



The North Carolina Sandhills Weed Management Area: Facilitating Regional, Invasive Species Management Partnerships Among DoD and Neighboring Land Stewards

The following document outlines a strategic plan that identifies goals and actions for the North Carolina Sandhills Weed Management Area for 2009-2011.

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1.0 Introduction

1.1 Background

A Weed Management Area (WMA) is a partnership of federal, state and local government agencies; individuals; and various interested groups that cooperatively manage non-native invasive plant species in a defined area (MIPN 2006). A non-native invasive plant species (NIS) is defined as any plant species, which is not native to the ecosystem under consideration, whose introduction does or is likely to cause socioeconomic or environmental harm.

NIS that naturalize and spread prolifically throughout natural areas, displace native flora; alter community structure and water, energy, nutrient and disturbance cycles leading to biodiversity loss, increased soil erosion, and degradation of threatened and endangered species habitat (Cronk and Fuller 1995, Trammel and Butler 1995, Rothstein et al. 1998, Olson 1999, Ehrenfeld et al. 2001, Pimental et al., 2005).

With only three percent of the historic longleaf pine-wiregrass ecosystem remaining today, landowners in the North Carolina (NC) Sandhills play an important role in conserving rare species diversity (Noel et al., 1998). For example, five federally-endangered species as well as numerous state and federal listed species of concern occur within the region. Unfortunately, herbarium records, floral inventories, and an extensive NIS survey in 2004 confirm that at least 51 NIS also occur in the Sandhills (Russo et al., 1993, Hohmann and Frank 2006, Sorrie and Gray 2006). The number of NIS and infestations impacting the region will undoubtedly increase.

Developing a Weed Management Area enables successful NIS management (MIPN 2006). Organization of a Weed Management Area within a defined region facilitates cooperation among land managers and owners to tackle a common NIS problem. The NC Sandhills Weed Management Area will tier off the existing NC Sandhills Conservation Partnership (NCSCP) coordinating NIS management efforts among partners. Coordinated NIS management efforts allow for joint management prioritization, ensuring regional efforts target areas requiring critical management.

Aggressive regional management efforts are highly effective at reducing the long-term magnitude and cost of invasive species impacts (Hobbs and Humphries 1995, Madsen 1997, Chen 2001, McNeely et al., 2003). The diverse group of land managers represented in the Weed Management Area can share resources and expertise to prevent current small, manageable infestations from spreading beyond control. A NC Sandhills Weed Management Area (NCSWMA) will also work to prevent introductions of new regional NIS invasions identified through early detection/rapid response efforts. By coordinating these efforts regionally, landowners benefit protecting sensitive resources through NIS control.

1.2 Approach

This plan represents an initial vision for the NCSWMA from planning sessions with the Department of Defense, The Nature Conservancy (TNC), NC Wildlife Resources Commission, US Fish & Wildlife Service, Sandhills Area Land Trust, and commercial foresters. The overall approach emphasizes the need for integrated regional management addressing NIS impacts. Goals, objectives, and actions specifically address: fundraising, outreach, management coordination, data management, and early detection/rapid response (ED/RR). This plan should be updated as new information becomes available, and new ideas are developed. It is intended for use by all NCSWMA members.

1.3 Non-native Invasive Plant Impacts

Non-native invasive plants impact the NC Sandhills. NIS competitively displace native species, alter community structure and function by altering water, energy, nutrient and disturbance cycles thereby leading to biodiversity loss, native species displacement and increased soil erosion. No studies have been conducted to measure non-native invasive plant species impacts in the NC Sandhills. However, several studies have measured impacts elsewhere in the Southeast, indicating similar possible impacts in the NC Sandhills (Merriam 2003). To date, 51 non-native invasive plant species have been documented in the region. Notable species capable of forming dense monocultures and causing major impacts include: Chinese tallowtree (*Sapium sebiferum*), multiflora rose (*Rosa multiflora*), Chinese privet (*Ligustrum sinense*), Japanese stiltgrass (*Microstegium vimineum*), golden bamboo (*Phyllostachys aurea*), and Japanese knotweed (*Polygonum cuspidatum*).

