

Aquatic Nuisance Species Status Report
Florida Fish and Wildlife Conservation Commission
April-September 2018

Prepared for Gulf & South Atlantic Regional Panel on Aquatic Invasive Species

MARINE NONNATIVE SPECIES STATUS REPORT

Lionfish (*Pterois volitans/miles*)

The 4th Annual Lionfish Removal and Awareness Day was held May 19-20th, 2018. The main event was held in Pensacola, FL with close to 3,000 people in attendance. Visitors got to taste lionfish, watch fillet demonstrations, participate in family-friendly games and much more. Inclement weather cancelled one tournament, but more than 15,000 lionfish were removed from Florida waters.

Nonnative Fish and Wildlife Program (NFWP) staff provided information on other nonnative species programs and projects conducted by the FWC at one of the events held in Sebastian, FL (Figure 1). In 2018, participating divers in 19 derbies held around the state removed nearly 19,000 lionfish from Florida waters during these events (Table 1).



Figure 1. FWC's NFWP staff at Lionfish Removal and Awareness Day in Sebastian, FL.

Table 1. Lionfish removed during 2014-2018 derbies.

Year	Lionfish Removed	Lionfish Derbies
2014	17,246	28
2015	10,953	29
2016	26,951	28
2017	20,887	19
2018	18,963	19
Total	95,000	123

May 19th, 2018 kicked off the Lionfish Challenge where recreational and commercial divers compete for prizes for removing the most lionfish. Participants qualify for prizes based on the number or weight of lionfish removed. The Lionfish King or Queen title is given to the recreational and commercial diver removing the most weight of lionfish. Both winners receive a trophy, a feature article in FWC's Recreational Saltwater Regulations, air refills and a customized cooler. The Lionfish Challenge ran through September 3rd and 28,260 lionfish were removed by 132 recreational divers and 23 commercial divers. The Recreational Lionfish King submitted 1,137 lionfish and the Commercial Champion submitted 5,017 pounds of lionfish.

The FWC launched a new contest featuring tagged lionfish in 2018. FWC staff tagged and released these lionfish on 50 randomly selected public artificial reefs in depths of 80-120 feet. Divers who remove a tagged lionfish can win valuable prizes including GoPro cameras and

Engle coolers or cash awards ranging from \$500 to \$5,000. As of September 1st, 27 divers submitted 56 tagged lionfish at participating checkpoints.

Two new state records for heaviest lionfish collected by pole spear were set during this report period. The new Atlantic record weighed in at 1,408 g and the new Gulf record weighed in at 1,533 g (Table 2). The divers are recognized with their big catch on the Lionfish State Record webpage.

Table 2. Florida state records for lionfish as of September 4th, 2018.

		Atlantic	Gulf
Spearfish	Heaviest	1,408 g (3.10 lbs)	1,533 g (3.38 lbs)
	Longest	477 mm (18.78 in)	459 mm (18.07 in)
Hook and Line	Heaviest	---	1,040 g (2.29 lbs)
	Longest	---	414 mm (16.30 in)
Junior Hook and Line	Heaviest	---	886 g (1.95 lbs)
	Longest	---	398 mm (15.67 in)

Risk Screening-Completed

Lionfish Risk Screening

The primary goal of this study was to evaluate the risk of invasion of lionfish in the genera *Dendrochirus*, *Parapterois*, and *Pterois* (excluding red and common lionfish) using the Aquatic Species Invasiveness Screening Kit (AS-ISK). University of Florida (UF) researchers completed bioprofiles for 19 lionfish species and the AS-ISK risk screening tool was applied to 14 species of ornamental lionfish. The risks of lionfish in the ornamental trade are low with the exceptions of *P. russellii*, *P. lunulata*, and *D. brachypterus*. Elevated invasion risk was identified for these three species. The FWC will use results from these risk screens to determine the most appropriate management strategies to mitigate potential impacts from this group of fish.

