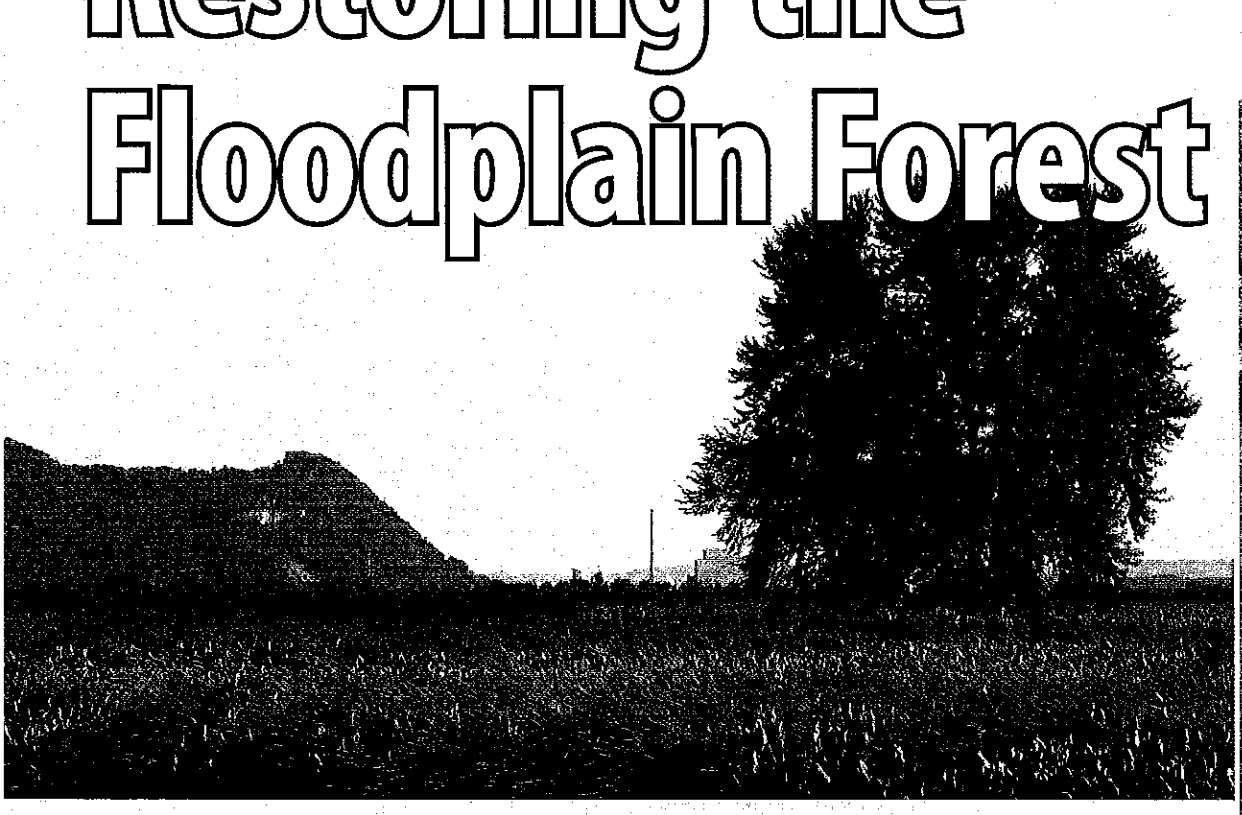
Restoring the Floodplain Forest



Reed canary grass has spread widely through the islands and forests of the river floodplain.

Right: Kurt Brownell, Army Corps natural resource specialist, stands in a sea of small silver maple seedlings. They would be taller if hungry deer didn't browse on them. (both by Pamela Eyden)

By Pamela Eyden

Kurt Brownell stood at the new Hunters Point boat landing at Goose Island Park, south of La Crosse, Wis., and pointed to some grassy islands across a narrow boat channel.

"Those islands were full of trees a few years ago," recalled the natural resource specialist with the Army Corps of Engineers.

Except for a willow or two, there wasn't a tree in sight. The trees had been replaced by thick stands of reed canary grass.

"That's the future of river floodplain forests," he warned.

Cutting the Grass

Reed canary grass (*Phalaris arundinacea*) is a hardy grass with a feather-shaped seed-head that turns golden brown while the grass is still green. It can grow seven feet or more, in dense thickets that crowd out all other plants. One species is native to North America. An imported northern European species is still planted as a hay crop and for animal bedding. A hybrid of the two has become an aggressive invader.

The scale of the problem is immense. One study estimated that reed canary grass had become one of the three most prominent plants in the understory of floodplain forests in the Upper Mississippi River Valley.

