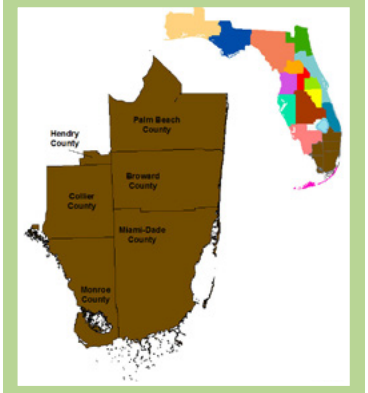
CISMA
Everglades Cooperative Invasive Species Management Area

Newsletter

VOLUME 6 JULY 2015

ECISMA partners survey for Northern African pythons. (Photo by Liz Barraco, FWC)

TABLE OF CONTENTS



Chasing the wild invasives

by Jenny Ketterlin Eckles, Florida Fish and Wildlife Conservation Commission biologist

Over the past year, the Florida Fish and Wildlife Conservation Commission (FWC) and partners increased resources directed at three nonnative species that have been under on-going management efforts for several years: Northern African pythons, Argentine black and white tegus and Nile monitors. Increased staff and contractor funding allowed the number of surveys to increase markedly for Northern African pythons in Miami-Dade County and Nile monitors in Palm Beach County. Increased contractor funding also resulted in an increase in the number of live traps set, camera traps deployed and tegus telemetered in Miami-Dade County. Generally, these increased efforts resulted in increased removals.

Starting in fall 2014, FWC led an effort to ramp up surveys for Northern African pythons in Miami-Dade County. Surveys were increased from monthly to more than twice per week by hiring a technician (an experienced python permittee), contracting with the University of Florida (UF) and partnering with Miami-Dade County Parks, Recreation, and Open Spaces (MDCPROS), Everglades National Park (ENP), U.S. Geological Survey (USGS), South Florida Water Management District (SFWMD) and Miccosukee Tribe of Indians.

Some new approaches were tested, such as setting out artificial refuges and testing for environmental DNA. More than 50 individuals participated in the 48 survey days that totaled over 370 man-hours. Despite all these efforts, including increased outreach to the local community, no Northern African pythons were found during this past dry season. Two Burmese pythons were removed. While somewhat disappointing to the searchers, the absence of Northern African pythons may be a sign that past efforts affected this population and eradication is indeed possible. It will take many more surveys to make this declaration decisive, but there may be a silver lining to an observation of zero.

In 2014 and 2015, FWC and ENP were able to contract with UF and USGS to trap and monitor natural areas for Argentine black and white tegus. UF also conducted a telemetry study on females while USGS tracked tegus during their period of dormancy, or brumation. FWC and Miami-Dade County Fire Rescue Venom One unit also continued to respond to tegu sightings in the Florida City and Homestead residential areas. The increased number of traps and coverage area resulted in 404 tegus removed in

Species	Removed in 2014	Removed Jan, 1 2015 to June 15, 2015
Northern African pythons (Miami-Dade County)	1 (Dead on Road)	0
Argentine black and white tegu (Miami-Dade County)	404	338
Nile monitors (Palm Beach County)	19	8
Spectacled caiman (Miami-Dade County)	36	6
Oustalet's chameleons (Miami-Dade County)	8	5

(CONTINUES ON PAGE 2)

Chasing Wild Invasives (CONTINUED FROM **PAGE 1**)

FWC surveys for Nile monitors on the C-51 canal in Palm Beach County. Pictured (left to right) are Kelly Gestring and Murray Stanford with FWC. (Photo by Liz Barraco, FWC)

2014, double the number removed in 2013 (183). Valuable information is being collected on tegus that should help researchers understand how to control and manage this species. This year, both groups are again conducting telemetry studies along with trials on different trap models in order to increase the efficacy and reduce cost of trapping. However, tegu numbers overall do not seem to be decreasing, and more outliers are being detected, which is a cause for concern. This demonstrates the need for even more efforts directed at tegus.

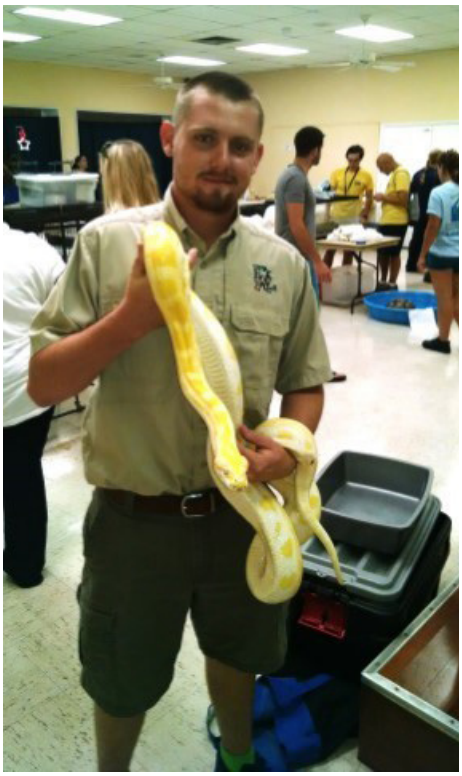
Halfway through 2014, FWC also increased surveys for Nile monitors on the C-51 canal in Palm Beach County from two per month to four to six per month. Since this population has remained relatively isolated and removal by shotgun is a viable option, it is hoped increased efforts will lead to eradication in this county. Removal of Nile monitors more than doubled after increasing the number of surveys, and FWC plans to continue this regime throughout 2015. Biologists also are analyzing trip data with the goal of determining an occupancy, habitat associations and optimal survey times.

Efforts also continued to eradicate Gambian pouched rats on Grassy Key, Oustalet's chameleons in Miami-Dade County, and to assess and remove spectacled caimans in Miami-Dade. In January 2015, FWC hired a technician to conduct monthly trapping events in Grassy Key and monitor the area with remote cameras. No rats were detected in the traps or on the cameras during six monthly trips. There have not been any confirmed sightings from the area since December 2013. Oustalet's chameleon surveys also are showing promising results, with few animals found each month during UF surveys. Unfortunately, the same cannot be said for spectacled caiman. They continue to persist in an area of southeastern Miami-Dade County. This species is a concern because planned Everglades restoration activities would restore a hydrologic connection between that area and more natural areas to the east. The population warrants continued monitoring and removal. ♦

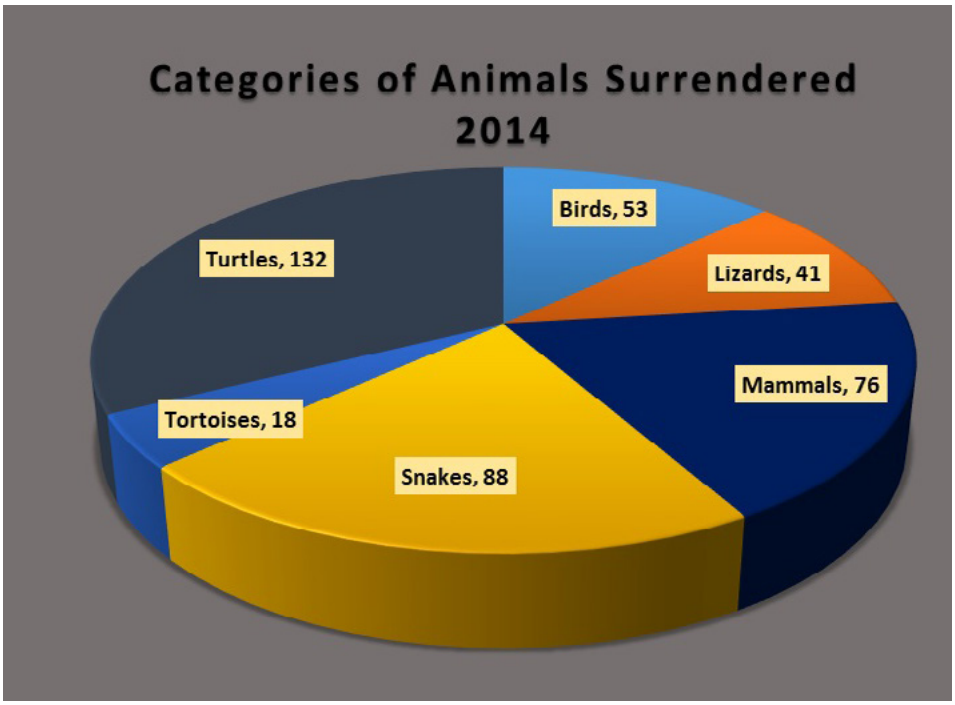
Nile monitors removed during FWC surveys. (Photo by Murray Stanford, FWC)

