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Research, Education and Outreach in the Division of Agriculture, Forestry and Veterinary Medicine



Mississippi State University

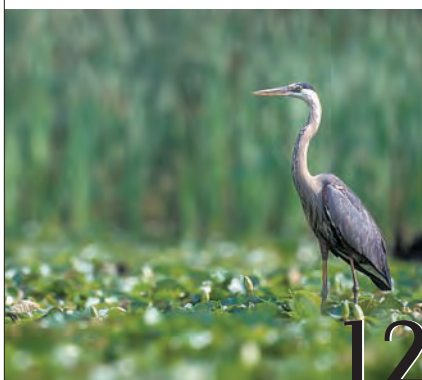


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The fragrant water lily is one of the native aquatic plants being displaced by invasive species in Mississippi's waterways. The story beginning on page 12 explains how MSU scientists are tackling the problem of invasive aquatic plant species. (Photo by Joe Hudspeth, Jr.)

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Even frogs are being squeezed by new plants, including algae species, in their habitat. (Photo by Joe Hudspeth, Jr.)

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MSU

Researchers Advise Not To Waste 'Waste Rice'

By Karen Brasher

Millions of ducks and geese depend on waste rice—grain that escapes combines during harvest—as a rich source of energy while wintering in major rice-growing states such as Arkansas, California, Louisiana, Mississippi, Missouri and Texas.

Rice producers do not intentionally waste rice, but combines are unable to collect all the rice and some falls to the ground. In fact, recent research conducted in Mississippi State University's Forest and Wildlife Research Center shows that, on average, about 240 pounds per acre, or about five bushels, of rice remains in fields after harvest in the Mississippi Delta.

The study found that between harvest in September and the first major arrivals of waterfowl in mid- to late-November, about 70 percent of the original deposit of waste rice gets further wasted through decomposition and consumption by rodents, birds and insects. Part of the loss is also from rice seedlings that germinate from the fallen grain but die after the first hard freeze.

By early winter, an average of only about 70 pounds an acre remains in harvested rice fields. That may seem like a lot, but when spread over an acre it is near the level at which ducks will stop feeding, said Rick Kaminski, professor and waterfowl ecologist in the Department of Wildlife and Fisheries.

"There is scientific evidence that ducks stop feeding and abandon rice fields when the 'giving-up' density of rice reaches about 45 pounds per acre," Kaminski said. "Additional research was needed to evaluate strategies that might decrease the loss of waste rice."

Kaminski, along with former graduate student and now Ducks Unlimited biologist Jennifer Kross and U.S. Geological Survey scientist Ken Reinecke, tackled the problem of how to conserve waste rice during fall in harvested fields. Ducks Unlimited, MSU's Forest and Wildlife Research Center, the Mississippi Agricultural and Forestry Experiment Station, the North American Wetlands Conservation Council, the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and the states of Mississippi and Arkansas funded the research.

Kross evaluated the effects of postharvest burning, rolling, disking, mowing and no manipulation (control) of rice stubble to determine which strategies conserved the most waste rice. Immediately after harvest, the treatments did not significantly affect the abundance of waste rice, indicating all treatments had a similar starting point in early fall.

"By late fall, however, only standing stubble, burned and mowed paddies contained levels of waste rice above the giving-up density for feeding ducks," Kross said. "Paddies left in standing stubble contained the most waste rice at 93 pounds per acre, followed by burned at 65 pounds, mowed at 60 pounds, rolled at 45 pounds and disked paddies at 43 pounds."



Joe Mac Hudspeth, Jr.

Dense standing stubble, she noted, may protect waste rice from seed predators and reduce germination of fallen seed, while fire may kill the embryo of waste seeds and prevent them from germinating.

New research by current MSU graduate student Houston Havens has found that while the most waste rice was conserved by leaving fields in standing stubble, ducks and geese do not use those fields as much as those that are burned or rolled and then flooded.

"Perhaps standing stubble may not provide the optimal interspersion of vegetation and open water favored by waterfowl," Havens said.

He added that burning conserves the second greatest amount of waste rice, is far more economical than mechanical treatments and remains a legal postharvest field practice in the Delta.

The researchers recommend burning harvested rice fields with a slight head wind. This way, the fire will travel across fields quickly and produce a "patchy" distribution of stubble and open water after flooding.

"In regions of the country where fire is not permitted because of air-quality regulations, the next best strategy appears to be rolling stubble to create openings for ducks and geese to land after fields are flooded," Havens said. "Mowing and disking are not recommended because both are costly, and disking buries rice seed, making it less available for feeding waterfowl."

In addition to managing harvested rice fields to maximize availability of waste rice after harvest, the researchers strongly recommend integrating moist-soil wetlands into farmed landscapes. These natural wetlands occur frequently where rice and other lowland agriculture flourish and support a great diversity of natural grasses and sedges that produce abundant seeds and tubers used by ducks and geese.