- **Native species displacement** – The NC Sandhills have unique plant and animal communities relying on specific moisture, light, fire, nutrient and habitat conditions. NIS introduction into communities can alter these conditions dramatically changing species composition, displacing rare native species.
- **Threatened and Endangered Species** – A large number of state and federally listed threatened and endangered species populate public and privately owned natural areas in the NC Sandhills. NIS alter habitat and directly displace these threatened and endangered species. Research indicates Chinese privet, an abundant NC Sandhills NIS, specifically impacts rare plant habitat (Urbatsch 2000). Fire tolerant shrubs like Chinese lespedeza (*Lespedeza cuneata*), or shrubby bushclover (*Lespedeza bicolor*) replace native groundcover species thereby degrading federally endangered Red-cockaded Woodpecker (RCW) habitat (Remaley 1998). This structural change diminishes the foraging capabilities of RCWs, which prefer to forage in open areas with low growing groundcover.
- **Forestry** – NIS can adversely affect timber production, aesthetics, recreation, wildlife, and forest management (FDACS). Many NIS also affect forest health, productivity, access, and management costs. Several NIS present in the NC Sandhills have the potential, or have impacted various forest product industries. An obvious example is kudzu (*Pueraria montana*), covering approximately 7 million acres in the Southeast and costs roughly 500 million dollars annually in lost farm and timber production (FDACS). Cogongrass (*Imperata cylindrica*) has significantly impacted commercial forestry operations in Georgia, Florida, and South Carolina; fortunately it has not yet been identified in the NC Sandhills (FDACS). NIS also impact the pine straw industry. In

Florida, the Japanese climbing fern (*Lygodium japonicum*) infestations has forced pine straw producers to abandon leased pine stands making clean and legally saleable production impossible (FDACS). Japanese climbing fern has not been identified in the NC Sandhills; however the presence of other non-native invasive plant species could impact pine straw operations. Foresters, landowners, and land managers must be proactive against non-native invasive plant species to maintain the health, function and long-term productivity of their forests.

- **Prescribed burns** – NIS can alter fire regimes by increasing or decreasing invaded site flammability. NIS with increased flammability and heat content can create dangerous fires that harm native plant communities, damage property, and create safety hazards (Richburg et al., 2001). Decreased flammability will reduce of prescribed burns efficacy, potentially altering native plant communities and impacting threatened and endangered species and wildlife habitat. In a study comparing the combustibility of native and NIS, three NIS found in the NC Sandhills, Oriental bittersweet (*Celastrus orbiculatus*), Japanese stiltgrass, and Japanese knotweed were shown to have a lower heat content than native species. Cooperative regional management will ensure of future prescribed burning effectiveness to promote native species and inhibit NIS establishment.
- **Recreation** – NIS can impact recreational opportunities in the NC Sandhills. Infestations of aquatic NIS like alligatorweed (*Alternanthera philoxeroides*), parrot's feather (*Myriophyllum aquaticum*), and aneilima (*Murdannia keisak*) can disrupt boating, swimming, and fishing. Rapid establishment, growth, and spread of dense vegetation mats on water surfaces can also alter water flow and light resources, leading to the accumulation of sediment and debris, or flooding. Terrestrial species like kudzu and Chinese privet can form dense thickets reducing site accessibility for hiking, bicycling, and horseback riding.
- **Erosion** – NIS can increase erosion by replacing native species (Ehrenfeld et al., 2001). For example, Japanese stiltgrass is an annual NIS that rapidly invades streambanks, creating complete monocultures. Japanese stiltgrass has a shallow root structure that cannot hold soil in place like native species, thus increasing erosion. Japanese stiltgrass is abundant in some parts of the NC Sandhills. Proactive, regional management of species like Japanese stiltgrass will help prevent erosion problems.

1.4 Weed Management Area Benefits

WMAs can be effective at preventing NIS from becoming difficult, expensive problems. Cooperative weed management can provide an effective framework to communicate and respond to the early detection of new infestations of highly invasive species. Additionally, public education campaigns highlighting the impacts of NIS can reduce the use of harmful species in landscaping; and the spread of invasive species on vehicles, equipment, and clothing. Prevention is the most effective and affordable type of invasive plant species management.

WMAs allow for management to occur across jurisdictional boundaries, helping ensure effective invasive plant species control within the entire region. Through a WMA, land managers are able to work with neighbors to prevent infestations from becoming a problem for everyone.

Costs and management burdens are reduced for individual landowners when resources, manpower, and expertise are shared amongst members of the WMA. Expensive machinery or tools can also be shared amongst landowners. Additionally, WMA funds can be used to purchase stocks of materials, like herbicide for all members to use. Similarly, volunteer work forces can be shared. WMAs eliminate the need for every landowner in the region to be an invasive species expert with a large stock of resources and manpower.

Members of the WMA can work together to secure funds from more sources than could any individual landowner. For example, federal grants can be used for management on state property within the context of the WMA and vice versa. Several funding sources specifically give priority funding to establish Weed Management Areas. Funds are pooled together and then distributed to the highest priority needs for the region as determined by WMA leadership and stakeholders.

