

A Land Manager's Guide to Best Management Practices (BMPs) to Prevent the Introduction and Spread of Invasive Species



THE UNIVERSITY OF GEORGIA
**CENTER FOR INVASIVE SPECIES
AND
ECOSYSTEM HEALTH**

WARNELL SCHOOL OF
FORESTRY AND NATURAL RESOURCES

COLLEGE OF AGRICULTURAL
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Front Cover: Kudzu, the “poster child” of invasive plants. Photo credit Chris W. Evans, River to River CWMA, Bugwood.org

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Developing Best Management Practices (BMPs) for Invasive Species

Land managers are facing increasing pressure from invasive plants, animals, insects and plant pathogens on the lands they own and manage. Furthermore, many land management practices used for forestry, agriculture, wildlife and recreational habitat management involve periodic disturbances that favor the introduction and/or spread of invasive species.

Most natural resource managers are familiar with the concept of Best Management Practices or BMPs uses in forestry as guidelines for recommended practices to protect water and soil resources during management operations such as timber harvests. As invasive species threaten more lands in the South, land managers can use BMPs for invasive species by developing a proactive approach to invasive species identification, documentation and control on their properties. To accomplish this, landowners must develop an awareness of the potential for the introduction and/or spread of invasive species as related to “normal” use or management on their lands.

Key BMPs for invasive species management (adapted from Wisconsin Council of Forestry 2009)

- Learn to identify invasives common in your area.
- Inventory invasives when developing plans for management activities, and assess the extent of invasive species on and near the property by scouting, locating and documenting infestations.
- Develop response/control plans to treat invasives when found.
- Educate property users about invasive species, their impacts, and ways to prevent their introduction and spread.

- Require all property users to follow BMP practices.
- In planning for activities on the property, limit the potential introduction and spread of invasive species.
- Properly dispose of soil, seeds, plant parts or invertebrates found during inspection and cleaning.
- Consider responses of invasive species to land management activities that result in disturbances
- Use as practical, construction and maintenance materials (mulch, gravel, topsoil, etc.) that are free of invasive species

This brochure highlights invasive plant, animal, insect and plant pathogen issues that landowners might encounter and provides guidelines for preventing their introduction and spread.

Many landowners unknowingly introduce and spread invasive plants on their lands through management practices they implement. Practices, from traditional silviculture to wildlife enhancement and agricultural land-use, all influence invasive plant growth, production, and dispersal. During the planning stage for any management project, document existing invasive species and develop plans with your forester, contractors and vendors to keep from spreading existing invasives or introducing new ones.



D. J. Moorhead, UGA

Landowner and consulting forester examining Japanese climbing fern in a stand scheduled for timber harvest.

General Principles to Reduce the Impact of Invasive Plants

- Learn to identify invasive plants and incorporate their management into any land-use plan.
- Prevent introduction of invasive plants to uninfested sites. This critical component is one of the most cost-effective methods of management.
- Contain and treat new invasive plants or those not yet well established. Controlling small infestations is more effective and economical than trying to control well-established, rapidly spreading infestations.
- Minimize transport of invasive plants from infested to uninfested areas. Cleaning vehicles and equipment is the most effective method of prevention.
- Use weed free soil, fill, and mulch in construction projects. Monitor sites where potentially infested materials were used.
- Minimize soil disturbance. Invasive plants often prefer disturbed ground, don't disturb soil unless it is necessary. Monitor disturbed sites through several growing seasons for invasives.
- Maintain desirable species: Establishing and maintaining competitive, desirable plants along roadsides and disturbed areas prevents or slows establishment of invasive plants.

Land Management Practices

Harvest Activities

Harvest activities include practices in which trees are harvested, such as regeneration cuts (for example, shelterwood, seed tree, and group selection), thinning operations, or clear cuts.

Habitat Alterations:

- Soil disturbance
- Increased light to understory or forest floor
- Mechanical damage
- Use of off-site equipment



D. J. Moorhead, UGA



D. Wade, USFS

Skidding can spread invasives across the harvest tract.

Prescribed fire can be used to control certain invasive species and spread others.

Prescribed Fire

Prescribed fire is the practice of using fire, intentionally set, to obtain certain management objectives. Often prescribed fire is used to inhibit establishment of undesirable species or to set back succession. The use of prescribed fire also includes creation and maintenance of fire breaks.

