Minnesota Board of Water & Soil Resources

BWSR Snapshots

October 2012

Northeast White Cedar Plant community restoration project

By Dale Krystosek, Wetland Special Projects Lead

The Board of Water and Soil Resources received a $250,000 LCCMR appropriation in 2011 for the Northeast White Cedar Plant community restoration project. Northern white cedar (*Thuja occidentalis*) wetland plant communities have been declining in Minnesota for decades. One of the goals of this project is to reverse the decline of northern white cedar wetland plant communities in the state through establishment of restoration and preservation demonstration projects and training local and state government land managers on restoration and protection techniques.

Currently, white cedar regeneration success is extremely rare in Minnesota due to seedling damage from deer, snow shoe hare, rodents and unsuitable seedbed conditions. Many mature white cedar stands have been lost due to high water levels caused by poorly designed road crossings in wetlands. Northern white cedar provides unique wetland functions in Minnesota including:

- thermal cover for white tailed deer and other wildlife during winter;
- critical habitat for pine, marten, fisher, songbirds; and
- provide thermal buffering for cold water fisheries (brook trout streams).

The first goal of the project is to reverse the decline of northern white cedar wetland plant communities in Minnesota. The project will achieve its goals by evaluating and prioritizing white cedar stands for restoration and preservation and through the establishment of demonstration restoration and preservation projects. The second goal of the project will be to improve the quantity and quality of white cedar plant communities in northeast and north central Minnesota. The project will accomplish this by development of a training program for local government resource managers regarding restoration techniques for white cedar plant communities regarding site preparation and re-

vegetation techniques and protecting white cedar from damage by poorly designed wetland crossings for roads and trails. ***The project has made the following accomplishment to date:***

- **The core project team** has been assembled and includes: Dale Krystosek, BWSR Project Manager; Jerry Stensing BWSR Project Technician; Dr. Rodney Chimner (Michigan Tech University) Technical Advisor; Kurt Johnson, University of Minnesota Duluth, Natural Resource Research Institute; Rick Dahlman (retired DNR Forestry Best Management Practice Coordinator), Brian Fredrickson, and Tom Estabrooks, Minnesota Pollution Control Agency. Additional advisors from DNR and local units of government have also participated in the project and an additional advisory committee will be established which will include additional DNR staff, U.S. Army Corps of Engineers, U.S. Forest Service and local units of government.
- The project team has **reviewed potential sites for high priority white cedar restoration and preservation demonstration sites** using the Northeast Wetland Mitigation Inventory, and Land Type Association data and forest inventory data using geographic information system expertise from the University of Minnesota Duluth, Natural Resources Resource Institute. Potential sites were reviewed in Cook, Lake, St. Louis, Koochiching, Beltrami, Lake of the Woods, Itasca, Aitkin, Cass, Crow Wing, Aitkin, Hubbard, Wadena, Kanabec, Pine, Clearwater and Carlton County.
- The **project team spent four days on field investigations of potential demonstration sites**, coordinating closely with Minnesota DNR foresters and ecologists and County Land Department foresters.
- **Seven demonstration sites** in Beltrami County, Koochiching County, St. Louis County and Lake were identified and **restoration plans and prescribed treatment plans** were developed for the seven sites.

- **Plant materials including white cedar seedlings, transplants and seed have been ordered** and reserved for the restoration work.
- The team is currently **researching suitable seedling protection** to prevent white tailed deer damage to white cedar seedlings and transplants.
- The team is currently working on **developing contracts with several land departments** to implement demonstration sites.
- **Several project tour sites have been identified** including:
  - *A site in Beltrami County that starkly demonstrates the impacts of hydrologic manipulation (roads and ditches) to white cedar regeneration and northern white cedar plant community understory composition and diversity. The diversion and drainage of natural hydrology on these sites had drastic impacts not only on white cedar regeneration, but also on the understory and diversity of the plant community.*
  - *Sites in St. Louis County that demonstrate impacts of hydrologic manipulation on white cedar plant communities.*
  - *Site in Koochiching County that demonstrates the importance of maintaining seed trees to promote white cedar regeneration.*

