UF UNIVERSITY of FLORIDA IFAS Extension

The Invader Updater

Invasive species news for busy Extension professionals

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Highlights:

- Facts about "Frankenfish"
- Signs of success in the war on lionfish
- Invasive species: commonly rare, rarely common
- Invasive carp safe for consumption
- Assessing carp prevention plans
- Invader dispersal patterns are key

In this Issue:

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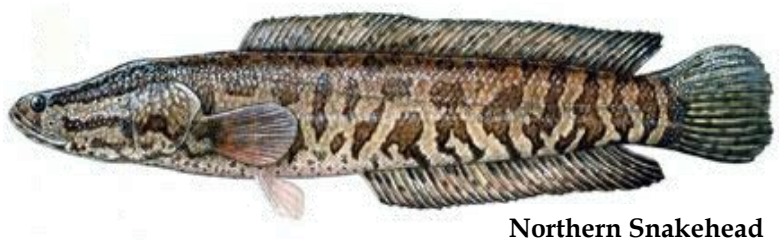
Focal Species: Snakeheads

Scientific names:
Channa argus , *C. marulius*

Size:
To 3-4 feet long

Native range:
South Asia



Northern Snakehead

Rumors about invasive snakehead fish, dubbed "Frankenfish," have claimed that these toothy beasts breathe air, walk on land, grow to gigantic size, and attack humans. Although many of these rumors were overblown, these species do pose a serious threat to invaded ecosystems and are listed as "injurious wildlife" under the Federal Lacey Act. All 28 snakehead species have the ability to breathe air--and some must breathe air or die—which allows them to survive in low oxygen conditions. As adults, they cannot move over land, but juveniles of some snakehead species are known to migrate over land—likely during heavy rains. The two snakehead species established in the U.S. can grow to 3-4 feet long. Although their large teeth are ferocious, these two species do not attack humans. Females of the giant snakehead (*Channa micropeltes*) have been known to attack humans who approach their eggs, but this species has been found in the U.S. only on a few occasions in areas too cold for it to be able to establish a reproducing population. All snakeheads impact native fish communities through direct predation and occupy a trophic niche similar to that of bass. However, their diet is more narrow than that of bass. Snakeheads prey very heavily on small fishes and the occasional macroinvertebrate, lizard, or small mammal, whereas the diet of bass is more diverse and crayfish are an important prey item.

Snakeheads are native to southern and southeast Asia but have been introduced to the U.S. through Asian food markets and intentional releases. In 2002, the northern snakehead (*Channa argus*) was discovered in a pond in Maryland and was eradicated using the chemical rotenone. Despite these eradication efforts, northern snakeheads were found to be established in the heavily degraded Potomac River by 2004. Northern snakeheads are currently established in Virginia, Maryland, Pennsylvania, New York, and Arkansas and individual fish have been found in several additional states in the northeastern U.S. as well as in California and Florida. Similarly, the bullseye snakehead (*Channa marulius*) has become established in South Florida since it was first documented in 2000, but seems to be restricted to South Florida and to a canal system which is already rife with non-native and invasive fishes. In these altered ecosystems, it is difficult to quantify the impact of snakeheads on native fishes. Learn More...

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Science: War on Lionfish Promising

Hunting Lionfish – Oregon State University Photo

Researchers recently used ecological modeling techniques to study the effects of localized removal of invasive lionfish (*Pterois volitans*)—yielding some of the first "good news" in the war on lionfish. The lionfish invasion of the Atlantic Coast of the U.S., the Gulf of Mexico, and the Caribbean Sea has been called the fastest finfish invasion in history. As these predatory fish begin to dominate a reef or mangrove ecosystem, they prey on young native fishes and crustaceans and other culturally, commercially, and ecologically important species such as grunts, snapper, grouper, and cleaner fish begin to disappear.

However, this recent study found that localized removal of lionfish can result in dramatic recovery of native fish populations, even when the lionfish are not completely extirpated. When lionfish were removed, the scientists found that biomass of small native fishes increased by 10-65%. By comparison, on sites where lionfish were not removed the biomass of small native fish decreased by more than 50%. Although complete extirpation of lionfish from a reef was not necessary in order to realize increases in native fish biomass, the researchers found that lionfish density must be reduced by 75-95%, and there is no "magic" target density—each site has its own threshold value. The implications of this research are especially important for marine conservation areas where all fishing is traditionally prohibited. In these sensitive areas, permitting—and even encouraging—lionfish harvest may be a critical component of conservation efforts. Similarly, mangroves and other areas that serve as fish nurseries may be key targets for intensive lionfish removal programs. Learn More...

