

MONITORING FERAL ORIENTAL WEATHERFISH INFESTATIONS IN NEW YORK STATE



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SPECIES DESCRIPTION

The Oriental Weatherfish (*Misgurnus anguillicaudatus*) is a small freshwater fish in the true loach family Cobitidae. Native to Asia, it can live up to 10 years in captivity and grow to about a foot long. This fish is named for its erratic behavior in response to changes in barometric pressure (e.g., approaching storms) and is one of approximately 110 loach species found worldwide. Also known as the Asian, pond, dojo, or weather loach it has the familiar loach-like mouth barbels, but is long and slender with dorsal cryptocoloration (gray-brown-green) and dark blotches or spots (Figures 1 and 2), unlike the smaller more colorful tropical loaches.

HABITAT AND BEHAVIOR

Originating from the temperate regions of Asia, Oriental Weatherfish prefer slow, shallow water environments with soft substrate and vegetation, such as wetlands, headwater ponds, meandering streams, and ditches. It is a hardy species that can survive in water with low dissolved oxygen by using its intestine to process oxygen from the air. It is also capable of surviving a long cold winter and brief dry periods by burrowing into the mud and producing a protective layer of mucus to prevent desiccation. Like catfish, loaches use their barbels to detect food items as they opportunistically scavenge along the bottom. Oriental Weatherfish, in particular, feed primarily on organic matter, such as algae and small aquatic organisms including insect larvae and worms but also fish eggs and fry.

INVASIVE POTENTIAL AND ECOLOGICAL IMPACTS

In their native range Oriental Weatherfish are raised as a food fish, used in rice cultivation and for mosquito larvae control, but less frequently used as a baitfish. Outside

of their native range this species is also farmed, sold to restaurants, and popular in the aquarium trade. Consequently, it has been introduced into various waters around the world and feral populations are now established in Europe, Australia, southern Canada, and over a dozen states in the U. S. (<http://nas.er.usgs.gov>). FishBase reports that the majority of Oriental Weatherfish introductions worldwide are believed to be fish-farm escapees with unknown ecological impacts to native fishes and their communities (www.fishbase.org). Feral populations of this species have been established in Hawaii since the 1800s but reports from most states are more recent.

Due to their adaptable behavior and hardiness, the Oriental Weatherfish seems to overwinter quite well in North America. It can also persist in sub-optimal habitats such as trout streams. However, potential interactions with salmo-



Figure 1. Oriental Weatherfish from the Manor Kill watershed in Schoharie County, NY.

nids in coldwater streams may be limited due to an avoidance of flowing waters with coarse substrate where vegetation is often scarce. In low diversity headwaters Oriental Weatherfish can quickly become the dominant aquatic vertebrate with the potential to outcompete native aquatic fauna, such as resident salamanders (Figure 2). As we have seen with other invasive species, changes in a fish community can disrupt the delicate balance of an aquatic ecosystem.

POPULATIONS IN NEW YORK

Initially, Oriental Weatherfish were only recorded in two isolated waters in the far corners of the state (Figure 3): Chautauqua Co. in western NY in 2001 and Long Island in 2003 (Table 1). However, between 2009 and 2013 three more populations were found in three different drainages (13 subwatersheds) expanding from two to nine counties in New York. All of these populations are considered established with both young and adult Oriental Weatherfish present.

It is unknown when the various infestations occurred in New York waters (Table 1) but it is likely that most are isolated, occurred years before they were reported, and are a result of the illegal release of live aquaria pets. In many instances concerned landowners have reported unusual fish found roadside after flooding events or in their minnow traps. Other reports have come from fisheries surveys targeting other species. Oriental Weatherfish now have gained access to our larger river systems and will continue to spread.

MONITORING

Oriental Weatherfish are readily captured using various gear types in shallow vegetative backwaters of streams or wetlands with muck bottom, their preferred habitat. Baited fish traps appear to be the most productive and least time-consuming method of capture in still waters (Figure 2). Dog biscuits or hard bread are productive bait. Backpack electrofishing also works well in shallow streams where wading is more applicable.

The number of Oriental Weatherfish currently in New York waters is unknown but overall they probably number in the tens of thousands. Table 1 lists all waters in their respective sub-watersheds where this species was first recorded. Estimates of individuals are based on capture effort. Intense sampling seems most productive in the spring when food is limited and fish activity is rising with water temperature. It is common to harvest dozens of Oriental Weatherfish from a single baited fish trap in the spring (Figure 2) but harvest appears to decrease during the summer spawning period perhaps in combination with increased food availability.



