

Invasive Species
Will Take Over
America's Wildlife Refuges
Unless We Act Now

SILENT INVASION

A Call to Action

from the

National Wildlife

Refuge Association

October 2002





The mission of the National Wildlife Refuge Association (NWRA) is to protect, enhance and expand the National Wildlife Refuge System, lands set aside by the American people to protect our diverse wildlife heritage.

The NWRA works with decision-makers in Washington, D.C., to help the Refuge System better fulfill its wildlife conservation mission. We promote community support for refuges by providing the more than 200 refuge Friends volunteer organizations with the tools, information and resources to make a difference. And we work to educate the public about the importance of protecting Teddy Roosevelt's unique conservation legacy.

Our diverse national membership includes U.S. Fish and Wildlife Service professionals, members of refuge Friends organizations, refuge volunteers and other conservation-minded citizens.

To learn more about the NWRA or become a member, please visit our website at **www.refugenet.org**, or write:

National Wildlife Refuge Association
1010 Wisconsin Avenue, NW
Suite 200
Washington, DC 20007

Day by Day, Acre by Acre...

... aliens are quietly spreading throughout America. They arrive by air, in ships, and over highways. They don't carry identification, and they don't stop at borders. Despite dozens of vigilant government agencies, including the Department of Defense, on the lookout — they slip in.

They are invasive species: insects, plants, and animals that wreak havoc on native ecosystems. Some invasives, native to other parts of the

world, find their way to the United States through international trade and travel. Others originate in this country but spread to different regions, choking out the native life in their path.

Invasive species are reaching deep into our National Wildlife Refuge System — 540 refuges and 3,000 waterfowl areas on 95 million acres throughout the United States and its territories, managed by the U.S. Fish and Wildlife

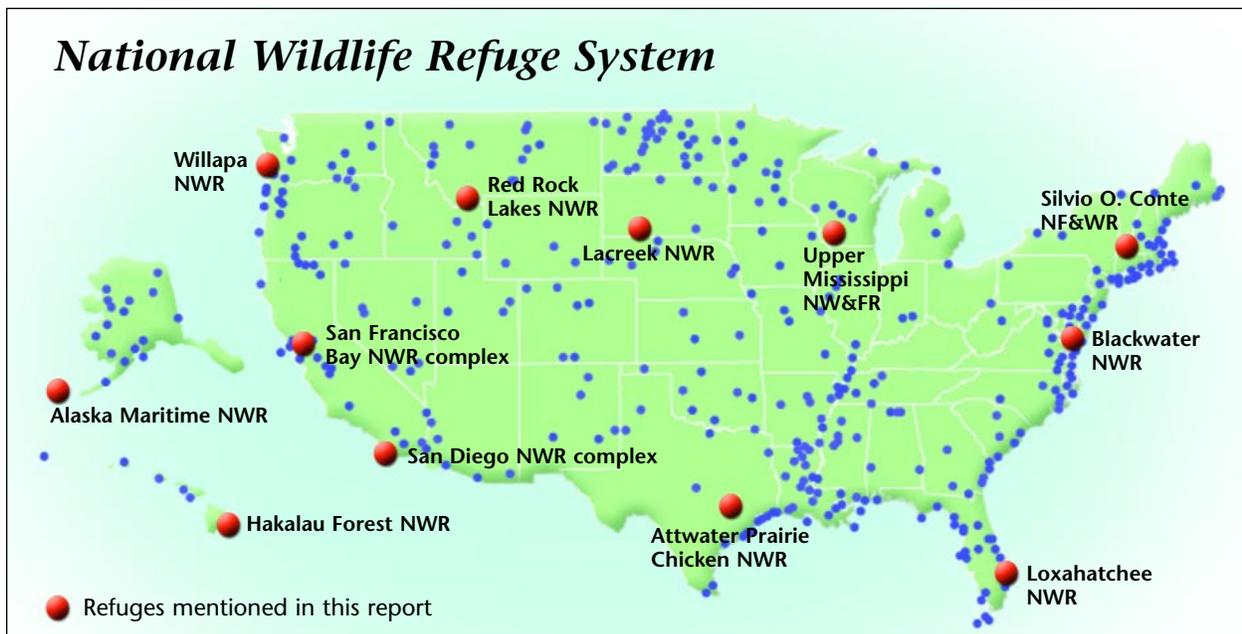
Service. These invaders are creating an ecological crisis in the very places we have set aside to protect native life and pristine landscapes.

