Aquatic Nuisance Species Status Report
Nonnative Fish and Wildlife Program

Florida Fish and Wildlife Conservation Commission
November 2023 through April 2024
Prepared for Gulf & South Atlantic Regional Panel on Aquatic Invasive Species

MARINE NONNATIVE SPECIES STATUS REPORT

Lionfish

2024 Lionfish Removal and Awareness Day and Lionfish Challenge

Figure 1. Join in the 2024 Lionfish Removal and Awareness Day!

The 2024 Lionfish Removal and Awareness Day (LRAD) will be held May 19, 2024, in Destin, FL. Visitors will have the opportunity to taste lionfish, watch fillet demonstrations, participate in family-friendly games and much more (Figure 1). This event is held in conjunction with the state's largest lionfish removal event, the Emerald Coast Open Lionfish Derby on May 17 and 18, with a final weigh-in on the 19th, 2024. The six days leading up to LRAD is called Restaurant Week. Each day, one of six participating restaurants create and sell a lionfish dish that highlights the great taste and versatility of this unique seafood. It is hoped that the more people that taste lionfish, the higher the public demand for this unwanted but available resource will be. The 2023 LRAD event was very successful with 281 participants removing 30,494 lionfish. Prizes were also awarded for the largest lionfish (465 mm) and smallest lionfish (64 mm).

The Florida Fish and Wildlife Conservation Commission (FWC) is also planning to hold the 2024 Lionfish Challenge. The goal of the Challenge is to encourage and reward recreational and commercial divers for removing lionfish from Florida waters. The Lionfish Challenge is scheduled to begin May 24, 2024 and run through Labor Day, September 2, 2024. The Challenge is a statewide event open to recreational and commercial divers. Checkpoints will be set up around the state for recreational divers to submit their catch and commercial divers will

provide copies of trip tickets to document the weight of lionfish they harvested. At the end of the Challenge the recreational diver with the most lionfish and the commercial diver with the most weight of lionfish will be crowned the Lionfish King or Queen for their category. To keep divers interested, there will be a tiered prize system based on the number or weight of lionfish submitted to encourage continued harvest. There will also be bi-weekly raffles for all participants that have submitted a qualified entry. The 2023 Recreational Lionfish King brought in 1,514 fish and the Commercial Lionfish King won with 1,208 pounds. This Challenge is a fun and potentially rewarding way to help reduce the number of lionfish on Florida's reefs. Additional information on the 2024 Lionfish Challenge can be found at http://fwcreefrangers.com/lionfish-challenge

Green Mussel (*Perna viridis*)

No confirmed reports of Green Mussels were received during this report period.

Asian Tiger Prawns (*Penaeus monodon*)

No confirmed reports of Asian Tiger Prawn were received during this report period.

FRESHWATER NONNATIVE AQUATIC SPECIES STATUS REPORT

Zebra Mussels (*Dreissena polymorpha*)

No confirmed reports of Zebra Mussels were received during this report period.

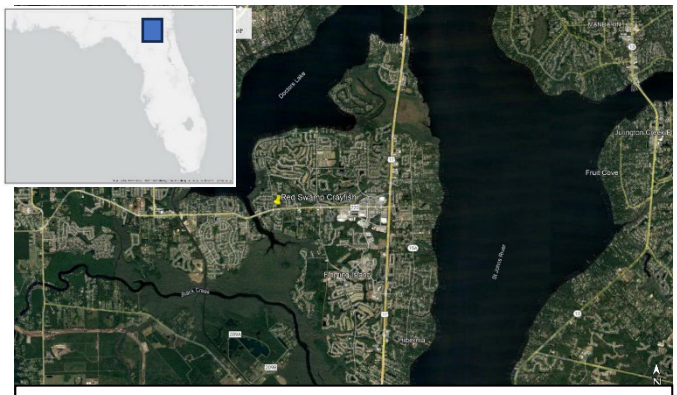

Figure 2. Confirmed Red Swamp Crayfish location in Fleming Island, FL. Site is near a population of the State Threatened Black Creek Crayfish (bottom left).

Red Swamp Crayfish (*Procambarus clarkii*) In August 2022, an EDDMapS report of Red Swamp Crayfish (RSC) was received from a location in northeast Florida near Jacksonville (Figure 2). FWC staff positively identified them as RSC. Red Swamp Crayfish 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. The Black Creek Crayfish is a species already under stress from a native crayfish species that has been transplanted into the

Black Creek drainage basin. The RSC site has a series of drain lines connected to a retention pond. The RSC were first spotted 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. It is unclear at this time who and why RSC were released at this site. Trapping and surveying of waterbodies near the site were rapidly initiated to define the geographic range of the RSC and a team was developed to formulate an Early Detection Rapid Response plan to address this novel Florida invasion. Two applications of copper sulfate were applied to the retention pond, drain lines, and pothole. The treatments were unsuccessful in eradicating the RSC from any of the sites.

Figure 3. Access well with partially plugged drain line.