Figure 2. Oriental Weatherfish and native salamanders captured in a baited fish trap.

DEC Region 4 Fisheries, located in Stamford, NY, have been monitoring the feral Oriental Weatherfish population in the Manor Kill watershed of Schoharie County since it was reported in 2010 (Table 1). In just four years, over 3,700 specimens have been collected. Concurrently, Bob Schmidt of Bard College at Simon's Rock has been tracking this species in Ulster and Orange Counties (DEC Region 3) since 2009 where it has spread from the Wallkill River watershed into other lower Hudson River tributaries (Table 1 and Figure 3). Upon examining their distribution, it was found that many of the infested waters have headwater ponds and/or small isolated wetlands that appear to be the source of their release and subsequent dispersal.

All Oriental Weatherfish catches in NYS to date have been in tributaries, feeder streams or wetlands in their associated watersheds (Table 1). Low density populations may be present in favorable habitat of the larger parent waters yet no specimens have been documented in Chautauqua Lake despite annual electro-fishing or found in baited traps set in Schoharie Reservoir (2012). This may reflect more on the complex nature of larger aquatic systems and the inherent difficulties in sampling for small benthic fish

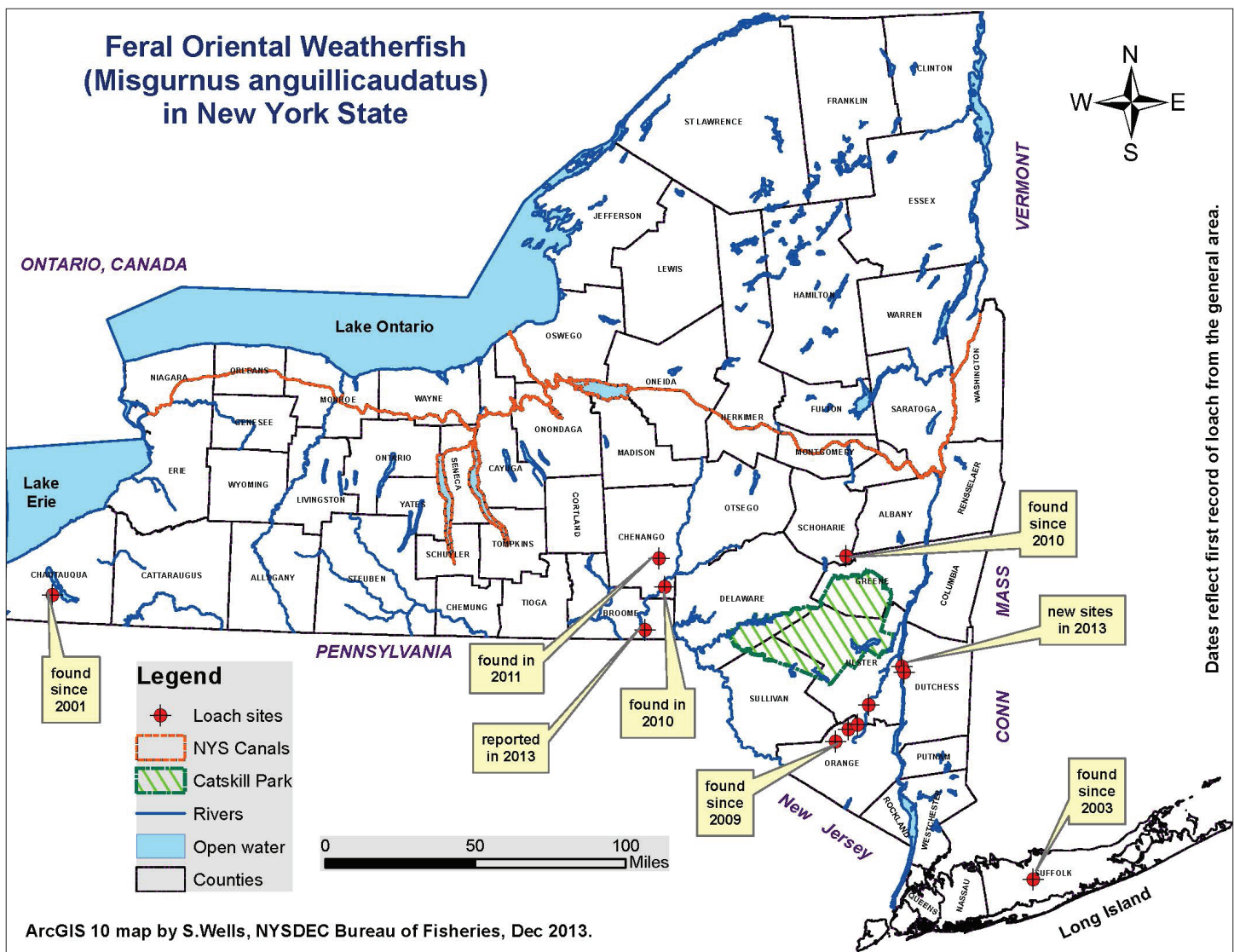


Figure 3. Map of Oriental Weatherfish infested areas in New York State.

in an expansive littoral zone. Conversely, the downstream dispersal of Oriental Weatherfish in the middle Susquehanna and lower Hudson River watersheds (Figure 3) is now presumed via multiple confirmed reports of their presence in adjoining waters (Table 1). Recent large flooding events may be responsible for what appears to be accelerated dispersal of this species throughout these watersheds via climate change, which has been implicated as the driving force behind the increased prevalence of large storm systems along the east coast.

FUTURE RESEARCH

Much is still unknown about Oriental Weatherfish populations in North America. DEC staff is teaming up with other agencies and academia in New York to examine specimens collected from our infested waters (Table 1). Adding to laboratory work conducted by Bob Schmidt and a small number of biologists in other states, we hope to better understand the ecology and life history of Oriental Weather-

fish in hopes of managing this invasive species for the benefit of our native aquatic fauna. More studies are needed to determine their impacts in the wild.

