Texas Under Attack

Cherokeean Herald, 4/21/10, by Larry Hodge

Invasive species are marching on Texas—but beneficial bugs are bracing for battle

Paddling a kayak across Old Folks Playground on Caddo Lake brings me face to face with the enemy. Giant salvinia and water hyacinth crowd in from every direction, a noxious salad that, like aliens in sci-fi movies, chokes the life out of its host.

Caddo Lake is dying a slow death, but it's not the only part of Texas in trouble. From the Rio Grande to the Canadian, the Sabine to the Pecos, non-native plants brought into the state by accident, good intentions or sheer ignorance have reshaped our lands and waters. In less than 200 years we have introduced more than 800 non-native plant species, some of which are wreaking havoc on the ecosystem.

In fact, the Texas of today is not the one the first settlers found in the 1820s. The Texas we pass on to our grandchildren will be different still. Whether it is better or worse than the one we know depends on what we do about the alien invaders. And much of that will depend on still other foreign species: insects with names like *Diorhabda elongata, Cyrtobagous salviniae* and *Agasicles hygrophila.*

Dr. Guy Nesom of Fort Worth, a systematic botanist and retired college professor, has given Texas a gift no other state has: a complete list of documented non-native species, 820 in all, classified according to their potential to be controlled or eradicated. Among the 51 species Nesom classifies as F1 (invasive in both disturbed and natural habitats and negatively affecting native species) are some familiar names: *Arundo donax* (giant river cane), several species of *Tamarix* (saltcedar trees), *Salvinia molesta* (giant salvinia), *Hydrilla verticillata* (hydrilla) and *Eichornia crassipes* (water hyacinth).

(Not all species from other countries turn out to be undesirable. *Malus domestica* from Kazakhstan, for example, is loved by people worldwide who know it as apples.)

Nesom classifies more than 250 additional species as F2 (expanding in range but not yet significantly affecting native species). "The F1 species and many of the F2s are well-known invaders and already so widespread that it is unlikely that they can be eradicated or even controlled except by sustained efforts on local levels," he told listeners at the Texas Invasive Plant and Pest Conference in San Antonio in November 2009.

It is ironic that in the land where mass communication was born the public knows so little about invasive species and that controlling them depends on the very lowest of low-tech: biological control, or using living things to eat or otherwise kill the invaders.

Nesom regards aquatic plants as particularly troubling because of their potential for rapid dispersal and growth. Among these is giant salvinia, a plant well known to Texas Parks and Wildlife Department (TPWD) biologists, anglers and boaters. Giant salvinia has been found (and in some cases removed from) more than a dozen lakes in East Texas. It persists on Toledo Bend Reservoir, Sam Rayburn Reservoir and Caddo Lake.

Giant salvinia, like water hyacinth and hydrilla, is a fast-growing tropical plant with no natural predators in this country. Left unchecked, these plants can completely take over a body of water, blocking access for boaters and denying species from ducks to fish what they need to live. Put simply, they can kill a lake, and giant salvinia is the worst of the lot, being capable of doubling in coverage in a week or less.

Worst of all, it's easily spread from one lake to another when plants or parts of plants are transported on boats, boat trailers or hauling vehicles. That makes every person who puts a boat in the water a potential carrier of the threat—or a guardian of the resource. That dichotomy drives the public awareness campaign that will be launched by TPWD in spring 2010 encouraging boaters to inspect and clean their boats and trailers before launching and when retrieving a boat. (See sidebar.) It is illegal to transport giant salvinia, but many people continue to do so.

TPWD practices Integrated Pest Management—using a number of techniques in combination. "We need public awareness, herbicide application, water management, biocontrol and prevention," says Howard Elder, TPWD's aquatic habitat enhancement biologist. "Prevention is the cheapest means of control. The best method of control of an invasive species is never to get it."