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

Researchers in Michigan use pyrethrin, a common 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. At the time of this treatment, juvenile RSC were observed in the pond and in the pothole. Sections of the drain lines were partially plugged and pyrethrin was applied to the pond, pipe sections, and pothole at a concentration of 2 ppm (Figures 4,5). 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. Main drain line partially plugged and being filled with pyrethrin-treated water.

Additional trapping continued in 2023 to monitor the pyrethrin treatment. In February 2023, water collected in a second low area in the ditch, a spot that had been dry in December 2022. Dip netting yielded an adult and several juvenile RSC in this location but in no other sites 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. In September 2023, all trapping locations were sampled over a three-day period resulting

in the capture of three RSC, two from the pond and one from the drainage line well on the northeast side of the pond. No RSC were trapped outside the original location. All locations were again trapped in February 2024 with the assistance of volunteers with the University of North Florida (UNF). Four RSC were captured in this effort including three from the pond and one from a burrow in one of the drainage wells (Figure 6).

Figure 6. RSC burrow in drain line well.

With the continued collection of RSC only from the from the pond and associated drain lines, the decision was made to conduct another renovation attempt with pyrethrin. On April 8, 2024, volunteers from UNF set 20 traps in the pond to assess the population size. The traps were pulled the following day and yielded five adult RSC. These individuals were retained and placed in traps modified to prevent escape to serve as sentinels to determine treatment efficacy (three in the pond, one each in two drainage wells, Figure 7). The pond was treated with a 2 ppm concentration of pyrethrin, and the drain lines were partially plugged and filled with four to six inches of treated water and allowed to sit overnight. The following morning, the five sentinel crayfish in the pond and drains had expired indicating a successful treatment. An additional two dead RSC were recovered from the pond. However, a burrow was discovered approximately one foot from the edge of the pond (Figure 8). An adult female was uncovered approximately six inches deep in the burrow and was still alive but could not right itself, an indication it was near death. The sediment surrounding this portion of the burrow was silty/muddy. Upon further excavation of the burrow, an active adult male RSC was recovered. This portion of the burrow was dug into heavy clay soil. It is thought that treated water from the pond was able to diffuse through the silt layer into the burrow and affected the female RSC. The male RSC was less affected by the pyrethrin because it was surrounded by an impervious layer of clay. The burrows are very difficult to detect and the fact that two RSC were found alive 16 hours after treatment suggests a few can survive the treatment and potentially repopulate the pond. FWC and the UNF volunteers will continue to monitor the pond and surrounding location post-treatment.

Figure 7. Sentinel RSC in modified minnow trap.

Figure 8. Active RSC burrow near edge of pond. Two adult RSC were recovered.

Bullseye Snakehead (*Channa marulius*) Removal Project

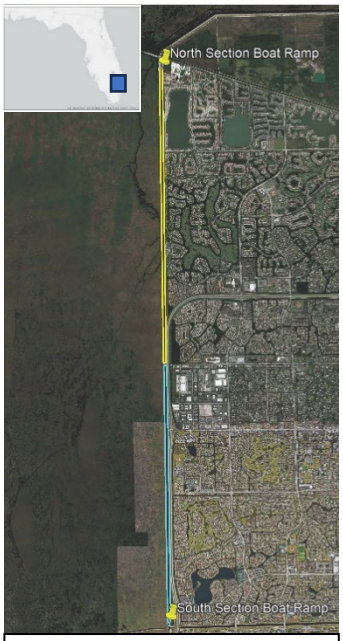

Figure 9. The north and south sections of the L-36 Canal in west Broward County.

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 9). 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. This project will last 2 years and will provide insights on Bullseye Snakehead impacts in a relatively closed system. To date we have removed over 400 Bullseye Snakehead weighing over 700 pounds from the south section. The catch rate, average weight, length, and size distribution of Bullseye Snakehead are slowly decreasing but it is too early to determine if the native fish community is responding to the removals.

As a side project, we will monitor the canal sections annually to see how long it takes for the Bullseye Snakehead population in the removal section to reach pre-removal sizes.

Risk Screening of Nonnative Species

Bioprofiles and AS-ISK Risk Screening for 16 Nonnative Fish and Wildlife Species

FWC contracted with the University of Florida to generate bioprofiles and complete AS-ISK risk screens for Asian Swamp Eel (*Monopterus albus/javenensis,* Figure 10), African Jewelfish (*Rubricatochromis letourneuxi,* Figure 11), Yellowbelly Cichlid (*Trichromis salvini,* Figure 12), Pike Killifish (*Belonesox belizanus,* Figure 13), Tire Track Eel (*Mastacembelus favus,* Figure 14), Spotfin Spiny Eel (*Macrognathus siamensis,* Figure 15), Chanchita (*Cichlasoma dimerus*), Cuchia (*Amphipnous cuchia*), Pond Loach (*Misgurnus angullicaudatus*), Silver Arowana (*Osteoglossum bicirrhosum*), Black Arowana (*O. ferreirai*), Peacock Hind Grouper (*Cephalopholis argus*), Humpback Grouper (*Chromileptes altivelis*), Chameleon Blenny (*Protemblemaria punctata*), Marsh Frog (*Pelophylax ridibundus*), and African Bullfrog (*Pyxicephalus adspersus*).