FWC's triple defense in exotic species management

by Ashley Taylor and Jenny Novak, Florida Fish and Wildlife Conservation Commission



Jake Edwards, FWC wildlife technician handles surrendered albino Burmese python at Exotic Pet Amnesty Day at Palm Beach Zoo. (Photo by Ashley Taylor, FWC)



Types of animals surrendered through the Exotic Species Hotline and Exotic Pet Amnesty events during 2014. (Graphic courtesy FWC)

Exotic Pet Amnesty Program

Since 2006, the Exotic Pet Amnesty Program (EPAP) and IveGot1 Exotic Species Hotline have been successful in "rehoming" more than 2,350 unwanted exotic pets. Out of 2,350 animals, 408 of these animals were surrendered in 2014 alone. The EPAP goal to prevent the release of unwanted exotic animals into the wild is important across the state, but really hits home within the Everglades Cooperative Invasive Species Management Area (ECISMA). The established breeding populations of invasive species in the ECISMA footprint such as the Burmese pythons, Argentine black and white tegus, and Nile monitors are believed to have originated from escaped or released pets. Due to the potential threat posed by these invasive species in the ECISMA footprint, annual Exotic Pet Amnesty events were held at both Zoo Miami and Palm Beach Zoo in 2014. The mission of these events is to keep unwanted exotics out of the wild, and educate the public regarding responsible pet ownership. More than 140 animals were surrendered at these events, including a ringtail lemur, a fennec fox and two Burmese pythons.

Proud Exotic Pet Amnesty adopter with her new pet ball python at Miami Zoo event in 2014. (Photo by George Schellenger, FWC volunteer)

1-888-IveGot1 Exotic Species Reporting Hotline

The Exotic Species IveGot1 Hotline is a tool for the public to report nonnative animal sightings, and a resource to help rehome unwanted exotic pets. In 2014, FWC biologists documented and addressed 1,393 hotline calls. Most calls were from Floridians reporting commonly seen nonnative species, such as Argentine black and white tegus, or mistakenly reporting native

Photo confirmation of emu sighting in Hillsborough County, Florida. (Photo by John Anderson, IveGot1 Exotic Species Hotline caller)

(CONTINUES ON PAGE 4)

FWC's triple defense (CONTINUED FROM **PAGE 3**)

Argentine black and white tegu surrendered at Zoo Miami Pet Amnesty event in 2014. (Photo by George Schellenger, FWC volunteer)

red rat snakes as Burmese pythons. One caller reported seeing an emu in his front yard, and when photos confirmed the species, FWC wildlife officers assisted in the capture and return of the large Australian bird to its owner.

The Exotic Species Hotline is one of the tools FWC uses to keep nonnative species from becoming established in south Florida and throughout the state. Some hotline calls misidentified native species as exotic, but this provided FWC with an opportunity to discuss nonnative wildlife issues with the public. Having citizens serve as the agency's eyes out in the field and reporting sightings is essential to managing the spread of exotic species. Information generated by the hotline resulted in the removal of a number of tegus from urban areas in 2014.

As more people become aware of the Exotic Species Hotline, additional information from the public will help both FWC and ECISMA prevent the establishment of new exotic species and eradicate the species that are already established in the greater Everglades Area.

New python patrol logo. (Graphic by FWC)

Python Patrol Program

Python Patrol has been going strong since it was recently incorporated into FWC's Early Detection and Rapid Response (EDRR) programs. During this time, 54 training workshops, including 47 Python Patrol and 7 Reptile Identification trainings, have been conducted for more than 800 participants. Target audiences included natural resource staff of county, state, federal and non-governmental organizations, the Department of Transportation, U.S. Army Corps of Engineers and South Florida Water Management District; tribal member of the Seminole Tribe of Florida and Miccosukee Tribe of Indians of Florida, and law enforcement, animal control and fire rescue officers. Trainings are now being conducted for the general public, which has shown a huge interest in learning about Burmese python issues and receiving training on safe capture of this species. Most public training sessions, held in Miami-Dade, Broward and Palm Beach Counties, were filled to capacity.

A certificate of completion has been developed for the program and all participants who have completed the training since November 2013 will receive a certificate via e-mail. A Python Patrol logo was created. The new logo was updated on the program flyer and will continue to be used on various signs and publications. Participants who complete a Python Patrol training currently receive a complete live Burmese python transport kit, which consists of two snake bags and a plastic tote box. Plastic tote boxes are being provided through a grant from the Minnesota Zoo's Ulysses S. Seal Conservation Grant Program, which funds conservation projects worldwide. ♦

FWC nonnative field technician Ed Mercer with a captured Burmese python. (Photo by Jake Edwards, FWC)

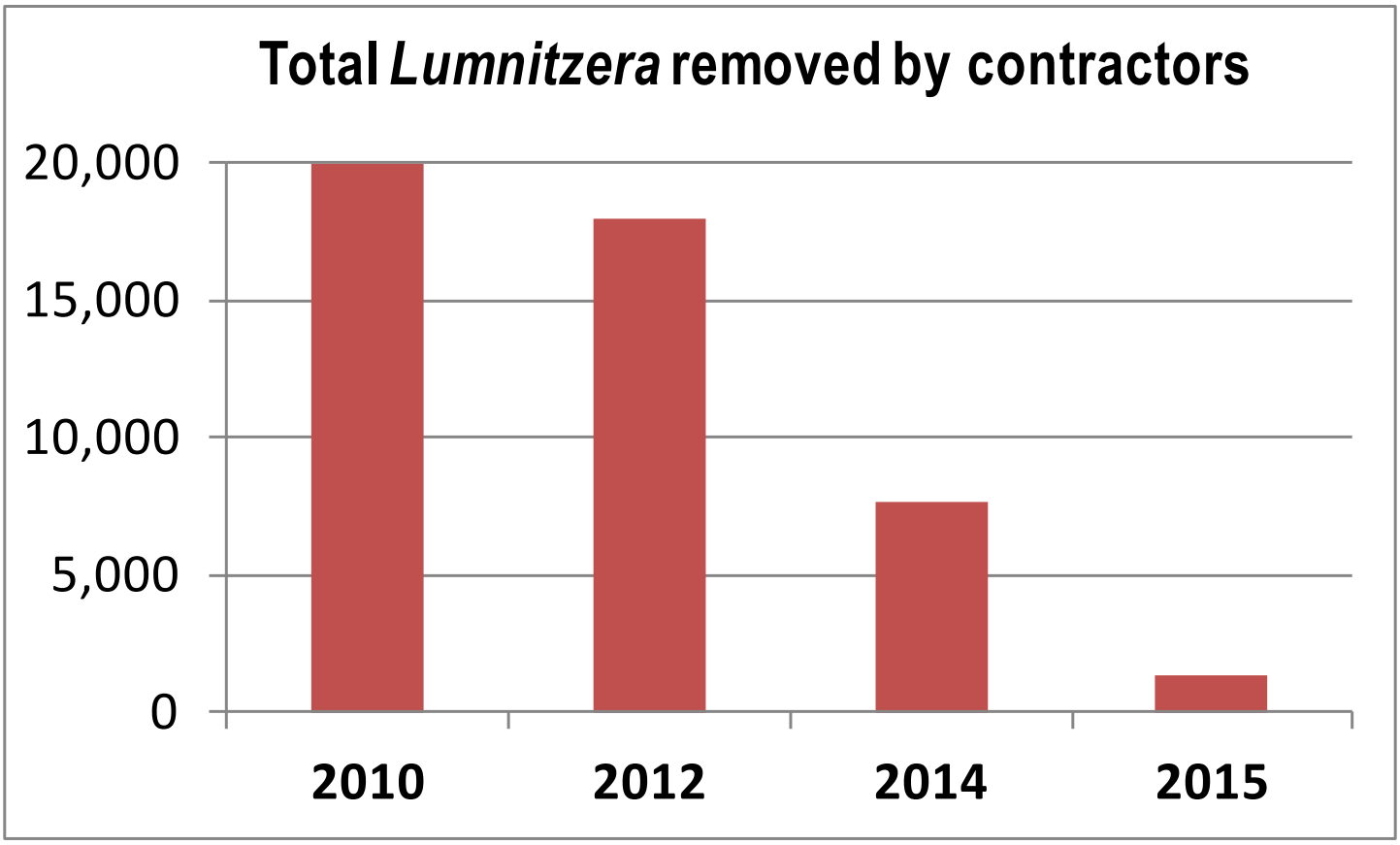
Python Patrol training held at Daggerwing Nature Center. (Photo by Ashley Taylor, FWC)