Habitat Alterations:

- Creation of bare soil
- Initial release of nutrients
- Kill or top kill of under and mid-story vegetation
- Increased light to understory or forest floor
- Soil disturbance (fire breaks)
- Use of off-site equipment



B. Jackson, UGA

Road construction uses off-site materials which may contain invasives.

Internal Roads and Stream Crossings

Roads are often built within a parcel of land to enable the owner/manager to move equipment and reach remote areas. Included within this category is the creation and maintenance of internal roads and stream crossings.

Habitat Alterations:

- Soil disturbance
- Open canopy
- Increased light to understory or forest floor
- Off-site material
- Use of off-site equipment
- Potential wetland disturbance



B. Jackson, UGA

Straw mulch may harbor seeds of invasive plants

Mechanical Site Preparation

The practice of site preparation (or site prep) manipulates the ground layer to achieve a better microclimate for seedling establishment and growth. Site prep often follows a clearcut treatment and precedes planting. Common mechanical site prep treatments are: bedding, chopping, and disking.

Habitat Alterations:

- Exposes bare mineral soil
- Increased light to understory or forest floor
- Use of off-site equipment
- Removal of native vegetation
- Damage and alteration to root zone (compaction, rutting, drainage)



D.J. Moorhead, UGA

Site preparation creates bare soil and high light environment conducive to invasive establishment and spread.



D.J. Moorhead, UGA

Tree planting equipment may harbor invasive seeds or plant material.

Tree Planting

Tree planting includes the practices involved in planting seedlings. Seed bed preparation treatments, such as scalping and sub-soiling, and seedling planting are included within this category.

Habitat Alterations:

- Soil disturbance
- Mechanical damage
- Use of off-site equipment
- Off-site material

Release Treatments (Intermediate Treatments)

Release treatments are used to free small trees from competition from undesirable vegetation. Treatments include herbicide, mowing, cutting, and fire.

Habitat Alterations:

- Increased light to understory or forest floor
- Midstory removal/thinning
- Understory damage/disturbance
- Soil disturbance
- Off site equipment



D.J. Moorhead, UGA

This scalper could carry plant roots and rhizomes across sites.



D.J. Moorhead, UGA

Release treatments create high light environments conducive to establishment of invasives.

Special Considerations

Pine Straw Production

Many pine stands are managed for pine straw production. The needles that are naturally shed from pine trees are raked, baled, and sold as pine straw mulch. Pine straw production involves managing stands for optimum straw production, removing understory vegetation with herbicide and/or fire, collecting (raking) the straw, and making bales. Often practices such as prescribed fire, mowing, and herbicide treatments are used in production areas. Stand alterations include soil disturbance, removal of understory and midstory, and increased light to the forest floor. Bales and equipment from infested stands can foster the widespread distribution of invasive plants.



E.D. Dickens, UGA

Pine straw production

Wildlife Enhancement

Wildlife enhancement involves any practice that can improve or enhance the wildlife habitat on a land, such as food plot installation, fertilization, and selective thinning and planting. This is a varied category but can include aspects of other silvicultural practices. Wildlife enhancement practices are a common avenue for invasive plant introductions, either via contaminated equipment or intentional planting. Areas to monitor for any invasive plants are camps, food plots, and other areas used.



D.J. Moorhead, UGA

Wildlife food plot



B. Humphries, FRC, Inc.

Forest stream

Streamside Management Zones (SMZ)

These areas are protected because of water quality and erosion concerns. They can be refuges for invasive plants which can spread into adjacent lands. Since SMZs are adjacent to drainages, streams and rivers, invasive plants that favor wet areas, streambanks, or bottomlands are likely to be present. Conduct annual inspections to detect establishment of invasives, particularly, following flooding events.

Land Use Conversion

This category covers practices used when converting lands previously under cultivated agriculture or pasture into trees. A different suite of invasive plants can become problems in areas undergoing land use conversion. Established invasive plant populations or viable seedbanks may exist in surrounding agricultural fields or pastures. Fencerows may serve as a harbor for these invasives. A plant that was a minor pest in the previous land use may not be inhibited by the current management practices and suddenly expand its population drastically.