A WMA provides members with a united voice to state, federal, and local legislators, helping to focus attention on invasive plant issues. An example of an important invasive plant species issue a WMA can address is regional economic and environmental sustainability in the NC Sandhills. Population growth can bring new residential and commercial development to the borders of the many managed natural areas and commercial forests in the region. Development can bring an influx of non-native invasive landscaping species, which can affect all land managers in the region. A coordinated group of concerned land managers represented by an established WMA can work with local county and municipal officials to promote the use of native and non-invasive landscaping species, thereby limiting the introduction of NIS from new development.

1.5 Participation in the NCSWMA

There is no formal membership application process. The NCSWMA encourages membership from important landowners, agencies, municipalities and organizations, whose work is relevant to invasive plant species issues in the region.

The Memorandum of Understanding for the NCSCP, which is required for federal agencies to share resources with different agencies and organizations, is considered an official agreement for the NCSWMA as well.

There are numerous opportunities for members of the NCSWMA to contribute to the group's immediate success. Members can serve as leaders, helping to guide the group. They can also share information on NIS, or they can volunteer their time and equipment to support projects. These are just a few examples.

- **Leadership** – The NCSWMA is at a very important time in its development. The group needs interested people to be leaders and active participants, so it can grow into an effective organization. There are opportunities to fill the following key leadership roles; Chair, co-Chair, Secretary, and five Council Leadership positions. There will always be room for people to take on leadership positions in the future.
- **Information sharing** – Regional priorities can be established to focus NIS management on urgent problems based on shared information concerning invasive plant occurrences, impacts on land-use, management resource needs, and current and planned management practices.
- **Manpower** – Organizations can contribute manpower for NCSWMA projects, whether it is personnel or volunteers doing on-the-ground management, maintaining a website, writing grant proposals, attending meetings, or any other project assisting the NCSWMA.
- **Equipment** – Organizations can contribute equipment for NCSWMA projects. There may be a need for backpack herbicide sprayers, hand tools, mowing equipment, GPS units, or quality printers to make brochures or posters. Sharing equipment can be an easy way to support NCSWMA projects.

2.0 Regulations and Legislation

There are numerous regulations and legislation related to non-native invasive plant species that are important for landowners in the NC Sandhills to consider. State and federal regulations and legislation can implement quarantines, initiate emergency control efforts, prohibit the sale or transport of infested materials, and require management.

2.1 North Carolina Regulations and Legislation

North Carolina Department of Agriculture & Consumer Services, Plant Industry Division – Noxious Weed Regulation

This regulation empowers the NC Board of Agriculture to determine which species are official noxious weeds and declare quarantine to restrict their movement within the state. A state declared quarantine could potentially affect land management in the NC Sandhills by limiting intrastate transport of resources. This law also has implications for interstate transport since the Plant Protection Act (see section A.1.2) recognizes state designated noxious weed lists.

North Carolina Department of Agriculture & Consumer Services, Plant Industry Division – Aquatic Weed Control Act of 1991

This law empowers the Secretary of Environment and Natural Resources to designate noxious aquatic weed plants. The Secretary can direct the control, eradication, and regulation of noxious aquatic weeds anywhere in the state.

North Carolina Department of Agriculture & Consumer Services, Plant Industry Division – Seed Regulation

This regulation outlines which noxious weed seeds are prohibited versus restricted under the NC Seed Law. This regulation makes it unlawful to sell and/or transport turf and agricultural seed mixes that are contaminated with prohibited or restricted noxious weed seeds, thereby providing some assurance and protection against accidental introductions of certain weed species via contracted or in-house use of commercial seed.

2.2 Federal Regulations and Legislation

Plant Protection Act (PPA) (2000) [7 U.S.C. 7701]

The PPA consolidates the authorities in the Plant Quarantine Act, Federal Plant Pest Act, Federal Noxious Weed Act and seven other plant pest related statutes. It authorizes the U.S. Department of Agriculture (USDA) to prohibit or restrict the importation, exportation, or interstate movement of any plant product, biological control organism, noxious weed, article

or means of conveyance, if the Secretary of Agriculture determines that the prohibition or restriction is necessary to prevent a plant pest or noxious weed introduction, or spread within the United States. The Act defines plant pest as any living stage of any of the following that can directly or indirectly damage or, cause disease in any plant or plant product: protozoan, animal, parasitic plant, bacterium, fungus, virus, infectious agent or other pathogen, or any article similar to or allied with any of those articles. A noxious weed is defined as a plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment. Currently recognized noxious weeds are listed in (7 CFR 360) Noxious Weed Regulations (see section A.3.1). The PPA provides for public input, by allowing any person to petition that a species be added to the regulated noxious weed list.