Update on *Lumnitzera*

by Jennifer Possley

Lumnitzera racemosa is a non-native species of mangrove that escaped from Miami's Fairchild Tropical Botanic Garden sometime after its introduction in the 1970s. The infestation, which covers approximately 20 acres, has not yet been documented to occur beyond the immediate vicinity of Fairchild and neighboring Matheson Hammock County Park. In early 2015, the Florida Fish and Wildlife Conservation Commission funded a fourth round of contracted removal through its Invasive Plant Management Section (IPMS) Upland Exotics program. A seven-member crew from Miami-Dade County's Natural Areas Management Division removed 1,380 stems over 12 mornings. While 1,380 is certainly less than ideal, numbers have reduced drastically since the onset of the eradication program in 2010. In the near future, Fairchild and Miami-Dade County will conduct periodic surveys for more plants, and both agencies are cooperating with researchers from Florida Atlantic University's Harbor Branch Oceanographic Institute, who have proposed several greenhouse studies to learn more about the basic biology of the species in order to help tailor a management plan. ♦

Some of the members of Miami-Dade County's *Lumnitzera* crew, in the dwarf mangroves of Matheson Hammock. (Photo by Emil Nitu)



Graph showing number of individual *Lumnitzera* removed by FWC contractors. The figure for 2010 is an estimate. (Graphic courtesy Jennifer Possley)

Breaking *Bruguiera*

story and photos by Dennis J. Giardina, Florida Fish and Wildlife Conservation Commission

Bruguiera gymnorrhiza reproductive propagules.

Bruguiera gymnorrhiza is a mangrove tree species native to Southeast Asia, East Africa, North Australia and the South Pacific. It was collected by David Fairchild in Sulawesi, Indonesia, and in 1940, he planted two trees on a small rectangle of land on the bay side of his home in Coral Gables, Florida. His estate eventually became the Kampong Tropical Botanical Garden, and over the years, the two *Bruguiera gymnorrhiza* trees grew up surrounded by native mangroves. In 2008, after *Lumnitzera racemosa* was found to have escaped from Fairchild Tropical Botanic Garden and aggressively invaded Matheson Hammock Park, an inventory was made of all exotic mangroves in the collections of both botanical gardens. When the *Bruguiera gymnorrhiza* trees planted by Fairchild were visited, the group of researchers found only one of the two originally planted, but it had turned into a beautiful mature specimen, full of crimson flowers and fertile propagules. In the understory were 86 seedlings, saplings and small trees.

In March 2014, the director of Kampong Tropical Botanical Garden invited a group of Everglades Cooperative Invasive Species Management Area (ECISMA) partners to visit and survey the grounds for *Bruguiera gymnorrhiza*. In May 2014, Kampong staff and a volunteer group of ECISMA partners collected data on the population and then removed every propagule, seedling and sapling. A few of the larger recruits and the 75-year old specimen tree were treated with herbicide. In December 2014, a follow-up survey of the *Bruguiera* treatment area turned up 23 seedlings that had grown since May and a sapling that was missed during the first treatment. In May 2015, John Ricisak, who oversees mangrove forest management and compliance for Miami-Dade County, saw a tree growing within a stand of mangroves in Coconut Grove, less than half a mile up the coast from the Kampong that looked different from the surrounding natives. He took photos and collected a sample of what turned out to be *Bruguiera gymnorrhiza*. In June 2015, Ricisak and a group of ECISMA partners returned to the site and removed 37 seedlings and saplings. The large tree was cut down and the stump treated with herbicide.

Tony Pernas of the National Park Service displays *Bruguiera gymnorrhiza* seedlings, saplings and propagules removed from the Coconut Grove infestation discovered by Miami-Dade County's John Ricisak.

Fortunately, *Bruguiera gymnorrhiza* does not appear to be as invasive in South Florida as *Lumnitzera racemosa*. However, some exotic species have been documented to spread slowly initially, taking up to a century or more for their populations to reach critical mass in the environment. It should be noted that ***Bruguiera gymnorrhiza* has the broadest natural range of all mangrove species**, from East Africa to Polynesia and as far north as the Ryukyu Islands in Japan. ECISMA partners will continue to be vigilant in monitoring the species and surveys will

(CONTINUES ON **PAGE 7**)

Breaking *Bruguiera*

(CONTINUED FROM PAGE 6)

continue. *Bruguiera* will be removed wherever it is found and those sites will be monitored for years thereafter. It is also fortunate that David Fairchild chose *Bruguiera gymnorrhiza* to plant at his Biscayne Bayfront home, rather than *Lumnitzera racemosa*. Had that been the case, based upon what researchers have observed at Fairchild and Matheson, there is a chance that *Lumnitzera* propagules would have spread widely on the coastal currents throughout the native mangroves and intertidal ecosystem of Miami-Dade County.

Due to the species poor composition of mangrove forests in South Florida and the potential availability of unoccupied niches in the environment, it is imperative that these forests be protected from invasion by species from the biologically rich mangrove forests of the Old World, Australia and the Pacific. Other non-native mangrove species have proven to be highly invasive elsewhere, including Florida native *Rhizophora mangle*, which has spread throughout the Hawaiian Archipelago since it was planted on Molokai Island in 1902. *Lumnitzera racemosa* has proven invasive enough in South Florida to be considered a candidate for listing as a federal noxious weed. There is one other species in the genus, *Lumnitzera littorea* and a hybrid between *Lumnitzera racemosa* and *Lumnitzera littorea*, *Lumnitzera X rosea*. There are six species of *Bruguiera*: *Bruguiera gymnorrhiza*, *Bruguiera sexángula* (and a hybrid of the two; *Bruguiera X rynchopetala*), *Bruguiera cylindrica*, *Bruguiera exaristata*, *Bruguiera hainesii* and *Bruguiera parviflora*. As Internet commerce continues to facilitate the transportation of plant and animal species across environmental and political boundaries, official regulatory oversight becomes increasingly difficult and prevention of potential invasive species becomes less likely. To be able to detect incipient populations of invasive species and to coordinate rapid responses that lead to eradication, collaborative networks like the Everglades Cooperative Invasive Species Management Area become increasingly important as the environment's de facto front line of defense. ♦

Measurement of a *Bruguiera gymnorrhiza* seedling.

Bruguiera gymnorrhiza flowers.

Stakeholder Surveys Help Guide Invasive Species Management

by Rebecca Harvey, University of Florida

Participant Tom Rahill searches for Burmese pythons during the 2013 Python Challenge™. (Photo courtesy of Thomas A. Rahill)

Ecologists and resource managers regularly survey plant and animal populations to monitor the spread and impacts of invasive species. Less common, though, is the use of social science surveys that provide data on human behavior, knowledge and perceptions. Social insights can be particularly valuable when dealing with potentially controversial topics such as invasive species control. Surveys can help managers understand their "stakeholders" (people affected by natural resource issues), anticipate conflicts, counter misperceptions, and ultimately develop more successful policies.

University of Florida (UF) recently conducted two surveys for the Florida Fish and Wildlife Conservation Commission (FWC) about two of the state's most notorious invasive species: Burmese pythons (*Python molurus bivitattus*) and lionfish (*Pterois volitans and Pterois miles)*. After the 2013 Python Challenge™, UF surveyed participants (plus a comparison group of non-participants) about their experiences, motivations, and concerns related to Burmese pythons. In 2015, UF surveyed the Florida public, SCUBA divers, and saltwater anglers to gather information regarding awareness, knowledge, attitudes, and involvement related to lionfish control efforts.