"Managed moist-soil wetlands can help lessen losses of waste rice, because these unharvested natural crops provide more than five times the seed and duck foraging potential as harvested rice fields," said Kross, who has also researched seed availability in moist-soil areas.



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Researchers Tackle Aquatic Plant Invasion

By Karen Brasher



Many species of alligators, fish and birds make their home at Mississippi's largest surface water impoundment, the Ross Barnett Reservoir. Now, however, new residents—aquatic plants that are not native to the area—are invading the reservoir.

Built in 1966, the Ross Barnett Reservoir contains 33,000 acres, mostly between Madison and Rankin counties.

The reservoir, managed by the Pearl River Valley Water Supply District, is the primary source of drinking water for the city of Jackson.

"The reservoir provides many recreational opportunities, including campgrounds, parks and trails, as well as residential areas," said John Madsen, assistant research professor in MSU's GeoResources Institute. "However, in recent years, invasive species have become an increasing problem on the reservoir."

Introduced from other parts of the world, invasive aquatic plants affect aesthetics, drainage, fish and wildlife habitat, water quality, irrigation, navigation, recreation, and ultimately land values, Madsen added.

To gain a better understanding of the plant invasion, scientists in the Mississippi Water Resources Research Institute and MSU's GeoResources Institute are developing an aquatic plant management plan for the Ross Barnett Reservoir.

"The first step in developing a long-term aquatic plant management plan is to assess the reservoir's plant community by mapping their current distribution," said Ryan Wersal, research associate in the GeoResources Institute.

To map the distribution of plants, the team used a handheld personal digital assistant outfitted with a GPS receiver.

Scientists mapped more than 1,423 points during the study. In addition to sampling for aquatic species, researchers also recorded light intensity and environmental parameters, such as depth, pH and water temperature.

"Of the 14 aquatic plant species observed, only three were exotic or invasive," said Mary Love Tagert, assistant research professor in Mississippi Water Resources Research Institute. "However, these invasive species occurred one-third as many times as native plants."

The invasive plants are so prevalent now, Tagert added, that a series of warm winters could allow them to spread to new areas throughout the reservoir.

One of the problems with these invasive species is that they are floating and mat-forming plants that shut out light for more desirable native species.

"The reservoir is a shallow body of water and has the potential to support many rooted submersed native plants," Tagert said.

Invasive species not only affect water quality, in particular oxygen and temperature, they also can play havoc with fish populations.

"Invasives completely change the structure of the shallow, weeded areas of the reservoir, which impacts the growth, survival and health of fish populations," said Eric Dibble, associate professor and fisheries biologist in MSU's Forest and Wildlife Research Center.

The problem is, Dibble added, that invasive species add so much structure to the system compared with native plants, that they can reduce fish populations and health. The long-term result would be a significant reduction in recreational fishing on the reservoir.

The new plants also affect other wildlife, such as birds,

making it difficult for them to find a good meal because of the massive floating plant communities. Fewer birds would impact another popular recreational activity at the reservoir—bird watching.

One of the newest invasive species found in the reservoir is hydrilla.

“Hydrilla is a submersed rooted plant that forms a dense mat and has been detected in several locations in the reservoir,” Wersal said. “If invasive species such as hydrilla are not controlled, an infestation could easily encompass more than 7,000 acres of the reservoir.”

Funded by the Pearl River Valley Water Supply District,

scientists are actively working to assess changes and the spread of nuisance species populations on the reservoir.

“We will continue to monitor the distribution of invasive species as well as implement and assess techniques to control the nuisance plants,” Wersal said. “Our goal is to promote the growth of desirable native plants and improve the water quality in the reservoir and other bodies of water in Mississippi.”

The Mississippi Water Resources Research Institute is a unit of MSU’s Forest and Wildlife Research Center. The GeoResources Institute is an affiliate of MSU’s High Performance Computing Collaboratory.

Photos by Joe Mac Hudspeth, Jr.



Wildlife photographer Joe Mac Hudspeth, Jr., often has to navigate an ocean of invasive aquatic plants as he photographs birds and animals at Ross Barnett Reservoir. (Photo by Jim Johnston)

INVADING PLANTS SQUEEZE OUT WILDLIFE PHOTOGRAPHER

Joe Mac Hudspeth, Jr., wildlife photographer and native Mississippian knows firsthand the problem with invasive species. Hudspeth has been photographing Ross Barnett Reservoir for more than 20 years.

“I’ve all but lost all of the places I’ve photographed over the last 16 years. You can’t get to the place where the image of me in the boat was taken,” Hudspeth said. “The east side of Pipeline

Road on the east side of the reservoir (Rankin County) was ‘taken over’ five or six years ago.”

Hudspeth went on to say that he would probably lose complete access to the wetlands off Pipeline Road on the west side of the reservoir (Madison County) within the next two years.