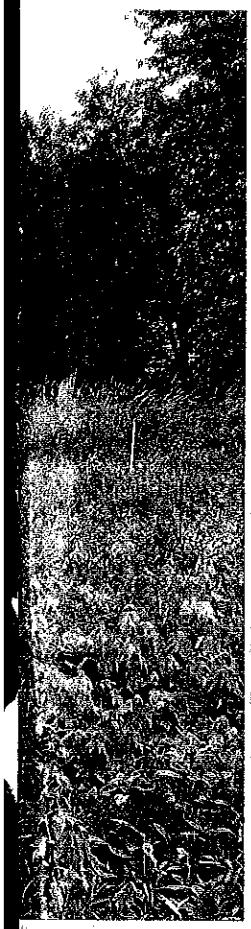
The native swamp white oak has been declining for years, victim of the perpetually high waters of the dammed river.

This is happening against a background of other trouble in the floodplain forests. The native swamp white oak has been declining for years, victim of the perpetually high waters of the dammed river. Now silver maple, another tree that's important for migratory birds, is also not regenerating. Silver maple has about a 120-year lifespan. Since most of the tall trees alive today are about 80 years old, resource managers estimate that they may all be gone in 40 to 50 years.

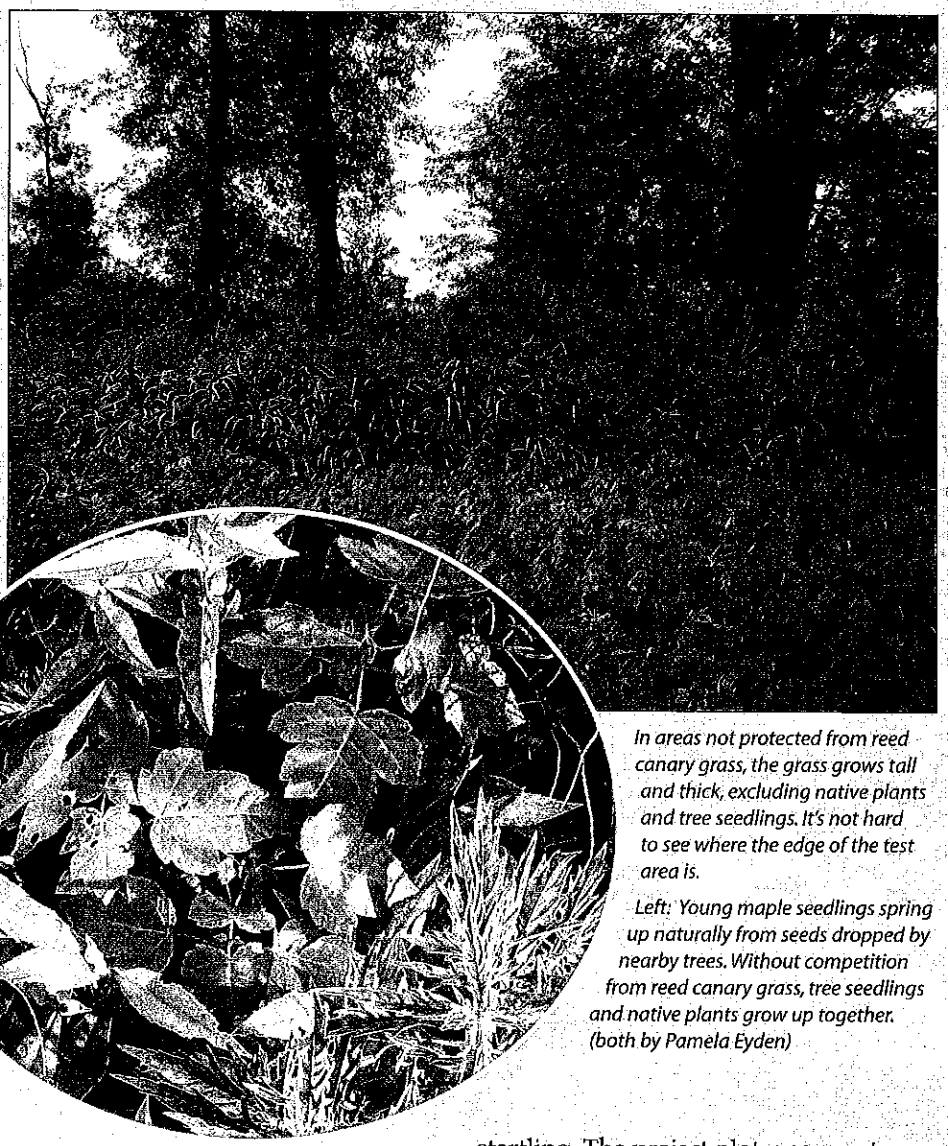
Could grass and high water bring down a forest? The majestic floodplain forests of the Upper Mississippi may look primordial, but they are constantly changing, following a natural and predictable succession of trees. Once a forest matures, wind or flood or some other disruption fells trees and creates an opening, and the cycle begins again. Reed canary grass has changed the game. It grows quickly in the spring and shades out tiny, slow-growing seedlings of maple, cottonwood, ash and oak. The tree seedlings can't grow under a dense blanket of grass. Any opening in the forest, even from natural causes, is an open invita-

