

The Water Line

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AN INTRODUCTION TO INTRODUCED SPECIES

Introduced, invasive, non-native, nonindigenous, exotic – all of these terms are used to describe organisms found outside of their native watershed, state, country, or continent. Species introductions are a global problem affecting both terrestrial and aquatic habitats, and have become so widespread that introduced species may comprise up to 20% of the flora and fauna in a give region. While some organisms, like the armadillo and the opossum, are naturally expanding their range, most have had help from us.

We have introduced all types of organisms into aquatic ecosystems including amphibians, reptiles, fish, mammals, mollusks, crustaceans, plants, algae, bacteria, viruses and parasites. Whether accidental or intentional, we have played a key role in introducing species. When we humans first started moving around, we started moving organisms with us. Since we have developed the ability to move farther faster, the number of introduced organisms has greatly increased. For example, over the past 200 years over 150 aquatic organisms have been introduced into the Great Lakes – 1/3 of these introductions have occurred since 1959, when the St. Lawrence Seaway opened. Introductions into aquatic environments have occurred through the release of ballast water from ships, recreational boating, sport fish stocking, aquarium trade, and bait buckets.

While not all species introductions are harmful, some have had severe ecological and economic consequences. Invasive species may cause habitat alteration or loss, changes in food webs and alteration of

In This Issue

Introduced Species	1
Asian imports	2
Fish in the news	2
Missouri's Introduced Species	2
30 Years of the Clean Water Act	3
Water Quality facts	3
Website Update	4
What is a 305(b) Report?	5

ecosystem processes such as primary production and decomposition. Any of these may cause a reduction in the biodiversity or even the complete extinction of native species. Invasions have also resulted in loss of revenue to the industries of aquaculture, recreation and tourism.

One exotic species threatening the state of Missouri is the zebra mussel. The zebra mussel was released into the St. Lawrence Seaway in 1986 from the ballast water of a ship. The first population of zebra mussels was detected in Lake St. Clair in 1988, and by 1993 it had spread to all of the Great Lakes as well as lakes and rivers in 18 states. The invasion of zebra mussels has negatively impacted fisheries, and disrupted aquatic ecosystems. Zebra mussels have the unique ability to attach to surfaces, causing the extinction of many native species by literally growing over them. The mussels will attach to anything, including each other, resulting in the clogging of power plants, water intakes, the cooling systems of boats, and the sinking of navigational buoys. Cities and power companies have already spent millions of dollars trying to control zebra mussels; however, the economic impacts over the next ten years are expected to be in the billions of dollars. Zebra mussels will also attach to boats, anchors, trailers, and wetsuits, facilitating their spread since they can live for up to two weeks out of the water.



LAKES OF MISSOURI VOLUNTEER PROGRAM

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The state of Maryland has been dealing with an Asian invader. This invader is capable of consuming prey up to one-third its size, and poses a threat to native species. The northern snakehead,



a fast-growing fish with a mouth full of sharp teeth and the ability to survive without water for 3 days was discovered in a pond. Someone had purchased several of the fish at a market, intending to make soup. The unused fish were dumped in a pond where they not only survived, but thrived and bred. The pond was eventually poisoned to eradicate the fish (and all other life within it). Ironically, this move was supported by the People for the Ethical Treatment of Animals.

Snakehead species have been found in California, Hawaii, Florida, Maine, Massachusetts and Rhode Island. There are laws in at least 13 states that ban possession of live snakeheads, though they are easily obtained in Boston and New York fish markets.

While infestations of snakeheads are a threat to existing populations of native fish, another Asian fish has already become so entrenched in Missouri culture that we often forget it's an invader. This fish is so insidious that it has even convinced many of us to not only purchase food for it, but to hand feed it as well! You can often find rogue gangs of these fish hanging about the marinas on larger lakes, practically demanding a hand-out. Of course I'm talking about *Cyprinus carpio*, the common carp.

Originally from Asia, the common carp was introduced to Europe hundreds of years ago.

The Europeans brought carp to the US in 1876, and to Missouri in 1879.

According to *The Fishes of Missouri* by

William Pflieger, the Missouri Fish Commission raised 80,000 carp for distribution in Missouri before the program was discontinued in 1895.

Common carp have been blamed for out-competing native species for resources, eating the eggs of native fish, consuming aquatic vegetation (which degrades native fish habitat), and increasing turbidity. Though carp can be useful as a source of food, fertilizer, or (believe it or not) leather, they are not universally appreciated in North America.