The PPA also specifically authorizes the USDA to hold, seize, quarantine, treat, destroy, apply other remedial measure, or otherwise dispose of any plant, plant pest, noxious weed, biological control organism, plant product, article or means of conveyance that is moving (or has moved) into, or out of the United States or between states, if USDA considers it necessary in order to prevent the dissemination of a plant pest or noxious weed that is new to or not known to be widely prevalent or distributed within or throughout the United States. The PPA also authorizes USDA to order an owner, or an agent of the owner of a plant, biological control organism, plant product, plant pest, noxious weed, article, or means of conveyance to treat, destroy, or otherwise dispose of those items. In addition, when a state is unable or unwilling to take the necessary action to prevent the spread of a plant pest or noxious weed, the Secretary of Agriculture has the authority to declare an extraordinary emergency and take the actions described in this paragraph with a state (i.e., when interstate movement is not involved). Civil and criminal penalties of up to \$500,000 and one year imprisonment are also authorized.

The PPA also authorizes USDA to cooperate with other federal agencies or entities, state or political subdivision of states, national governments, local governments of other nations, domestic or international organizations, domestic or international associations, and other persons to carry out the provisions of the PPA.

The greatest impact of the PPA will likely be associated with the requirement to inspect means of conveyance (i.e. vehicles) during international and inter-state transit. However, this requirement is entirely in the best interest of landowners in the NC Sandhills, since prevention is the most effective and economic means of NIS management.

Federal Noxious Weed Act of 1974 (FNWA) as amended [7 U.S.C. 2809]

Although the Plant Protection Act superseded and repealed most of the Federal Noxious Weed Act of 1974 (FNWA), section 15, "Management of undesirable plants on Federal lands" (7 U.S.C. 2814) was left intact. Section 15 of the FNWA requires federal land management agencies to develop and establish a management program for the control of plants that are classified under state or federal law as undesirable, noxious, harmful, injurious, or poisonous, on federal lands under the agency's jurisdiction. The Act also requires the federal land management agencies to enter into cooperative agreements to coordinate the management of undesirable plant species on federal lands, if similar programs are being implemented on state and private lands in neighboring areas. This legislation is significant to the DoD as it calls for development and implementation of management plans for a broad group of plants NIS on federal lands. The other key element in the legislation is the requirement to also manage species identified by state governments.

Endangered Species Act (ESA) [PL 93-205 as amended, 16 U.S.C. 1531-1544]

The ESA regulates federal actions that jeopardize threatened and endangered species (TES) or their critical habitats, and calls for the protection and management of TES on federal property. The strong protections required under the ESA could regulate federal actions that directly or indirectly introduce or promote NIS in TES habitats. The ESA could also be used as a basis for the mitigation, control, or eradication of non-native invasive plant species when TES or their critical habitats are jeopardized. Incidentally, the ESA treats threatened or endangered plants differently from animals. Section 9 prohibitions on take do not apply to threatened or endangered plants, but cautions can be provided in a Biological Opinion. Therefore, Fort Bragg should consider the ESA as one of the primary drivers for non-native invasive plant species control and management, and prioritize its control and management actions to ensure ESA compliance.

Clean Water Act (CWA) (1972) [PL 92-500, 33 U.S.C. 1251]

The CWA provides for the restoration and maintenance of the chemical, physical and biological integrity of the Nation's waters. The CWA has been invoked in situations where invasive species threaten the biological integrity of the Nation's waters. For example, section 303(d) of the CWA requires states to list impaired waters (e.g., for use as public water supplies, propagation of fish and wildlife, recreational, agricultural, and industrial), and the cause of impairment. Currently, states have listed over 900 waters as impaired from noxious aquatic plants.

3.0 Available Information Related to NIS Presence in the North Carolina Sandhills

Fort Bragg has conducted several floral surveys, providing accurate data for both native and non-native plants (Russo et al., 2003, Hohmann and Frank 2006). Given that Fort Bragg is by far the largest landowner in the NC Sandhills, NIS data from these surveys provides a good indication of many of the species that are problematic in the entire region.

Informal NIS observations outside of Fort Bragg indicate there are several highly invasive NIS in the region not found on the installation. These observations highlight the need to conduct more formal NIS surveys in the region.