These surveys produce rich datasets that can be used by managers in a variety of ways. Survey results **quantify public awareness about invasive species** at a specific point in time. The lionfish survey found that most anglers and divers (87 to 96 percent) knew that invasive lionfish inhabit Florida's coastal waters, compared to about 50 percent of the general public sample. After FWC expands its lionfish outreach campaign in 2015, a follow-up survey will evaluate how outreach influenced public awareness and knowledge.

Surveys also **highlight specific information that still needs to be communicated** to certain target audiences. Many divers and anglers did not know that a fishing license is *not required* for hunting lionfish (when using certain spearing gear or a handheld net), or that FWC wants people to report lionfish sightings. Outreach can help fill these knowledge gaps and also allay safety concerns about encountering and consuming lionfish. Some Python Challenge™ participants conveyed feelings of surprise or disappointment at the lack of pythons encountered during the competition. Organizers of future events may be able to foster more realistic expectations by providing information about python behavior, habitat use and the low likelihood of detection.

Survey data can also be used to identify ways to **increase public involvement in invasive species control**. Many people who participated in python and lionfish removals were ecologically motivated, suggesting that recruitment messages focused on environmental protection will likely resonate with that group. In addition, promoting invasive species removal as a fun social experience (and for lionfish, as a good food source) may draw in more participants. Conversely, frequent reasons for *not removing lionfish* were a lack of appropriate gear or lack of spearfishing experience. Understanding these barriers may help managers develop programs (e.g., spearfishing trainings) to increase public participation. Many 2013 Python Challenge™ participants also voiced a desire for further training and education.

Finally, survey research can **illuminate**

(CONTINUES ON PAGE 9)

Stakeholder Surveys

(CONTINUED FROM PAGE 8)

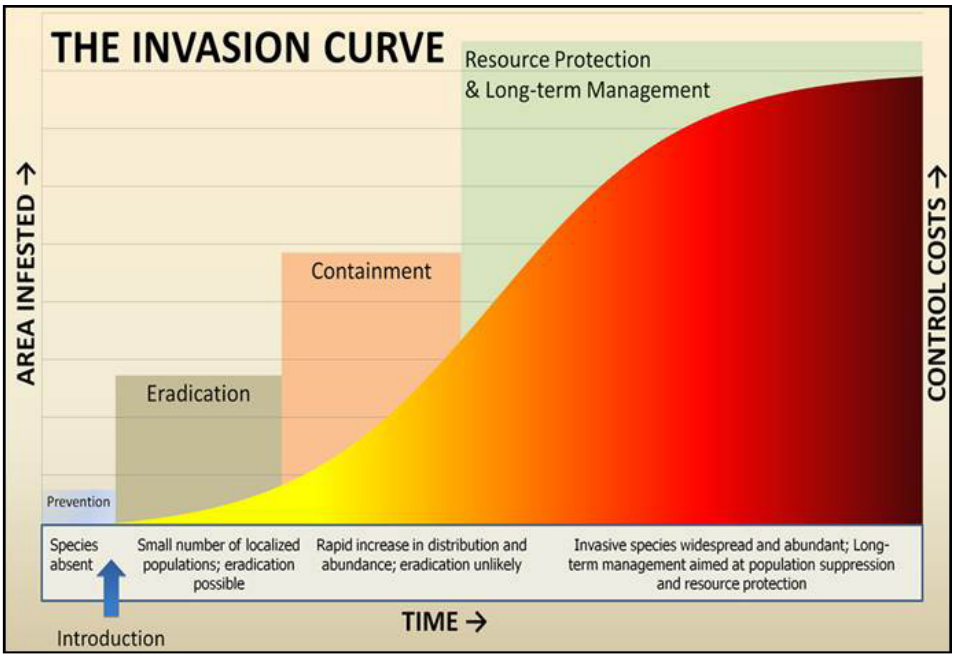
stakeholder attitudes that underlie support for management. Divers and anglers (and to a lesser extent, the general public) tended to agree that lionfish threaten Florida's ecosystems and fisheries, and that agency action is needed. Python Challenge™ participants and non-participants generally agreed that pythons are harming the Everglades and that managers should prevent further introductions. This is good news, suggesting that agencies can intensify control efforts and be met with public agreement.

However, the Python Challenge™ survey also revealed something unexpected: people who were *more involved* in the Challenge exhibited *less concern* for the python problem. In part, this is because more involved participants have more knowledge, resulting in complex and nuanced understandings of python management. Also, for some participants, the experience of *not seeing any pythons* may have led them to believe there are fewer pythons and perhaps, that pythons are not a severe threat to the Everglades ecosystem. Understanding this relationship between experience and attitudes can help managers plan future public involvement programs and ensure stakeholder support for invasive species control. ♦

Danielle Morley of FWC's Fish and Wildlife Research Institute (FWRI) removes a lionfish using handheld nets. (Photo by Katie Correia, FWRI/FWC)

Managing at the wrong end of the Invasion Curve: Shoebutton ardisia in the Miami-Dade County South Dade Wetlands Preserve

By Gwen Burzycki and Cynthia Guerra, Miami-Dade County Environmentally Endangered Lands (EEL) Program



(Graphic courtesy of SFWMD and ECISMA)

Shoebutton ardisia (*Ardisia elliptica*) is an evergreen shrub or small tree native to Asia. It is a summer-flowering, fall-fruiting species that is closely related to the native marlberry (*Ardisia escallonioides*), an uncommon shrub found in South Florida hammocks. The native marlberry is not abundant due to the presence of a native seed predator which renders up to 90 percent of its seed non-viable. There is no known seed predator in South Florida for *Ardisia elliptica* and birds and other wildlife disperse the seeds.

Originally imported as an ornamental plant in the early 1900s, *Ardisia elliptica* has become a prolific invasive species that is very expensive to control. *Ardisia elliptica* is now commonly found in short hydroperiod wetlands, hammocks and tree islands in Miami-Dade, Broward, Palm Beach, St. Lucie and Brevard Counties. In the 1980s, *Ardisia elliptica* was found to be invasive within Everglades National Park. Since then, the extent and range of *Ardisia elliptica* has expanded as it displaces both native and invasive exotic plant species. Because it impacts community structure and ecological function of native habitats, *Ardisia elliptica* is a Category 1 invasive on the Florida Exotic Pest Plan Council Invasive Plant List. Category 1 plants are defined as "Invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives." The desired outcome in managing this invasive species is to find and implement a cost-effective control.

First spotted outside Everglades National Park during vegetation mapping in 1990, *Ardisia elliptica*

(CONTINUES ON PAGE 10)

Invasion Curve (CONTINUED FROM **PAGE 9**)

Mechanical clearing in the south Dade wetlands. (Photo courtesy Miami-Dade County Environmentally Endangered Lands Program)

expanded to several hundred acres by 1996. Today, there are approximately 4,000 acres of *Ardisia elliptica* within and adjacent to the Miami-Dade County South Dade Wetlands Preserve, an important wetland system in the southern part of the County. Land in this area is targeted for acquisition and management by the County's Environmentally Endangered Lands (EEL) Program because of its strategic location between two national parks, Everglades National Park and Biscayne National Park, and within the watersheds of Florida Bay, Biscayne Bay, Card Sound and Barnes Sound. *Ardisia elliptica* extends up the coast within Miami-Dade County, especially in coastal wetlands that are already impacted by Brazilian pepper or in areas that have been farmed in the past. *Ardisia elliptica* spreads rapidly in nutrient enriched soils such as those that have been altered by farming, and tolerates longer hydroperiods than Brazilian pepper.

Beginning in 2002, the EEL Program implemented a concerted effort to treat *Ardisia elliptica* within the South Dade Wetlands Preserve, and that work continues today. The control effort is limited because not all of the land within the Preserve has been acquired. Invasive species present on private lands, including *Ardisia elliptica*, are not being treated, so the private parcels act as a seed source. Control of *Ardisia elliptica* is further complicated because field identification is difficult as the invasive strongly resembles the native marlberry and dahoon holly (*Ilex cassine*). Field crews must undergo training and gain practical experience so they properly identify the correct species to treat. In controlled studies, the chemical Triclopyr amine was over 90 percent effective at reducing cover of *Ardisia elliptica* with one application. The effectiveness rate of Triclopyr amine is diminished in the field when plants in dense stands are inadvertently missed during treatment. Re-sprouting plants and massive seed germination with increased light after initial treatment requires repeated follow-up treatments. The chemical Imazapyr has been used as an alternative supplement to Triclopyr amine but Imazapyr is not appropriate for all habitats and can result in high non-target damage to surrounding plants like buttonwood (*Conocarpus erectus*) and white mangrove (*Laguncularia racemosa*). Detection of *Ardisia elliptica* by aerial survey is not effective. Finding infestations can be difficult in remote areas and requires ground verification.