J.H. Miller, USFS

Newly planted pine stand invaded by kudzu

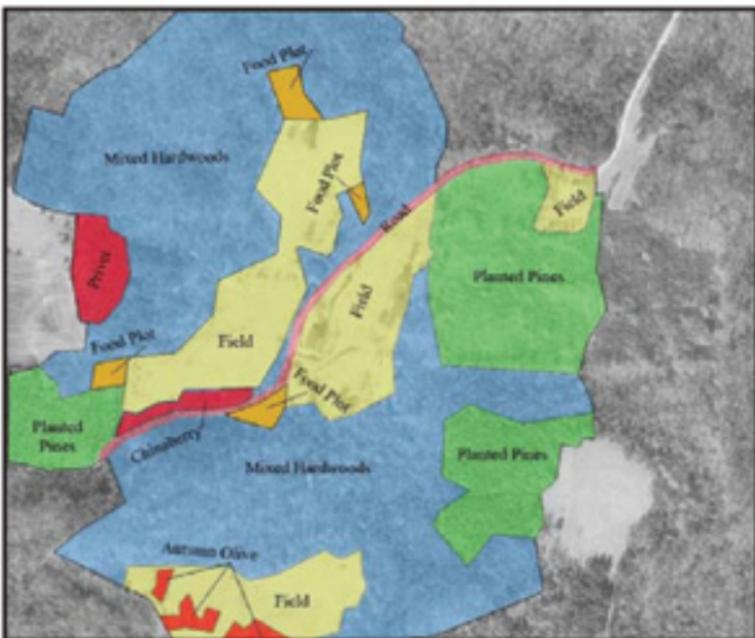
General Guidelines for Risk Reduction: Early Detection Through Monitoring

- Monitor disturbed habitats for newly established invasive plants.
- Sites to monitor include food plots, cut-over lands, roadsides, stream sides, recently flooded areas, storm damaged areas, internal roads and trails, firebreaks, burned areas rights-of-way, and fencerows.
- Mark known infestations on a map and flag them in field for easy re-location.
- Search the surrounding areas for any “satellite” infestations and mark them as well.



J. Toliver, USFS

Harvest tract with SMZs and fencerows



C.W. Evans, River to River CWMA

Resource map showing land-use and invasive plant infestations

Best Management Practices for Activities Involving Soil Disturbance

- Before starting ground-disturbing activities, inventory invasive plant infestations both on-site and in the adjacent area (fencerows, SMZs, ROWs, etc.).
- Begin activities in uninfested areas before operating in infested areas.
- Use uninfested areas for staging, parking and cleaning equipment. Avoid or minimize all types of travel through infested areas, or restrict to those periods when spread of seed or plant reproductive parts are least likely.
- Minimize soil disturbance and retain desirable vegetation in and around the area to the maximum extent possible.
- When possible, to suppress growth of invasive plants and prevent their establishment, retain relatively closed canopies.
- Do not blade roads or pull ditches where new invaders are found, if possible.
- When it is necessary to conduct soil work in infested roadsides or ditches, schedule activity when seeds or propagules are least likely to be viable and to be spread.
- Quarantine soil from infested area to prevent off-site spread.
- Monitor disturbed areas for at least three growing seasons following completion of activities. Provide for follow-up treatments based on inspection results.



D.J. Moorhead, UGA



B. Jackson, UGA

Road maintenance

Fire break

Best Management Practices Involving Off-site Material and Equipment

- Invasive plants can be introduced and spread by moving infested equipment, sand, gravel, borrow, fill and other off-site material.
- Determine the need and identify sites where equipment can be cleaned. Seeds and plant parts need to be collected when practical and incinerated. Remove mud, dirt, and plant parts from project equipment before moving it into a project area and clean all equipment before leaving the project site, if operating in infested areas.
- Inspect material sources at site of origin to ensure that they are free of invasive plant material before use and transport. Treat infested sources for eradication, and strip and stockpile contaminated material before any use.
- Inspect and document the area where material from treated infested sources is used annually for at least three years after project completion to ensure that any invasive plants transported to the site are promptly detected and controlled.
- Maintain stockpiled, uninfested material in a weed-free condition.
- Incorporate invasive plant prevention into road work layout, design, and decisions.
- Minimize roadside sources of seed that could be transported to other areas.
- Periodically inspect system roads and rights-of-way for invasion. Inventory and mark infestations and schedule them for treatment.
- Avoid working in infested areas if possible. Postpone work until invasive plants have been eliminated from the site.
- Perform road maintenance such as road grading, brushing, and ditch cleaning from uninfested to infested areas to help prevent moving seeds and plant material from infested areas into adjacent uninfested areas.
- Clean road graders and other equipment immediately after operating in infested areas. Clean all dirt and plant parts from the top and underside of mower decks.