Refuge managers know what to do: find partners, devise strategies, and mobilize volunteers to drive out the invaders and begin to restore our lands and waterways. But our national wildlife refuges need consistent federal financial support to ensure success.

A Call to Action

The National Wildlife Refuge Association (NWRA) urges Congress and the Administration to provide \$150 million over five years to implement this three-part strategy against invasive species on our national wildlife refuges:

1. Train and mobilize 5,000 volunteers to assist refuges.
2. Deploy 50 rapid response "strike teams."
3. Implement the Management Plan of the National Invasive Species Council.



The National Wildlife Refuge System is the world's largest land and water system, set aside to protect and conserve America's diverse wildlife. While 12 refuges battling invasive species are highlighted in this report, invasives are a serious threat throughout much of the 95-million-acre system. If not addressed now, the problem will grow exponentially.

That Was There — This Is Here

A Challenge To Roosevelt's Legacy



The year 1903 marked the birth of the National Wildlife Refuge System, when President Theodore Roosevelt established Pelican Island in Florida's Sebastian River as the first refuge. Roosevelt set aside more than 50 other refuges and laid the foundation for the nation's premier network of wildlife conservation lands and waters. Since then, caring people have worked hard to add hundreds of sites to the System. Now, as the System

approaches its centennial year, it faces perhaps its most daunting challenge: non-native plants and animals threatening the species we want most to conserve. In another 100 years, will the refuges remain thriving havens for native wildlife? Or will they be overrun by fast-growing weeds and harmful animals, insects and microbes? The answer depends on the commitment of citizens across the country and our national leaders in Washington to this uniquely American institution, the National Wildlife Refuge System.

At Willapa National Wildlife Refuge (NWR) in Washington State, refuge managers are trying to kill the cordgrass *Spartina alterniflora*. Yet at Blackwater NWR in Maryland, they're trying to grow it. When is a species considered to be "invasive"? When it's not native to the ecosystem and causes harm to what's there already: the environment, economy, and human health.

For centuries, people have intentionally moved species across the globe for food, fiber, or ornamental purposes — and sometimes unintentionally, in ballast water, for example. Free from the predators and other natural controls in their native habitats, these species can spread rapidly. Although some non-natives provide agricultural value, others crowd out desirable natives — becoming what we call

"invasive." Invasive species don't wear black hats, so there is sometimes understandable confusion among the public. People wonder how a pretty flower can actually be an invader taking over the landscape. That's why public education and involvement are such important components of the campaign against invasive species.



RUDY SCHUIVER

Spartina grass is an invasive species in Willapa Bay NWR in Washington, where it destroys mudflat habitat for local shorebirds. But at Blackwater NWR in Maryland, it is a sought-after native that supplies important habitat to numerous East Coast species.

Pretty Perennials

Extending 261 miles along the Mississippi River, the Upper Mississippi River National Wildlife and Fish Refuge is an oasis in America's heartland, where bottomland forests are vanishing and more than half the wetlands have been lost. The refuge is combating zebra mussels, black locust, and other non-natives, including purple loosestrife — an attractive plant that advances army-like through wetlands, forming stands that push out native plants needed by fish and wildlife. "With urbanization," says refuge manager Jim Nissen, "there's an interest in planting pretty perennials, and loosestrife fits that bill." To educate plant consumers as well as combat the problem, the district launched the highly successful Exchange-A-Plant program: dig up a loosestrife plant from your yard and receive a native perennial plant, provided at a discount by a local cooperating nursery. The Brice Prairie Conservation Association has recently released captive-raised beetles, which feed on loosestrife, on the refuge. Although it's too early to note declines in loosestrife density, adult beetles and beetle damage to plants have been observed at release sites — possible indicators of good results to come.



