

# The Invasive Asian Weatherfish in Ohio

*(Misgurnus anguillicaudatus)*



Doug Sweet

Superintendent, London State Fish Hatchery



# The Japanese (Asian) weatherfish is a newly discovered aquatic invasive species found in Ohio



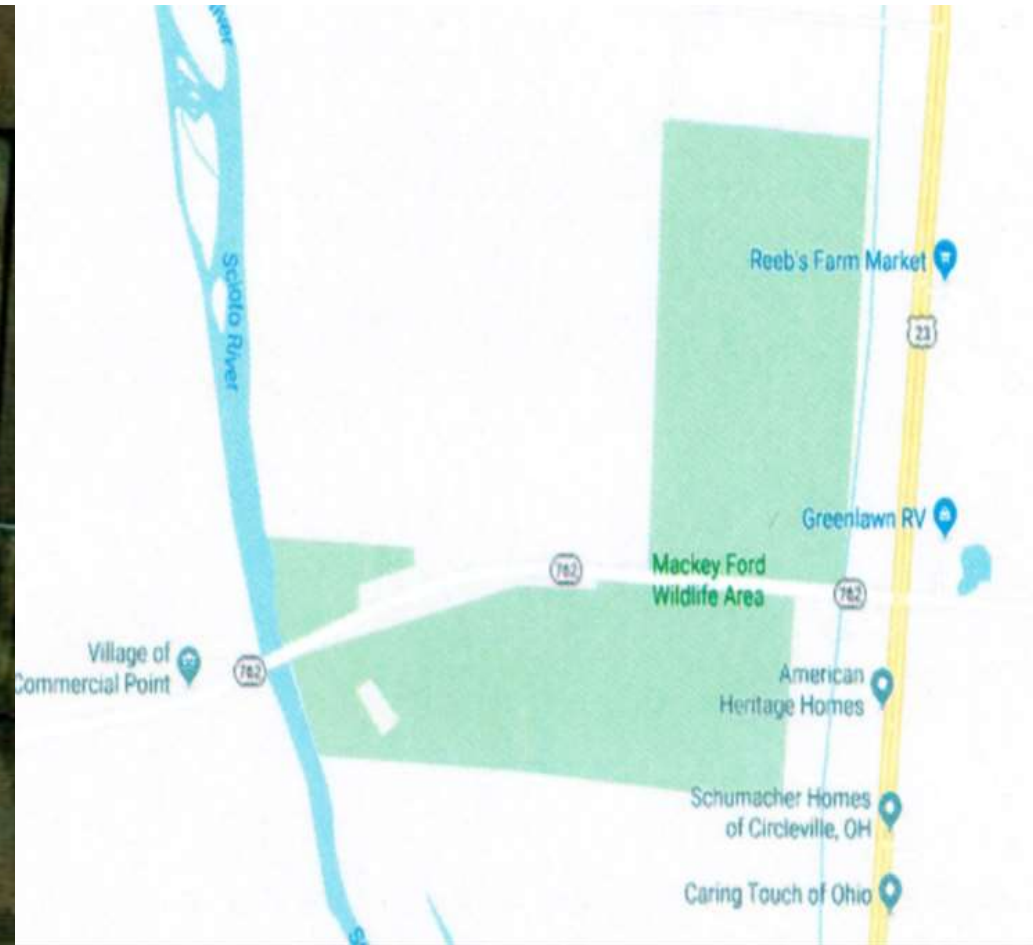
**After high rain events in mid June 2019, highway workers noticed unusual eel shaped fishes in the course cobble adjacent to the road.**

- **A tributary to the Scioto River overflowed the road at the Mackey Ford Wildlife Area adjacent to SR 762**
- **They reported this find to the Division of Wildlife**
- **Ethan Simmons from District 1 was sent to the location with an electro-fisher and was able to capture 18 individuals**
- **Later identified as Japanese weatherfish (*Misgurnus anguillicaudatus*)**





# Mackey Ford Wildlife Area, Lockbourne, Ohio



# What are weatherfish or weatherloaches?

- Was collectively family Cobitidae:
  - Now divided into (at least) these families
    - Botiidae (like the clown loach)
    - Cobitidae (typical loaches including weatherfish)
    - Balitoridae (hillstream loaches)
    - Nemacheillidae (brook or stone loaches)
  - (collectively 111 genera and more than 1,043 species!)
  - Huge family of fishes originally from Europe, Asia, and north Africa

# Kottelat's Conspectus Cobitidum

SUPPLEMENTS PUBLISHED

- [illegible]



Approved by the Department of Technology Services, National University of Singapore

Content appearing in this journal on national or scientific matters should reflect current conditions, conventions, policies, and environmental science information research, along with ecological, anthropological, and historical information. Abstracts should be written in a clear, concise, and factual manner.