— Tony Thorpe

Some of Missouri's introduced species:

Carp	Eurasian Water Millfoil
Grass Carp	Daphnia lumholzi
Goldfish	Freshwater jellyfish
Brown Trout	Purple Loosestrife
Rainbow Trout	Gypsy Moth
Muskellunge	Starlings
Zebra Mussel	House Sparrow
Asian Clam	Ring-Necked Pheasant
Woodland Crayfish	Dutch Elm Disease

West Nile Virus

Other fish news:

At least 4 Floridians have been struck by jumping sturgeon this year. The latest was a fisherman who was struck in the chest by an airborne fish. He then crashed his boat into the shore and suffered a broken sternum, a collapsed lung and 2 broken rib, among other injuries.

Asian carp in the great lakes are also taking to the air, jumping as high as 20 feet. An electric barrier is proposed to prevent the fish from entering Lake Michigan. There is a barrier in place already to prevent introduced fish species from leaving Lake Michigan and entering the Illinois River. Rob Maher of the Illinois DNR believes that the barriers will have no effect on carp movement. He says, "you come anywhere near these fish with electricity, and their response is to jump 20 feet in the air."

30
Years of the

Clean Water Act

I was 2 years old in 1972, and living in West Texas when Richard Nixon signed what we now call the Clean Water Act (at the time it was called the Federal Water Pollution Control Act). Being so young, I didn't understand how polluted the waters of the nation had become. Later, I found out about the Cuyahoga River catching fire, and Lake Erie being declared dead. But those places were far away, and West Texas is VERY dry. There were few recreational opportunities that included water. My summers were spent in the Four Corners area of New Mexico moving irrigation pipe on my uncle's alfalfa fields. Irrigation ditches crisscrossed the state, moving water to those with "water-rights." Dead frogs, dogs and horses were common sights in the dark water ditches. I was warned to stay out of the polluted fast moving waters, and punishment was swift if I disobeyed. These man-made watercourses were my only knowledge of streams. Later we moved to San Antonio, where the stormwater flowed in underground tunnels, or concrete lined ditches. The *River-Walk* was a beautiful tree-lined trail paralleling a green stinking river.

The Clean Water Act (CWA) changed the way Americans treat their water. Before the act, there were no regulations on wastes or toxins dumped into our waterbodies. Now, each municipality is respon-

sible for treating their own wastes. The water from treatment plants is monitored for contaminants such as fecal coliform, biochemical oxygen demand, total suspended solids, oil/grease, and pH.

Thanks to the CWA, industries have to apply for a National Pollutant Discharge Elimination System (NPDES) permit. The permit sets conditions and limitations under which a facility may make a discharge. The NPDES limits for discharges can be based on technology, or set by federal or state water quality criteria. This is where monitoring plays a role. Water quality standards can vary from state to state, and even within a state. From data collected by the University of Missouri staff and LMVP volunteers, we know that pollutants such as atrazine and sediment (suspended solids) are most problematic in the North, while small additions of phosphorus in the clear lakes and streams of the Ozarks can have profound effects.

The nation has come along way during the last 30 years. However, there is still work to be done. Many states are facing lawsuits for not complying with the fishable/swimable water quality guidelines set forth in the act. As a result, states are hustling to set Total Maximum Daily Loads (TMDLs) for each impaired waterbody. These TMDLs will set limitations on the amounts of pollutant each waterbody can receive, and still maintain water quality standards.

The San Antonio river is fed almost entirely by wastewater, and industrial cooling water. The CWA has allowed for advocacy groups to fight to increase the quality of the water discharged by the wastewater treatment facilities. New treatment facilities have been built, and the San Antonio

— continued on page 5

Water Quality Facts

- 260 million pounds of toxic chemicals were legally dumped into U.S. waters in 2000.
- Missouri has the dubious distinction of being one of the top 10 states with the greatest number of facilities in non-compliance with the CWA.
- 49 states have issued health advisory against eating fish due to unsafe levels of contaminants like PCBs or mercury.
- 40 percent of the nation's waters are still too polluted to be fishable/swimable.

Introduced Species: (continued from page 1)

The zebra mussel was first reported in Missouri in 1991, at sites on the Mississippi river. The mussel was not reported elsewhere in the state until 1999, when it was detected in the Missouri River, and the lower Meramec River. The zebra mussel thrives in lakes and rivers, and has the potential to spread to all of Missouri's waters. Once established, the zebra mussel is difficult to manage and nearly impossible to eliminate. The prevention of their spread throughout the state of Missouri is the best management plan. This can only be done if boaters diligently inspect their boats and trailers, particularly after being in waters known to be infested with zebra mussels.