NORMAN E. REES, USDA ARS

Purple loosestrife, found at the Upper Mississippi NW&FR, has a beautiful blossom but crowds out native plants that provide food for waterfowl. Refuge volunteers are encouraging local citizens to plant less harmful perennials in their gardens.

Who Would Have Thought...

... the thumbnail-size zebra mussel, a European stowaway aboard a cargo ship, would reproduce so rapidly and become a costly nightmare throughout the Great Lakes and the waters of the Mississippi? Or that the West Nile virus, arriving from Africa, would spread disease and death across dozens of states so quickly?

When the northern snakehead, a fish native to south China, was discovered at a Maryland pond, its exotic characteristics and the frantic attempts to eradicate it provided grist for media humor — people called it "Franken-

fish." But there's nothing funny about the more than \$100 billion worth of damage caused by invasives in the United States every year.

Across all 50 states, invasive plants have filled more than 100 million acres, an area roughly the size of California. They continue to spread at an annual rate of



CAIT GILLESPIE

Imported as a delicacy from China, the northern snakehead has voracious appetite of its own, threatening native fish species.

approximately 14 million acres. Invasive plants, animals and microbes can devastate populations of native species — in fact, these invaders are a leading cause of native species becoming threatened or endangered.

Some invasive species are obviously menacing while others are deceptively attrac-

tive. When you've been bitten by a red fire ant, an import that has spread across the southern states, you know it! On the other hand, the beautiful water hyacinth, native to the Amazon basin, is quietly choking the life out of many U.S. waterways.

Not Even Refuges Are Safe...

Dramatic Expansion

In southwestern South Dakota, Lacreek National Wildlife Refuge encompasses sandhills, meadows, fresh water marshes, and grass prairie uplands. This remote place serves as an important staging area for migrating Canada geese, sandhill cranes, and other birds and provides winter habitat for the high plains trumpeter swan population. Unfortunately, it also provides good conditions for the invasive Canada thistle. A long-time resident, the thistle expanded dramatically in the last 10 years because of generally wet weather patterns. It crowds out native grasses and forbs on the refuge and hurts yields on neighboring farmlands — even cattle don't like to eat it! The refuge is combating Canada thistle with a number of tools: mowing, prescribed burns, and herbicide applications. Partners in the effort include state agencies, local weed boards, private landowners, and others. Working with university and government researchers, the refuge has used biological controls — insects from the thistle's original home range in Europe — but with little success. "The thistle is really resilient," says Matt Sprenger, invasive species specialist for the refuge. "It just keeps coming at you."



NORMAN E. REES, USDA-ARS

Invasive Canada thistle, above, out-competes native grasses and forbs such as goldenrod and sunflowers on Lacreek NWR. Among the refuge's native species are white pelicans, below.



JOHN AND KAREN HOLLINGSWORTH

... from the devastating effects of invaders. Day by day invasives reach more deeply into the National Wildlife Refuge System, America's premier network of conservation lands and waters.

Founded 100 years ago to provide havens for native plants and animals, the Refuge System is a uniquely American concept that protects our national heritage of splendid biological diversity and natural beauty. Nearly 37 million people visit refuges every year to watch and photograph wildlife, learn about the environment, hunt, fish, or volunteer.

Now, as the Refuge System approaches its centennial, it also faces a legion of unwelcome visitors — invasive species. Nearly *eight million acres* of habitat distributed among *half the national wildlife refuges* across the country are infested by at

least 675 different invasive species.

And with the world's ever-increasing international trade and travel, invasive species are gaining more and more opportunities to spread from their original habitats to places where they just don't belong.