Figure 10. Asian Swamp Eel (*Monopterus/javenensis*)

Figure 11. African Jewelfish *(Rubricatochromis letourneuxi*)

Figure 12. Yellowbelly cichlid (*Trichromis salvini*)

Figure 13. Pike Killifish (*Belonesox belizanus*)

Figure 14. Tire Track Eel (*Mastacembus flavus*)

Figure 15. Spotfin Spiny Eel (*Macrognathus siamensis*)

The results of the AS-ISK risk screening placed Pond Loach, Asian Swamp Eel, African Jewelfish, and Peacock Hind Grouper in the High-Risk Category. Cuchia, Spotfin Spiny Eel, Chanchita, Tire Track Eel, Silver Arowana, Yellowbelly Cichlid, Humpback Grouper, Chameleon Blenny, March Frog, and African Bullfrog all fell in the Medium-Risk Category. Black Arowana was the only species to be placed in the Low-Risk Category. FWC will use this information to inform management actions for these species.

New Nonnative Species Discovery

Cuchia Mud Eel (*Amphipnous cuchia*)

In November 2023, two adult Cuchia Mud Eels were collected from Lake Underhill near Orlando during routine electrofishing. A third adult was collected from the same lake several months later in a targeted electrofishing effort to determine the abundance and distribution of this new species. No other Cuchia Mud Eels were collected in this effort. Cuchia Mud Eels look very similar to the Asian Swamp Eel (*Monopterus* spp., ASE), a species complex that is established throughout much of central and southern Florida. The primary morphological differences between Cuchia and ASE are that Cuchia have paired lateral air sacs and scales on the tail (Figure 16, images A and B) while ASE have a ventral throat air sac and no scales (Figure 16, image C). The source of Cuchia in Lake Underhill is unknown, but they have been found living in Florida and Georgia food markets. Cuchia rank as Medium Risk in Florida using the AS-ISK Risk Screening Tool and FWC will continue to monitor waterbodies in the Orlando area for this recently discovered species.

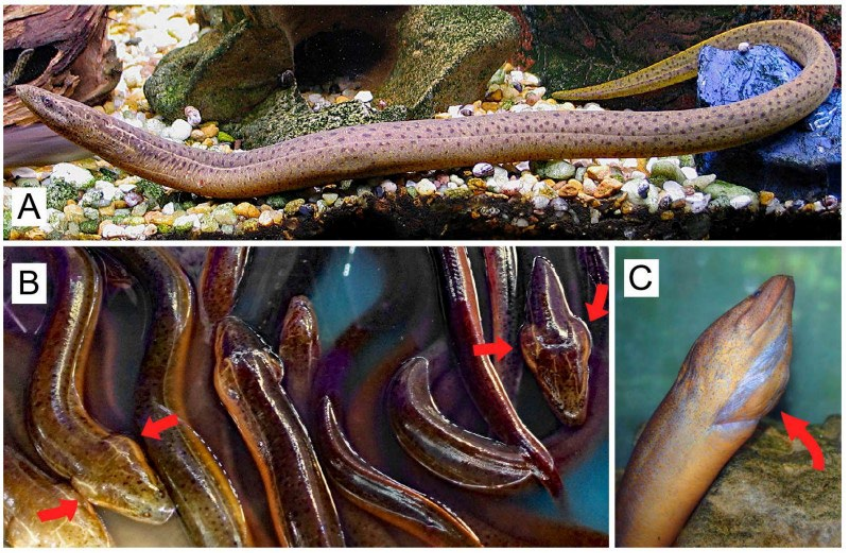

Figure 1. (a) An adult *Amphipnous cuchia*—live in aquaria—obtained from a Florida food market (field# LGN 02-51); (b) dorsal

Figure 16. Images of Cuchia (*Amphipnous cuchia*) and Asian Swamp Eel (*Monopterus albus/javenensis*) describing morphological features used in identifying the two species. Citation: Nico et al, 2019. Asian swamp eels in North America linked to the live-food trade and prayer-release rituals. Aquatic Invasions, Volume 14, Issue 4:775-814.

Upcoming Events

GSARP Spring Meeting: The spring meeting of GSARP will be held May 14-15, 2024, in-person at Biloxi, MS.

Southwest CISMA Invasive Fish RoundUp: The Southwest Cooperative Invasive Species Management Area is hosting a nonnative fish removal contest April 26-28, 2024. Anglers of all ages will target nonnative fish in hopes of winning a prize for the most species, most fish, and heaviest aggregate weight submitted as part of the competition.

2024 Lionfish Challenge: The 2024 Lionfish Challenge is scheduled to run from May 24 through Labor Day September 2. The goal of the Challenge is to encourage and reward recreational and commercial divers for removing lionfish from Florida waters. For more information visit FWC's lionfish website at: https://fwcreefrangers.com/lionfish-challenge/

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