**Aquatic Nuisance Species Status Report**
Florida Fish and Wildlife Conservation Commission
April – October 2023
Prepared for Gulf & South Atlantic Regional Panel on Aquatic Invasive Species

## MARINE NONNATIVE SPECIES STATUS REPORT


Figure 1. The 8th annual Lionfish Challenge held May 20th through October 1st, 2023.

### Lionfish (*Pterois volitans/miles*)

The 8th Annual 2023 Lionfish Challenge kicked off on May 20th and ended on October 1, 2023 (Figure 1). The Lionfish Challenge is a summer tournament that encourages and rewards recreational and commercial divers to remove lionfish from Florida waters. The tournament is open to everyone and is totally free to enter. Divers compete for prizes for removing the most lionfish and participants qualify for prizes based on the number or weight of lionfish removed. This year, 493 people registered for the Lionfish Challenge. Two hundred eighty-one divers submitted lionfish, up from last year's record of 196 participants. A total of 30,494 lionfish were removed which is also up from the previous record of 26,572 lionfish in 2018. The winner in the Recreational Division won the title of Lionfish King by bringing in 1,514 lionfish. In the Commercial Division, the winner and Commercial Champion of 2023 submitted 1,208 pounds of lionfish.

The Lionfish Removal and Awareness Day (LRAD) was held May 21st, 2023, in Destin, Florida. LRAD coincides with the Emerald Coast Open (the world's largest lionfish tournament). This year divers set a new record by submitting 19,560 lionfish. The overall winning team brought in 2,898 lionfish. The largest lionfish submitted measured 465 mm and the smallest was only 64 mm long!

### Asian Tiger Prawns (*Penaeus monodon*)

During the April-October 2023 period, there were no reports of Asian Tiger Prawns.

**Green Mussels (*Pernas viridis*)**
One EDDMapS report of Green Mussels was received in September from Collier County. This report is from an area known to have Green Mussels.

## FRESHWATER NONNATIVE AQUATIC SPECIES STATUS REPORT

### Red Swamp Crayfish (*Procambarus clarkii*)

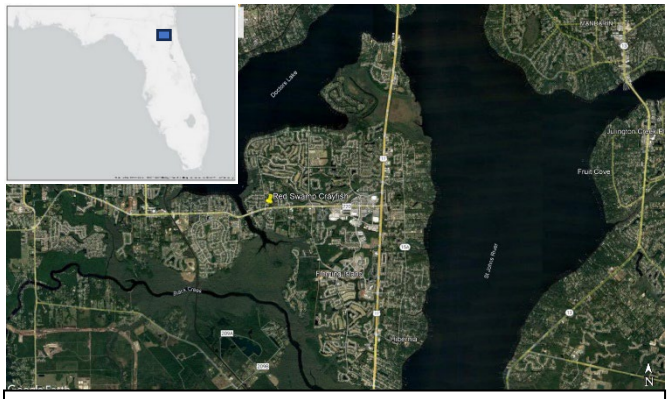


Figure 2. Confirmed Red Swamp Crayfish location in Fleming Island, FL. Site is near the State listed Black Creek Crayfish (bottom left).

**<u>Red Swamp Crayfish (*Procambarus clarkii*) Update</u>**

In August 2022, an EDDMapS report of Red Swamp Crayfish (RSC, *Procambarus clarkii*) was received from a location in northeast Florida near Jacksonville, Figure 2). FWC staff positively identified them as RSC. RSC are native to the Escambia River basin in western peninsular Florida, but this site is more than three hundred miles from their native range. RSC are considered highly invasive, and the site is near habitats occupied by the State Threatened Black Creek crayfish, a species already under stress from a native crayfish species that has been transplanted into the Black Creek drainage basin. The site has a series of drain lines connected to a retention pond. The RSC were first observed in one of the access wells of the drainage system (Figure 3) and were also trapped from the retention pond. Small numbers of RSC were also trapped from a shallow pothole in an almost completely dry drainage ditch just north of the site. Two applications of copper sulfate were applied to the retention pond, drain lines, and pothole but were unsuccessful in eradicating the RSC from any of the sites.

Figure 3. Drain line partially plugged and filled with pyrethrin-treated water.

Figure 4. Application of pyrethrin to retention pond containing RSC.

Researchers in Michigan are using pyrethrin, a commonly used insecticide, as an effective means of removing RSC. However, it is not currently labeled for use in aquatic systems. Exemptions were obtained from the EPA and NPDES and a treatment was conducted in December 2022 (Figure 4.). The pond, pipe sections, and pothole were monitored for three days by visual inspection and trapping. No live RSC were recovered. Additional trapping was conducted in waterbodies outside the treated areas and no additional RSC were recovered.