Trouble in Paradise

Much of Hakalau Forest National Wildlife Refuge on Hawaii was a working cattle ranch until it was set aside in 1985 to protect rare plants and birds. The refuge prohibits access by the cattle that remain and wild pigs with extensive fencing and other measures. Gorse, blackberry, and other invasive weeds, which came to the island by various routes, crowd out native plants. “We’re gaining ground on gorse,” says refuge complex manager Dick Wass, “but only because we’ve spent a lot of money and time on it.” Rats are a bane to native birds because they prey on fledglings — when rats were removed from an experimental area, birds enjoyed a four- to five-fold increase in fledging success. Federal, state, and private researchers are looking for cost-effective methods of rat control. Then there’s banana poka, a vine that grows to 100 feet and chokes out native trees. Cattle would keep it in check, but when they are removed to stop grazing damage, the vine flourishes. Wass says the refuge is “blessed” with many volunteers, from schools, conservation groups, and community clubs. They pull out banana poka and other invaders, and they’ve planted a quarter-million native trees to restore the landscape. Still, resources are needed to provide volunteer supervision and facilities at the refuge’s remote location.



RICHARD WASS & JACK JEFFREY, USFWS

A volunteer plants native oha wai seeds at Hakalau Forest NWR, HI.

Diverse Landscapes, Diverse Problems



JOHN AND KAREN HOLLINGSWORTH

Tijuana Slough, part of San Diego NWR Complex, is home to endangered light-footed clapper rails.

The San Diego National Wildlife Refuge Complex in Southern California encompasses a set of unique landscapes providing habitat for a great diversity of endangered species. In addition to the special challenges of managing a refuge within an urban area, the complex must combat a variety of invasive species that are competing with natural communities of plants and animals. Invasives are present in the bay and the estuary, on coastal dunes, in native shrublands, and along riparian zones. Exotic marine invertebrates have arrived in ship ballast. Invasive grasses have taken over many former natural areas, increasing fire hazards. Some invasive species are even unwittingly sold in the area as ornamentals. “Some invasives mix in, and some die off,” says refuge biologist Brian Collins, “but some incubate unnoticed for a while and then their populations explode because of other changes in the ecosystem.” Refuge managers cooperate with many federal, state, municipal, and private entities to fight invaders. The Tijuana Slough unit of the refuge is part of the Tijuana River National Estuarine Research Reserve, where federal, state, and private agencies are matching funds to develop best practices for controlling non-natives and restoring natural conditions.

We Have Mouse Traps...

“Emergency Pull”

If the water chestnut plaguing the Silvio O. Conte National Fish and Wildlife Refuge in New England were the kind traditionally used in Chinese food, the refuge might have a marketable commodity. But this plant with its spiked seeds is a destructive invader to the Connecticut River watershed, capable of quickly smothering entire ponds. Thanks to a grant from the National Fish and Wildlife Foundation, the refuge hired a specialist and now leads a regional effort against the water chestnut and other invasives. A grant from the U.S. Department of Agriculture supports a campaign that includes creating the web-based Invasive Plant Atlas of New England (with the University of Connecticut and the New England Wild Flower Society) and setting up an early warning/rapid response system against invasives. Rapid response is critical: when a new infestation of water chestnut was discovered just a few weeks ago, some 40 volunteers in canoes and kayaks did an “emergency pull,” removing ten tons of water chestnut from the pond. Volunteer labor keeps much of the campaign going. Charged with conserving biodiversity in the watershed, the refuge works with conservation groups, businesses, and public and private partners and landowners to combat water chestnut, Japanese knotweed, and many other invasive species. “We’re controlling the water chestnut,” says project leader Beth Goettel, “but there are dozens of other invasive species, with equally serious potential impacts, that we can’t even hope to tackle without more resources.”

Invasive water chestnut (top) smothers entire ponds at Silvio Conte NWR, MA. Volunteers pull the plant to make way for native species.



ALFRED COLFRANCESCO

... but we need more of them, and we need to build better ones. Depending on the exact

conditions, refuges cut, mow, pull, burn, trap, or spray invaders and then work to restore original landscapes and the species that belong there. At our national wildlife refuges, managers and biologists are working

with federal and state agencies, universities, private organizations, and landowners to develop and refine environmentally safe methods for controlling invasives such as a new mechanical herbicide sprayer with sensors that spray only the targeted weeds.

The hard work of refuge managers, the contributions of partners like universities and nonprofit organizations, and the efforts of refuge Friends groups and individual volunteers are a powerful and effective force but are not enough to stop the invasion — the refuges need active support from the nation’s decision-makers to effectively combat invasive species.

