

Annual Report on the Apple Snail Study at Jean Lafitte NHPP 2016

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Introduction

Between July 2014 and August 2016 we conducted research on the maculata apple snails (*Pomacea maculata*) at Jean Lafitte National Historical Park-Barataria Unit. We had two primary goals. First, determine what impact, if any, apple snails were having on the submerged aquatic vegetation (SAV) and floating leaved vegetation (FLV) in the cypress swamp ecosystem, a major habitat in the park. Second, to estimate the population size of the snails in the cypress swamp systems. To catch snails we used VanDyke funnel traps, and modified pyramid style crawfish traps. Traps were baited, generally with raw sweet potatoes and commercial crawfish bait. Trapping grids were set up a Bayou aux Carps near the US Fish and Wildlife Service established forest monitoring plots in an area where apple snails were known to be. A second control (non-snail) site was set up in equivalent habitat. The initial control site just off the Palmetto Trail, and later moved just south of the hurricane protection levee north of the park, adjacent to long term forest plots monitored by Ken Krauss(USGS). Late in 2015, in order better understand snail movement patterns, we began attaching telemetry devices to snails larger than 25g when convenient. We marked their release location with a pin flag. When relocated on subsequent site visits we measured the distance and direction from the previous location to the new location. As the project evolved the protocols were modified (see reports for 2014 and 2015) to: (1) reduce non-target species captures and mortalities and (2) incorporate what we learned about the effectiveness of the traps, snail movement patterns, and logistics.

Methods and Changes in Procedures from 2015 to 2016.

We sampled from January through August 2016. We used the same four sites and five sample plots as in 2015. They were Bayou aux Carpes (BaC), 2 plots 200 meters apart; the levee “control” site (Levee), one plot; and Bayou des Familles (BdF) one linear plot.

(1) In 2016 we discontinued the use of VanDyke traps for the following reasons:

(A) They had a lower snail catch efficiency as compared to the modified crawfish traps and a higher non-target mortality rate.

(B) They were too expensive (\$100 per trap VanDyke trap versus <\$20 per crawfish trap) to add a sufficient number of them to bring the catch effort up to what we had with the crawfish traps.

(C) It took more time and personnel to process the VanDyke traps. Whereas one person could check a crawfish trap in under a minute, it took two people four or more minutes to process the contents of a VanDyke trap.

(2) The number of crawfish traps was increased to 16 at the BaC and Levee sites, arrayed in a 4x4 grid with the traps spaced 4 meters apart, and 14 traps spaced 4 meters apart at BdF. In 2015 we used a 3x3 grid spaced 3 meters apart.

(3) On March 7 2017, following a recent flood event, we captured our first snail at the Levee Control Site. Thus, the Levee site was no longer a “control” for comparing vegetation with BaC sites.

(4) Expanding on the telemetry study begun in 2015, we put telemetry devices on eight individuals at BaC and three individuals at the Levee Site. We did not use telemetry at BdF because a boat would have been required to determine the snail locations and recovery would be difficult in the deeper waters of the site.

(5) We began to download the water data logger at least once a month.

Results

Snail Captures:

Summary statistics for all three years and all study locations: BaC (A, B, C & D): 424 captured events, 309 new and 115 recaptures, between July 24, 2014 and June 4 2016. BdF: 24 capture events, 21 new and 3 recaptures, between 11/19/15 and 7/20/16. Levee: 11 capture events, 9 new and 2 recaptures, between March 7, 2016 and July 26, 2016. Summaries of snail measurements are in Tables 1 and 2.

Egg Masses:

Summary data for egg mass observations are in Table 3. Egg mass production was for the most part seasonal in that more egg masses were found in spring and summer than in late fall and winter. However, if there was an extended warm period in January or February you might find one or two egg masses. The data presented is for egg masses in and nearby the study plots. We also noted egg masses we found between study plots in Bayou aux Carpes. That data hasn't been examined. We intend to combine it with data collected from the data loggers to determine if we can predict egg mass production from variables such as water or air temperature.

Non Target Captures for 2016: Unless otherwise noted, the non-targets were alive when caught and released. Mammals and snakes: 0; crawfish: 406 live, 150 dead; tadpoles: 15; frogs: 3 live, 2 dead; amphiuma/siren: 2 live, 1 dead; turtles: 81 live, 1 dead; Planorbidae snails: 33; Physidae snails: 7; minnows: 43; other (newts, fish other than minnows) 16. The most common turtles were stinkpots and turtles in the *Graptomes* genera. See the reports for 2014 and 2015 for summaries of their non-target capture data.

Telemetry: We placed radio transmitters on nine individuals at Bayou aux Carps (2015 and 2016) and three at the Levee site (2016). Preliminary analysis indicates that snails moved in 'random' directions and they moved an average of 2.5 meters per week. One individual moved between two plots that were 200 meter apart, in at least 19 weeks time or 10.5 meters per week.

Vegetation: The dominate submerged (SAV) and floating leaved (FLV) vegetation at BaC and the Levee sites was *Salvinia minima*, with the occasional water hyacinth present. Preliminary analysis did not show any differences in the aquatic vegetation between snail occupied and the snail free plot. After the Levee site became a snail site no differences were noticed that were not explainable by seasonal abundances. However, the data has yet to be subjected to formal statistical analysis. BdF is a former river channel that has converted to a floating marsh and not comparable to the BaC and Levee sites. BdF was dominated by water hyacinth near shore where the traps were placed. This graded into vegetation more typical of a floating marsh towards the center of the bayou.