Marine Fish Risk Screening-Funded for FY18/19

Pomacentrid Risk Screening

Pomacentrids (damselfishes) are one of the most important marine ornamental fish groups. Collectively, over 4 million individuals are imported annually into the United States representing approximately 40% of all marine ornamental fish imports. Trade volume in aquarium species is thought to correspond to frequency of introductions. In July 2018, the FWC's NFWP executed a 1-year contract with UF to produce bioprofiles for the top nine species based on trade volume plus Spiny Chromis (*Acanthochromis polyacanthus*) and Regal Demoiselle (*Neopomacentrus cyanomos*). Spiny Chromis is being monitored at a marina in Miami Beach and the Regal Demoiselle is established in the western Gulf of Mexico and is spreading east towards waters off the Florida Panhandle. The Regal Demoiselle represents the only other established marine fish in the tropical western Atlantic besides lionfish. Bioprofiles will be developed for: Green Chromis

(*Chromis viridis*), Sapphire Devil (*Chrysiptera cyanea*), Threespot Dascyllus (*Dascyllus trimaculatus*), Whitetail Dascyllus (*Dascyllus aruanus*), Clown Anemonefish (*Amphiprion ocellaris*), Orange Clownfish (*Amphiprion percula*), Goldtail Demoiselle (*Chrysiptera parasema*), Blacktail Humbug (*Dascyllus melanurus*), Azure Demoiselle (*Chrysiptera hemicyanea*), Spiny Chromis, and Regal Demoiselle.

Asian Tiger Prawns (*Penaeus monodon*)

During this report period, the FWC did not receive any reports of tiger prawns.

FRESHWATER NONNATIVE AQUATIC SPECIES STATUS REPORT

Fishbrain App

In November 2016, the FWC partnered with Fishbrain AB, the world's largest free-to-use app for anglers, to collect information on nonnative freshwater fish (Figure 2). To date, the FWC has received over 3,000 nonnative fish reports, but no reports of new nonnative freshwater fish species have been submitted. Anglers reported Butterfly Peacock (*Cichla ocellaris*), Mayan Cichlid (*Cichlasoma urophthalmus*) and Bullseye Snakehead (*Channa marulius*) most frequently.

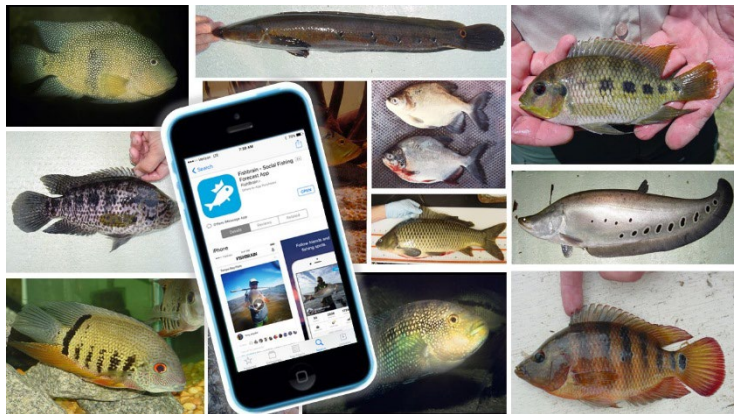


Figure 2. Fishbrain app with nonnative fish species of interest reported to the FWC.

Natural Waters Survey for Nonnative Freshwater Fish

FWC staff use natural waters surveys to proactively determine the distribution and abundance of established nonnative freshwater fish species in natural systems and, if a new species is detected, to implement management strategies to eradicate or minimize potential negative impacts.

Associations between native and nonnative fish species in natural areas may be different than in urban canals. By surveying natural waters, the FWC's NFWP staff can compare their findings to results from urban canals to better address these concerns and study freshwater fish in natural areas. These surveys are complimentary to the standardized electrofishing surveys for nonnative freshwater fish in urban systems.

During this report period, staff sampled three natural areas: the Lox Slough, Sebastian River, and the North Fork of the St. Lucie River. FWC NFWP staff sampled by electrofishing and minnow traps, then counted, measured, and weighed fish when possible. The number of sample sites, nonnative species collected, and other data for the three areas is provided in Table 3.

Table 3. Summary of electrofishing sampling of natural waters including the number of sites sampled, nonnative fish species collected, and nonnative fish specimens collected.

