Vegetation Community Relationship with *Pomacea paludosa* and *Pomacea maculata* in Lake Okeechobee Florida

By

Dean Monette Ecology and Environment, Inc.

Scott Markwith Florida Atlantic University

Sharon Ewe Ecology and Environment, Inc.

Matt Dinkins, LG^2 Environmental Solutions, Inc.

Presentation Objectives

- Brief history of *Pomacea maculata*
- *P. paludosa* and *P. maculata* habitat similarities and differences
- Points to consider

Island Apple Snail
(Pomacea maculata)

- Native to South America
- *Pomacea* species introduced into Asia 1979
- In Asia, 20+ years of research continues on how to resolve the issue
- Management Research (Physical, Cultural, Chemical, Biological, etc.)

- First noticed late 1990's into Florida
- Research and Management started in early to mid 2000s
- Major infestation in STA: summer 2013

Is *Pomacea maculata* a problem?

- *Pomacea canaliculata complex ??*
  - Identification issues
  - *P. maculata* (formerly *Pomacea insularum*)
  - *Pomacea* species is a global pest in non-native ranges
- *P. maculata* important life history facts
  - Matures quickly (180 days)
  - High fecundity (~200 - 3500 eggs)
    - *P. paludosa* 30-60 eggs
  - Life span 3-5 years
    - *P. paludosa* ~12-18 months

Why is *P. maculata* Difficult to Manage

- Limited Research
  - Biotic/Abiotic
    - Life History
    - Behavioral
    - Management
    - Spatial Movement
- Food Source to Snail Kite
  - Endangered species policies
- Difficult to estimate populations
  - Aquatic invader

Snail Impact in STA

Healthy, diverse aquatic community

STA-1E, cell 4S (March 2014)

Resource Vegetation Relationship Study Methodology

- Examine *P. paludosa* and *P. maculata* habitat similarities and differences in Lake Okeechobee
- Photo shows *Pomacea paludosa* (native) egg cluster laid upon *P. maculata* (exotic) and

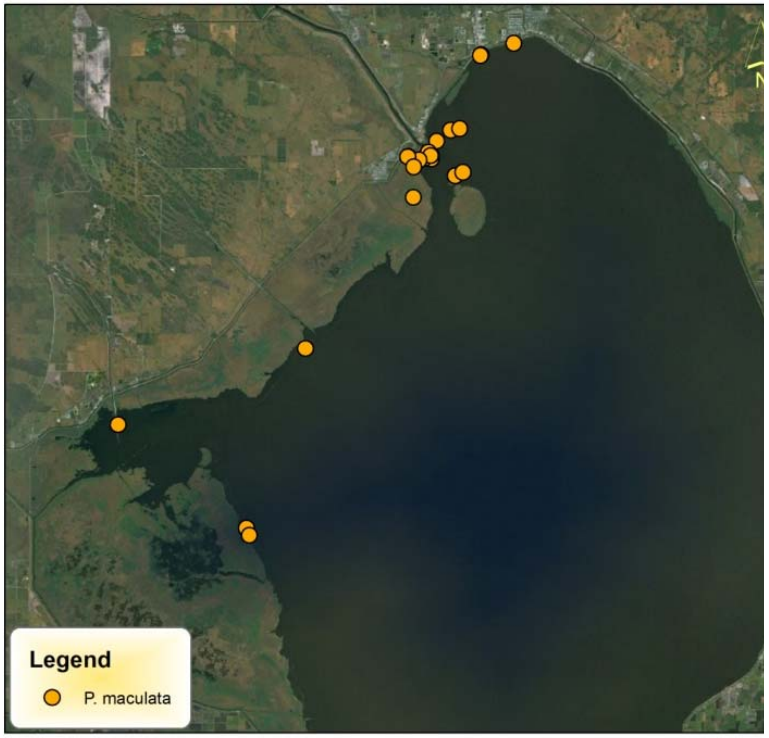
Resource Vegetation Relationship Study Methodology

- Field
  - Sampled throughout the littoral zone in Lake Okeechobee 2010-2012
  - Over 85 sites over 3 years between March through May
  - Used a 1m^2 steel trap randomly thrown along transects in Snail Kite foraging habitats
  - Dominant and Secondary emergent, SAV plants recorded

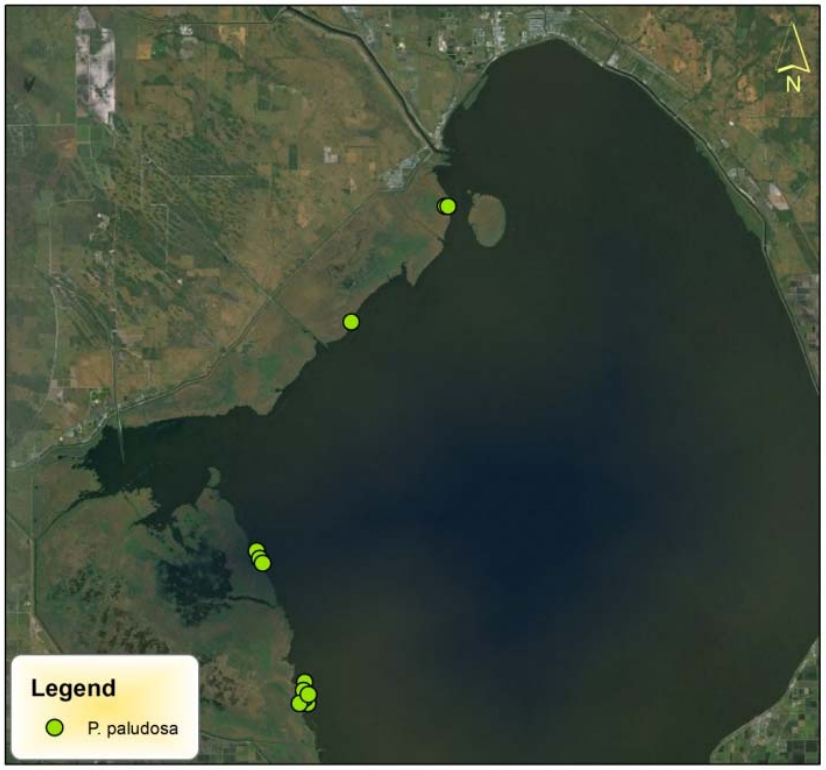
Resource Vegetation Relationship Study Methodology