3.1 Fort Bragg Surveys

3.1.1 NIS Survey

To acquire information necessary for the development of an Integrated NIS Management Plan, a survey of NIS distribution and abundance was conducted on Fort Bragg during the 2003 and 2004 growing seasons (Hohmann and Frank 2006). Two distinct approaches to sampling were adopted, a roadside survey and a plot-based survey.

Roadside sampling was conducted by recording all infestations identified along all roadsides and parking lots in a GIS database. Plot-based sampling for NIS utilized a 25 m x 50 m (0.125 hectare) plot. Plots were placed within the large tracts of forested land that make up the training lands. Plots were placed in highest concentrations where NIS impacts were likely to pose the greatest risk to military use, land use sustainability, and protected species management. The stratified survey design resulted in 5,005 plots being sampled for NIS abundance. The data generated by this plot-based approach were used to generate accurate, installation-wide, abundance estimates using advanced mapping procedures.

3.1.2 RTLA Surveys

The Range and Training Land Assessment (RTLA) program collects a wide variety of data to analyze the installation's ability to meet natural resources and training land management needs. The program was initiated in 1991 and involves sampling approximately 210 plots in the same location every five years. An aspect of the survey is to update Fort Bragg's floral inventory as new species are found. RTLA surveys have identified 33 NIS.

3.2 NCSWMA Survey

The NCSWMA began assessing NIS impacts and challenges in the region by distributing a web-based survey to landowners in the region. Responses have not all been collected and results have not yet been compiled. The data will be used to prioritize future research and management needs.

3.3 Non-native Invasive Plant Species Identified

There is documentation of 51 NIS in the NC Sandhills, with even more likely to be found (Table 1) (Russo et al., 2003, Hohmann and Frank 2006, Sorrie and Gray 2006). The following table should be continuously updated as more information becomes available.

Table 1. Non-native invasive plant species identified in the NC Sandhills.

Scientific name	common name
<i>Agropyron repens</i>	quack grass
<i>Ailanthus altissima</i>	tree-of-heaven
<i>Albizia julibrissin</i>	mimosa, silk tree
<i>Allium vineale</i>	wild garlic, wild onion
<i>Alternanthera philoxeroides</i>	alligatorweed
<i>Ampelopsis brevipedunculata</i>	porcelain-berry
<i>Artemisia vulgaris</i>	mugwort
<i>Arthraxon hispidus</i>	jointed grass
<i>Arundo donax</i>	giant reed
<i>Berberis thunbergii</i>	Japanese barberry
<i>Cassia obtusifolia</i>	sickle pod
<i>Celastrus orbiculatus</i>	Oriental bittersweet
<i>Cirsium vulgare</i>	bull-thistle
<i>Coronilla varia</i>	crown vetch
<i>Dioscorea batatas</i>	Chinese yam
<i>Egeria densa</i>	Brazilian water-weed
<i>Elaeagnus pungens</i>	thorny olive
<i>Elaeagnus umbellata</i>	autumn olive
<i>Eragrostis curvula</i>	weeping lovegrass
<i>Euonymus alatus</i>	winged burningbush
<i>Euonymus fortunei</i>	wintercreeper
<i>Festuca elatior</i>	tall fescue
<i>Glechoma hederacea</i>	gill-over-the-ground
<i>Hedera helix</i>	English ivy
<i>Ipomoea spp.</i>	morning-glory
<i>Lespedeza bicolor</i>	shrubby bushclover
<i>Lespedeza cuneata</i>	Chinese lespedeza
<i>Ligustrum japonicum</i>	Japanese privet
<i>Ligustrum sinense</i>	Chinese privet
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Lygodium japonicum</i>	Japanese climbing fern
<i>Melia azedarach</i>	chinaberry

<i>Melilotus spp.</i>	sweet clover
<i>Microstegium vimineum</i>	Japanese stiltgrass
<i>Morus alba</i>	white mulberry
<i>Murdannia keisak</i>	aneilima
<i>Myriophyllum aquaticum</i>	parrot's feather
<i>Nandina domestica</i>	sacred bamboo
<i>Paulownia tomentosa</i>	princess tree
<i>Phyllostachys aurea</i>	golden bamboo
<i>Poa compressa</i>	Canada bluegrass
<i>Polygonum caespitosum</i>	bristled knotweed
<i>Polygonum cuspidatum</i>	Japanese knotweed
<i>Populus alba</i>	white poplar
<i>Pueraria lobata</i>	kudzu vine
<i>Quercus acutissima</i>	sawtooth oak
<i>Raphanus raphanistrum</i>	jointed charlock
<i>Rosa multiflora</i>	multiflora rose
<i>Rumex crispus</i>	curled dock
<i>Sapium sebiferum</i>	Chinese tallowtree
<i>Setaria faberi</i>	giant foxtail
<i>Sorghum halepense</i>	johnson-grass
<i>Spiraea cantoniensis</i>	Reeves' meadowsweet
<i>Spiraea thunbergii</i>	Thunberg's meadowsweet
<i>Stellaria media</i>	common chickweed
<i>Veronica hederifolia</i>	ivy-leaved speedwell
<i>Vinca major</i>	periwinkle
<i>Wisteria spp</i>	wisteria