Location	County	Sites/ Transects Sampled	Pedal Minutes	Nonnative Fish Species Collected	Nonnative Fish Specimens Collected
Lox Slough	Palm Beach	6	120.0	0	0
Sebastian River	Indian River	13	124.0	7	29
North Fork of the St. Lucie river	St. Lucie	11	94.5	6	47
Total		30	338.5	13	76

Nonnative Fish Round-Up

The 9th annual Everglades Cooperative Invasive Species Management Area (CISMA) Nonnative Fish Round-Up was held April 27–28th, 2018. The Nonnative Fish Round-Up utilizes anglers to gather distribution information and promotes the consumptive use of nonnative freshwater fish. Anglers caught 1,826 fish (18 species) weighing 1,013 pounds (Table 4). No new nonnative species were caught, and all unwanted fish were donated by participants (Figure 3).



Figure 3. Nonnative fish species caught as part of the 9th Annual Nonnative Fish Round-Up, April 2018

Table 4. Number of anglers, fish, species and total weight of fish caught in Nonnative Fish Roundups, FY 12/13-FY 17/18.

	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18
Anglers	55	51	65	56	64
Fish caught	436	1,062	---	2,228	1,826
Species	18	15	14	21	18
Total weight	580	544	543	1,564	1,013



Figure 4. Bullseye snakehead catch at Snakehead Roundup.

Bullseye Snakehead Round-Ups

FWC's NFWP staff served as weigh-masters for three Catch, Keep and Kill Bullseye Snakehead tournaments between April and August 2018 (Figure 4). A total of 126 anglers participated in these tournaments, spending 644 hours catching 368 Bullseye Snakehead totaling 1,233 pounds (Table 5).

Table 5. Number of tournaments, anglers, Bullseye Snakehead caught, hours fished, and total weight of Bullseye Snakehead caught in Snakehead Round-Ups 2010-2018.

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Tournaments	2	4	5	5	5	6	4	5	3
Anglers	33	59	135	244	260	254	154	251	126
Snakeheads	160	522	670	791	772	827	483	710	368
Hours (effort)	174	379	793	1,096	1,216	1,181	741	1,209	644
Total weight	458	1,308	2,363	2,795	2,435	2,551	1,541	2,350	1,233

Risk Screens Completed



Figure 5. Redtail Catfish caught from an urban pond in Miami-Dade County.

Large Nonnative Catfish

Bioprofiles and Fish Invasiveness Screening Kit (FISK) v2 risk screening were completed for five species of large nonnative catfish found in the aquarium trade; Goonch Catfish (*Bagarius yarrelli*), Redtail Catfish (*Phractocephalus hemioliopterus*), Spotted Sorubim (*Pseudoplatystoma corruscans*), Barred Sorubim (*P. fasciatum*) and Tiger Sorubim (*P. tigrinum*). Redtail Catfish and at least one species of sorubim catfish have been collected from the wild in Florida but with no evidence of reproduction. The FISK scores ranged from 3 for Redtail Catfish to a high of 9 for Spotted Sorubim. Based on the FISK v2 calibrated threshold value of 10.25 that distinguishes medium risk (non-invasive) from high risk

(invasive) all species fell in the medium risk category.

Freshwater Fish Risk Screening - Funded for FY18/19

Risk Screening for Florida of Fishes on the Federal “Injurious” List and Alligator Gar

A recent federal court ruling increased the risk of invasive “Injurious” species being brought into Florida through interstate transport. Many species federally listed as “Injurious” may have a high potential to become invasive in Florida but are not currently regulated by the FWC as Conditional or Prohibited, including 10 freshwater fish species. To determine level of risk associated with these species, risk screenings will be conducted on Crucian Carp (*Carassius carassius*), largescale Carp (*Hypophthalmichthys harmandi*), Prussian Carp (*Carassius gibelio*), Wels Catfish (*Silurus glanis*), Eurasian minnow (*Phoxinus phoxinus*), Stone Moroko (*Pseudorasbora parva*), European Perch (*Perca fluviatilis*), Roach (*Rutilus rutilus*), Amur Sleeper (*Perccottus glenii*), and Zander (*Sander lucioperca*). Salmonids are listed as “Injurious” wildlife due to disease issues but are not considered “Injurious” if they are accompanied in their shipping by a health certificate. Due to a pending largescale aquaculture operation in south Florida, a single species of salmonid (Atlantic Salmon *Salmo salar*) will also be evaluated.