THE KAPPLIS BULLETIN OF ZOOLOGY 2012

SUPPLEMENT NO. 20

**The Raffles Bulletin  
of Zoology**

An International Journal of Southeast Asian Zoology

CONSPECTUS COBITIDUM:  
AN INVENTORY OF THE LOACHES OF THE WORLD  
(TELEOSTEI: CYPRINIFORMES: COBITOIDEI)



MAURICE KOTTELAY

Supplement No. 26

DECEMBER 2012



# Loach family representatives:



## Summary:

- **Ostariophysan Fishes**
- **Share many anatomical, physiological, and genetic traits with carps and minnows (Family Cyprinidae) and the suckers (Catostomidae)**
- **Barbels or sensory whiskers around the mouth**
- **Pharyngeal teeth**
- **Weberian Ossicles**



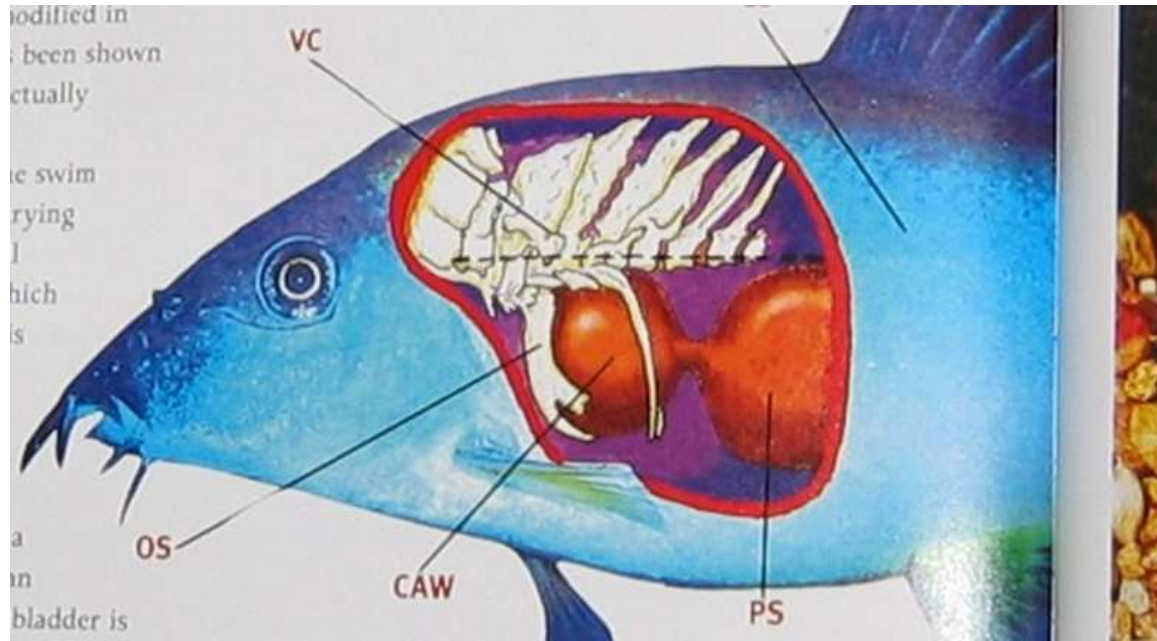
# Other loach characteristics:

- **Pre-orbital spines for defense**
- **Reduced swim bladder**
- **Intestinal respiration**
- **Very tiny scales – almost appear scaleless**



# What are and what do Weberian Ossicles in loaches do?

- **Bones that surround and connect the swim bladder to the back of the skull**
- **Give loaches extra sensory capabilities**
- **Generate and hear sound better than most other fishes**
- **Sense changing barometric pressure during an advancing storm front**



# Why does a fish need to predict, and react to, an impending storm?

- What evolutionary significance does this have? What survival advantage or adaptation does this represent?
  - Prediction of weather to prepare for high velocity water flow?
  - An indicator of impending water chemistry change?
  - Cue for changing food source? Migration?
  - Cue to begin reproduction?
  - All of the above?

