

Invasive Species Background

Introduction

Invasive species are known by many different names: invaders, exotics, invasives, and non-native species. However, all names have the same definition, a non-native plant or animal deliberately or accidentally introduced into a new habitat.ⁱ Invasives are often a cause for concern as they can greatly affect an ecosystem, most often in a negative fashion.

Methods of Introduction

There are six recognized methods of introduction: hitchhiker, aquarium trade, ballast water, bait release, intentional introduction, and canals. All introduction methods are caused by humans, however some are deliberate and others are accidental.

Introduction Method	Definition	Accidental or Deliberate?
Hitchhiker	Organism that “catches a ride” from one body of water to another; common rides include boat trailers, waders, nets, etc.	Accidental
Aquarium Trade	Organisms introduced to new areas through aquarium and pet shop sales	Deliberate
Ballast Water	Large oceanic vessels take water in ballast to help with balance; organisms are taken in at one port and released at another	Accidental
Bait Release	Bait is released into a new body of water after fishing	Deliberate
Intentional Introduction	An organism is put into an area on purpose	Deliberate
Canals	Organisms move through waterways via canal systems	Accidental

Impacts

One of the greatest impacts invasive species can have on an environment is loss of biodiversity. Invasive species represent the second leading cause of species extinction and loss of biodiversity in aquatic environments worldwide.ⁱⁱ When invasives are introduced to

an area, they frequently have no natural predators or parasites. This allows for growth at a fast rate, and in most cases, native species are lost or replaced by non-native species. A good example is the round goby in the Great Lakes. This small, bottom dwelling freshwater fish has outcompeted native fish such as darters and sculpins. Due to their aggressive nature, this fish can take over ideal habitat and eat other fish's eggs and young. Substantial reductions in local populations of sculpins already have been reported from areas in which gobies have become established.ⁱⁱⁱ Another impact is cost. Invasive species can bring about large economic costs to introduced areas. For example, the zebra mussel, originally from the Caspian Sea region of Asia, clogs waterways and irrigation systems which have cost the Great Lakes area billions of dollars in clean up efforts. In fact, since 1989, some facilities located on Lake Erie have reported big reductions in pumping capacity and occasional shutdowns caused by encrusted zebra mussels.^{iv}

New York State Case Study: Northern Snakeheads

Northern snakeheads are a highly invasive freshwater fish species, native to China, Russia, and Korea. Anatomy structures and feeding habits allow this fish to have significant impacts on an ecosystem. "Snakeheads", as they are commonly referred to, have an elongated, tan-ish brown body with dark brown blotches on their sides with long, continuous dorsal and anal fins. For a photo, log onto the New York State Department of Environmental Conservation's (NYSDEC) website at: <http://www.dec.ny.gov/animals/45470.html>. Sharp teeth, large body size, and a large mouth which reaches far behind its eyes make the snakehead a top predator. At every stage in their life, snakeheads compete with native fish species for food. They voraciously feed on other fish, crustaceans, and aquatic insects, often out-competing the native fish populations. Moreover, snakeheads have a primitive lung located above their gills, which means in order to breathe they must come to the water's surface for air. This primitive lung gives snakeheads the ability to survive in low oxygen environments. As juveniles they can survive out of water, in damp conditions, for several days.^v

Two separate populations of northern snakehead were identified in New York State: NYC and Orange County. In 2005, the NYSDEC along with New York City Department of Parks and Recreation found four snakeheads in Meadow Lake, in Flushing Queens, during a routine sampling. Meadow Lake, connected to Willow Lake, is isolated from other freshwater bodies; however, it is a tributary of Flushing Creek, which is brackish water. This caused concern that the population could move downstream, but because snakeheads have a very low tolerance for saline water, no aggressive actions were needed. NYSDEC staff are continuously monitoring the lake and the snakeheads impact on other fish populations. Not long afterwards, in 2008, snakeheads were found in Ridgebury Lake, in Orange County, NY. This discovery was more significant due to the connection between Ridgebury Lake, located in the Wallkill River drainage area, and the Hudson River; which could mean a possible spread of the invasive fish into other water-bodies in NY, and eventually, the continental US. Because of this fact, a harsher action was required for the snakehead population in Ridgebury Lake. In August 2008, the snakehead population was eradicated, by the NYSDEC, using the piscicide Rotenone, an aquatic pesticide that targets fish.^{vi} Before introducing rotenone to the lake, the NYSDEC electrofished, removing 1,400 fish and held them alive in tanks. After the treatment of Ridgebury Lake, 8 tons of fish were killed and 220 snakeheads were removed. The NYSDEC restocked Ridgebury Lake with those fish collected prior to treatment, after water quality samples showed safe levels of rotenone.^{vii}

The NYSDEC plans to continue working with the Orange County community in order to monitor and restore Ridgebury Lake.

The NYSDEC has asked that any angler that catches a northern snakehead not release the fish, and instead kill it, put it on ice, and if possible take a photo. Then, the angler should immediately call the NYSDEC regional office (<http://www.dec.ny.gov/outdoor/7927.html>) in his or her area.

Prevention

To prevent the introduction or spread of invasive species, a few simple steps can be taken:

- Learn to identify common exotic species
- Do not release unwanted plants or animals into the wild unless they came from that body of water
- Do not release unused bait
- Remove any plants, animals or mud before transporting equipment
- Eliminate water from all equipment before transporting
- Wash/rinse and dry anything that came in contact with the water

Additional Resources

Protect Your Waters.net

<http://www.protectyourwaters.net/>

U.S. Fish and Wildlife Service

<http://www.fws.gov/invasives/>

National Sea Grant Office

<http://www.seagrant.noaa.gov/themesnpa/aquaticinvasivespecies.html>

U.S. Geological Survey

<http://biology.usgs.gov/invasive/>

Michigan Sea Grant

<http://www.miseagrant.umich.edu/ais/index.html>

ⁱ Environmental Protection Agency. 4 December 2008
<<http://www.epa.gov/bioiweb1/aquatic/exotic.html>>.

ⁱⁱ Environmental Protection Agency. 4 December 2008
<http://www.epa.gov/owow/invasive_species/>.

ⁱⁱⁱ Minnesota Sea Grant. 8 December 2008.
<http://www.seagrant.umn.edu/ais/gobies_invade>.

^{iv} Minnesota Sea Grant. 4 December 2008
<http://www.seagrant.umn.edu/ais/zebramussels_threaten>.

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- v “Northern Snakehead Fish.” New York State Department of Environmental Conservation 2009. 20 February 2009 <<http://www.dec.ny.gov/animals/45470.html>>.
- vi “Northern Snakehead Fish Found in New York City Lake.” New York State Department of Environmental Conservation. September 2005. 20 February 2009. <<http://www.dec.ny.gov/environmentdec/19140.html>>.
- vii “DEC Plans to Eradicate Northern Snakehead Fish” New York State Department of Environmental Conservation 2009. 23 February 2009 <<http://www.dec.ny.gov/animals/45488.html>>.