

## **Nonindigenous Species.**

How we humans coexist with other living species includes nonindigenous or exotic species (not from here) and invasive (taking over) species. Within the Crystal Lake Watershed, they impact the wetlands, the nearshore waters and deepwaters of Crystal Lake, and the forests of the surrounding high ridges.

### **What are Exotic, Invasive, Alien, Nonindigenous, or Nuisance Species?**

Our environment is a balance of many different living species. Some, like our pets, live happily with human owners. Others, like house mites, insects, rats, and other pests, cause allergies, produce odors, destroy food, and carry disease. The terms, exotic, invasive, alien, nonindigenous, and nuisance, generally refer to species (kinds) of plants, animals, or microorganisms growing where they don't belong, or are not wanted. They may be bad for native plants and animals, by competing for food, crowding for space, and making them "go away". (The analogy of human influx to our Watershed can be made.)

A "weed" to a gardener or a farmer is a flower or vegetable growing in the wrong place. Deer and turkey, usually thought of as "wild", are now common sights in rural and urban environments. *E. coli*, a bacterium found in digestive tracts of mammals including humans, usually causes no harm other than occasional mild digestive disturbances. A rare variety, *E. coli O157:H7*, produces large quantities of potent toxins that cause severe damage to the intestinal lining. The mold, *Saccharomyces cerevisiae*, commonly known as baker's yeast or brewer's yeast, is beneficial in making bread or fermenting sugar to alcohol. Undesirable molds grow on bathroom fixtures, and on walls that have been damaged by water.

Nonindigenous or alien species live outside the area where they originate. Exotic refers to a species not typically found in an area, and coming from some other origin (place). Nonindigenous or exotic species are not necessarily "bad", and many are actually "good". Salmon and smelt are nonindigenous (not native) to the Great Lakes, but have been in our lakes for decades, and are not considered exotic (foreign). Crystal Lake is the source of all the smelt in the Great Lakes, except Lake Ontario! In 1912, 16,400,000 smelt eggs from Green Lake, MN, were planted in Crystal Lake as a food source for the native lake trout. Some smelt escaped into Lake Michigan by way of Outlet Creek. By 1918, smelt "runs" were seen in Cold Creek. Smelt dipping was very popular until Cold Creek was closed to "protect" this lake trout food. Smelt are still caught through the ice of Crystal Lake for eating or as bait for lake trout.

Nonindigenous and exotic describe where a species comes from. Invasive describes how a species lives and reproduces. An invasive species successfully reproduces (and becomes established) and forms a sustainable population in a new territory. Invasive species have high reproductive rates, good means of dispersal (like the wind-borne seeds of the milkweed or the "tumbling" of the baby's breath), and ability to survive adverse conditions (like cold winters). Some native species are invasive, but because they evolved within the same ecosystem in which they are found, usually have natural predators (enemies), or other factors to keep their populations in check. Nuisance species cause problems from a human perspective. Poison ivy is indigenous (native) to North America, but is both an invasive and a nuisance plant. Salmon and smelt are not nuisances but both are nonindigenous to the Great Lakes.

### **What Invasive Species Are Found in the Crystal Lake Watershed?**

Invasive species found within the Crystal Lake Watershed, to name a few include: baby's breath, garlic mustard, purple loosestrife, spotted knapweed, Eurasian watermilfoil, and the Zebra mussel. The Gypsy moth is present in Benzie County, but the emerald ash borer has not yet been found. Efforts toward eradication range from hand weeding of baby's breath, to protecting the habitat of the Pitcher's thistle, to selective herbicide spraying to control the Gypsy moth.

In 1995-6, the CLWF surveyed phytoplankton (algae) in Crystal Lake finding a healthy balance of common species. In 1996, the CLWF surveyed aquatic plants, finding limited growths of Eurasian watermilfoil (EWM). In lakes with high levels of nutrients, algae and EWM are serious concerns. Large mats of floating vegetation adversely affect boating and swimming. Because of the very low levels of plant nutrients in Crystal Lake, algae and aquatic plants are not major problems. A few nearshore locations have localized growths. The CLWF began testing for Zebra mussels (ZMs) in 1994, confirming their presence in 1998. By 2002, ZMs had been found in 230 lakes in Michigan, including Bass, Crystal,

Herring, Little Platte, Platte, and Loon Lakes in Benzie Co., and all the large lakes in NW lower MI. From a small localized infestation, ZMs have dispersed throughout the nearshore waters of Crystal Lake. Numbers of ZMs vary depending upon the substrate (sand or rock) and local nutrients (from excessively fertilized lawns and poorly functioning septic systems). Water clarity of Crystal Lake (already exceptional) has improved over several decades of monitoring, and there has been no dramatic increase due to ZMs.