The refuges *require federal funding* that is adequate and consistent to *control today’s invasives* and *set up early warning systems* for those that will surely come.



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A Light Hand on the Landscape

Bordered by the rugged Centennial Mountains, Red Rock Lakes National Wildlife Refuge in Montana was established in 1935 to protect the rare trumpeter swan and is also home to eagles, bears, an indigenous population of Arctic grayling, and other species. The refuge is a National Natural Landmark and one of the few marshland Wilderness Areas in the country. So far, knapweed and other noxious weeds are making only spot appearances on the refuge, and refuge manager Danny Gomez intends to keep it that way. “What seems to prevent infestation is to have an intact ecological immune system,” he says, “so we use a light hand on the landscape.” That means minimizing soil disturbance and taking other measures to maintain healthy natural rangeland. The refuge has also played a leadership role in a partnership to control weeds in the entire region. The partnership includes the U.S. Fish and Wildlife Service “Partners For Wildlife” program, The Nature Conservancy, state and county agencies, and private landowners — working together with vigilance to literally nip the noxious weed problem in the bud.

A lupine meadow (above) at Red Rock Lakes NWR, MT, shows little sign of invasive infestation. A partnership in the region works to control weeds. The refuge was established to protect the rare trumpeter swan (below).



JOHN AND KAREN HOLLINGSWORTH

Pay Enough Now or Pay Lots More Later

Waiting Makes the Problem Worse

Willapa National Wildlife Refuge, on Washington's Pacific Coast, was established in 1937 as a key stopover for shorebirds migrating along the Pacific Flyway. But *Spartina alterniflora*, a non-native cordgrass, is making the mudflats and saltmarsh inhospitable to birds. "If you're flying from Alaska to Mexico, and you have ten places where you can stop and feed, and you suddenly lose one of them," says project leader Charles Stenvall, "... well, how many water stops can you pull out of your marathon?" What's more, the advance of *Spartina* is potentially a significant threat to Willapa Bay's shellfish harvest. Partners in the fight against *Spartina* include the shellfish industry, state agencies, universities, and Friends of Willapa NWR, which provides public education about the problem among other efforts. Two years ago, the refuge staff prepared a plan to eliminate *Spartina* through a six-year program. "Year One" would be underway right now, if not for lack of funding. Meanwhile in some places on the refuge, *Spartina* is doubling its range every year.

At Willapa NWR, WA, shore birds like these short-billed dowitchers (right) depend on mud flats for foraging. Spartina grass (below) fills in these vital feeding areas.



RUDY SCHUYER

In 1998, the battle against invasive species cost the Refuge System \$13 million. Today, the backlog of *known* invasive projects on refuges has increased to more than \$150 million. If preventive action is not taken now, the cost will double or even triple every year. We can pay now — or pay much more later,

not only in dollars but also in human effort. In delaying, we also risk permanent damage and irreplaceable loss of imperiled native plants and animals.



JOHN AND KAREN HOLLINGSWORTH

The “Dirty Dozen”

Hundreds of invasive species plague our national wildlife refuges. Here are some of the “Most Wanted!”



ERIC COOMBS

Purple loosestrife infests about 400,000 acres of federal wetlands, marshes, pastures, and riparian meadows in every state except Florida. It crowds out higher-quality nutrition for wildlife, reduces aquatic habitat value, and wipes out endangered species such as the orchid.



WILLEY DURDEN

Melaleuca is a fast-growing evergreen tree, introduced to dry out wetlands. It can reach 50 feet in height and produces dense stands that crowd out native plants and diminish native habitat. Melaleuca is widely recognized as a serious threat to the Florida Everglades ecosystem.



SCOTT ROBINSON

Giant salvinia quickly takes over slow-moving freshwater bodies, blocking needed sunlight and atmospheric oxygen. A single plant has been documented as growing to cover 40 square miles in three months. Giant salvinia is found in the Southeast and in California and Hawaii.



TED BODNER

Chinese tallow, has been called the “north Florida melaleuca.” Found throughout the Southeastern U.S., it’s a tree that spreads rapidly and takes over large areas by outcompeting native plants. It can thrive in diverse conditions: well-drained uplands, bottomlands, and shores of waterbodies.