One of Hudspeth’s favorite reservoir spots to photograph blue-winged teals is now uninhabitable because of invasive plants.

“I wasn’t able to photograph blue-winged teals last spring because the ‘hole’ they had been frequenting for several years is so thick that they can’t land in any water, and I can’t walk to it,” Hudspeth added.

The problem is such that Hudspeth did not even attempt to photograph on Pipeline Road this year or last year.

Hudspeth indicated that other places in Mississippi are also suffering from the invasion.

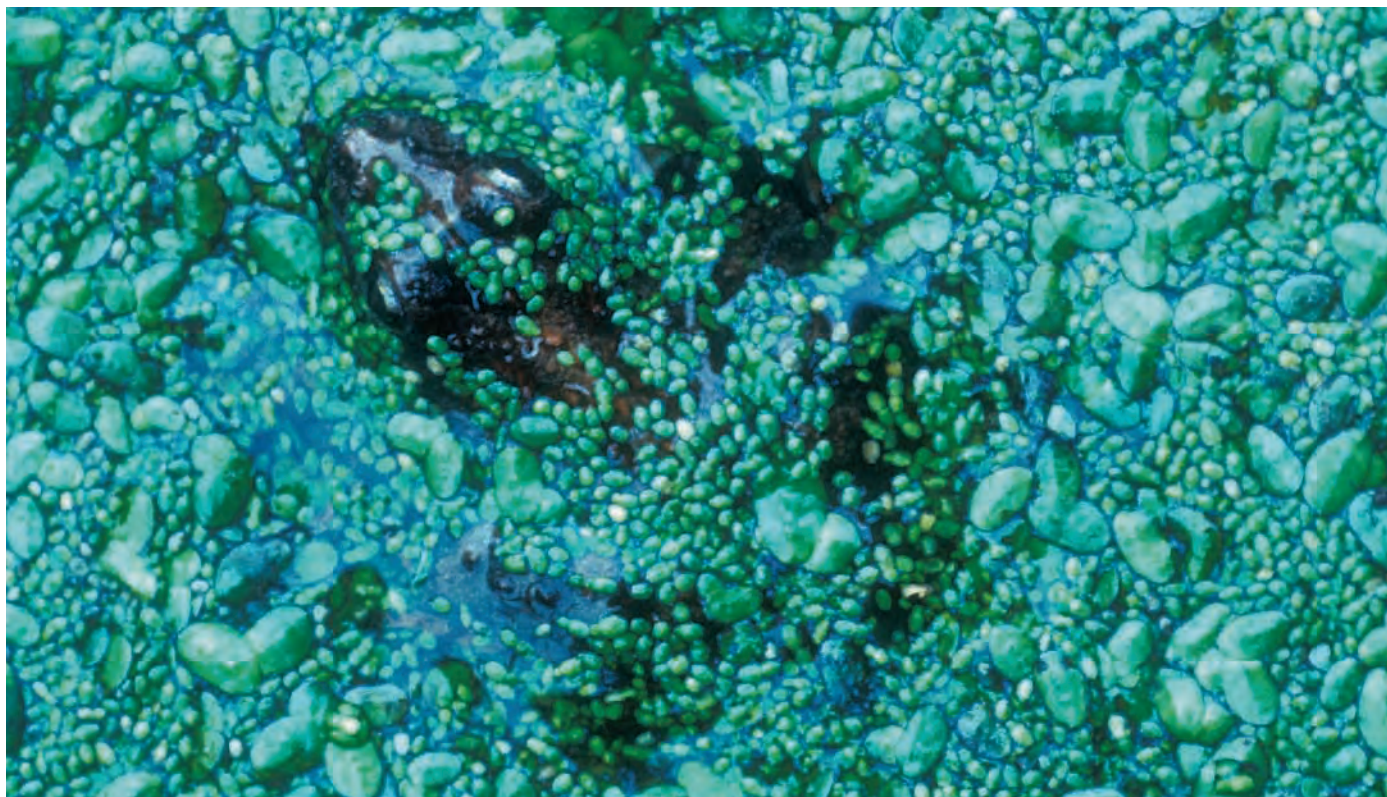
“The back waters of Bluff Lake at Noxubee National Wildlife Refuge were invaded so badly that park officials drained Loakfoma Lake to try to stop the nuisance plants,” Hudspeth said.

Hudspeth, a Lafayette County native, has been published more than 900 times in national, regional and statewide publications. In 1993, he received national recognition when his image of an immature least bittern, taken on Ross Barnett Reservoir, was selected from more than 2,000 wildlife calendar photographs and awarded the Grand Prize for Wildlife by the Roger Tory Peterson Institute for Natural History.

Hudspeth’s photos have appeared on nine Mississippi Duck Stamps and 10 Mississippi sportsman’s licenses.

It's all in the name. Check it out for news and information from the Division of Agriculture, Forestry and Veterinary Medicine.

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