Once introduced, a species can have a tremendous impact on the invaded system. The impacts of invasion may be far reaching, causing economic problems as well as ecologic ones. There is little that we can do to un-introduce a species once it has been established. The best we can do is educate ourselves about them, and take care not to move them around.

— Jennifer Graham

Zebra mussels

Zebra mussels are 1 - 1 ½ inches, and have a very distinctive striped pattern on their shell. They are also the only freshwater mussel in North America that can attach to surfaces. If you believe you have



located a population of zebra mussels please contact the Missouri Department of Conservation.

For more information on zebra mussels and boat inspections visit:

<http://www.conservation.state.mo.us/nathis/exotic/zebra/>
For more information on introduced aquatic species visit:

<http://nas.er.usgs.gov/>

For more information on invasive species in North America visit:

<http://www.invasive.org/>

<http://www.invasivespecies.gov/>

The LMVP is one of only 2 lake monitoring efforts to be mentioned by name in the 2002 Missouri Water Quality report!

Updated Website!

The LMVP website (www.lmvp.org) has been updated to include links to outside data, whenever possible. For example, the newly added Truman Lake page now has links to the Corps of Engineers most recent water quality report (1999), USGS real-time data, and the TMDL information sheet for Truman Lake from the DNR. To see for yourself go to the "Lakes" page of the website and click on a lake or county. Of course, if you know of a data source that I haven't listed, please let us know and we'll check it out.

Also new on the website is the 2002 Missouri Water Quality Report. This document is used to fulfill the State of Missouri's requirements to the Clean Water Act (CWA), section 305B (see "what the heck is a 305(b) report anyway", page 5).



According to the CWA, each state must produce on a biennial basis, a document that summarizes the water quality for that state. The EPA then summarizes the nation's water quality and presents that document to Congress. The LMVP is one of only 2 lake monitoring efforts to be mentioned by name in the Missouri report! You can pat yourselves on the backs for that one. You can get the 2002 Missouri Water Quality Report from the "News" page of the website.

We told you that LMVP data is used for Missouri's 305(b) report, but....

What in the heck *is* a 305(b) report, anyway?

I have summarized when possible, but according to the Clean Water Act, section 305(b):

- (1) Each State shall prepare and submit to the Administrator by April 1,....biennially...., a report which shall include —
 - (A) a description of the water quality of all navigable waters....
 - (B) An analysis of the extent to which all navigable waters....provide for the protection of... shellfish, fish, and wildlife, and allow recreational activities in and on the water.
 - (C) An analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality which provides for the protection ofshellfish, fish and wildlife, and allows recreational activities....have been or will be achieved.... (and)...recommendations as to additional actions necessary...and for what waters such action is necessary.
 - (D) An estimate of the (i) environmental impact, (ii) the economic and social costs necessary to achieve (CWA) objectives.... (iii) the economic and social benefits of such achievement, and (iv) and estimate of the date of achievement; and
 - (E) A description of the nature and extent of nonpoint sources of pollutants....
- (2) The Administrator shall transmit such State reports, together with an analysis thereof, to Congress....

Translation:

- Each state produces a report every other year. This report should describe:
- A.) What the water quality of navigable waters in the state was like during the preceding year.
 - B.) How the waters provide for both the animals that live there, and for humans that use the water.
 - C.) the beneficial effects on the animals, and our ability to use the water, if pollution were eliminated due to the CWA. AND recommendations of further actions and additional waterbodies needing help.
 - D.) an estimate of the costs, both financial and social, of achieving the objectives outlined in the CWA, as well as a list of the benefits.
 - E.) a list of the nonpoint source pollutants and the extent of their pollution.

You can get the entire text of the Clean Water Act online at:

<http://www.epa.gov/region5/water/cwa.htm>

30 Years of the CWA: (Continued from page 3)

River has seen the most water quality improvements of any Texas river. Texas, just like Missouri is moving in the right direction, but quality water will always be the goal.

Missouri is still a long way from removing all waters from the impairment list, and meeting fishable/swimable standards. New pollutants such as mercury show us that continual water quality monitoring is necessary. With the help of LMVP volunteers, that monitoring is possible.

— Georganne Bowman

For more information on the CWA, or the San Antonio Riverwalk, see the following links:

- <http://www.epa.gov/owow/nps/index.html>
- <http://www.chemalliance.org/Handbook/background/back-cwa.asp>
- http://www.ems.org/cleanwater/sub2_cleanwater.html
- <http://www.thevictoriaadvocate.com/local/local/story/485327p-604235c.html>