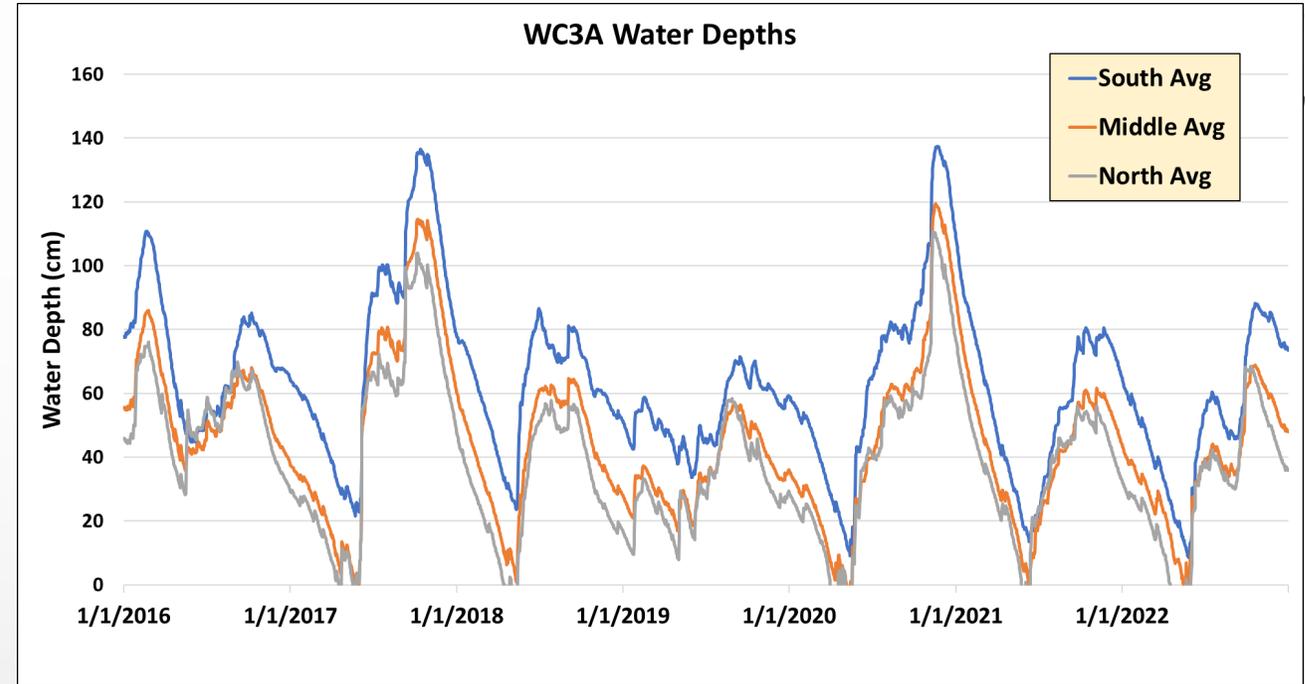
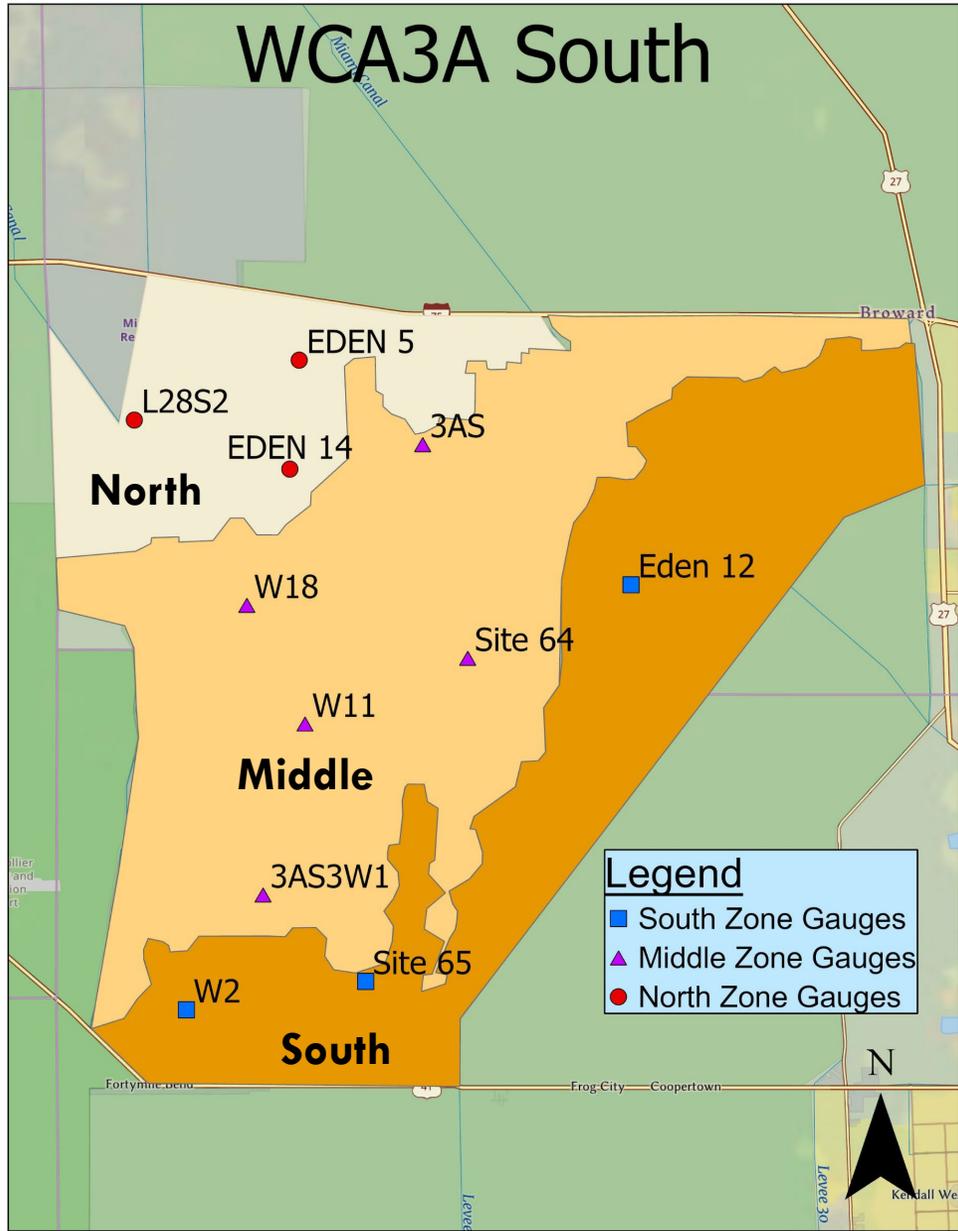