tion to canary grass.

"Reed canary grass thrives on rich nutrients and nitrogen, as well as in silt and conditions of frequent flooding," Brownell said. "We've created something like the 'perfect storm' for reed canary grass growth on the river."



After it gets established, controlling or getting rid of it is very difficult. The usual non-chemical means don't work very well. Burning, mowing and tilling only encourage it, although mowing five times a year for five to ten years has been effective. Tilling works, if you till deeply through the sod layer several times during the growing season, then flood the area to a depth of 18 inches from November through May or June. Cows eat only young grass shoots. Goats and sheep will graze on it, but they'll eat everything else, too.



In areas not protected from reed canary grass, the grass grows tall and thick, excluding native plants and tree seedlings. It's not hard to see where the edge of the test area is.

Left: Young maple seedlings spring up naturally from seeds dropped by nearby trees. Without competition from reed canary grass, tree seedlings and native plants grow up together. (both by Pamela Eyden)

Brownell and his research partner, Meredith Thomsen, a plant ecologist and assistant professor of biology at the University of Wisconsin-La Crosse, are in the third year of a project to reclaim floodplain forest on four and a half acres just north of Goose Island. After straight line winds blew down a stretch of mature trees in the late 1990s, reed canary grass moved in quickly. By 2006 the grass had taken over the whole site. Brownell and Thomsen set up experimental and control sites. The first fall the area was totally scarified with a grubbing machine that chops up refuse and everything within a few inches of the surface. Then four different pre-emergent herbicides were applied to different sites. Pre-emergent herbicides get absorbed into the roots and stay there throughout the winter and spring floods.

"These were chosen because they are approved for wetland use. They stay put and do not drift off into the river or the floods," said Thomsen.

Grubbing and herbicide still didn't stop the grass. The next season it was slow to emerge, but eventually did begin growing the next summer.

To combat reed canary grass on the experimental sites, they used three different types of herbicides at different times: pre-emergent, grass-specific and glyphosate, the main ingredient in Roundup. Because it kills all living plants, glyphosate can be used only in areas where reed canary grass is the only thing growing, Brownell said.

By 2008 the reed canary grass was gone and no further herbicide treatment was required.

Thomsen and Brownell are excited about the success of the project. In mid-July 2009 the difference between the plot and surrounding land was startling. The project plot was a wet meadow crowded with native grasses, forbs and lots of young silver maple seedlings ten to twelve inches tall. Surrounding the plot on all sides was a dense wall of reed canary grass.

"The resident plant community is now resistant to invasion by reed canary grass," said Thomsen. "Or at least I hope it is. I'm a scientist, so I always hedge my bets."

Brownell and Thomsen anticipate writing up their initial research results this year.

Next year Thomsen will continue working at the site, finding ways to keep deer from browsing all the silver maple seedlings. She and a graduate student will consider tubes, exclosures, solar-powered electric fences, taller fences, and a stinky repellent spray made from pig blood.

Brownell will begin an active management project at Gores Wildlife

Black locusts are invasive because they reproduce readily by both seeds and underground runners. The young saplings on the left sprang up from runners extending from the roots of trees that were cut the season before. Saplings grow into mature trees like those on the right. (Pamela Eyden)

Area, near Red Wing, Minn. By doing patchwork cuts of mature trees, then keeping reed canary grass out of the openings, they hope to re-institute an area of multi-aged floodplain forest that will survive the expected die-off of mature silver maples in 40 to 50 years.

Before locks and dams raised water levels, all floodplain forests were multigenerational. They were, in plant ecology terms, resistant to invasion.

Plague of Locusts

Brownell is equally involved in another project to restore floodplain trees in an area taken over by black locust trees.

Black locusts are native to North America, although they didn't have a toehold in the North until they were imported during the Dust Bowl era of the 1930s. This scrubby-barked tree with thorns and ferny leaves reproduces itself primarily by way of runners and rhizomes, like reed canary grass does. Like the grass, too, it has little value for wildlife and replaces trees that do.