Figure 5. Pothole containing RSC treated with pyrethrin.

Follow-up trapping continued in January and February 2023 to monitor the pyrethrin treatment. During this time, water collected in a second low spot in the ditch, a spot that had been dry in December 2022. Dip netting in February yielded an adult and several juvenile RSC in this location but in no other site six weeks post-treatment. This pothole was treated with pyrethrin, and no live RSC were recovered. Due to the burrowing ability of RSC and the high water table in the area, it appears that RSC were able to survive and even reproduce during the dry season and occupy a shallow pothole after a rain event.

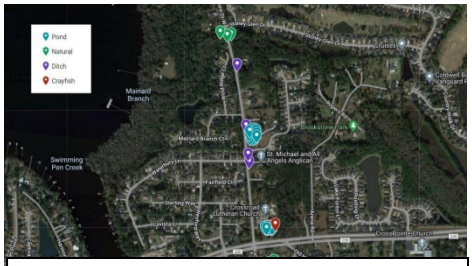


Figure 6. Waterbodies sampled for RSC in September 2023. Green = creeks, Purple = ditch, and blue = ponds.

In September 2023 the original pond and ditch where RSC had been confirmed and treated along with several waterbodies interconnected with the ditch (Figure 6) were sampled with minnow traps. The traps at most locations were set out for three days and two nights. Two adult RSC were trapped from the pond in nearly 900 hours of trap time, and none were collected from any of the adjacent sites. A third adult RSC was collected with a dipnet from the drain line well on the northeast side of the pond. (Figure 7). No other RSC were collected from any of the other trapping sites.

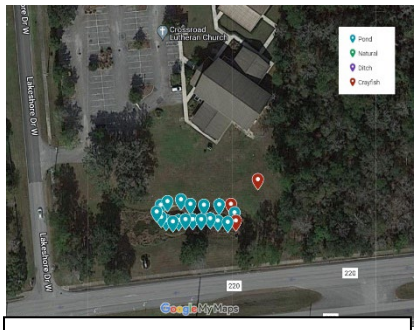


Figure 7. Original pond showing RSC trap sites and collections in September 2023. Blue = pond traps without RSC; Red = RSC collection

The source of the three adult RSC is unclear. They may have immigrated from an unknown location, been the result of another

introduction, or estivated in a burrow outside the treatment area. FWC is currently exploring recruiting biology students from a local university to periodically trap and monitor the site.

**Differentiating *P. paeninsularis* (native) from RSC (nonnative)**

One of the most reliable field characteristics to identify RSC from native crayfish in Florida is the areola (Figure 8). The areola (space between the two sections of carapace immediately behind the head) is much wider in *P. paeninsularis* (left) than in RSC (right). Also, the tubercles on the body and legs of RSC are large and bright red.

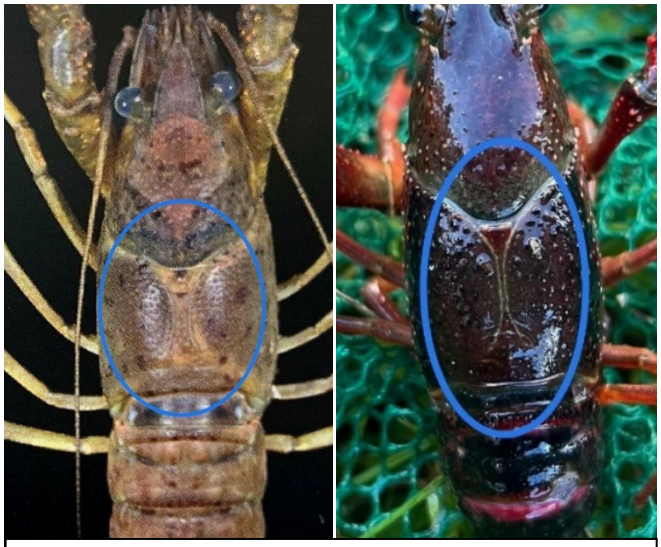

Figure 8. The areola (space between the two sections of carapace immediately behind the head) of *P. paeninsularis* (left) vs. RSC (right).