### **Impacts on the Crystal Lake Ecosystem**

Whether or not a particular invasive species is a direct nuisance to humans, it may have direct or indirect impacts on native plants and animals that share the same habitat (home), and an indirect effect on the people who rely on those resources (fishermen, farmers, tourists). Zebra mussels nearly eliminated native clam populations in Lake St. Clair and western Lake Erie, and affected crawfish populations in Lake Michigan. They also have disrupted the balance of phytoplankton (algae). Invasive species like the spiny waterfleas and freshwater jellyfish also change the food web that is important to young fish. In some cases, an invader may benefit one segment of the economy or a particular user group at the expense of others. The alewife, another nonindigenous fish found in the Great Lakes, was once considered a costly nuisance in the early 1960's. Now it is considered to be the primary food source for trout, and salmon (several are also nonindigenous) and supports a multi-billion dollar sport fishery.

Unlike Crystal Lake, with visibility of 20 to 30 feet, in Saginaw Bay, Lake St. Clair, and western Lake Erie in 1986, it was difficult to see down more than a few feet prior to the entry of the ZMs in 1986. Now one can see the bottom (!) - a benefit for recreational boaters and divers, but also a benefit for bottom-rooted plants, which improve fish habitat, if growth is not excessive. Because ZMs prefer to eat green algae, nuisance blooms (excessive growths) of less desirable blue-green algae have been reported in summer months in these same areas. In excess, blue-green algae cause taste and odor problems, increased treatment costs for municipal water supplies, and detract from recreational use.

The concerns for invasive species are not new. Plants, animals and microorganisms, and their human counterparts, manifested as tourists and retirees, all tend to move around on their own, and may naturally "invade" new territories. They even find their way across or around significant natural barriers (such as oceans), but at very slow natural rates. We humans help to speed up this movement by moving ourselves and our goods around the planet. Multiple routes and means of transport greatly increase opportunities for new species to enter new habitats, with unpredictable and possibly costly results.

Construction of shipping canals in the late 1800's and early 1900's breached the natural barriers to species movement between adjacent watersheds. Niagara Falls blocked passage of the sea lamprey (an invasive species predatory on native trout) between the Atlantic Ocean and the upper Great Lakes until the construction of the Welland Canal in 1829. The sea lamprey is not found in Crystal Lake because of the barrier of the Outlet Dam, which restricts the direct entry of exotic species from Lake Michigan. Sea lampreys are controlled in the Great lakes by periodic treatment of tributaries with a selective chemical.

Ballast tanks of international cargo ships are the major contributor to the global movement of invasive aquatic species. Large quantities of "ballast water" (used to stabilize empty ships) must be discharged when the ships take on cargo. The potential for simultaneous release of invasive species is significant. Water quality in coastal zones and harbors also has improved, making it easier for new species to survive. Another source of invasive species is the garden, aquaria, and bait trades, and the increased movements of boats from lake to lake. The Zebra mussel came to Crystal Lake most probably from transient boaters, since ZMs cannot fly. The increasing rates of new aquatic species invasions also reflects wider recognition and attention to the problem -- we are simply looking harder.

For further information: Jude, D., Stoermer, E., Johengen, T., and Perakis, A.N., Non-Indigenous Species in the Great Lakes: Ecology, Interactions, Impacts, and Future Research Directions, UM Initiative in Great Lakes Research, 2002. [www.snre.umich.edu/faculty\\_cv/johengencv.pdf](http://www.snre.umich.edu/faculty_cv/johengencv.pdf), [www.glerl.noaa.gov/pubs/brochures/invasive/ansprimer.html](http://www.glerl.noaa.gov/pubs/brochures/invasive/ansprimer.html)