4.0 Weed Management Area Structure

The NCSWMA is an independent working group comprised of the following partnerships: Department of Defense, The Nature Conservancy, NC Wildlife Resources Commission, US Fish & Wildlife Service, Sandhills Area Land Trust, Sandhills Ecological Institute, NC State Parks and Recreation, the USDA Natural Resources Conservation Service, and private landowners.

4.1 Organization

The NCSWMA will focus on specific issues related to cooperative weed management in the NC Sandhills (see Figure 1).

4.1.1 Emphasis Areas

- **Outreach** – To promote public education and communication of WMA goals to those outside of the NCSCP.
- **Fundraising** – To raise funds to support the implementation of WMA actions within the Sandhills.
- **Management Coordination** –Coordinate management amongst partners, and identify resource/equipment needs.
- **Data Management** – To collect and maintain regional invasive species data within a database, analyze data for reporting, coordination, and outreach purposes, share data with NCSCP Working Groups and members, as well as other invasive species groups in NC and southeastern U.S.
- **Early Detection / Rapid Response** – To identify and treat highly invasive species that can be realistically eradicated from the region.
- **Recruitment (ad hoc)** – To recruit active members and leaders in the NCSWMA, from all key invasive plant species stakeholders who will be advocates of the WMA goals. This council should seek individuals who can contribute to the development of the WMA by serving as active participants in key leadership roles.

4.2 Leadership

NCSWMA leaders will work as the Leadership Committee; consisting of a Chair, Co-Chair, Secretary, and Emphasis Area Managers.

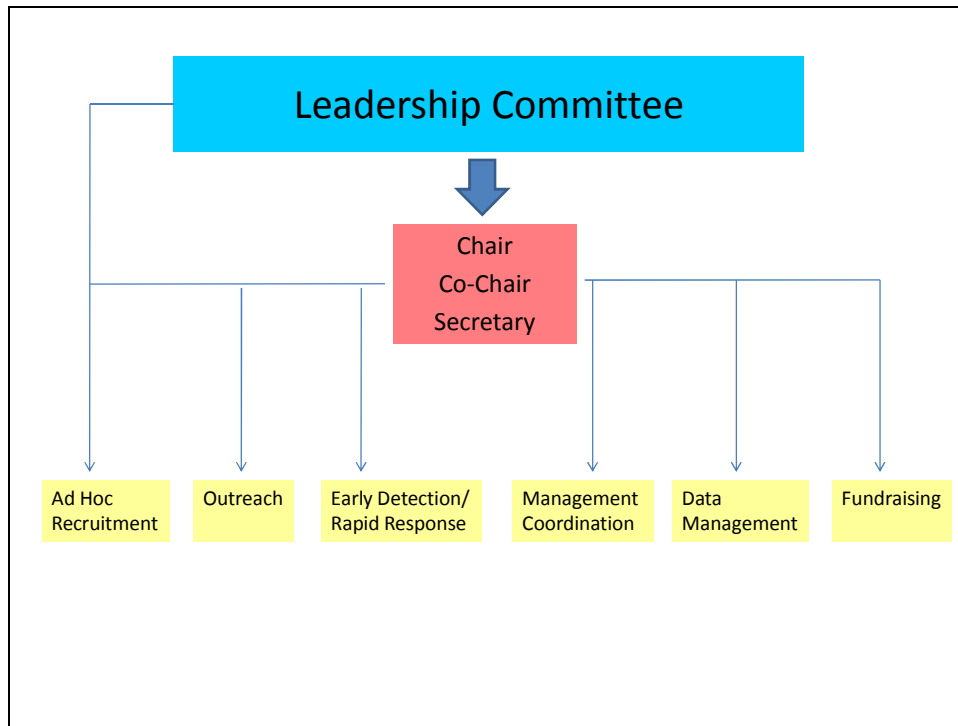


Figure 1: The Leadership Committee provides overall guidance to the NCSWMA.

5.0 NC Sandhills Weed Management Area Goals

5.1 Overall Goals, Objectives, and Actions

GOAL: To promote the cooperative management of invasive plants in the NC Sandhills.