Alligator Gar (*Atractosteus spatula*) are not considered “Injurious,” are native to the Florida panhandle, and require a permit to possess. The Florida Department of Agriculture and Consumer Services has recently begun to issue authorizations to certified facilities to possess, culture and sell Alligator Gar if they originated from outside Florida. This species may have the potential to establish, spread and impact peninsular Florida via potential genetic interactions between wild and captive origin fish and through direct depredation of native fish. UF researchers will evaluate the risk to Florida of these 10 “Injurious” species, Atlantic Salmon, and Alligator Gar using the FISK v2 risk screening protocol.

Risk Screening of Five Conditional Freshwater Fish Species

Bighead Carp (*Hypophthalmus nobilis*), Black Carp (*Mylopharyngodon piceus*), Silver Carp (*Hypophthalmichthys molitrix*), Nile Perch (*Lates niloticus*), and Walking Catfish (*Clarius batrachus*; Figure 5) have been on FWC’s Conditional fish list for decades. Conditional species can be permitted for research, commercial import or export businesses, or for public educational exhibits. These species are not permitted for personal possession. The decision to list these species as Conditional was based on the best information available to biologists at the time. A great deal of new information is available on these species with new risk screening tools available to



Figure 6. Walking Catfish (*Clarius batrachus*)

examine potential risk. The objective of this study is to evaluate the 5 FWC Conditional freshwater fish considered “Injurious” using the FISK v2 risk screening protocol.

African Clawed Frog Management



Figure 7. African Clawed Frog (*Xenopus laevis*).

African Clawed Frogs (ACF; *Xenopus laevis*, Figure 7) were first discovered in the Riverview area east of Tampa in 2013-2014. Several attempts have been made to eradicate ACF from ponds in this area, but all were unsuccessful as ACF returned to the ponds after treatment with hydrated lime. It remains unclear if hydrated lime did not kill all the frogs or if the ponds were recolonized once the pH

returned to normal. Surveys were conducted on 117 additional water bodies since the treatments and 11 new ACF infested ponds were discovered (Figure 8). Management strategies have shifted to removal using trapping with b-style minnow traps. These traps have resulted in the removal of 20,441 tadpoles and metamorphs with a trapping rate of 78.7 ACF per trap day.

The FWC has discontinued surveying ponds in Riverview for ACF and have contracted a research project with UF to start in FY 18/19. UF will identify the spatial extent of ACF in the Riverview area using comprehensive surveys, identifying dispersal patterns and performing thermal tolerance trials to determine bounds on the potential distribution of ACF in Florida.

The FWC has also contracted with the University of Central Florida to study disease ecology, populations genetics and environmental detection of DNA to understand potential impacts of the ACF population in the Tampa Bay area. The objectives of this study are to develop eDNA protocol to detect ACF from water samples, to measure the prevalence and intensity of three amphibian pathogens (*Batrachochytrium dendrobatidis*, Ranavirus and Perkinsea) in ACF and native anurans, to understand how diseases may facilitate or hinder the invasion front, and to lay the groundwork to characterize population genomics of ACF across space and time to identify genomic correlates of invasion success.