JAMES R. ALLISON

Phragmites is an aggressive plant that outcompetes and eliminates other marsh species to form large, impenetrable stands that can be detrimental to waterfowl. In the mainland U.S. its range extends through most of the states except for some inland areas in the Southeast.



DR. JOHN MEADE

Garlic mustard poses a significant threat to native plants in forest communities ranging from Maine to Georgia and through the Great Lakes and Great Plains. It monopolizes light, moisture, nutrients, soil, and space, thus depriving wildlife of essential food sources such as pollen, nectar, and seeds.

Leafy spurge uses toxins that prevent the growth of other plants underneath it to displace native vegetation in prairie habitats and fields. Its seed capsules open explosively, dispersing seed up to 15 feet from the parent plant. Only the Southeast has not been infected thus far.



WILLIAM M. CIESLA

Spotted knapweed is found in most states including Hawaii. Its early spring growth allows it to dominate rangelands that receive less than 8 inches of annual precipitation. In addition, it suppresses the growth of other plants, including desirable natives, by releasing inhibiting chemicals from the roots.



SARA ROSENTHAL, USDA ARS

Yellow star thistle forms dense thickets and rapidly depletes soil moisture, preventing the establishment of other species. It is found in most mainland states except in the Southeast.



USDA ARS

Rats can live and spread to virtually anywhere in the country. Not only do they prey on native birds and eat the seeds of rare plants, rats also carry diseases endangering animals and humans.



PETER DUNLEVY

Nutria are aquatic mammals introduced into North America for fur-farming. Many nutria were set free when the market failed to meet expectations. Nutria now populate fresh and salt water ponds and swamps in the mid-Atlantic, Southeast, Great Lakes, and Northwest states, where they disrupt irrigation and destroy native aquatic ecosystems.



USFWS

Wild pigs are the descendants of boars and domestic pigs. They are found in nearly half of the mainland states and in Hawaii, where their rooting and feeding damages both wild and cultivated landscapes. They can also spread disease to animals and humans.



RICHARD WASS & JACK JEFFREY, USFWS

A Three-Part Strategy To Combat Invasive Species on Refuges

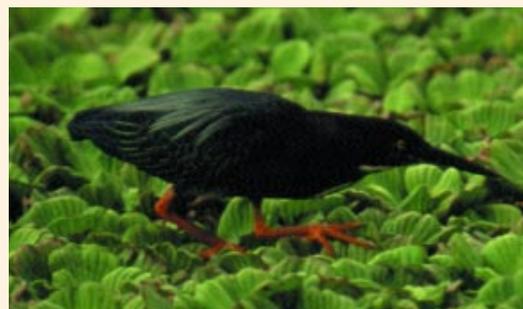
The National Wildlife Refuge Association urges Congress and the Administration to provide \$150 million over the next five years to implement this three-part strategy against invasive species on our national wildlife refuges:

1 Train and mobilize 5,000 volunteers to assist refuges — an average of 10 volunteers per refuge. In 2000, almost 36,000 people volunteered more than 1.3 million hours to the Refuge System. Those hours equaled 639 full-time employee positions with an estimated value of \$14 million. This level of dedication shows that adding an average 10 volunteers per refuge is a fully attainable goal. With proper training and support, these individuals can readily be integrated into a national early detection, eradication and community education network for stopping invasive species in their tracks.

Alternative Spring Break

The Arthur R. Marshall Loxahatchee National Wildlife Refuge encompasses the northernmost portion of the Everglades in Florida. Every year, as many as 257 species of birds use the refuge’s diverse wetland habitats. Measured by the acres infected, the worst invasive plant problem is the melaleuca tree, brought from Australia to dry out the ‘Glades. Biological control insects released to target seedlings and saplings have significantly reduced the infestation, proving to be the perfect technique for eradicating melaleuca. A more ominous problem is the Old World climbing fern, which reproduces by releasing millions of microscopic spores. Attempts to combat this plant have so far been ineffective, and refuge wildlife biologist Bill Thomas says the plant is “advancing across the Everglades like you wouldn’t believe,”— spreading an estimated 16 acres per day. The refuge has hired a specialist to lead the fight against these invaders. Volunteer groups help clear unwanted plants; one college group took an “alternative spring break,” spending a week clearing the invasive Brazilian pepper from habitats bordering the refuge’s cypress swamp boardwalk. Loxahatchee is the only refuge to lease most of its land from the state, and refuge managers work closely with state agencies and university researchers on combating invasive exotic plants. The U.S. Department of Agriculture is building a new research facility in Fort Lauderdale that will support efforts to eradicate invasive exotic pest plants by concentrating on biological control research.