On average, initial control of *Ardisia elliptica* has cost up to $11,000 per acre for selective hand treatment by a crew of six individuals, walking an area looking for and treating seedlings, saplings and trees. After initial treatment opens up the canopy, the *Ardisia elliptica* seed bank responds to increased light levels, and second year treatments can cost up to $9,000 per acre to address all of the new seedlings. By the third year, most of the seed bank is exhausted and the cost decreases to less than $6,000 per acre, with subsequent annual maintenance treatments averaging between $1,000 and $1,500 per acre. In native-dominated wetlands, treatments must occur every three to four years because the *Ardisia elliptica* is co-located with listed and rare species that will be displaced if the habitat is not maintained free of invasive species. The EEL Program has treated more than 350 acres through selective hand treatment and follow-up maintenance activities.

Ardisia elliptica is a fall-fruiting species. (Photo by Anne Murray, courtesy University of Florida/IFAS Center for Aquatic and Invasive Plants)

(CONTINUES ON **PAGE 11**)

Invasion Curve (CONTINUED FROM **PAGE 10**)

With selective hand treatment by crews, the control costs for *Ardisia elliptica* were too high to be sustainable over the entire 4,000 acres. To reduce costs in areas that are dominated by invasive vegetation, treatment efforts are now being used to manipulate the habitat to make it less suitable for *Ardisia elliptica*. In dense stands of *Ardisia elliptica*, the current strategy is to use heavy machinery such as a gyrotrack or brontosaurus mulcher to grind up both native and exotic woody material, with follow-up mowing and aerial spraying. The land is allowed to convert to prairie, which then can be maintained through the application of prescribed fire. By early 2014, the EEL Program had successfully converted 26 acres to prairie, and had another 22 acres in process. This treatment method has averaged about $3,000 per acre for mulching, and not more than $300 per acre for mowing or aerial spraying. In treated areas, there has been significant recruitment of native grasses. While not yet applied, prescribed fire is expected to cost less than $100 per acre. As a side note, it is important to use proper phytosanitation and equipment decontamination practices when using heavy equipment. Some exotic grasses can be brought in unintentionally, especially on mowers. Additionally, mulching is preferable to land clearing and grubbing because soil disturbance may also result in new infestations of undesirable species like cattail (*Typha species*).

A primary management goal of the EEL Program is to reduce the amount of exotics-dominated forested wetlands to provide for a diverse ecological community, including habitat for listed ferns, bromeliads and orchids. A critical component of this management goal is to reduce coverage of *Ardisia elliptica* to make control cost-effective and feasible in the long-term. This is especially important because there is no biological control in development due to the presence of a closely related native species in the same genus. In total, the EEL Program has spent almost $5 million to control *Ardisia elliptica* and other associated invasive species in the South Dade Wetlands since 2000. More research on the demographics and life cycle of *Ardisia elliptica* is needed. Specific information on the relationship to soil nutrient characteristics, response to prescribed fire, seed banks and dispersal vectors can all inform management decisions and help to reduce management costs. Most importantly, consistent and sustained funding is needed to help bring this species under permanent control. Funding comes in cycles, but the invasion doesn't slow down or stop without active management. Lacking sustained and sufficient funding, land managers are forced to prioritize their management strategies, which often means choosing between whether to maintain what has already been restored or respond to new or expanding threats. ♦

To learn more about Shoebutton ardisia (*Ardisia elliptica*), visit the University of Florida IFAS website: http://plants.ifas.ufl.edu/node/43

Shoebutton ardisia (Ardisia elliptica) is a summer-flowering species. (Photo by Anne Murray, courtesy University of Florida/IFAS Center for Aquatic and Invasive Plants)

The ripened fruit of *Ardisia elliptica*. (Photo by Anne Murray, courtesy University of Florida/IFAS Center for Aquatic and Invasive Plants)

Catch, click and submit your nonnative fish

by Kelly Gestring, Florida Fish and Wildlife Conservation Commission

Dillon Gardner reported his catch of a redtail catfish on EDDMapS. (Photo courtesy of Dillon Gardner)

A new contest was "reeled out" in 2015 to recruit anglers to help document where nonnative fish species are found in Florida. The first Nonnative Fish Catch, Click and Submit Contest was held February 21 through March 1, 2015 as part of National Invasive Species Awareness Week.

The Early Detection and Distribution Mapping System (EDDMapS) was used as the reporting tool. The goals of the contest were to increase public awareness of nonnative fish issues and encourage anglers to catch, keep and eat nonnative fish. The Florida Fish and Wildlife Conservation Commission (FWC) and partners at the U.S. Fish and Wildlife Service, U.S. Geological Service and National Park Service hosted the event.

Since Florida has a large number of canals and lakes not frequently sampled for nonnative fish, the Nonnative Fish Catch, Click and Submit Contest gave anglers a chance to assist natural resource managers by documenting where nonnative fish species occur by doing what anglers enjoy most — going fishing!

Contestants were asked to go to their favorite fishing holes, catch as many different kinds of nonnative fish as they could, take a photo of each one and submit it to EDDMapS. Early detection of new nonnative fish species helps fisheries managers to control or even eradicate a population before it has the chance to become problematic to native fish populations and ecosystems. Anglers help protect Florida waterways by finding these fish before their populations become difficult to control.

Contest participation was fairly low during the inaugural event, with 13 anglers submitting 35 reports of catching nonnative fish. Anglers will have a chance to serve as citizen scientists again next year, as the event will be held annually. This year's event was a promising first step toward achieving public awareness about this little known yet significant threat to native fish and their habitats.

The MyFWC Facebook (http://www.facebook.com/MyFWC) post on the contest reached an audience of 170,816 people, with nearly 4,000 likes and shares. It generated many questions from the public, providing staff the opportunity to disseminate information on nonnative fish issues. In addition, the statewide news release on the contest (http://myfwc.com/news/news-releases/2015/february/19/nonnative-fish-contest/) reached nearly 9,000 media outlets and FWC staff was interviewed by several local news organizations, resulting in a number of articles and news stories.

What was reeled in? No new nonnative fish in Florida were discovered. However, the unusual catches reported included a redtail catfish and a sailfin catfish caught on a fly. Eleven nonnative fish species were caught by contest participants, including the Mayan cichlid, spotted tilapia and butterfly peacock bass.

Florida is home to at least 34 species of reproducing nonnative freshwater fish species, and new species continue to be found. These nonnative fish may have detrimental impacts on native fish communities, particularly as the number of new species increases. Most were introduced illegally: released as unwanted pets, released as potential food fish, or as escapees from aquaculture ponds. However, butterfly peacock bass and triploid grass carp were introduced legally by fisheries managers as biological controls for exotic fish and aquatic plants.

Learn more about the Nonnative Fish Catch, Click and Submit Contest, including contest rules and prizes at http://www.floridainvasives.org/CatchClickSubmit/index.cfm. ♦

Non–Native Fish Round Up

by Tony Pernas and Shea Bruscia, National Park Service

The Everglades Cooperative Invasive Species Management Area (ECISMA) and Southwest Florida CISMA hosted the 6th Annual Non-Native Fish Roundup on May 8, 2015. The one-day roundup encourages south Florida anglers to remove non-native fish from the ecosystem while targeting them for consumption. Many of these non-native fish have become established in south Florida following illegal releases of aquarium fish by homeowners.

The main goal of the roundup is to educate the public about the detrimental effects of non-native species on the delicate balance of the south Florida aquatic ecosystem. All non-native fish were eligible for weigh-in with the exception of peacock bass and grass carp. Peacock bass are stocked by the Florida Freshwater Fish and Game Commission (FWC) in an effort to reduce non-native fish populations and Grass carp have been stocked to reduce the invasive aquatic plant hydrilla.