Released aquarium pets is the most likely source of Oriental Weatherfish introductions in New York waters, thus we need to increase public awareness of the problems associated with invasive species. It is critical to slow the spread of these and other elusive aquatic invasive species. Even just a few released fish can reproduce and spread to all connecting waters as far as it can swim or be carried, resulting in far-reaching ecological disruption. Accordingly, Oriental Weatherfish have recently been listed as a "prohibited invasive species" in New York because of the potential risk it pose to aquatic environments (www.dec.ny.gov/regulations/93848.html). Please remember that no captive fish (aquarium pets, baitfish, etc.) should ever be released alive into the wild. We need your help to monitor invasive species, so please report any unusual fish that you encounter to a New York Regional Fisheries Office.

Table 1. Oriental Weatherfish (*Misgurnus anguillicaudatus*) first recorded¹ in various waters of New York State.

Year	Watershed	Location	Cliffs, New Jersey.		Est. #s
			County	Habitat ²	
2001	Chautauqua Lake	Ball Creek (T11)	Chautauqua	wetlands	1000s
2003	Long Island Sound	Ronkonkoma Swamp	Suffolk	wetlands	100s
2009	Shawangunk Kill	Mara Kill (T1)	Ulster	stream	10s
2009	Wallkill River	Shawangunk Kill (T19)	Ulster	stream	10s
2009	Wallkill River	Unnamed stream (T23)	Ulster	stream	100s
2009	Wallkill River	Dwaar Kill (T24)	Ulster/Orange	stream	1000s
2009	Dwaar Kill	Unnamed stream (T24-4)	Orange	stream	10s
2009	Dwaar Kill	Unnamed stream (T25-5)	Orange	stream	10s
2010	Schoharie Reservoir	Manor Kill (T112)	Schoharie	stream	1000s
2010	Manor Kill	Unnamed stream (T112-16)	Schoharie	wetlands	1000s
2010	Susquehanna River	Unnamed stream (T137-1)	Chenango	wetlands	100s
2011	Susquehanna River	Unnamed stream (T137)	Chenango	wetlands	10s
2011	Susquehanna River	Willey Brook (T142)	Chenango	stream	100s
2013	Hudson River	Indian Kill (T-129)	Dutchess	tidal stream	10s
2013	Hudson River	Klyne Esopus Kill (T132)	Ulster	stream	1000s
2013	Susquehanna River	Ditch below T101 ³	Broome	wetlands	na

T: tributary or stream number, ordered from mouth upstream. Kill is Dutch for creek.

Est.: estimated number of individuals in the wild at sites where Oriental Weatherfish were found.

¹Database records from NYSDEC, NYS Fish Museum, Bard College at Simon's Rock, and Hudson River Almanac.

²Many of the streams begin in, or run through, either state and/or federally protected wetlands.

³Location near Windsor, NY, has yet to be verified by DEC staff.