Significant differences were found among years and zones, with statistically significant greater populations in the South Zone.

# Dry Season water levels and next year snail populations



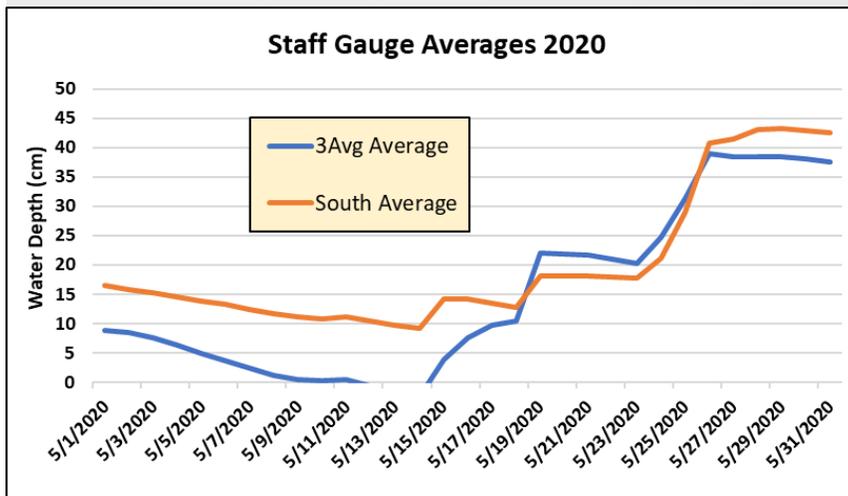
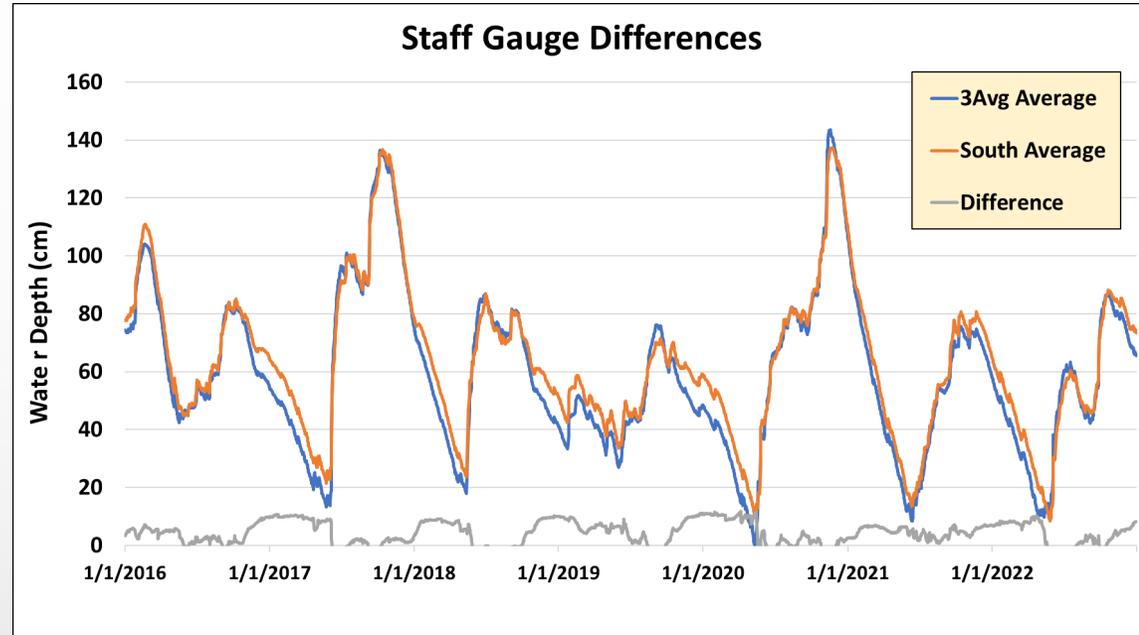
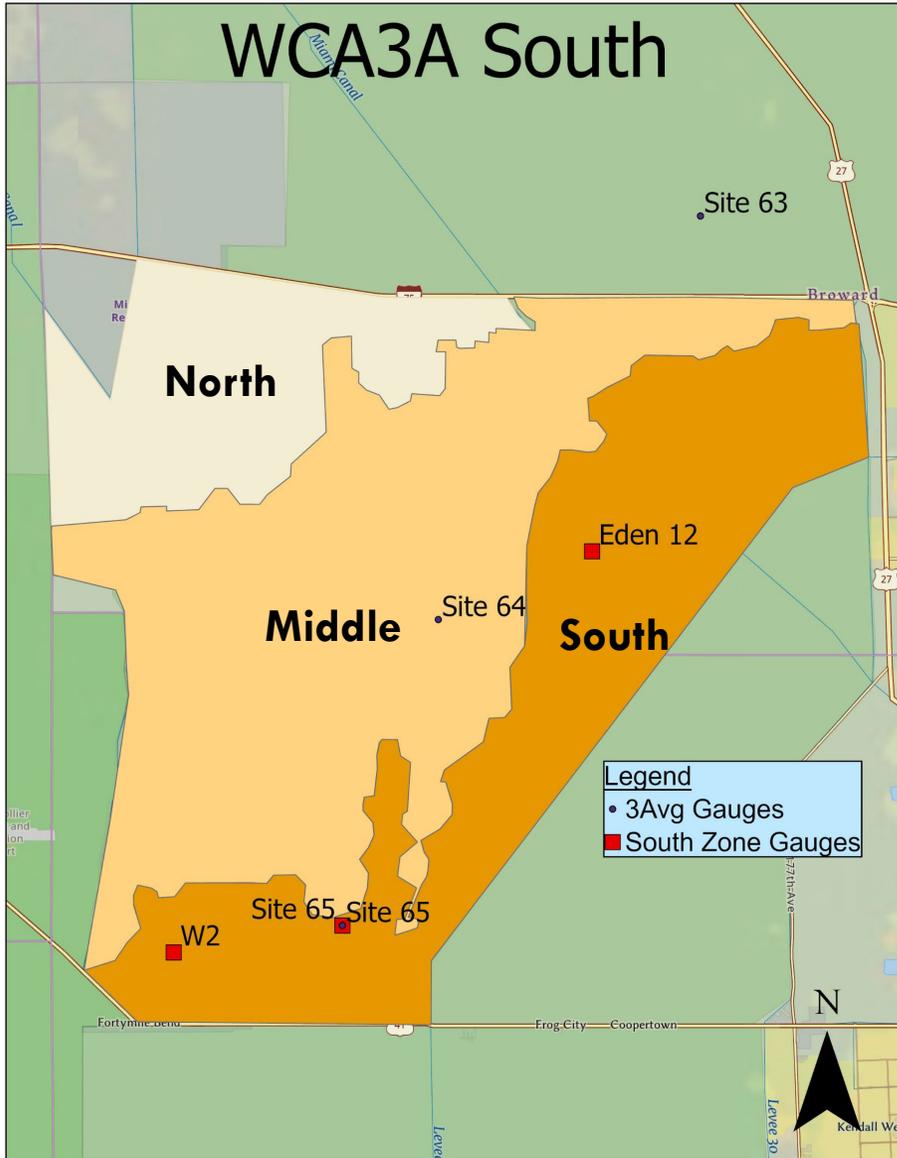
# You can't please all the native snails everywhere at the same time



South gauge avgs showed optimal water levels for the dry season. The following year, the native snail population numbers were higher

# Comparing Staff Gauge Averages

Land managers have been using the 3Avg (from the MSTS report) in reporting water levels, but these can differ staff gauges within the South Zone.



Should we base management strategies where we know snails are doing well?

# Limitations and Future Discussions

- It isn't possible to explain apple snail populations on hydrology alone (water chemistry, exotic snails, exotic predators..etc).
- A larger data set is needed to better determine if staff gauge averages in different zones can give an indication of the following years population numbers within each respective zone.
- It isn't possible for land managers to manage the hydrology for a specific species every year.
- Considerations may be given to where the snail populations are highest, and use staff gauges within that zone to direct optimal water levels during dry season.

# Works Cited

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