\*Most loaches spawn during the rainy season. After major storm events increase water depth which then floods river adjacent oxbows, wetlands, or forest areas. After an increase in water depth they move into these nursery areas to spawn and then leave and return to main river channel.





# Known as weatherfish – living barometers made them popular aquarium fishes



# Misgurnus species

- *M. anguillicaudatus* (Japanese weatherfish or dojo)
- *M. mizolepis* (Chinese weatherfish)
  - *Paramisgurnus dabryanus*, *M. nikolskyi*; *mohoity*; *bufoensis*
- *M. fossilis* (European weatherfish)
- Range from Western Europe, Russia, China, Korea, all the way to Japan and south to Indo-China



# Somewhat popular aquarium fish







# Asian delicacy – ground mudfish stew – “choo-o-tang”









**Chinese weatherfish (*Paramisgurnus dabryanus*) have been genetically modified with extra growth genes to grow to 16 inches in one year.**



In some areas Asian weatherfish are also considered a good bait fish





# Asian weatherfish, both Japanese and Chinese, have proven to be invasive species around the world.

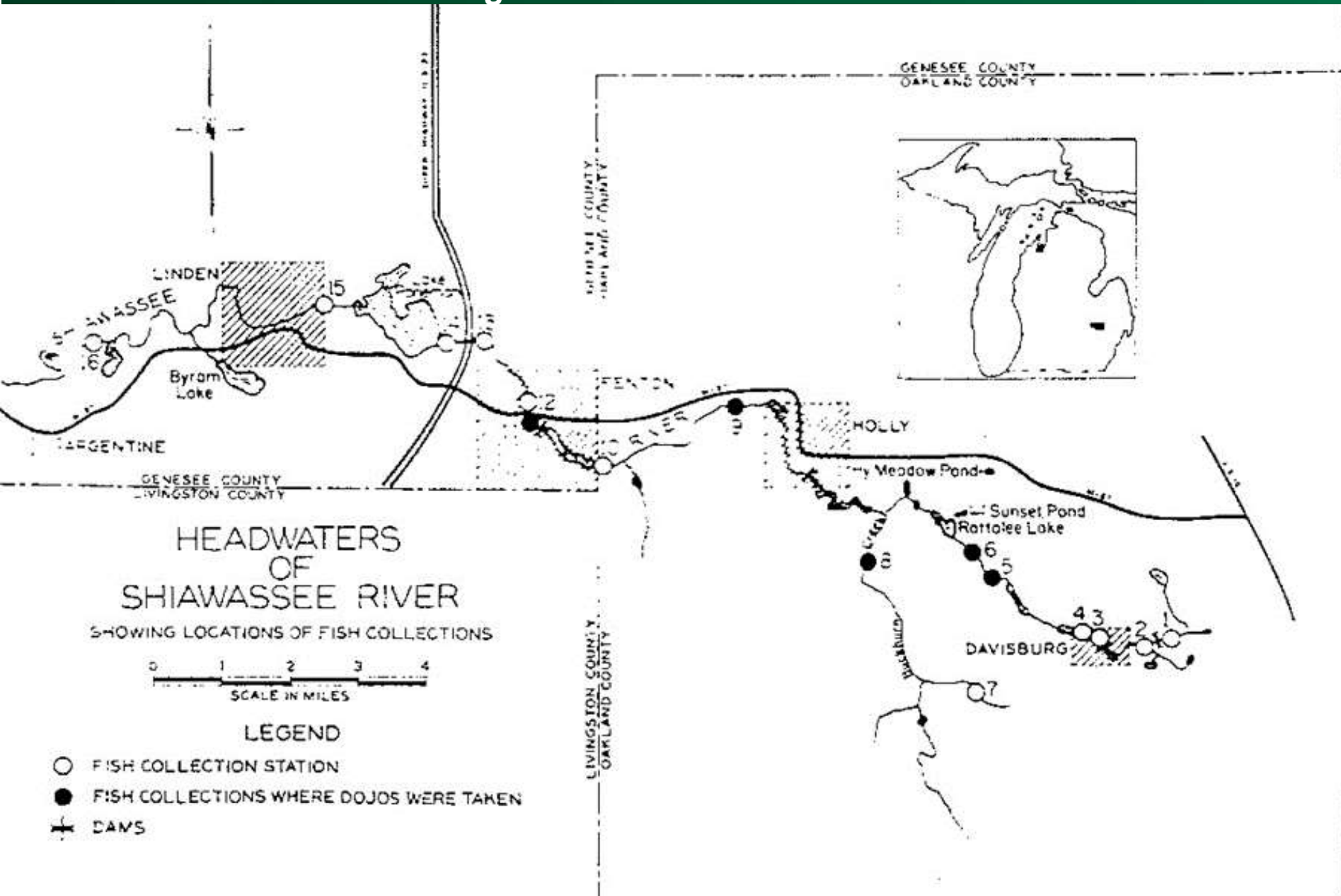
- The first reported establishment in the continental United States was in the Shiawassee River, Michigan.
- A garden pond fish importer (Sunset Water Gardens) brought in Japanese weatherfish and stocked them to a small pond (Sunset Pond) near Holly Michigan in 1939.
- Michigan DNR discovered the loaches in Hy Meadow Pond after application of rotenone and toxaphene in July 1958.
- In 1958 and 1959 additional electrofishing surveys found weatherfish in 10 contiguous miles of the upper Shiawassee River, from Davisburg to Fenton.
- Published in Transactions of the American Fisheries Society in 1960