- **Objective 1:** To encourage participation from important landowners, agencies, municipalities and organizations, whose work is relevant to invasive plant species issues in the region.
 - **Action 1.1:** Develop outreach teams to recruit and maintain membership in the NCSWMA, from all key organizations and private stakeholders who will be advocates for regional invasive plant management, including:
 - US Forest Service
 - NC Dept. of Agriculture and Consumer Services
 - NC Division of Forest Resources
 - NC Cooperative Extension
 - NC Department of Transportation
 - Sandhills Community College
 - City of Fayetteville
 - Town of Southern Pines
 - City of Raeford
 - Town of Spring Lake
 - Village of Whispering Pines
 - Village of Pinehurst
 - Private landowners

Progress Report: As of March 2008, participation from regional landowners, agencies, municipalities and organizations; including: Department of Defense, TNC, NC Wildlife Resource Commission, Weymouth Woods SNP, USFWS, Sandhills Ecological Institute, NC Division of Parks & Recreation, and others has been expanded.

- **Objective 2:** Establish a Leadership Committee to provide guidance and oversight to the NCSWMA.
 - **Action 2.1:** Develop and implement a nominations and election process for Leadership Committee positions.

Progress Report: Chair (Janet Gray), co-chair (Terry Myers), secretary (Ginny Carswell), web-page manager (Kerry Brust), and GIS manager (Susan Miller) positions were filled February 26, 2008.

- **Objective 3:** Support critical on-going functions important for NCSWMA success, including: fundraising, outreach, management coordination, data management, and early detection/rapid response.
 - **Action 3.1:** Enlist expertise of member organizations and existing NCSCP working groups to support council goals and objectives.

Progress Report: The NCSWMA Leadership Committee is providing guidance and project oversight.

- **Objective 4:** Update this plan in five years (2012-2013) in order to continually guide the actions of the NCSWMA.
 - **Action 4.1:** Establish the necessary content, format and timeline for the plan and divide responsibilities to complete specific sections among the Leadership Committee.

Progress Report: In November 2008, the NCSWMA strategic plan was updated.

- **Objective 5:** Hire a full-time or part-time person to help coordinate the NCSWMA
 - **Action 5.1:** Seek support from within member organizations for a NCSWMA coordinator
 - **Action 5.2:** Prepare and submit grants to support the NCSWMA coordinator position

Progress Report: Proposals were submitted to receive Legacy, BASF, and Z. Smith Reynolds Foundation grants.

5.2 Management Coordination

GOAL: Support coordinated invasive plant management efforts amongst NCSWMA members in the region.

- **Objective 1:** Determine invasive plant species presence, density and management initiatives by conducting a regional survey for invasive plant species.
 - **Action 1.1:** Develop standard methods for collecting invasive plant species data.

Progress Report: Rapid Response Team site profile sheets were developed in the summer of 2007.

Action Required: Develop a scope of work for regional invasive species survey.

- **Action 1.2:** Develop and distribute an electronic survey to gain landowner permission to collect information about invasive plant locations to facilitate a regional survey.

Progress Report: Although an electronic survey was distributed to agency personnel in 2007, an electronic survey was not distributed among NCSWMA landowners.

Action Required: An electronic survey needs to be developed and distributed among NCSWMA landowners, and the results need to be tabulated.

- **Action 1.3:** Support and identify invasive plant species management resource needs for landowners.

Progress Report: NCSWMA established a website as a forum for fielding questions regarding invasive species issues.

- **Objective 2:** Determine management priorities based on the survey data collected in Objective 1.

- **Action 2.1:** Compile information from landowners that have serious infestations that could impact other landowners.

Action Required: Spatial GIS analysis will occur upon completion of the regional invasive survey.

- **Objective 3:** Identify candidate ED/RR species and map the distribution of their known infestations within the region.

- **Action 1.1:** Identify species having low enough abundances to allow for eradication within scope of work for regional mapping; ED/RR sites will be identified.

Action Required: This information will be captured within the scope of work for the regional invasive species survey.

- **Objective 4:** Organize and coordinate a field team to assist landowners in searching for and treating infestations of invasive species.
 - **Action 3.3:** Identify funding to pay for seasonal employment of a field team.

Progress Report: Funding for two positions has been allocated for treating infestations during the 2009 field season.

- **Objective 3:** Support management of infestations based on priorities identified in Objective 2.
 - **Action 3.1:** Develop Hold Harmless Release forms, allowing volunteers, landowners or agencies to come onto properties to do control work, and releasing property owners of liability in case of accidents.