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An Ugly Problem: Controlling the common carp

By Brad Wozney, Metro Board Conservationist

Originally from Europe, common carp (*Cyprinus carpio*) were imported in the 1870s by the U.S. Government to satisfy the requests of European immigrants. Carp are fairly intelligent and long-lived, with life spans exceeding 50 years. They can become a water quality nightmare as they scavenge the bottom for worms and other tiny organisms, scouring up to several inches deep in lake, wetland and river bottoms. This causes the uprooting of native vegetation and the re-suspension of bottom sediments, and as a result phosphorus is released. This can eventually lead to algae-dominated (turbid) lake conditions, especially in shallow lakes, that no longer sustain waterfowl and other species.

Attempts at controlling carp over the last several decades through the use of the fish toxin rotenone and lake drawdowns were met with mixed long-term results and can be expensive and damaging to native fish populations. Recently, significant strides have been made in understanding the life cycle and behavior of common carp from pioneering research by the University of Minnesota (U of M).

An important discovery in this groundbreaking research, led by biology professor Peter Sorensen and research assistant professor Przemek Bajer, found that although adult carp are tough and long-lived, their eggs and larvae are extremely vulnerable to predation and require predator-free habitats to survive. If such habitats are not available, carp's life cycle is broken and their populations will decline. Using telemetry the U of M researchers showed that adult carp employ interesting strategy to overcome this important limitation.

In the spring, hundreds or even thousands of adults will leave the lakes in which they overwinter and migrate to shallow interconnected marshes to spawn. They do so because shallow marshes often winterkill and are devoid of carp egg and larvae predators such as bluegills. However, if these migration routes are blocked or if marshes are aerated to prevent winterkills, carp's predator-avoidance strategy fails and sustainable control of carp populations becomes much easier to implement. In fact, Bajer, Sorensen and their colleagues have already shown that carp populations can be effectively controlled in entire chains of lakes if winterkills in shallow marshes are prevented.

In addition to determining how carp's reproductive strategy can be controlled, the U of M team showed how the adult carp that are already present in lakes in large numbers can be effectively and selectively removed without using toxins or harming native biota.

Radio-tagged carp, originally dubbed as "Judas fish" by carp researchers in Australia, are used to pinpoint the fish in the winter as they congregate in large numbers

under the ice. Nearly 95 percent of carp from some lakes have been removed in a few nettings. Pheromones are also being considered as an aggregation technique.

Carp removal on Lake Gervais, Ramsey County. Photo courtesy of the University of Minnesota.

Reducing the carp population to a manageable level and ultimately sustaining improved water quality is a complex process. It will likely require comprehensive, ecosystem-wide approaches and tools that target specific elements of carp's life history. The installation of fish barriers to prevent the migration of carp to areas prone to winterkill or the use of Judas carp to remove winter aggregations of adults are two such tools. The implementation of common carp management strategies need to be conducted with minimum impact on native biota, because the U of M research shows that diverse native fish communities are key in controlling common carp populations.

Once carp are reduced to manageable levels another challenge is establishing desirable native aquatic plants while preventing development of nuisance populations of curlyleaf pondweed and Eurasian watermilfoil which is the latest research led by U of M's Dr. Ray Newman.

The U of M has forged solid partnerships with the Riley-Purgatory-Bluff Creek and Ramsey-Washington Metro Watershed Districts to battle the well-established and invasive common carp. Additionally the University received LCCMR appropriated funds. The applied research and control techniques have yielded success in the Riley-Purgatory-Bluff Creek Watershed District. After several years of intense work, there is enough evidence as of September 2012 to indicate that adult carp are at manageable populations and there are no young-of-the-year carp in the entire Riley Creek chain of lakes according to the University researchers. This has resulted in immediate water quality improvements.

Construction of a fish barrier to prevent carp migration. Photo courtesy of the University of Minnesota.

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