Best Management Practices for Revegetation

- Revegetate all disturbed soil, except on surfaced roads, in a manner that optimizes plant establishment for that specific site, unless ongoing disturbance at the site will prevent establishment of invasive plants.
- When revegetating areas that were previously dominated by invasive plants, try to achieve at least 90% control of the invasive before attempting restoration.
- Use local seeding guidelines and appropriate mixes, but realize that many species previously recommended for this purpose are now presenting invasive problems. Use native material where appropriate and available. Revegetation may include planting, seeding, fertilization, and mulching.
- Monitor and evaluate success of revegetation in relation to project plan.



B. Jackson, UGA

Applying mulch for soil stabilization



B. Jackson, UGA

Seeding



C.W. Evans, River to River CWMA

Native longleaf wiregrass stand

Best Management Practices for Prescribed Burns

Carefully plan all prescribed burns and identify and map invasives found in the burn tract. Determine the interactions between the invasives and the planned burn.

- Before conducting a prescribed burn, apply for a burning permit as required.
- Avoid intense burns that remove forest floor litter which may expose soil.
- Use natural or existing barriers (e.g., roads, streams, lakes) where possible, or wet lines for firelines where bladed or plowed firelines will erode soil and degrade water quality.
- Check fire plows and tractors before use and clean as necessary prevent introduction of invasives.
- Plow fire lines in areas where invasives are not present before plowing in areas infested with invasives to prevent spread. Clean equipment before leaving site.
- Scout in the growing season following the burn for new invasives in the burned stand and breaks.
- Use mowing or other practices that do not expose soil as alternatives to blading or disking for maintaining firebreaks.

Other Invasive Species Concerns

Many properties are leased or used for hunting, fishing, camping and other recreational uses. Movement of firewood, boats, ATVs, equipment used for habitat management, food plot establishment and other activities can unintentionally introduce invasives. Landowners should meet with all property users to inform them of invasive species concerns and BMPs required to prevent their introduction. Ask users to report invasive sightings.

One important key is to use only local firewood as many serious invasive insects and diseases can move on firewood from infested areas.



Firewood stacks

Emerald Ash Borer has a broad distribution in the United States and Canada and was recently discovered in East Tennessee in July 2010. The widespread distribution is primarily due to the transportation of infested ash commodities such as nursery stock, unprocessed logs, firewood, and other ash tree products. Federal and state quarantines in infested states now regulate transport of these products.



D. Cappaert, Michigan State University

Emerald ash borer

The Asian long-horned beetle is known to attack at least 18 species of hardwood trees including maple, birch, horse chestnut, willow, elm, ash, and black locust.



M. Bohne, USFS

Asian long-horned beetle

The Sirex woodwasp, while not yet found in the South, can attack loblolly, slash and shortleaf pines. The female drills into the wood and inserts a toxic mucous and the fungus *Amylostereum areolatum* along with her eggs. The mucus prevents anti-fungal toxins from being formed at the site of infection. The fungus grows in the wood causing it to dry out and the trees die in a few weeks or months.



D. Lance, USDA APHIS PPQ

Adult Sirex woodwasp

Thousand cankers disease has been found in many Western States. The first confirmation of the beetle and fungus within the native range of black walnut was in Tennessee (July 2010). The potential damage to eastern forests could be great because of the widespread distribution of eastern black walnut, the susceptibility of this tree to the disease, and the capacity of the fungus and beetle to invade new areas.



K. Snover-Cliff, Cornell Univ.

Thousand cankers disease symptoms

These serious invaders can easily move on firewood from infested areas. Require those using your lands to follow these BMPs.

DON'T MOVE FIREWOOD

Our forests are threatened by nonnative insects that can kill large numbers of trees. Three recently introduced insects—emerald ash borer, Asian longhorned beetle, and Sirex woodwasp—are wood-infesting species that can be transported long distances in firewood. Once transported into new areas, these insects can become established and kill local trees. We must **STOP THE SPREAD** of these insects and protect our forests and trees.