At Goose Island Park, owned by the Army Corps and leased to La Crosse County, Brownell is working to restore indigenous trees in an area taken over by black locust trees. The 20-acre plot was cleared with the help of a phalanx of hard-working volunteers. Sale of the logs netted about $5,000.

"Black locust doesn't rot. It's also good firewood," Brownell said.

Because black locust spreads by underground rhizomes, cutting wasn't enough. The fields were also worked over with the grubbing machine. After this preparation, in 2005 the Army Corps planted 2,000 trees. The next spring, they found that under the snow hungry mice had gnawed the saplings at ground level.

"It was like some kind of Bugs Bunny cartoon," Brownell recalled. "You know, when he pulled on the carrot tops and they weren't attached to anything."

The next year they disked in acorns and walnuts. As saplings sprouted they installed protective five-foot-tall tubes to keep deer from browsing on them.

They also planted saplings grown specially for the project by a company that produces four- to seven-foot tall saplings by a patented method. These trees were protected with a deer repellent made of pig blood.

Brownell heard that hawks might help keep the rodent population down, so he had a friend make pole

Young native trees grow up in tubes to protect them from browsing deer. Tall stands made of rot-resistant black locust were built to attract hawks to eat the mice that were also eating the tree seedlings. (Pamela Eyden)

A refuge technician and a graduate student push through five-foot-tall reed canary grass to get to the project plot. (Eric Nelson, USF&WS)

A monitoring team relaxes after spending the day in heavy reed canary grass at the Whalen Tract north of New Albin, Iowa. (Eric Nelson, USF&WS)

perches out of black locust. The 12-foot poles provoke more questions from visitors than the tubed trees do. Brownell isn't sure the hawk poles have done the job, but mice are not the problem they once were.

"People tell me they have seen hawks and owls perched out there," he said with a ready laugh.

Another Grass Attack

The U.S. Fish and Wildlife Service (FWS) is also looking for effective ways to manage reed canary grass and restore native species. Now in the second year of a three-year study, seven refuges are participating, including the Upper Mississippi River National Wildlife and Fish Refuge, the Minnesota Valley National Wildlife Refuge in Minnesota and the Port Louisa National Wildlife Refuge in Iowa. Each has three to six plots of two to three acres each. Some were meadow and some were forest before being overrun by reed canary grass.

In late summer of the first year, an application of glyphosate knocked down the reed canary grass on both land types. A different grass-specific herbicide (fusillade) was used the second year, because it kills only the grass, not other types of meadow plants that may have grown up.

Two years of glyphosate is the plan for forest sites.

"The first year it knocks out the existing plants and their heavy roots. The second treatment, hopefully, knocks out new grass shoots that germinate from seeds residing in the seed bank," said Eric Nelson, wildlife biologist for the Upper Mississippi Refuge.

A seed bank of reed canary grass can produce a carpet of up to 2,000 grass plants per square meter. Established plants grow to a density of 200 to 500 stems per square meter.

Nelson said he believes that reed canary grass control is among the most important ecological projects on the refuge.

Like the Army Corps project, these plots are carefully monitored for water levels, light levels and what seeds naturally fall from surrounding vegetation. After the first snowfall in early winter 2009, seeds of a variety of native grasses, sedges and forbs will be broadcast over the meadow area.

"They will self-plant when the snow melts," said Nelson.

Next summer researchers hope to have a better idea about which seeds work best. Wind-blown tree seeds are expected to repopulate the forest areas, although the project calls for planting trees in the spring of 2010.

The FWS project involves computer modeling and the cooperation of scientists at both the University of Minnesota and University of Florida. Careful analysis of results will allow them to adjust herbicides, timing, seed mix, etc., and adapt the treatment. Success against this aggressive and adaptive plant will be measured by the extent of regrowth of native trees and meadows. That won't happen overnight.

Nelson said he believes that reed canary grass control is among the most important ecological projects on the refuge. The project will cost about $300,000 for three years, which indicates it's got fairly high priority.

"This is one of the big problems," he said. "It's bigger than purple loosestrife. Reed canary grass reduces diversity — it may not affect waterfowl, who depend on vegetation in deeper parts of the pool, but it will certainly affect bitterns, rails and wrens, and a lot of other species."

Nelson said that he does not expect to eliminate all reed canary grass.

"It's an aggressive, adaptive plant that will take many years to control. We're concerned it's going to replace floodplain forests and meadows."

Pamela Eyden is news and photo editor of **Big River.**