Science: Invasive Species Rarely Common

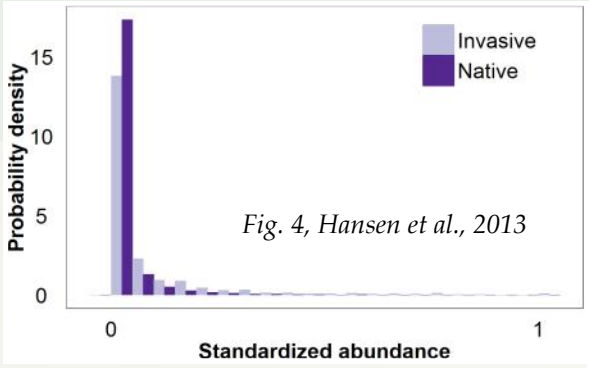

Fig. 4, Hansen et al., 2013

The impacts of certain invasive species is frequently attributed, in part, to their extremely high abundance. Certain invasive species--especially terrestrial plants--crowd out and exclude all other species. However, a recent study suggests that this pattern of extremely high abundance may be the exception, rather than the rule, at least when it comes to aquatic invasive species. In this study, a group of scientists compared data from over 24,000 populations of 17 invasive and 104 native aquatic species. They compared the abundance distributions of native and invasive counterparts—that is, invasive versus native crayfish and invasive fish versus various native fishes—to help them to better understand the patterns of abundance of these species. Additionally, they only included well-established populations (i.e., established >19 years) so that they could control for patterns of exceptionally high abundance early in the invasion process. The species they studied included some of the world's most infamous invaders such as zebra mussels, rusty crayfish, sea lampreys, round gobies, and Eurasian watermilfoil. The scientists found that, although invasive species did reach significantly higher densities than native species, the overall pattern of abundance did not differ between native and invasive counterpart species. As the graph above shows, the abundance probability graphs for invasive and native species were all skewed, with the highest probabilities on the low abundance (i.e., left) side of the graph—meaning that both native and invasive species were found in relatively low abundance in most cases. Their results suggest that most invasive species are present in high densities at only a very few sites after they become established. Furthermore, they found that species with known relationships between density and negative impacts—such as rusty crayfish and invasive snails—were only found at problematic density at around 15-17% of sites. However, they did note that two invasive species that have required widespread management efforts—sea lampreys and Eurasian watermilfoil—were found in higher abundances in more populations than the majority of the invasive species they studied. This suggests that other especially problematic invasive species may also be more frequently found in higher than expected—although not high—density. Learn More...

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Science: Invasive Carp Safe to Eat

"Asian carp" are not one species but rather four species—bighead, silver, black, and grass carp—that were introduced into ponds in the U.S. for vegetation and snail control but escaped into the Mississippi River and have steadily expanded their range toward, or even into, the Great Lakes. These fish threaten native ecosystems and are difficult to manage. Carp is highly valued as a food fish in some parts of the world, and efforts to popularize consumption of carp is considered by many to be one of the best options for managing this invasion. A new study by scientists at the University of Illinois has found that this may, indeed be a viable option. They found that bighead and silver carp from the Illinois River have undetectable to low levels of Selenium and Arsenic and levels of Mercury below the USDA action level. Although they found that these carp are safe to eat, people who are sensitive to Mercury may need to limit consumption. Learn More...

Asian carp steaks with Cajun remoulade at the Heaven City Restaurant in Mukwonago, WI. Photo: Gary Porter /Milwaukee Journal Sentinel.

Science: Evaluating Carp Prevention Plans

In January, the U.S. Army Corps of Engineers (USACE) completed the Great Lakes and Mississippi River Interbasin Study (GLMRIS) Report. This report, which was submitted to Congress, described—but did not compare—eight strategies for preventing invasive Asian carp from entering the Great Lakes through the Chicago Area Waterway System. Researchers at Notre Dame followed up on this report by using a panel of experts to evaluate the effectiveness of 17 different potential separation strategies, including those discussed in the GLMRIS report. Their method weighted each expert's opinion based on their knowledge and abilities. Instead of controlling for uncertainty, their method quantified the uncertainty about how well each separation method would work. These expert estimates found that complete hydrological separation would be 99% effective at keeping Asian carp out of the Great Lakes, followed closely by electric and acoustic-bubble-strobe barriers (both estimated at 92%). All other strategies were less effective and had higher uncertainty. Learn More...

Science: Invasive Species Dispersal Patterns

Although logic might suggest that fewer individuals in a new population means less competition and faster growth, this is not always the case. In small populations, the "Allee effect" may yield a critical minimum population size threshold. For invasive species, an Allee effect would mean that there is some threshold—a minimum number of individuals—below which a new population of dispersed individuals will not survive. Therefore, spreading too rapidly, thus spreading the species too thin, could cause an invasive species to fail rather than thrive. In a recent study, scientists used bacteria to test the relationship between the Allee effect, dispersal patterns, and survival in order to better understand, among other things, the implications for invasion ecology. Their results suggest that dispersal patterns and critical population size thresholds could be the key to preventing successful new invasions. Learn More...

In Focus

Photo by Richard Neiling

These photos were provided by Floridians curious to know more about these invasive species. The photo on the left shows an invasive Tokay gecko found guarding her eggs (shown above her head) in a telephone utility box in Tavernier. This species is found in isolated areas in different parts of the state and new sightings are of interest to scientists; this photo was used as a voucher to report the sighting to the Florida Museum of Natural History. The photo on the right shows an invasive Cuban treefrog and a native cornsnake (a.k.a. red ratsnake). Ratsnakes are excellent climbers and have been seen in and around rain gutters where Cuban treefrogs may seek refuge from the cold. An unwary frog could become a nice meal for the snake.

Photo courtesy of Sherida Billman

The Invader Updater is a quarterly newsletter focused primarily on providing information on invasive vertebrate animals in Florida and the southeastern U.S. and was first published in Winter 2009. This newsletter is produced by:

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