How you can help:

- Leave firewood at home—do not transport it to campgrounds or parks.
- Use firewood from local sources.
- If you have moved firewood, burn all of it before leaving your campsite.



Inset photo: Asian longhorned beetle larva courtesy of Thomas B. Danforth, New Jersey Dept. of Agriculture, www.forestinsects.org

HELP STOP INVASIVE PESTS

For more information, visit the following Web sites:
www.emeraldashborer.info
www.na.fs.fed.us/lbp
www.apfils.usda.gov/apfils/



USDA Forest Service
Northern Area
State and Private Forestry
NA-P19-02-06
April 2006
www.na.fs.fed.us

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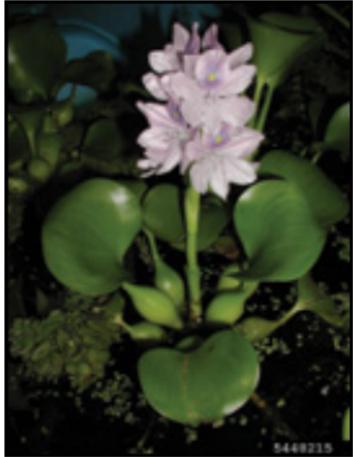
Best Management Practices for Firewood & Wood Products

- Buy firewood near where you will burn it.
- Wood that looks clean and healthy can still have tiny insect eggs, or microscopic fungi spores, that will start a new and deadly infestation. Always leave it at home, even if you think the firewood looks fine.
- Aged or seasoned wood is still not safe. Just because it is dry doesn't mean that bugs can't crawl onto it.
- If you already moved firewood, and you now know you need to dispose of it safely, burn it soon and completely. Make sure to rake the storage area carefully and also burn the debris. And next time, buy from a local source.
- Tell your friends not to bring wood with them—everyone needs to know that they should not move firewood.
- Post 'Don't Move Firewood' posters where anyone using or entering your land can see it.
- Any untreated wood or wood products should be treated with the same precautions as firewood.

Aquatic Plants and Animals

Invasive aquatic plants, used as water garden and aquarium decorations, aquarium fish, bait fish and fishing worms should never be dumped or “released” into any stream, lake, river or other water body.

Invasive aquatic plants, can infest slow moving water such as ponds, lakes, swamps, irrigation canals, or ornamental ponds.



L. Mehrhoff, UConn

water hyacinth



USEPA, Great Lakes NPO

Zebra mussels

Dense populations of invasive plants can clog waterways, which makes fishing, swimming and boating difficult. Thick colonies cover the surface of the water, preventing

air from reaching it. This reduces the amount of oxygen in the water, which fish and other organisms need to survive. These dense mats of invasive aquatic vegetation can also prevent animals from getting to the water, and may crowd or shade out native plants, which other organisms depend upon for food or shelter.

Many invasive aquatic plants continue to be sold through aquarium and pond supply dealers, both online and in retail garden centers.

New introductions are probably the result of



L. Mehrhoff, UConn

Parrot feather milfoil

the improper disposal of ornamental pond plants or water, or when ponds adjacent to local water bodies overflow with winter rains.

Best Management Practices for Boat Cleaning

For those using lakes, ponds and streams follow these BMPs to limit introduction of aquatic invasives.

Drain

- Drain every conceivable space or item that can hold water.
- Follow factory guidelines for eliminating water from engines. All engines hold water, and jet drives on personal watercraft and other boats can hold extra water.
- Remove the drain plug from boats and put boat on an incline so that the water drains out.
- Drain live-wells, bilge, ballast tanks and transom wells on land.
- Empty water out of kayaks, canoes, rafts, etc.

Clean

- Remove any visible plant or plant fragments as well as mud or other debris. Plant material, mud and other debris routinely contain other organisms that may be an aquatic nuisance species. Some plant species are aquatic nuisance species.
- Check trailer, including axle, fender and wheel areas - in and around the boat itself: anchor, props and jet engines, ropes, boat bumpers, paddles.
- Clean and check and dry off all parts and equipment that came in contact with water.
- Empty bait buckets into trash. Do not empty any bait fish into the lake or reservoir.
- Using a car wash or home power water sprayer is not adequate to kill and/or remove zebra or quagga mussels. Carefully inspect after washing and remove any remaining mussels.