**Rio Cauca Caecilian (*Typhlonectes natans*)**

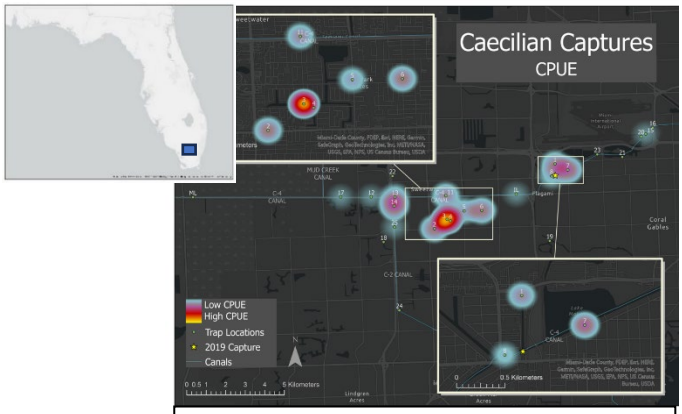


Figure 9. Distribution of Rio Cauca caecilians in Miami, Miami-Dade County, Florida, October 2023.

In October 2019 the Nonnative Fish and Wildlife Program (NFWP) collected the first known Rio Cauca caecilian (*Typhlonectes natans*) in North America from the Tamiami Canal (C-4) in Miami-

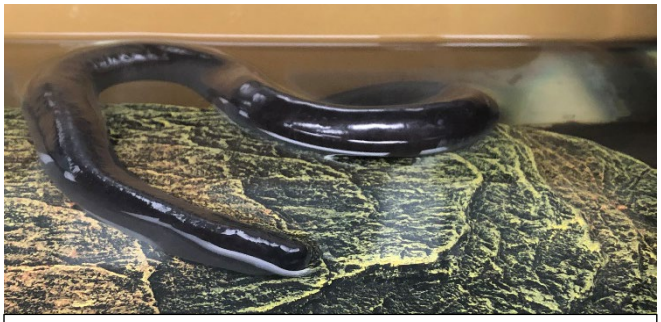

Figure 10. Rio Cauda Caecilian (*Typhlonectes natans*)

Dade County, Florida (Figure 9). Rio Cauca caecilians are dark gray, benthic, elongated, limbless aquatic amphibians native to the Rio Cauca/Rio Magdalena drainages of Columbia and Northwest Venezuela (Figure 10). They prefer slow moving lowland rivers and associated rivers. South Florida's analogous canal network connects directly to various wetlands including Everglades National Park. In their native range, Rio Cauca caecilians are opportunistic and feed largely on small vertebrates and insects. They are viviparous and give birth to 6-12 young. However, very little is known about Rio Cauda caecilians in South Florida. In May 2023 FWC enlisted the assistance of a Florida International University (FIU) professor and his student to assist in collecting distribution information and to determine if minnow traps are an effective method to trap Rio Cauda caecilians. Between May and July 2023, minnow traps with 1" or 2" holes baited with Vienna sausages were deployed at sites near the original 2019 record. Preliminary findings suggest Rio Cauda caecilians are restricted to an approximately 70km$^2$ area, but FWC plans to continue sampling this area because the interconnected canal system provides uninterrupted hydrologic connectivity to most of South Florida, offering few barriers to their expansion.

FWC is funding a project by the University of Florida (UF) to examine stomach contents from Rio Cauda caecilians collected from this population and will also be partnering with FIU to continue monitoring the spread of this unique amphibian. FWC also contracted with UF to complete a bio-profile and AS-ISK risk screening of this species to provide additional life history information and to inform FWC of the potential risk to Florida's native species (see Risk Screening of Nonnative Species section below).

## Bullseye Snakehead (*Channa marulius*) Removal Project

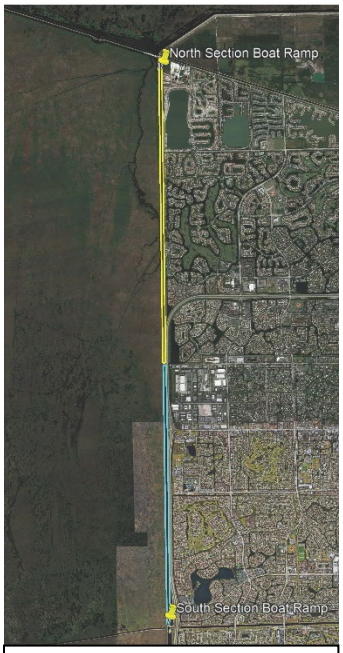


Figure 11. The north and south sections of the L-36 Canal in west Broward County.