The annual roundup has been successful in creating awareness of non-native fish impacts among the angling community and has been instrumental in identifying the presence of new non-native fish. Several new non-native fish species have been identified in previous roundups.

Mayan cichlids headed for the scale at the Conservancy of Southwest Florida, Collier County weigh-in site are the descendants of fish dumped out of aquariums that flourished in the south Florida ecosystem. (Photo by Dennis Giardina)

The 6th Annual Non-Native Fish Roundup also serves as a fundraiser for the Friends of Everglades CISMA, a 501(c) (3) non-profit organization. Funds are utilized for ECISMA education and outreach, and early detection and rapid response (EDRR) efforts. Thanks to this year's sponsors: El Capitan Marine and Fishing Center, Poe Roofing and Consulting, JD's Custom Baits, Allstate Fish and Wildlife Management, Allstate Resource Management, Bite Me Bait Shack, The Conservancy of Southwest Florida, Old Cutler Bait and Tackle, and Naples Zoo at Caribbean Gardens.

Everglades Most Wanted logo

There were three weigh-in locations, this year: Miami-Dade County, Broward County and Collier County. Anglers were able to fish from a boat or from the shore. All anglers received a roundup T-shirt and fishing lures donated by JD's Custom Baits. Prizes were awarded for largest fish, most fish (by weight) and the largest number of species, the Non-Native Fish Slam. There were separate prize categories for the bullseye snakehead, including the largest and most (by weight), since this species is generally much larger than other nonnative fish.

Fifty-two anglers caught 1,062 fish of 16 different species, totaling 545 pounds. The largest fish was caught by Daniel Hagood, a Nile tilapia weighing in at 3.52 pounds, and in the junior category, Ethan Rogge caught a sailfin catfish of 2.94 pounds. In the "most fish" category, Daniel Hagood took top honors again, weighing in 53.7 pounds of fish and the junior category was won by Ryan Osborne with 30.54 pounds. Josh Friars won the non-native slam with 7 species, and Sebastian Fraguela and Charlie Gannon tied in the Junior Slam, each finishing with 6 species. The "largest adult snakehead" category was taken by Jerry Joseph, with a 6.8-pound fish, and Ethan Rogge took the "junior snakehead" honors with a 4.56 pounder. In the "most snakehead" category, Jerry Joseph again won the adult category with 14.8 pounds and Mark Rogge took the award for the junior category with 8.8 pounds. ♦

Jerry Joseph won the adult prize for the largest snakehead. (Photo by Gintas Zavadzkas)

Developing tools to enhance Leadership Coordination in South Florida

by Carrie Beeler, South Florida Ecosystem Restoration Task Force

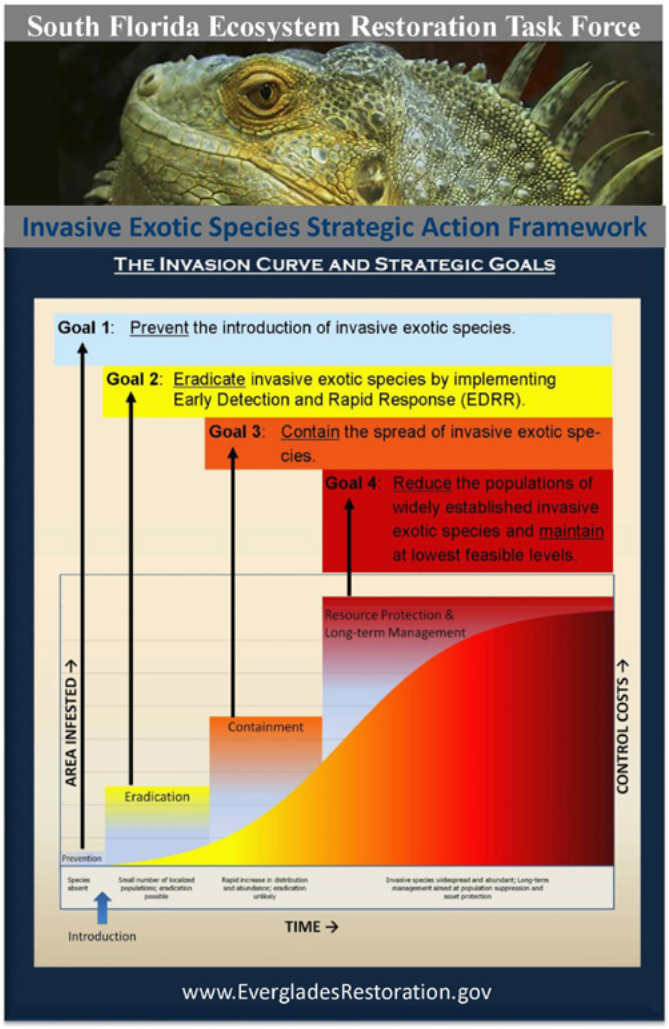
The South Florida Ecosystem Restoration Task Force (SFERTF)
The South Florida Ecosystem Restoration Task Force (SFERTF) consists of policy makers representing tribal, federal, state, and local government, working together on the largest ecosystem restoration project in the world: the greater Everglades ecosystem.

About the Cross Cut Budget
In 2013, the SFERTF provided direction to enhance efforts related to invasive exotic species (IES), including development of a cross-cut budget tool. This Cross-Cut Budget reports expenditures by participating member entities of the SFERTF related to the control of invasive exotic species. It is anticipated that this information will be updated regularly and used in conjunction with the SFERTF's Invasive Exotic Species Strategic Action Framework (Framework) and its associated Draft Preliminary Action Assessment to strategically lay out action and resource needs to mitigate the impacts of invasive exotic species in the South Florida Ecosystem and the Everglades.

The four goals of the Framework are Prevention, Eradication through Early Detection and Rapid Response (EDRR), Containment, and Long-term Management. These four goals are based on the phases of the Invasion Curve. The phases and colors of the Invasion Curve are used on the Cross-Cut Budget to depict where on the Invasion Curve an agency is applying resources.

What the numbers tell us
There is an order of magnitude difference between the expenditures on the two tables (approximately $48 million expended on invasive exotic plants versus $8 million on invasive exotic animals), making it evident that collectively, we are focusing most of our resources on IES plants. The Invasion Curve tells us that the "biggest bang for the buck" is in the first two phases: Prevention and Eradication through EDRR. EDRR also rose to the top as a priority during the development of the Framework. However, the tables illustrate that most of the funding is spent doing long-term management, battling widespread and abundant invasive exotic plant species. Most of the prevention dollars reported reflect expenditures on agricultural pests, illustrating that additional funding is needed for Prevention efforts for invasive exotic species that impact environmental resources. Additional information can be found at www.EvergladesRestoration.gov.

Additional reporting partners are welcome to participate in coordinating IES by providing IES funding numbers for the Cross cut budget to Carrie Beeler, **Office Of Everglades Restoration, at cbeeler@sfrestore.org** or **305-224-4258.**



(CONTINUES ON PAGE 15)

SFER Cross Cut Budget (CONTINUED FROM **PAGE 14**)

Definitions for reporting areas:

Reporting Area	Definition
Prevention	Actions taken to identify pathways and prepare for risks in order to stop the identified species from entering the South Florida Ecosystem along with actions to prioritize prevention efforts including an effective system of risk assessment.
Eradication through EDRR	Actions for preparation and monitoring in order to identify invasions as early as possible, rapid assessment and rapid response to identified threats. A systematic effort to eradicate, contain, or control a potentially invasive non-native species introduced into an ecosystem while the infestation of that ecosystem is still localized.
Containment	Actions to develop and deploy control tools at containment boundaries and known pathways, including coordination efforts for on-the-ground management activities directed at species, pathways, and high-value assets, and assessment and adaptation of current methodologies. Activities or investment in monitoring and science-based containment methods, and actions to engage the public to improve containment success.
Long-term Management	Actions to combat well-established invasive exotic species in order to minimize cost and impacts of invasive exotic species on the ecosystem. Improvements in long-term management effectiveness such as investment in science, development of new tools, and enhanced coordination.

