Exotic Does Not Mean Beauty

An Educational Series For Stream Teams To Learn and Collect

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When you hear the word "exotic" it usually brings to mind something unique, rare, beautiful, or unusual. However, it primarily refers to something that has come from another place, something not native. Organisms that have been moved into areas where they do not naturally live are called exotic, invasive, introduced, or non-indigenous species. They can come from another continent, state, county, or even another watershed or stream.

It was recently estimated there are 50,000 introduced species in the United States (Pimentel et al. 2000). This figure includes plants and animals, as well as microbes. Some introductions may be considered ancient (before 1800), but most have happened within the last 100 years. Scientists believe human activities, particularly international travel, trade, and tourism, combined with the emphasis on free trade, have increased the likelihood of movement of introduced species.

USGS Photo

The silver carp is an Asian carp imported to Arkansas in 1973 for phytoplankton control. It is now common throughout the Missouri and Mississippi Rivers. Known for its leaping ability, it can pose a truly significant threat to public safety.

Though it may not seem obvious at first, some organisms that are technically "exotic" include domesticated animals such as dogs, cats, or horses as well as some of our most valuable agricultural crops like corn, wheat, and rice. Introduced species can have both ecological as well as economic impacts. Some introduced species have caused major economic losses in agriculture, forestry and other areas in addition to harming the environment. One report totals losses and major environmental damage at approximately $137 billion per year (Pimentel et al. 2000).

Some introduced species have great physiological flexibility, can gain nourishment from many sources, and are able to adapt to a broad range of conditions. The ecological impacts of an introduced species vary significantly depending upon the invading species, the extent of the invasion, and the vulnerability of the ecosystem being invaded. Introduced aquatic species usually decrease the abundance of native aquatic species through competition for resources, predation, parasitism and/or hybridization. Additionally, they may cause more complex, indirect ecological effects which involve many native species. Introduced species may alter community structure and ecosystem processes. These complex effects are difficult to predict and may influence things like productivity and nutrient cycling. So, by adding a new species to an ecosystem, you may actually be subtracting the number of species that are able to survive, reducing the overall diversity.

Once introduced species become established as reproducing populations and expand their range, they carry a lasting

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legacy. Some biologists consider them to be "biological pollutants" which usually cannot be eliminated and contribute to the fear and potential of a "one-world fauna." A one-world fauna is one that no matter where you are in the world you will see the same animals: all generalists that are very adaptable and out-compete native species.

The negative effects of exotic species may not be immediately apparent. This is especially important in aquatic systems where the introduction may go unnoticed until the exotic species is established and a problem has occurred. These problems can range from habitat alterations to the decline or extinction of native species. For example, the Nile Perch (*Lates nilotica*) is cited as causing the extinction of perhaps up to 200 species of cichlids (tropical freshwater fish) in Lake Victoria, Africa. Approximately 40% of the species listed as threatened or endangered under the Endangered Species Act are considered to be at risk primarily because of nonindigenous species (Pimentel et al. 2000).

Inland aquatic biodiversity is declining rapidly. Freshwater ecosystems in North America are at much greater risk (to introduced species) than terrestrial systems (Master 1990), and the rate of extinction is five times more rapid than that of terrestrial animals (Ciruna, et al. 2004).

Introduced species are often cited as the first or second leading threat (behind changes in land use/habitat loss) to freshwater biodiversity and ecosystem function. According to Stein et al. (2000), almost 40% of freshwater fishes are extinct, critically imperiled, imperiled, and vulnerable. However, other freshwater invertebrates are even more threatened. About 70% of freshwater mussels and over 50% of crayfish have similar classification.

Introduced species pose a real and significant threat to the aquatic resources and economy of Missouri. Our central geographic location, extensive network of interstate waterways including a connection with the Great Lakes by the Illinois River, and many thousands of acres of public and private ponds and reservoirs make the likelihood of non-native species introductions greater than for most other inland states. Currently, there are several introduced aquatic species known to occur in Missouri, or are anticipated to arrive in the next few years. Look for upcoming Fact Sheets on some of these species.

Introduced species have caused and will continue to cause major problems to native fauna. If you collect fish or crayfish to use as bait, please either return any unused animals to the body of water in which they were collected, or dispose of them properly.

S.van Mechelan, Michigan Dept Environmental Quality

Probably the most infamous aquatic invasive organism is the zebra mussel. Currently, zebra mussels inhabit a number of interior U.S. lakes and almost every major tributary to the Mississippi River.

MISSOURI STREAM TEAM

Sources:

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