A canal in western Broward County that is divided into two similarly sized sections by water control structures was identified as a site to examine potential impacts of Bullseye Snakehead (*Channa marulius*) on native fish species with emphasis on Largemouth Bass (*Micropterus salmoides floridanus,* Figure 11, 12). The sections are divided into transects and quarterly fish community electrofishing was initiated in November 2022. In the south section, all Bullseye Snakehead collected have been removed, and all returned in the north section. Monthly removals from the south section are being conducted to expedite any potential changes in the native fish communities. We will primarily be looking for changes in relative abundance of native and nonnative species based on electrofishing catch rates and changes in size structure of native sportfish. To date we have removed nearly 400 Bullseye Snakehead weighing over 600 pounds from the south section. The catch rate, average weight, length and size distribution are slowly decreasing but it is too early to determine if the native fish community is responding to the snakehead removals.

Figure 12. Bullseye Snakehead (*Channa marulius*).

## *Arapaima gigas* Report

In April 2023, NFWP received a call through the Nonnative Species Hotline of an intact, dead arapaima floating in a freshwater canal near Naples. FWC Law Enforcement was notified and responded to the report. The headless fish was recovered and turned over to NFWP staff. A PIT tag was recovered and traced back to an aquaculture facility in Ft. Myers certified to possess arapaima (a Conditional species in Florida) to raise for food. FWC was unable to prosecute this case. Due to the size of the fish, the special equipment required to transport it, and the distance from the source, it is likely the arapaima was dead when placed in the canal. To date, only two arapaima carcasses have been recovered from the wild. There have been no additional arapaima reports since April 2023 with no indications that more individual fish have been illegally released into waterbodies of the state.

## Risk Screening of Nonnative Species

### Bioprofiles and AS-ISK Risk Screening for Eight Aquatic Nonnative Species

The FWC contracted with UF to generate bioprofiles and complete AS-ISK risk screens for Rio Cauca Caecilian (*Typhlonectes natans,* Figure 13*)*, Cuban Gar (*Actractosteus tristoechus,* Figure 14), Tropical Gar (*A. tropicus,* Figure 15), Shortnose Gar (*Lepisosteus platostomus,* Figure 16), and 4 species of Dogtooth Characins (*Hydrolycus armatus, H. scomberoides, H. tatauaia, and H. wallacei, (*Figure 17).

Figure 13. Rio Cauca Caecilian. (*Typhlonectes natans*). Photo credit: Noah Mueller, https://www.floridamuseum.ufl.edu/science/caecilians-found-in-south-florida/


Figure 14. Cuban Gar (*Actractosteus tristoechus*). Photo credit: Solomon R. David, https://www.serioulsy fish.com/wp-content/uploads/2021/04/Atractosteus-tristoechus.fpg


Figure 15. Tropical Gar (*Actractosteus tropicus*). Photo credit: http://roughfish.com/tropical-gar

Figure 16. Shortnose Gar (*Lepisosteus platostomous).* Photo credit Missouri Department of Conservation. https://mdc.mo.gov/discover-nature/field-guide/shortnose-gar