Invasive Exotic Animals Funding Amounts (Actual Dollars)

	USACE	*U.S. DOI	FDACS	FWC	SFWMD	Zoo Miami	Miami Dade EEL	**Palm Beach County Natural Areas Program	Total
Prevention	0	67,438	1,224,139	116,523	0	1,737	0	0	**1,409,837**
Research	0	30,000	0	30,500	0	0	0	0	**60,500**
Outreach & Education	0	37,500	49,870	25,000	0	0	0	0	**112,370**
Prevention Total	0	134,958	1,274,009	172,023	0	1,737	0	0	**1,582,707**
Eradication (EDRR)	0	31,316	3,133,353	140,914	0	0	0	4,557	**3,310,140**
Research	0	20,000	0	46,200	0	0	0	0	**66,200**
Outreach & Education	0	0	91,667	0	0	0	0	0	**91,667**
EDRR Total	0	51,316	3,225,020	187,114	0	0	0	4,557	**3,468,007**
Containment	750	43,837	131,966	145,174	0	13,335	0	0	**335,062**
Research	0	31,780	0	0	0	800	0	0	**32,580**
Outreach & Education	0	27,610	0	0	0	1,737	0	0	**29,347**
Containment Total	750	103,227	131,966	145,174	0	15,872	0	0	**396,989**
Long-term Management	0	119,319	0	261,096	283,404	0	0	99,269	**1,447,008**
Research	0	953,630	0	0	40,000	0	0	0	**993,630**
Outreach & Education	0	126,274	0	0	0	0	0	O	**126,274**
Long-term Mgt. Total	0	1,199,223	0	261,096	323,404	0	0	99,2690	**2,566,912**
TOTAL	750	1,488,702	4,630,995	765,407	323,404	17,609	0	103,826	**8,014,613**

*U.S. Department of the Interior includes Office of Educational Research and Improvement, Fish and Wildlife Service National Wildlife Refuges, Biscayne National Park, Big Cypress National Preserve, U.S. Geological Survey, National Park Service Florida/Caribbean Network, U.S. Fish and Wildlife Ecological Services, and Everglades National Park, totaling 3,114,665 acres of land.
**Palm Beach County FY2014 (Oct 1, 2013 - September 30, 2014)

(CONTINUES ON **PAGE 16**)

SFER Cross Cut Budget (CONTINUED FROM **PAGE 14**)

Invasive Exotic Plants Funding Amounts (Actual Dollars)

	USACE	U.S. DOI*	FDACS	FWC	SFWMD	Zoo Miami	Miami Dade EEL	**Palm Beach County Natural Areas Program	Total
Prevention	34,105	21,438	1,022,720	0	0	0	0	0	**1,078,263**
Research	0	0	0	31,144	0	0	0	0	**31,144**
Outreach & Education	0	37,500	49,870	0	0	0	0	0	**87,370**
Prevention Total	34,105	58,938	1,072,590	31,144	0	0	0	0	**1,196,777**
Eradication (EDRR)	0	20,438	0	106,173	0	0	0	52,551	**179,162**
Research	0	0	0	0	0	960	0	0	**960**
Outreach & Education	0	0	0	118,485	0	0	0	0	**118,485**
EDRR Total	0	20,438	0	224,658	0	960	0	52,551	**298,607**
Containment	232,278	305,438	60,000	512,175	0	0	0	0	**1,109,891**
Research	0	0	0	0	0	0	0	0	**0**
Outreach & Education	2,000	0	0	0	0	0	0	0	**2,000**
Containment Total	234,278	305,438	60,000	512,175	0	0	0	0	**1,111,891**
Long-term Management	1,369,607	3,183,867	1,674,597	16,567,335	13,361,469	0	2,451,624	5,190,031	**43,798,530**
Research	50,000	0	0	907,020	100,000	65,000	0	0	**1,122,020**
Outreach & Education	20,000	78,394	22,336	360,378		0	45,903	0	**527,011**
Long-term Mgt. Total	1,439,607	3,262,261	1,696,933	17,834,733	13,461,469	65,000	2,497,527	5,190,031	**45,447,561**
TOTAL	1,707,990	3,647,073	2,829,523	18,602,710	13,461,469	65,960	2,497,527	5,242,582	**48,054,834**

*U.S. Department of the Interior includes Office of Educational Research and Improvement, Fish and Wildlife Service National Wildlife Refuges, Biscayne National Park, Big Cypress National Preserve, U.S. Geological Survey, National Park Service Florida/Caribbean Network, U.S. Fish and Wildlife Ecological Services, and Everglades National Park, totaling 3,114,665 acres of land.
**Palm Beach County FY2014 (Oct 1, 2013 - September 30, 2014)

USACE – U.S. Army Corps of Engineers
U.S. DOI – U.S. Department of the Interior
FDACS – Florida Department of Agricultural Services
FWC – Florida Fish and Wildlife Conservation Commission
SFWMD – South Florida Water Management District
Miami Dade EEL – Miami Dade Environmental Environmentally Endangered Lands Program

Non-native Freshwater snails an agriculture and wetland pest

story and photos by April S. Ostrom, Palm Beach Atlantic University

Pomacea maculata laying eggs.

Non-native freshwater snail *Pomacea maculata/insularum* and *Pomacea canaliculata* have established in Florida, Texas and Hawaii. Originating in South America, these snails have impacted agriculture crops in many countries. Non-native *Pomacea* species have become the most serious snail pests, attacking a wide range of crops, with impacts in South-East Asia, Thailand, Vietnam, Malaysia, Indonesia, China, Taiwan, Japan and Philippines. *Pomacea* species infestations in 1990 cost the United States $28 to 45 million (Cowie 2002). Moderately effective methods of control include biological control, pesticides and draining heavily infested areas followed by manual removal.

Photo of Ostrom in micro lab.

An ongoing study is being performed with Dr. Suzanne Cardona and Dr. Thomas C. Chesnes at Palm Beach Atlantic University. The research is a preliminary assessment of microbiota residing within the snail *Pomacea maculata*. This study required researchers to collect large numbers of snails in a limited amount of time and due to current densities at Grassy Waters Preserve, this proved to be difficult. Thanks to Nemo R. D. Melton and Sam Dorfman at Grassy Waters Preserve, researchers we were able to experiment with various collection methods. Based on this collection assessment, a preferred "collection habitat" was designed and implemented by Nemo R.D. Melton. The term "collection habitat" refers to the fact these are not traps, but rather they create a desired habitat for snails to reside. Ultimately, the "collection habitats" provide limited protection from predators, a place to lay eggs, and for the trapper a place to bait. Therefore, when it is collection time, the snails are successfully reproducing and residing in the "collection habitats," where they are easily retrieved. For detailed instructions on how to make snail "collection habitats" contact Nemo R. D. Melton at nm.pifas@gmail.com (PIFAS- *Pomacea insularum* Facts and Answers).

An Assessment of Submersion as a Mechanical Control Technique of *Pomacea insularum* eggs in Southern Florida, USA, by April S. Ostrom, Thomas C. Chesnes. Published in *Natural Resource and Conservation*. ♦

Photos of Melton's freshwater snail "collection habitat."

Partners search for Northern African Pythons in south Florida by Art Roybal, U.S. Fish and Wildlife Service, Vero Beach

Jenny Eckles and Ed Mercer of the Florida Fish and Wildlife Conservation Commission show members of the media a captive Northern African python to help raise awareness and provide tips on how to identify this invasive species. (Photo by Art Roybal, FWS)

Did you know that Florida has more exotic reptile and amphibian species in the wild than anywhere else in the world? More than 80 percent of these nonnative reptiles and amphibians arrived here through the pet trade, either unintentionally escaping from their owners or purposely released into urban and natural areas.

Several local, state and federal agencies, tribal representatives and volunteers took advantage of the cooler weather, during the winter of 2014 to search for and remove invasive, nonnative Northern African pythons in south Florida. Personnel from the U.S. Fish and Wildlife Service (FWS), South Florida Ecological Services Office (SFESO) participated in the survey, an annual event since 2010. The goal of this ongoing effort is to eradicate the Northern African python, also known as the African rock python or rock python and limit its distribution to a 6-square mile location in south Florida.

The Northern African python established a small, localized population on the western boundaries of greater Miami, Florida. Biologists characterize the population of Northern African pythons in south Florida as a "possibly established" or self-sustaining population. Eradication is still considered possible. Since their discovery in 2001, 32 African pythons have been found dead or captured, with only a single snake found in 2014 and one in 2015. The small number of snakes found over the past few years could indicate that the partners have been successful in preventing this nonnative snake from expanding its range in south Florida and becoming an established species like the Burmese python did in the past.