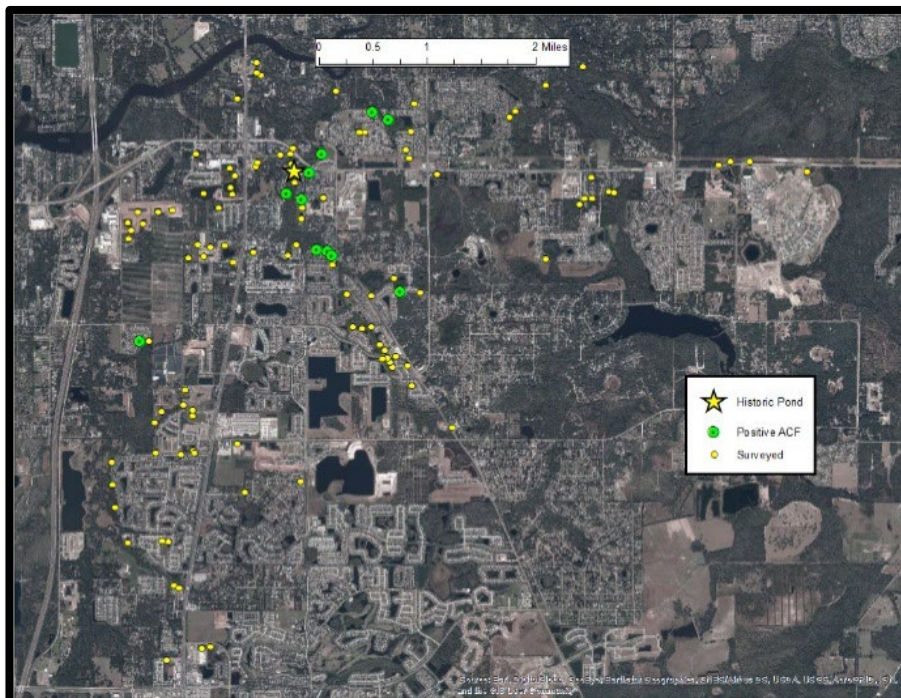


Figure 8. Map of ponds in Riverview, FL area surveyed for African Clawed Frogs. The yellow star is the pond where ACF were first discovered, yellow circles are surveyed ponds, and green circles are ponds containing ACF.



Figure 9. Bullseye Snakehead guarding young in a Broward County canal.

1st International Snakehead Symposium

The Virginia Department of Game and Inland Fisheries, the Virginia Chapter of the American Fisheries Society and the Mid-Atlantic Panel on Aquatic Invasive Species held the First International Snakehead Symposium July 18-19th, 2018 in Alexandria, Virginia. Presentations on distribution, biology/ecology, monitoring/response, and management/control primarily focused on Northern Snakehead (*Channa argus*) in the US and Japan, but Bullseye Snakehead in Florida and Blotched (*C. maculata*) and Chevron Snakehead (*C. striata*) in Hawaii were also

addressed. The consumptive use of Northern Snakehead was emphasized as the hotel chef prepared and served four different dishes to the attendees. The fish were harvested the night before by one of the attendees by nighttime bowfishing, a very popular and effective way to “catch” Northern Snakehead.