---

## Establishment and Early Dispersal of a Loach, *Misgurnus anguillicaudatus* (Cantor), in Michigan



# Weatherfish can be found to this day in the upper Shiawassee from Davisburg downstream to the Fenton Dam



# Rattallee Lake Road and Shiawassee River



# In Michigan: As an Aquatic Invasive Nuisance Species

- The possession, sale, and transport of Japanese weatherfish in Michigan is illegal
- Punishable by up to a \$10,000 fine and imprisonment.
- Many other States have found introduced weatherfish including:
- Florida, Hawaii, Oregon, Washington, California, Indiana, Illinois, New Jersey, New York, North Carolina, Louisiana, Tennessee, Idaho, Alabama, Virginia, Pennsylvania
- Most finds are Japanese weatherfish but Chinese weatherfish have been confirmed in California and possibly Oregon



# *Misgurnus anguillicaudatus*



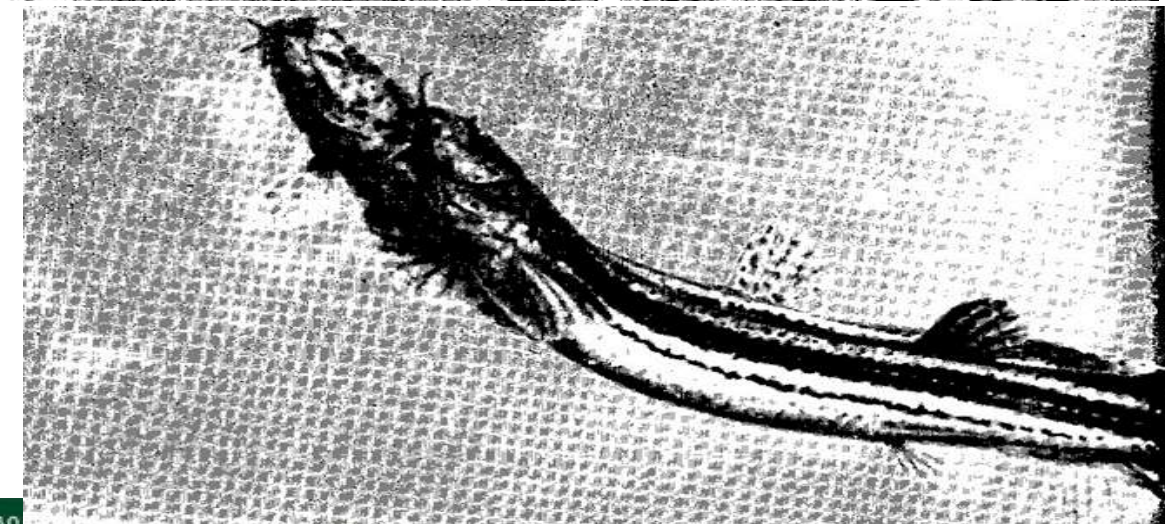
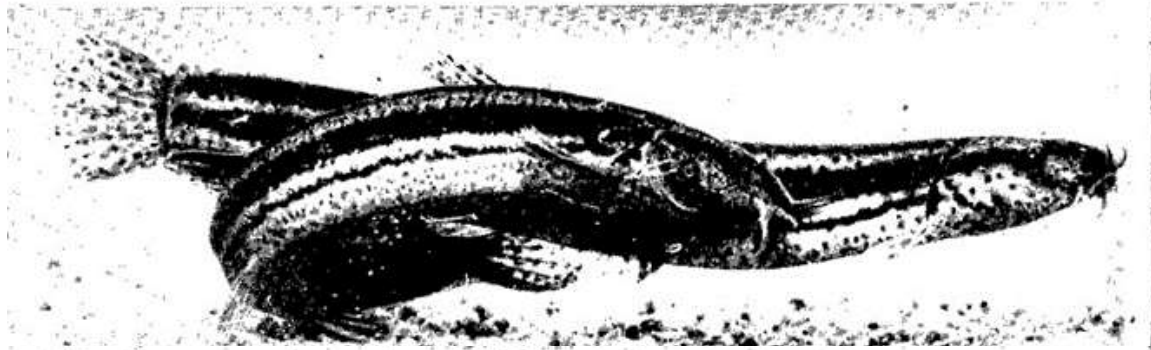
# Introductions have been global