Resource Vegetation Relationship Study Results

P. maculata

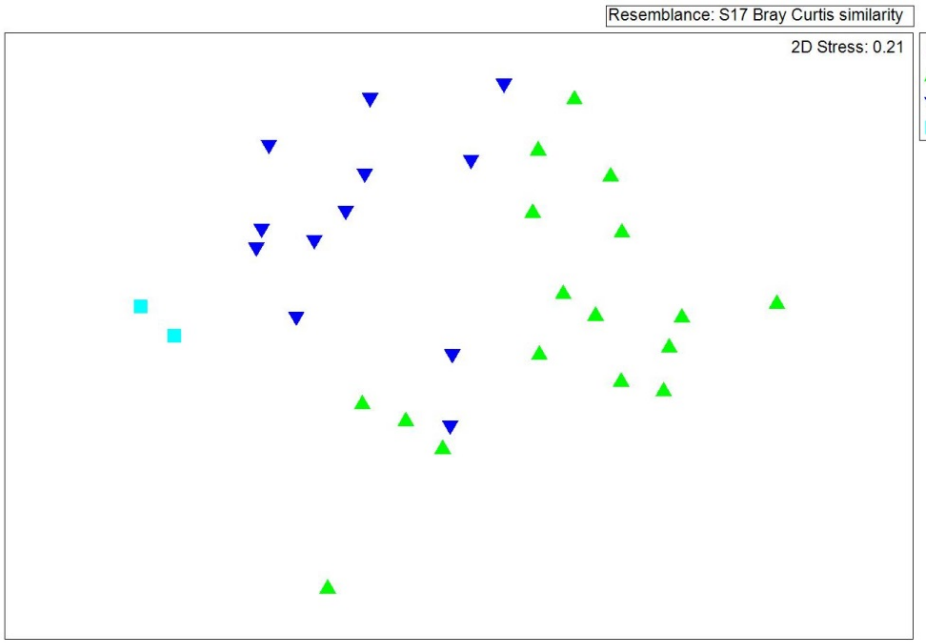


P. paludosa



NMDS Analysis between Snail Groups for Plant Vegetation

- Legend
  - Green= *P. maculata*
  - Dark Blue = *P. paludosa*
  - Light blue = both found
- Clear grouping between species
- All emergent/SAV presence/absence value
- 3 dimensional solution stress level = .12
  - 2D shown for viewing purpose



Field Surveys Habitat Communities

- Species overlap
- *P. maculata* observation with *Hydrilla verticillata*
- *P. paludosa* typically found with more native plant species

Average dissimilarity = 81.11					
	P. maculata	*P. paludosa*			
Species	Av.Abund	Av.Abund	Av.Diss	Contrib%	Cum.%
Eleocharis cellulosa	0.05	0.51	11.57	14.26	14.26
Hydrilla verticillata	0.49	0.14	9.79	12.07	26.33
Nymphaea odorata	0.08	0.39	9.2	11.34	37.67
Schoenoplectus americanus	0.21	0.34	7.72	9.52	47.19
Paspalidium geminatum	0.1	0.28	6.45	7.95	55.14
Utricularia Spp.	0.06	0.22	5.18	6.39	61.53

P. maculata					
Average similarity: 25.38					
Plant Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Hydrilla verticillata	0.49	17.04	1.15	67.15	67.15
Scirpus americanus	0.21	3.07	0.42	12.11	79.26
Nymphaea odorata	0.08	1.1	0.39	4.34	83.61
P. paludosa					
Average similarity: 36.22					
Plant Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Eleocharis cellulosa	0.51	10.73	1.08	29.62	29.62
Nymphaea odorata	0.39	6.72	0.72	18.55	48.17
Schoenoplectus americanus	0.34	6.39	0.97	17.63	65.8
Paspalidium geminatum	0.28	4.7	0.89	12.98	78.78
Utricularia Spp.	0.22	2.63	0.48	7.26	86.04

Summary of our Findings

- *P. maculata* and *P. paludosa* have some plant species overlap
  - High dissimilarity between plants typically found between snail species
  - Visual grouping patterns between species
  - Both species occupy *Vallisneria americana* habitat communities

Points to Consider:

- Currently seeing the grazing impacts to *V. americana* communities
- Short term Kite solution, long term environmental impact?

Acknowledgement

- Field Crew
  - Mike Cantaloube
  - Adriana Olavarria
  - Anton Lauter
  - Tony Welch
  - Andy Vala
  - Haiting Huang
  - David Cox
  - Garren Meza
  - Alexandra Samuel
  - Kelli Grim
- Florida Fish and Wildlife Commission
  - Don Fox
  - Tyler Beck
  - Alyssa Jordan
- SFWMD
  - Bruce Sharfstein
  - Amy Peters
- Army Corp
  - Jon Morton

Questions