Students spend an "alternative spring break" helping Loxahatchee NWR, FL, remove non-native pepper plants. Clearing invasive species benefits native birds like the green heron (below).





USFWS



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The Eucalyptus and the Salamander

The Ellicott Slough National Wildlife Refuge (part of the San Francisco Bay National Wildlife Refuge Complex) confronts a problem shared by other refuges: an attractive invader, in this case the eucalyptus tree. Among many species in its care, the refuge is responsible for one of the last remaining populations of Santa Cruz long-toed salamanders. But eucalyptus is crowding out oak woodlands, blackberry stands, and other native growth the salamander needs. Ivette Loredo, manager at Ellicott Slough, notes that the eucalyptus was introduced as a fast-growing tree that provided good firewood and is now valued for its pleasing appearance and aroma — but “from the wildlife and wildfire standpoint, they’re awful trees.” The eucalyptus is inhospitable not only to the salamander but also to many bird species, and its leaf litter is a fire hazard. The refuge works with state authorities to remove eucalyptus, pampas grass, and other invasives, which are replaced with live oak and other native seedlings grown by volunteers in the refuge nursery. Occasional public resistance to removing eucalyptus demonstrates the urgent need for community education about the value of native biodiversity and the threat of invasive species.



STEPHAN RUTH

At Ellicott Slough NWR, near Monterey Bay, CA, workers remove invasive eucalyptus trees that encroach on blackberry stands and other native plants needed by the endangered Santa Cruz long-toed salamander.

A Rat Spill Is Worse Than An Oil Spill

2 Deploy 50 rapid-response “Strike Teams” to quickly fight early infestations on refuges. Around the country, refuge professionals and volunteers know that the key to success is to stop infestations of invasives before they dominate a landscape. Creating a national network of rapid response strike teams means that understaffed and underfunded refuges will have the ability to combat this threat without diverting scarce resources from other refuge conservation priorities.



JOHN AND KAREN HOLLINGSWORTH

The Alaska Maritime National Wildlife Refuge encompasses hundreds of islands along the coastline of Alaska. Many of these islands have no native land mammals; thus the native species are particularly vulnerable to the growing populations of fox, ground squirrel, reindeer, cattle, and other alien mammals. Refuge staff worked with other federal agencies to remove foxes from a number of islands and helped the endangered Aleutian Canada goose and other native birds make comebacks. Such efforts are costly and time consuming; clearly the best approach is to stop the arrival of additional invaders. Rats, for example, were introduced in the region in cargo, particularly during WWII, and by shipwrecks. They carry diseases that threaten already declining populations of Stellar’s sea lion and they prey heavily on the native birds like the auklets of Kiska Island. The refuge works with local Native communities, the U.S. Coast Guard, state and other federal agencies, and private funders and organizations to educate shippers about preventing rat releases. Schoolchildren in the Pribilof Islands have set up stations to prevent rat introductions and to help the public understand the rat problem. Emergency teams are quickly deployed to shipwrecks to prevent rats from reaching land. “We consider a rat spill worse than an oil spill,” says refuge biologist Vernon Byrd.



USFWS

Alaska Maritime NWR supports many bird and mammal species such as the tufted puffin, top, and Stellar’s sea lion, below. Kids in the Pribilof Islands help look for invasive rats.