Dry

- Allow boat and trailer to completely dry before launching into another body of water.



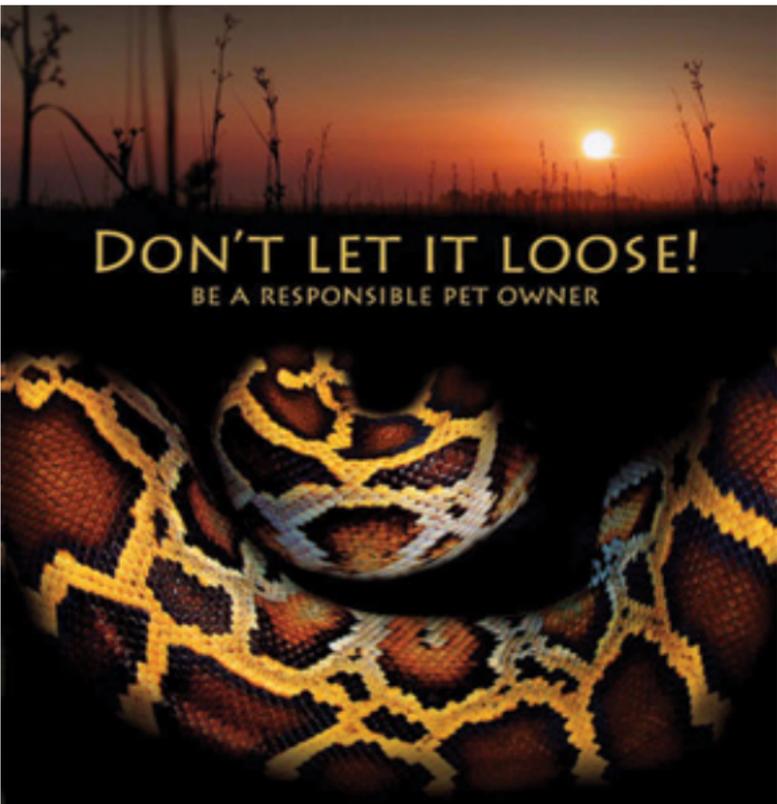
Boat motor with hydrilla wrapped in the propeller

Never Release Exotic Pets into the Wild

The greatest pathway by which non-native fish and wildlife species find their way into native habitats is through escape or release by pet owners. Burmese pythons, now established throughout south Florida and the Everglades, feed on native mammals and birds. Recent studies have found dramatic reductions in small mammal populations in Everglades National Park as python populations have increased. Nile monitor lizards in south Florida pose a threat to the Florida burrowing owl, which is a protected species. These are just a few of the many examples of non-native species that have escaped or been released from their owners.



Captured python



An Ad campaign in Florida to help educate the public about the dangers of releasing unwanted pets.

Feral Hogs (Wild Pigs)

European wild boar, feral hogs, and crossbreeds of the two can be found in the wild. Feral hogs are domestic hogs that either escaped or were released for hunting. Within a few generations they develop the traits needed for survival in the wild.

Feral hogs continue to grow in numbers. Because of their destructive feeding habits and potential to spread disease, feral hogs are a substantial liability to agriculture; native wildlife and natural areas. However, these animals are also sought for recreational hunting and commercial harvest. Adult feral hogs can weigh from 110 to 770 lbs. Females can give birth to litters of 1 –12 piglets beginning at about 9 months of age. Life span in the wild is usually about 10 years, but feral hogs have been recorded living as long as 27 years. Feral hogs are indiscriminate omnivores which allows them to survive across a wide range of habitats, limited only by scarcity of water and severely cold temperatures. They are considered to be intelligent and can be very aggressive when threatened. Humans are the main predator of mature feral hogs.

Trapping and hunting are the main forms of control.

B. Higginbotham, Texas AgriLife Extension Service



Damage by feral pigs



Feral sow and piglets

V. Dinets, University of Miami

Georgia's Cogongrass Program

Cogongrass (*Imperata cylindrica*) is one of the worst invasive plants we have in the South. Infestations of this grass are widespread in Florida, Alabama and Mississippi, but at present, there are scattered infestations in 50 Georgia counties. Lessons learned from these other states can help prevent spread in Georgia. In 2008, a Cogongrass Cooperative Weed Management Area was established for Georgia and an aggressive detection and control program is in place to combat this invasive weed throughout the state.