Water Quality: Across all sites pH ranged from 4.63 to 5.9, salinity from 0.03 to 2.2 ppt, conductivity from 0.07 to 4.03 mS and temperature at the time of our visit from 19.2° to 30.8°C. The study sites flooded several times and water over-topped the crawfish traps. The two instruments we used to collect water quality data were a YSI dissolved oxygen/salinity meter and a portable Hanna pH/salinity meter. In some instances one or the other instrument was not working. Tables 4 and 5 have the summary data for the separate devices.

The 2017 sampling season

We will not continue mark recapture work at Jean Lafitte in 2017. We may continue telemetry work depending on the availability of funds. The next step would be to move the study to a different habitat type in the park, perhaps more open systems such as the edges of water bodies or marsh systems. Unfortunately, it may be difficult to find areas within the park that do not already have apple snails. Logistically cypress swamps are an easier system to set up a trapping array. A different trapping/capture strategy will need to be developed for other habitat types.

Acknowledgements.

Throughout this project we had the aid and support of park staff, interns, and volunteers.

TABLES

Table 1. Summary of apple snail measurements for Bayou aux Carpes, all four plots, all three years

	Weight (g)	Length (mm)	Operculum (mm)	Width (mm)
Maximum	68.11	65.60	40.40	39.60
Median	16.04	39.65	26.60	25.90
Mean	17.17	39.33	25.75	26.29
Standard Deviation	11.61	12.24	6.17	9.14
Minimum	0.04	5.30	8.90	14.20
Count	399	312	117	9

Table 2. Summary of snail measurements for Bayou de Familles and the Levee 'Control' Site.

Site/Statistic	Weight (g)	Length (mm)	Operculum (mm)
Bayou de Familles (5/5/15:7/20/16)			
Maximum	88.01	72.8	49.3
Median	43.85	57.65	40.7
Mean	48.51	57.80	40.71
Standard Deviation	15.54	6.53	4.78
Minimum	21.0	42.6	26.6
Total Number Measured	24	26	25
Levee 'Control' Site (3/7/16:7/26/16)			
Maximum	56.9	63.5	44.2
Median	25.095	39.5	35.15
Mean	28.113	44.39	32.75
Standard Deviation	21.33	16.65	9.44
Minimum	4.1	21.1	16.1
Total Number Measured	10	11	10

Dates of first and last captures in parentheses.

Table 3. Summary of Egg Masses Detected. All sites, all three years.

Site/Statistic	Inside Fresh Eggs inside plot	Fresh Eggs within 2m	Near Fresh eggs outside 2m	Total Eggs in /near plot
Bayou aux Carpes				
Maximum	4.00	10.00	3.00	5.00
Median	0.00	0.00	0.00	0.00
Mean	0.55	0.73	0.38	1.17
Standard Deviation	1.06	2.01	0.85	1.68
Minimum	0.00	0.00	0.00	0.00
Count	8.00	7.00	5.00	11.00
Bayou de Familles				
Maximum	6.00	2.00	1.00	6.00
Median	1.00	0.00	0.00	0.00
Mean	1.53	0.50	0.11	1.75
Standard Deviation	1.81	0.67	0.33	2.63
Minimum	0.00	0.00	0.00	0.00
Count	8.00	5.00	1.00	4.00
Levee 'Control' Site				
Maximum	2.00	1.00	4.00	6.00
Median	0.00	0.00	0.50	0.00
Mean	0.62	0.38	0.92	1.64
Standard Deviation	0.77	0.51	1.31	2.20
Minimum	0.00	0.00	0.00	0.00
Count	6.00	5.00	6.00	5.00

Table 4. Summary of water quality data for all sites all three years from YSI

Site/Statistic	Dissolved Oxygen (% sat)	Salinity (ppt)	Conductivity (mS)	Temp (C°)
BaC				
Max	29.00	0.40	0.90	27.60
Median	9.00	0.10	0.28	20.30
Mean	10.48	0.16	0.37	18.56
StDev	4.70	0.08	0.18	6.17
Min	4.00	0.10	0.20	8.70
Count	31.00	31.00	31.00	31.00
BdF				
Max	29.00	0.30	375.00	28.80
Median	8.50	0.20	0.42	22.60
Mean	10.73	0.19	29.28	21.38
StDev	6.61	0.10	103.87	6.70
Min	5.00	0.00	0.20	10.20
Count	12.00	13.00	13.00	15.00
Levee				
Max	44.00	0.10	0.19	28.10
Median	12.00	0.10	0.13	20.70
Mean	15.42	0.08	0.12	20.74
StDev	14.13	0.05	0.06	6.30
Min	2.00	0.00	0.00	10.70
Count	12.00	9.00	10.00	14.00

Table 5. Summary of water quality data from Hanna pH meter.

Site/Statistic	pH	Salinty (ppt)	Conductivity (mS)	Temp (C°)
BaC				
Max	7.10	0.30	0.60	29.10
Median	6.23	0.13	0.26	20.50
Mean	6.23	0.14	0.29	19.61
StDev	0.39	0.05	0.11	6.56
Min	5.24	0.08	0.17	7.40
Count	31.00	31.00	31.00	31.00
BdF				
Max	7.10	0.37	0.72	29.10
Median	6.46	0.22	0.43	25.40
Mean	6.44	0.23	0.46	23.47
StDev	0.39	0.07	0.13	5.74
Min	5.77	0.14	0.29	12.00
Count	12.00	14.00	14.00	15.00
Levee				
Max	6.60	0.70	0.15	28.50
Median	6.15	0.06	0.12	22.30
Mean	6.15	0.11	0.12	21.38
StDev	0.37	0.18	0.02	5.82
Min	5.25	0.04	0.08	11.50
Count	11.00	13.00	13.00	13.00