Scientists are presently most concerned about south Florida ecosystems such as the Everglades, where predatory Burmese pythons now threaten vulnerable imperiled native species, especially small mammals and birds. The U.S. Fish and Wildlife Service strives to prevent the introduction and establishment of non-native constrictor snake species into new areas of the U.S. In 2012, the South Florida Ecological Services Office (SFESO) in Vero Beach, in collaboration with the U. S. Fish and Wildlife Service's Washington Office, listed the Northern African python, along with the Burmese python, yellow anaconda, and Southern African python as injurious reptile species under the Lacey Act. Federal law now prohibits their transport across state borders and importation into the country and insular territories without a permit. Report sightings of these and other nonnative invasive species by calling 888-IVE-GOT1 or on the web at http://IveGot1.org. ♦

Staff from the U.S. Fish and Wildlife Service, South Florida Ecological Services Office participated in Northern African python walking surveys in Miami-Dade County, in an attempt to search out and remove this aggressive invasive species before it can establish a foothold in south Florida. (Photo courtesy FWS)

Race against invasives by Tony Pernas, National Park Service

On a cool, misty February morning, 100 runners and walkers hit the pavement for the inaugural "Race Against Invasives 5k Fun Run/Walk" at Shark Valley, Everglades National Park. The race was one of many events scheduled across the country during National Invasive Species Awareness Week, February 22 through 28, 2015, to emphasize the need for invasive species prevention and management.

The runners and walkers who participated in the event enjoyed a beautiful sunrise along the scenic "River of Grass" route. The route also afforded participants numerous opportunities to view wildlife. Flocks of wading birds flew overhead and alligators were observed at various locations along the route.

The goal of the event was to raise awareness about invasive species in south Florida and to raise funds for Everglades Cooperative Invasive Species Management Area (ECISMA) education and outreach, and early detection and rapid response (EDRR) efforts.

This event organized by the Friends of ECISMA (FOE), is the first of what is anticipated to be an annual race and fundraiser. The race was limited to 100 participants and FOE worked closely with the National Park Service to ensure that the race went smoothly. Girls Scouts from Troop 704 assisted with timing and handing out water to participants along the way.

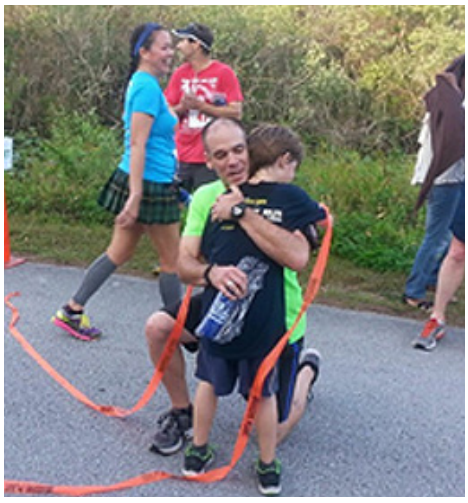
Brittany Knowles finished first in the women's division. (Photo by Justin Pernas)

Jonathan Lewis crossed the finish line first with a time of 19:46. The second-place finisher was Matthew King, with a time of 20:11 and Mike Tevelonis captured third with a time of 20:29. Brittany Knowles placed first in the women's division, with a time of 22:50, second place went to Emily Jones at 23:01 and Jane Dozier captured third with a time of 24:26. ♦

The Agricultural Research Service Invasive Plant Research Unit made a strong showing for the U.S. Department of Agriculture. (Photo by Justin Pernas)


The Urgelles clan made the Race Against Invasives a family affair. (Photo by Cynthia Guerra)


Jonathan Lewis took first place in the men's division and overall. (Photo by Justin Pernas)


National Park Service Biologist Raul Urgelles gets a hug from another participant - his son, Taylor, at the finish line. (Photo by Justin Pernas)


Mary Rose shares her joy during the early morning run in Shark Valley. (Photo by Cynthia Guerra)

About Friends of Everglades Cooperative Invasive Species Management, Inc.

by Joseph Ryan Steele, President and Executive Director of Friends of Everglades Cooperative Invasive Species Management, Inc.

FRIENDS OF CISMA
Everglades Cooperative Invasive Species Management Area

Goals

Invasive species are one of the greatest threats to the integrity of the Everglades ecosystem. Invasive species such as Burmese pythons, Argentine black and white tegus, Old World climbing fern, Brazilian pepper, and African jewelfish impact our native flora and fauna. The best defense against invasive species in the greater Everglades ecosystem in south Florida is prevention and rapid response when new infestations occur. Outreach and education efforts to engage and inform the public regarding problems with invasive species and how they can be part of the solution are important components in the ongoing battle against invasive species.

Tactics

Friends of Everglades Cooperative Invasive Species Management Area, Inc. (FOE) was established in 2013 as a 501(c) (3) nonprofit organization to support the Everglades Invasive Species Management Area (ECISMA). Funds raised by the Friends organization provides much-needed flexibility for early detection and rapid response efforts, including education and outreach.

Victories

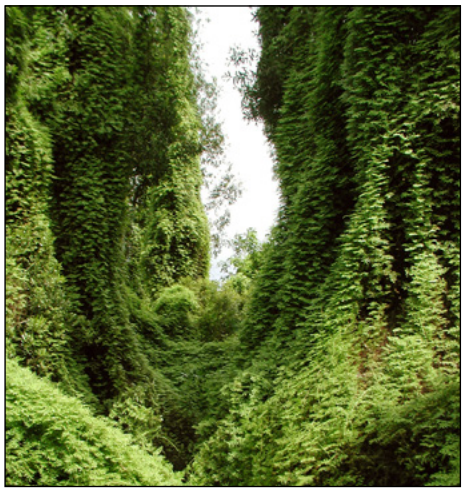
In 2014 and 2015, FOE raised more than $8 thousand through donations and fundraising events such as the first "Race Against Invasives" Everglades 5K Fun Run and Walk at Shark Valley in Everglades National Park. One hundred people participated in the inaugural event. Each received an ECISMA T-shirt, a stainless steel water bottle emblazoned with the Everglades CISMA logo and an invitation to return to the annual event next year. ♦

Website

www.friendsofecisma.org

Contact

J. Ryan Steele, friendsecisma@gmail.com



Old World Climbing fern. (Photo courtesy NPS)

Follow us on Twitter @ECISMA
https://twitter.com/ECISMA

"Like" Everglades CISMA on Facebook
http://bit.ly/ECISMAFB

Agency/Organization Abbreviations

DOI - Department of Interior
ECISMA - Everglades Cooperative Invasive Species Management Area
EDDMapS - Early Detection and Distribution Mapping System
EDRR - Early Detection and Rapid Response
EEL (Miami-Dade County) - Environmentally Endangered Lands
FDACS/DPI - Florida Department of Agriculture and Consumer Services Division of Plant Industry
FISST - Florida Invasive Species Strike Team
FOE - Friends of Everglades CISMA, Inc.
FWC - Florida Fish and Wildlife Conservation Commission
FWS - U.S. Fish and Wildlife Service
NPS - National Park Service
PROS (Miami-Dade County) - Parks, Recreation, and Open Spaces
SFWMD - South Florida Water Management District
UF - University of Florida
USDA - U.S. Department of Agriculture
USGS - U.S. Geological Survey

CISMA
Everglades Cooperative Invasive Species Management Area

ECISMA was created to formalize cooperation among land management agencies to improve the effectiveness of exotic species control by sharing information, innovation and technology across borders through a memorandum of understanding with the ultimate goal of helping to ensure the success of the Comprehensive Everglades Restoration Plan.

ECISMA contact information:

Tony Pernas
U.S. National Park Service
33100 Tamiami Trail East
Ochopee, Florida 34141
786-249-0073
Tony_Pernas@nps.gov

Dennis J. Giardina
Everglades Region Biologist
Florida Fish and Wildlife Conservation Commission
298 Sabal Palm Road
Naples, FL 34114
239-229-5403
Dennis.Giardina@myfwc.com

www.evergladescisma.org

2015 ECISMA Newsletter

Editor: Erica Skolte
Designer: David Kimery