Cogongrass burn

C. Bryson, USDA ARS

The Georgia Forestry Commission and the U.S. Forest Service are partners in an innovative program to treat cogongrass infestations at no cost to the landowner. For more information on cogongrass go to www.cogongrass.org. Report any suspected infestations to 1-800-GA-TREES.

Keys to Cogongrass Identification

Flower/Seed head

- Cylindrical in shape, 2-8 inches long
- Silvery white in color
- Light fluffy dandelion-like seeds
- Blooms from late March to mid June



C.W. Evans, River to River CWMA

Leaves

- Blades to 6 feet long
- About 1 inch wide
- Whitish, prominent midrib, that is often off center
- Margins finely serrate



M. Atwater, WCU, Inc.

Rhizome/Roots

- Dense mat
- Many sharp points
- Covered in flaky scales
- Bright white under scales
- Strongly segmented



C.W. Evans, River to River CWMA

Who can you contact to get information or report invasives in Georgia?

Georgia Forestry Commission

1-800-GA-TREES

Invasive plants, insects and diseases in forests and urban trees. Cogongrass control program.

Georgia Department of Agriculture

1-800-282-5852

The GDA Plant Protection Section conducts pest surveys for new insects, diseases, and invasive weeds that could harm Georgia's agriculture interests.

The Plant Health Inspection program works with all Georgia growers that sell plants, and facilitates the export of plants, fruits, and vegetables.

Georgia Department of Natural Resources Non-Game Wildlife Resource Division

1-770-761-3035

Invasive terrestrial and aquatic animals and aquatic weeds.

University of Georgia – Center for Invasive Species and Ecosystem Health

www.bugwood.org

Invasive species information, education and mapping

USDA Natural Resources Conservation Service (NRCS)

www.ga.nrcs.usda.gov

Information, assistance, and programs for natural resources conservation.

Georgia Crop Improvement Association

www.certifiedseed.org

Noxious Weed Free Forage and Mulch Quality Assurance Program

Online Resources

General Invasive Species Information

www.invasive.org

Invasive Species Information Specific for Georgia

www.gainvasives.org

Firewood

www.dontmovefirewood.org

Forest Pest Information

www.forestpests.org

Invasive Species Mapping

www.eddmaps.org

A Field Guide for the Identification of Invasive Plants in Southern Forests

<http://wiki.bugwood.org/Archive:IPSF>

A Management Guide for Invasive Plants in Southern Forests

<http://wiki.bugwood.org/Archive:MGIPSF>

Georgia Invasive Plant Management Handbook

www.gainvasives.org/handbook

Invasive Plant Responses to Silvicultural Practices in the South

www.invasive.org/silvicsforinvasives.pdf

A landowner's Guide for Wild Pig Management – Practical Methods for Wild Pig Control

www.aces.edu/pubs/docs/A/ANR-1397/ANR-1397.pdf

Citations

AgriLife Extension Texas A&M System. Coping With Feral Hogs: About Feral Hogs <http://feralhogs.tamu.edu/about/>

Evans, C.W., D.J. Moorhead, C.T. Barger, and G.K. Douce. 2006. Invasive plant responses to silvicultural practices in the South. The University of Georgia Bugwood Network. Tifton, GA. BW-2006-03. 52 p.

Invasive Species Best Management Practices. 2009. Wisconsin Council on Forestry. <http://council.wisconsinforestry.org/invasives/>

Miller, J.H., S.T. Manning, and S.F. Enloe. 2010. A management guide for invasive plants in southern forests. Gen. Tech. Rep. SRS-131. Asheville, NC. U.S. Department of Agriculture Forest Service, Southern Research Station. 120 p.

MyFWC.com Florida Fish and Wildlife Conservation Commission. How Do Nonnative Species Get to Florida? http://www.myfwc.com/WILDLIFEHABITATS/Nonnative_HowGetToFL.htm

University of Michigan Museum of Zoology: Sus scrofa, wild boar. http://animaldiversity.ummz.umich.edu/site/accounts/information/Sus_scrofa.html

USDA Forest Service Northeast Area. Don't move firewood. <http://na.fs.fed.us/firewood/>



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www.gainvasives.org

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