EVAN HIRSCHKE

Neutralizing Nutria

At Blackwater National Wildlife Refuge on Chesapeake Bay, 27 federal and state agencies and private organizations have marshaled their forces against the nutria, a South American rodent introduced decades ago in an unsuccessful attempt to boost the fur economy. In 1968, fewer than 150 nutria roamed the area — today, there are 50,000. Excavating the marshes to get plant roots for food, nutria have converted 7,000 to 8,000 acres of productive marsh into open water. The loss of wetlands also poses a huge economic threat to the Bay's world-renowned shellfish industry. "We've done a two-year study to gain information about how to eliminate the critter," says refuge manager Glenn Carowan, "honing our skills and adjusting our toolbox. Now, we're moving into the phase of employing these tools, to answer that basic question, is eradication possible?" The next phase will develop approaches to restoring the wetlands damaged by the nutria. Thanks to the refuge's efforts at grassroots public education, the program has enjoyed significant congressional support. Yet continuing funding will be important to achieve long-term results at Blackwater and in other areas where the nutria has taken hold.

One of an estimated 50,000 nutria at Blackwater NWR, MD. These rodents have destroyed 7,000-plus acres of the refuge's marsh habitat.



USFWS

3 Implement the Management Plan of the National Invasive Species Council.

After extensive public input, this presidentially mandated Council issued the first comprehensive blueprint for coordinated action on invasive species, available at www.invasivespecies.gov. The plan contains 57 action items that the Council considers essential to addressing the problem, emphasizing cooperation among federal and state agencies, national and international organizations, and private landowners. One of the Council's top priorities is a nationally cohesive early detection and rapid response capability to address infestations. The U.S. Fish and Wildlife Service and other agencies are incorporating early warning and rapid response into their invasive species plans.



JOHN AND KAREN HOLLINGSWORTH



GARY MONTOYA

Prairie Partners

Numbering fewer than 50 in the wild, the Attwater's prairie chicken depends on native coastal grassland habitat provided by the 10,000-acre Attwater Prairie Chicken National Wildlife Refuge in Texas. Yet the refuge, surrounding private lands, and other areas of the coastal prairie ecosystem are besieged by Chinese tallow and McCartney rose, the latter introduced at the turn of the 20th century from India to create natural fences. Combined, these two invasive species shade out native grasses that the prairie chicken needs for survival. Adding insult to injury, tallow and rose provide perches for hawks and great horned owls and cover for raccoons and skunks, all of which will prey upon the prairie chickens and/or their eggs. But an innovative program forged by U.S. Fish and Wildlife Service personnel with ranchers holds the potential of providing up to 100,000 acres of native coastal prairie habitat for this colorful bird. This successful cost-sharing incentive program has attracted more than 18 landowners who now work with refuge staff to combat these harmful invasives. But local support for the program isn't enough. Refuge manager Terry Rossignol says there is a list of landowners waiting to get management plans in place, but the refuge doesn't have money to implement them.



GARY MONTOYA



TED BODNER, SOUTH WEED SCIENCE SOCIETY

McCartney rose (top) invades native coastal prairie, habitat for the endangered Attwater's prairie chicken (center). Invasive Chinese tallow (above) provides perches for chicken predators such as hawks and great horned owls.

For More Information

Hundreds of public agencies and private organizations are working to combat invasive species on our national wildlife refuges and throughout our country. The National Wildlife Refuge Association's website provides detailed information about programs working to stop the spread of invasives:

www.refugenet.org.

What Do Refuges Need?

Congress and the Administration must allocate \$150 million over five years to implement this three-part strategy against invasives on our national wildlife refuges:

- Mobilize 5,000 volunteers to form the first line of defense against invasive species on our national wildlife refuges.
- Deploy a network of 50 rapid response "strike teams" to combat early infestations on refuges.
- Implement the coordinated management plan of the National Invasive Species Council.

Can We Afford To Wait?

No! Our national wildlife refuges can make substantial progress against invasives, in some cases eradicate them entirely, if we act now. Delay — and we give the invasives more time to proliferate. As the damage spreads, the cost of restoration skyrockets. There's no time to waste!

Special thanks to the refuges and photographers that provided images for this report. For others seeking high quality photos of invasive species, please contact the Bugwood Work Group at www.bugwood.org or www.invasive.org.