Permitting

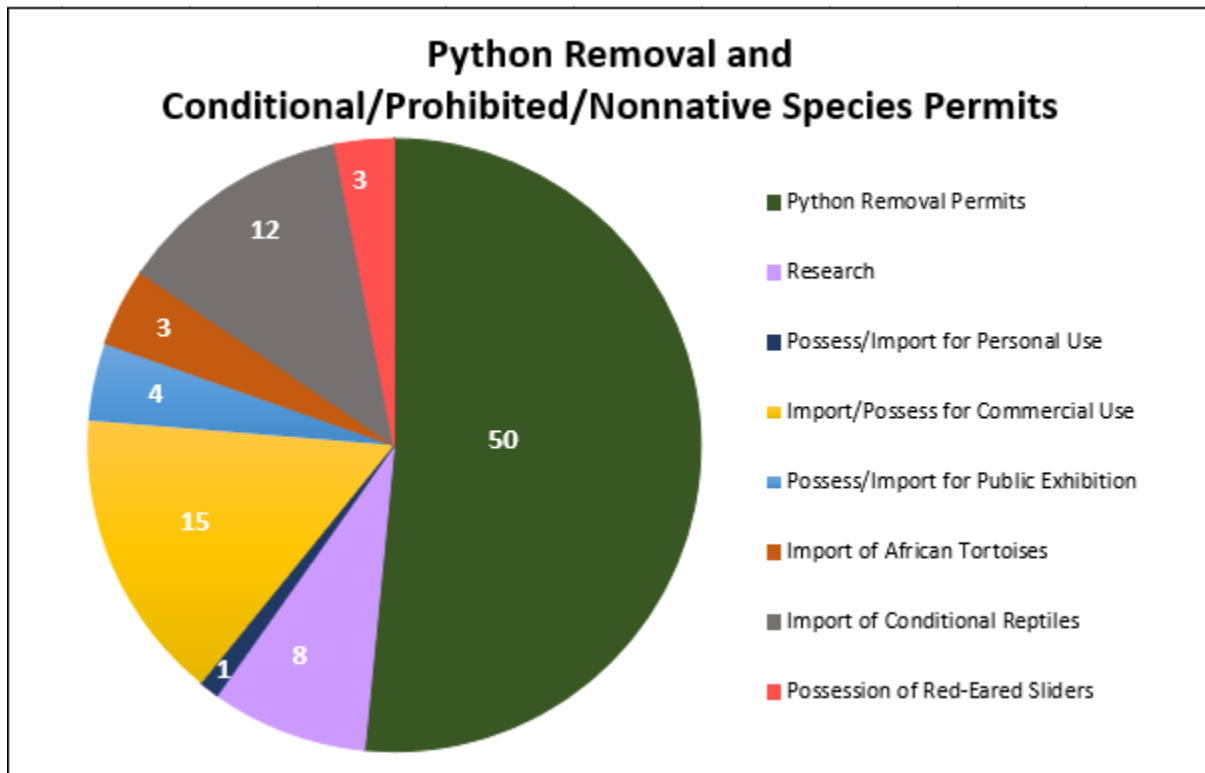


Figure 10, Python Removal and Conditional/Prohibited/Nonnative Species Permits from March 1st, 2018 through August 31st, 2018.

Python Removal Permits (PRPs; specifically, for the removal and transport of Conditional reptiles (primarily Burmese and other python species) again comprised most of the permits

issued during the March/April 2018 through August 2018 period (Figure 10). A total of 50 PRPs were issued; 45 were issued for the removal of Conditional reptiles from FWC Wildlife Management Areas, two were issued for the transport of Conditional reptiles captured on non-FWC managed lands by CISMA cooperators, government employees, or nuisance trappers, and three (3) permits were issued which combined both activities described by the other permit types.

During this period, a total of 47 Conditional/Prohibited/Nonnative Species Permits were issued as well. FWC staff issued 15 permits for the importation and possession of Conditional species for commercial use, mainly for red-eared sliders and Conditional aquatic species. Four permits were issued for the possession/importation of Conditional species for public exhibition; two of these included red-eared sliders, one included Burmese pythons for display by USGS, along with a few Conditional aquatic species. The 8 permits issued for research again largely involved Conditional and nonnative snakes and lizards, as well as nonnative amphibians and apple snails, but no freshwater fish species. A total of three permits were issued for the personal possession of red-eared sliders, and three permits were issued for the import of African tortoises into the state of Florida. Our staff also issued a single permit for the import of tropical/nonnative fish for personal use, and as a follow-up to the lifting of previous federal restrictions on interstate transport within the continental United States, 12 permits were issued for the import of Conditional reptiles into Florida, mainly for commercial purposes.

Upcoming Events

FWC standardized electrofishing: Six canals in Miami-Dade, Broward and Palm Beach counties will be electrofished in October 2018.

Snakehead Round-Ups: The final Snakehead Round-Up of 2018 will be held in October.

2018 Lionfish Summit: This 2-day event occurred October 2-4th, 2018. The Lionfish Summit brought together marine resource management staff, dive professionals, researchers and ocean conservationists to discuss three main themes: **Policy & Regulations, Control**

Efforts/Research & Monitoring, and Education & Outreach. A discussion on the findings of the Lionfish Summit will be provided in the April GSARP report.

FWC/USGS Nonnative Fish Slam: The next nonnative fish slam is scheduled for November 2018 and will focus on the L-67A/L-29 canals to sample for Bullseye snakehead based on a positive eDNA finding in urban canal systems in Miami-Dade and Broward counties.

Nonnative Fish and Wildlife Rule Development Workshops: The FWC is hosting a series of 5 workshops to gather public input on proposed changes to rules relating to nonnative species. The workshops will solicit public comment on adding high risk “Injurious” species of birds, mammals, and reptiles to the FWC’s Prohibited Species list; developing definitions for selected terms in the rules; and clarifying permitting issuance criteria for importation of nonnative species.