- **Australia**
- **Japan** (Chinese and Chinese Japanese weatherfish introduced to Japan)
- **Germany**
- **Netherlands**
- **Spain**
- **Italy**
- **Mexico**
- **Palau**
- **Philippines**
- **Turkmenistan**
- **Brazil**





A spawning sequence of the weatherfish. This species follows the usual loach pattern of the male feeling and nudging the female and then twisting his elongate body about hers. Both fish then rapidly move to the surface.



# Spawning of European weatherfish

At the surface the egg laying begins and may be continued on the bottom. The relatively large eggs are shown attached to a sprig of *Myriophyllum*. Photos by K. Knaack.





















# Newly hatched weatherfish fry

A



B



C



D



- *With special adaptations to flooded spawning*













WILDLIFE  
DIVISION







# Difficult to survey for weatherfish

- **Can be baited to minnow traps. Often thought of as the best way to find them.**
- **Electrofishing can be productive, but often is very difficult in heavy sediment and thick plant cover inhabited by these fish.**
- **Seine surveys are also difficult because of the same reason for electrofishing**







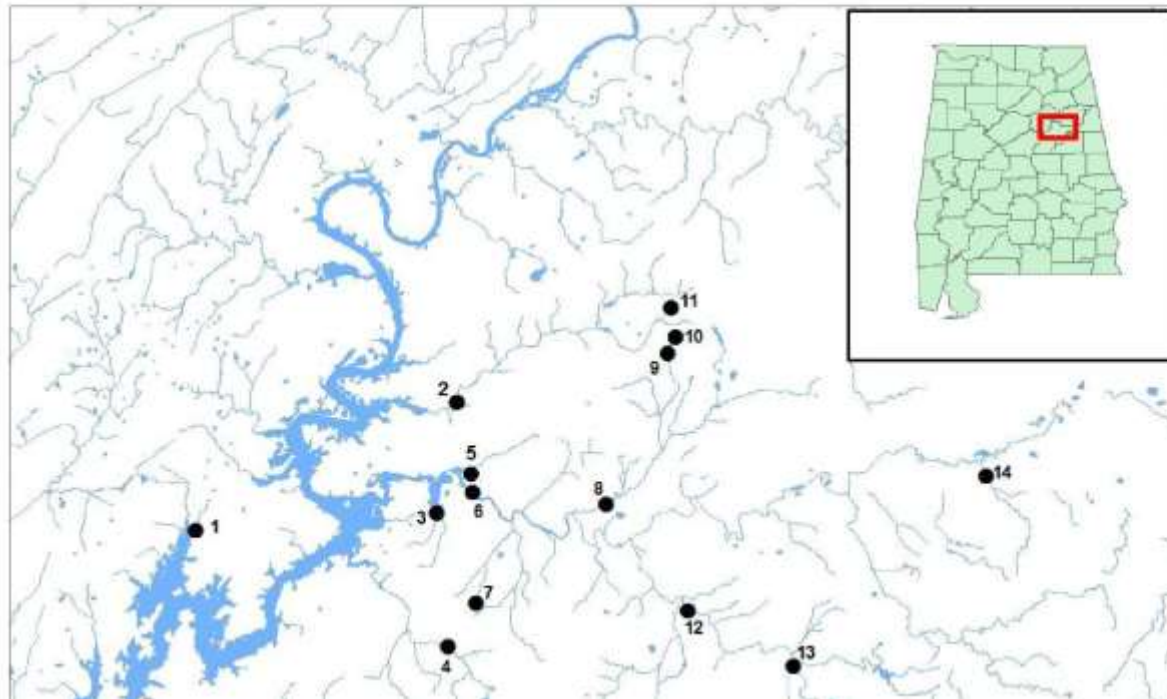
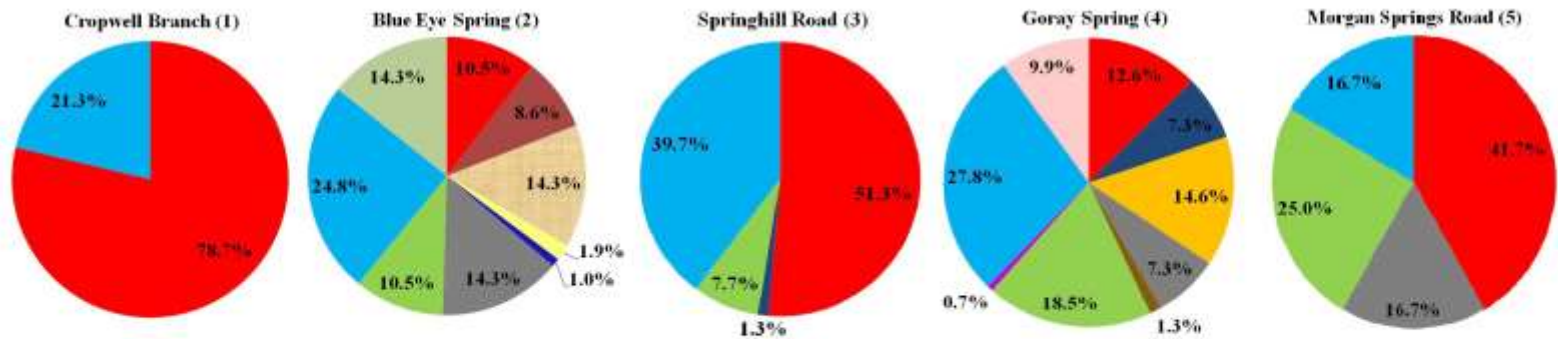
# Ecological damage by weatherfish:

- Questionable as to their effects on the ecology ????
- Some claim they can be fish disease vectors
- Some claim they change water quality (increase turbidity, ammonia, nitrite, and nitrate levels)
- They become significant fauna wherever they are introduced
- Feed heavily on benthic invertebrates (Chironomid larvae and annelids)
- Do they displace native fish? May feed on other species' eggs.
- Do they cause local loss of biodiversity?
- Some studies suggest this



# Occurrence of the Asiatic weatherfish, *Misgurnus anguillicaudatus* (Cantor, 1842), in Alabama, USA (BioInvasions Records 2015) Vol 4 I-2 125-132

Lindsay Michelle White\* and Mark Edward Meade Lindsay Michelle White\* and Mark Edward Meade



- *Misgurnus anguillicaudatus*
- *Campostoma oligolepis*
- *Cottus carolinae*
- *Ellassoma zonatum*
- *Essox niger*
- *Etheostoma ditrema*
- *Etheostoma stigmaeum*
- *Gambusia affinis*
- *Lepomis auritus*
- *Lepomis cyaneus*
- *Lepomis gulosus*
- *Lepomis macrochirus*
- *Lepomis spp. hybrid*
- *Micropterus salmoides*