While Environmental Protection Agency (EPA) approved herbicides provide short-term control, they are expensive. "TPWD will spend $1.3 million for spraying this year. A dollar's worth of prevention is worth $100,000 of control," says Ross Melinchuk, TPWD's deputy executive director for natural resources. "Education and outreach are important. Biological control has promise—we're excited about saltcedar beetles and giant salvinia weevils."

TPWD has introduced giant salvinia weevils (*Cyrtobagous salviniae)* at Toledo Bend and other lakes, but one problem has been getting a reliable supply. Currently Elder is working to establish brood and rearing facilities near Caddo Lake and Toledo Bend to ramp up production.
Ironically, using biological control works only if you don't get rid of *all* the invasive species. Enough needs to remain to host the control agent so some will always be available to keep munching at a level that keeps the invader in check.

While biological control is inexpensive compared to other methods and offers perhaps the only long-term hope for control, it has one big draw-back: It's slow. Potential biocontrol agents have to be located in the target plant's home range, evaluated for effectiveness, cleared for release by the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), tested on other plants to be sure they will harm only the target plant, then imported, propagated, released and monitored. In the case of *Diorhabda elongata* (saltcedar beetles) for example, it took 15 years to see meaningful results.

While it might seem risky to introduce one alien species to control another, that's not a problem, says Dr. Jack DeLoach of USDA's Agricultural Research Service (ARS). DeLoach, who works at the USDA-ARS facility in Temple, is the leading national expert on using saltcedar beetles for biological control, a project he's been working on since 1986.

"A lot of people are concerned about biological control, but they don't realize we only choose overseas insects that don't eat anything else as far as we know. That's the only kind released anywhere, worldwide," DeLoach says. He points to the track record of biological control in the U.S. "Out of 1,151 projects, only one resulted in moderate damage to a non-target plant—the release of seed-head weevils in 1965 to control musk thistle in Nebraska," he says. "In that case overseas testing was clear: They knew it would attack a native species, but they released it anyway. We're not going down that road again."

In the case of saltcedar beetles, DeLoach hired scientists in various home ranges of the beetles—France, Israel, Turkey, India, China, Turkmenistan, Uzbekistan, Crete and Kazakhstan—to research possible biological control agents for saltcedar. He also spent considerable time camping out near saltcedar in foreign countries, collecting bugs. The most promising were tested under quarantine at the Temple facility to be sure they would not eat any plants native to North America.

Saltcedars have been described as one of the worst ecological disasters in the western United States. First reported in the U.S. in 1823, they now occupy some 2 million acres of the most valuable land—riparian areas along streams and rivers. Saltcedars displace native plants and the wildlife that depends on them, lower water tables, increase soil salinity to the level that native cottonwoods and willows cannot grow and dry up springs and small streams. Every river system in West Texas has saltcedar.

The use of saltcedar beetles (*Diorhabda elongata)* to control saltcedar is probably the poster child for the success of biological control in the United States. Tens of thousands of acres in the West have been freed from the noxious tree's clutches. After a slow start in Texas, the beetles appear to be on the march—or munch—at locations on the Rio Grande, the Pecos, the Upper Colorado (where a $250,000 grant from the Wal-Mart Foundation is funding work) and the Canadian. Beetles have been released on the Matador Wildlife Management Area near Childress and Big Bend Ranch State Park near Lajitas. The most notable success has been on private land along Beals Creek near Big Spring. The original 38 beetles released in 2004, their offspring, and others stocked since have now spread along 35 miles of the creek and defoliated between 500 and 1,000 acres of saltcedar.

After being defoliated for two or three years, the trees begin to starve to death from lack of stored carbohydrates in their root crown, and something amazing happens. "I was shocked when I saw complete grass cover come back under the trees the very next year once the beetles defoliated the trees and the sun got through and water came back," DeLoach exults. "I could not believe it happened so fast."
Word spread quickly about the brown swath expanding along the creek just south of Interstate 20. "The thing landowners in the area are most interested in is getting their grass back," DeLoach says. "They all want to know, 'When can we get some beetles?'"
After grass the benefit of biocontrol likely of most interest to landowners is cost. "We've released beetles on about 20 different ranches, and there has not been one penny of cost to the ranchers," DeLoach reveals. "Now I think the thing to do is wait a while instead of spending a lot of money. Salt will leach out of the soil, and native vegetation will come back naturally. There will also be less streambank erosion, and reservoir sedimentation will be less."