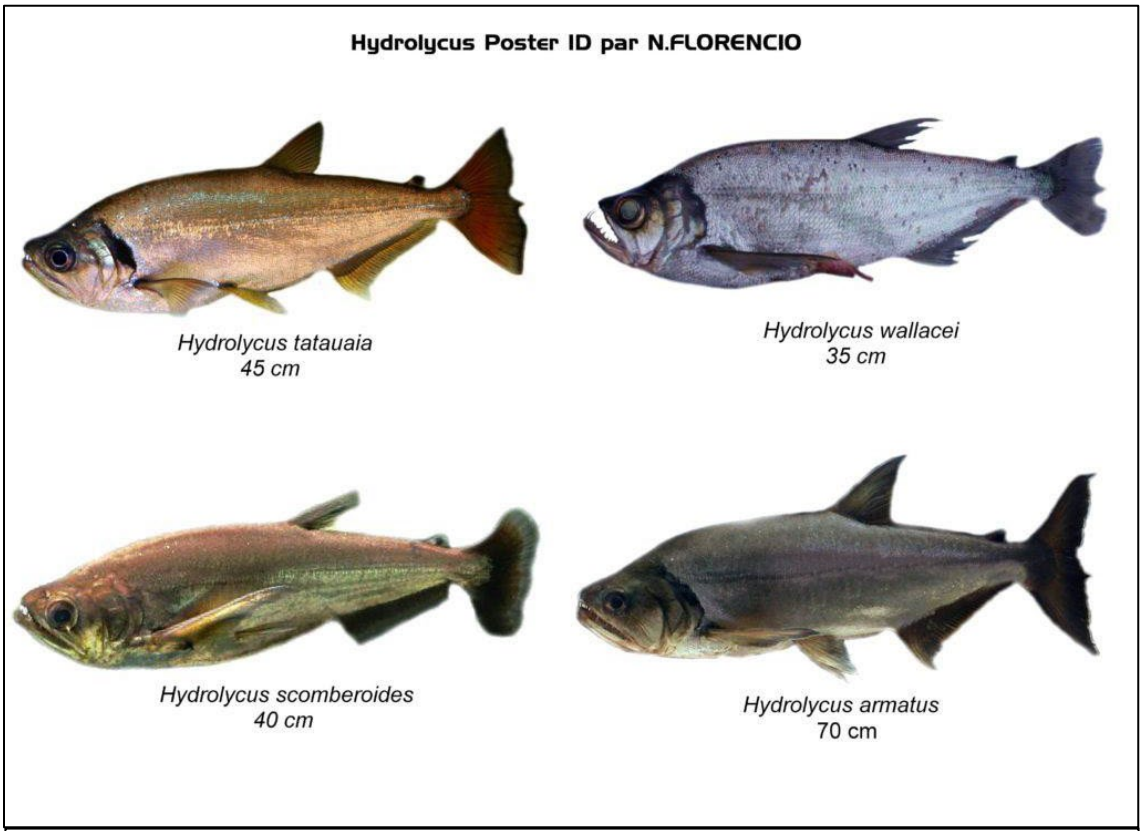


Figure 17. The valid species of *Hydrolycus*. https://ourmarinespecies.com/wp-content/uploads/2019/08/vampire_fish_5-1-1024x741.jpg.

The results of the AS-ISK risk screening placed the Rio Cauca Caecilian and the four species of Hydrolycus in the Medium Risk category. The three gar species ranked slightly higher, but also fell in the Medium Risk category. The FWC will use this information to inform future management recommendations for these species.

**Evaluating Use of a Commercial Haul Seine Fishery as a Potential Management Tool for Tilapia in River lakes of the Upper St. John River**

Figure 18. Tilapia beds (left) and Sailfin Catfish burrows (right).

Figure 19. Tilapia observed uprooting vegetation while feeding of filamentous algae in a Florida spring.

Tilapia (*Oreochromis* sp.) and Sailfin Catfish (*Pterygoplichthys* sp.) may be contributing to turbidity (bedding and burrowing activities, Figure 18) and submerged aquatic vegetation loss (tilapia) by uprooting plants during bedding and foraging activities in river lakes on the St. Johns River (Figure 19). Increased turbidity and plant loss can suppress the establishment of new plants and decrease habitat availability for native species. The FWC's Fish and Wildlife Research Institute (FWRI) has permitted the St. Johns River Water Management District (SJRWMD) to allow commercial fishers to harvest nonnative fish from selected lakes with the use of a haul seine.

The objectives of the study are:

- Evaluate the effectiveness of commercial haul seining as a management tool for tilapia population reduction.
- Determine the exploitation rate and catchability by the commercial gear in study lakes.
- Model the amount of effort needed to reduce tilapia biomass on a large scale.

Commercial haul seining took place on Lake Poinsett in May 2023. The haul seine used was 1,000 ft long and 19 ft deep with a 3-inch stretch. The area swept by the net ranged between 30 and 60 acres. FWC and SJRWMD biologists observed the fishing events and subsampled the catch to identify catch composition (Figure 20). The fishers kept and sold the tilapia and Brown Hoplo (*Hoplosternum littorale*) captured and were required to keep and dispose of the Sailfin Catfish. All non-target species were released alive. Tilapia comprised 80% of the catch by number; gamefish contributed only 11% of the catch. Over 45,000 pounds of tilapia were caught representing a value of >$30,000 to the fishers. Over 5,00 pounds of Sailfin Catfish were removed at a cost of $71 to landfill. Gamefish captured were primarily Bluegill *(Lepomis macrochirus*) and Redear Sunfish (*L. microlophus*) and experienced low mortality. Eighty-one tilapia were tagged but water levels dropped too low to attempt a second netting effort. Based on these findings, FWC and SJRWMD plan to continue these commercial netting efforts and expand removals into other lakes on the St. Johns River in 2024.

Figure 20. Haul seine fishermen scooping fish from the codend of the net to be sorted on-board.

**Upcoming Events**

The Fall 2023 GSARP is scheduled to meet November 13-16, 2023, in Wilmington, NC. This will be a joint meeting with the Mid-Atlantic Panel on Aquatic Invasive Species.

**Fish Slam**: This multi-agency effort is tentatively scheduled for December 13-14, 2023. The focus of this Fish Slam will be to look for nonnative fish species in areas not frequented by biologists. Waterbodies to be sampled will be in Collier, Lee, Charlotte, and Sarasota counties in southwest Florida.