Though turning a few bugs loose in the trees sounds simple, there are pitfalls. As great as Texas is, it's not home to the little critters, and there have been problems with some of the releases. An early discovery was that beetles need to come from a latitude close to that of their new home. Shortening days in the fall prompt the adult beetles to go to sleep for the winter, and bugs from the wrong latitude can go beddy-bye too early and starve to death before spring. Since they overwinter on the ground and live near streams, fall flooding can drown them. Once they make it through the winter and emerge, a late freeze can kill them. As if that were not enough, Texas ants find saltcedar beetles really tasty.

DeLoach thinks the key to solving the problems is the bugs themselves. "They can probably adjust to cold weather if enough survive a freeze, since those might be more resistant to cold," he says. As for the ants and other predators, DeLoach thinks the answer is to pretreat release sites with insecticides and release more beetles at a time. "It seems when the population gets built up enough, they sweep through the area and overwhelm whatever predators are out there." Gone are the days of releasing 38 beetles: 10,000 to 30,000 at a time is now the norm. Since the population can double every six to seven days, numbers increase exponentially.

TPWD has successfully used sterile grass carp to control hydrilla on Lakes Austin and Conroe, and work is beginning on the use of insects to control other plants. On Lake Fork, alligatorweed fleabeetles (*Agasicles hygrophila)* have been introduced to control a South American aquatic plant that, like water hyacinth and giant salvinia, can form huge masses that block waterways. The fleabeetles proved so successful in Florida that spraying of alligatorweed was discontinued in 1968. The bugs have been used in rice-growing areas along the Texas coast since 1967.

Cooperative efforts between USDA and Mexico are currently under way to release the wasp *Tetramesa romana* by airdrops along the Rio Grande to control *Arundo donax,* giant river cane. "The goal is a lower density of cane, a return to native vegetation in riparian areas and water conservation," says John Goolsby of USDA's Beneficial Insects Research Unit in Weslaco. "The cost of returned water from the reduction of cane is calculated at $44 per acre-foot." (The cost of water from newly-constructed reservoirs runs into the hundreds of dollars per acre-foot.)
Every part of Texas has its problems with invasive species, but since humans don't live for 200 years, it's difficult for us to see their long-term impacts. That's the focus of work being done at the Caesar Kleberg Wildlife Research Institute in Kingsville by ecologist Dr. Andrea Litt. She studies the changes that take place in an ecosystem as invasive plants move in and become dominant—and it's not a pretty picture. "Invasive plants can alter the quantity and quality of habitat for native wildlife by affecting cover, food, and other habitat features important for these species, resulting in shifts in community composition, abundance, and population structure," she says. In other words, when invasive plants move in, the Texas we know goes away: plants, bugs, birds, mammals, fish.

Jack DeLoach warns the danger is real. "In riparian areas, saltcedar has already changed Texas," he says. "In the rest of the country, it looks like we will lose all our native forests. More and more things are being brought in accidentally—the emerald ash borer, the gypsy moth, the soapberry borer, dutch elm disease, chestnut blight. It just keeps increasing, and we are doing a woefully inadequate job of addressing this. The future does not look good."

What can we do? Perhaps the first step is to recognize that the invasive species problem is really a people problem. Invasive species don't magically appear; someone brings them. "We need to tighten up the regulations and reduce the number of new introductions coming in," DeLoach says. "I would put a stop to all exotics coming in unless they were needed and had been tested to be sure they will not cause problems. We don't need any more ornamental plants or aquarium fish."