Progress Report: A liability release form from The Nature Conservancy was reviewed in 2007; however a Hold Harmless Release for NCSWMA volunteers was never developed.

Action Required: A “Hold Harmless Release” form will be drafted and adapted from the TNC release form, reviewed by an attorney, and distributed to all personnel and volunteers working on NCSWMA management projects.

 - **Action 3.2:** Share equipment, personnel, supplies, expertise, data, and funding resources to the extent necessary and possible.

Progress Report: TNC is providing storage for chemicals and equipment.

 - **Action 3.3:** Develop control recommendation materials to share with NCSWMA members.

Action Required: Proven control methods will be posted to the website

5.3 Data Management

Goal: Collect, maintain and share NIS data to support the mission of the NCSWMA.

- **Objective 1:** Collect and maintain regional invasive plant data within a database
 - **Action 1.1:** Consolidate information about known invasive plant occurrences, impacts on land use, and current and planned management practices from all member landowners in the NCSWMA.

Progress Report: Currently Susan Miller is assisting in the consolidation of information collected in 2007 regarding invasive plant occurrences.

Action Required: As additional data on invasive plant occurrences becomes available, land use impacts, and current and planned management practices become available; data/information needs to be relayed to Susan Miller for inclusion within the database.

- **Action 1.2:** Become a resource for member and non-member organizations within the region (e.g., NC Division of Forest Resources and other agencies) to inventory and include invasive species in their management plans.

Action Required: Develop inventory listings and sample invasive species management plan text for utilization when meeting with member and non-member agencies/organizations. Encourage each agency/organization to include the information within their working documents. Share Fort Bragg management Plan with TNC and other interested parties.

- **Action 1.3:** Continue to update invasive plant species data for the region from the US Forest Service, Southern Research Station, Forest Inventory and Analysis Data Center.

Progress Report: In 2007, some regional data was collected and published on the NCSWMA website in 2008.

Action Required: Review NCSWMA website invasive plant species data, revise if necessary, and input additional data as it is available.

5.4 Outreach

GOAL: Promote public education and communication of WMA goals to those outside of the NCSWMA.

Objective 1: Educate city, county and state governments; and private citizens residing in the NC Sand hills about regional invasive plant issues. Promote the use of native plant species for erosion control, wildlife forage, and landscaping.

- **Action 1.1:** Develop outreach materials, addressing invasive plant species introduction sources (e.g., nursery industry, erosion control plantings, roadside vegetation maintenance practices, and domestic and wildlife forage industries).

Progress Report: Two outreach flyers: Bad Neighbors and Least Wanted has been designed and distributed among the NCSWMA members. In March 2008, a newsletter was distributed among NCSWMA members. The newsletter will be distributed quarterly to anyone interested. Additional posters and presentation outreach examples are available on the NCSWMA website.

Action Required: Develop additional outreach materials, including information brochures; id booklet; native landscaping plants and native alternatives; sample press release, etc.

- **Action 1.2:** Formulate list of frequently asked questions (FAQ) and appropriate responses related to invasive species, their biological and economic impacts, and prevention and control management methods.

***Progress Report:** An extensive FAQ list has been developed.*

Action Required: Review current FAQ list and revise into a shorter more concise version, as either a one-page sheet or tri-fold brochure to be utilized by NCSWMA members and volunteers at public events and outreach programs.

- **Action 1.3:** Attend local government and community meetings, representing the NCSWMA to promote invasive plant prevention and management issues, especially on dates where zoning, landscaping ordinances, grounds and roadside service contracts issues will be discussed.

***Progress Report:** Attendance at local community based governmental and council meetings has been accomplished.*

Action Required: Obtain the schedules of upcoming community forums within the Sandhills region. Periodically check with each community to determine meeting agendas, and attend meetings in which the topic of invasive species management may be presented. Bi-annually or annually request invasive species as an agenda item for the community meeting.

- **Action 1.4:** Appeal to the NC Department of Agriculture & Consumer Services, Plant Industry Division to add invasive plants that are ecological threats to the Sandhills to the official regulatory list of State Noxious Weeds.

Action Required: Enlist the assistance of the NCSWMA members to appeal to the NC Department of Ag and Consumer Sciences, Plant Industry Division (PID) to add invasive plants to the official regulatory listing. Maintain communication with the PID to update listing as needed.

- **Action 1.5:** Promote invasive plant awareness during community events (e.g., Earth Day, National Public Lands Day, Arbor Day and Invasive Species Awareness Week) and plant workdays, including projects at highly visible sites, to encourage volunteer involvement in the NCSWMA.

Progress Report: In 2007, invasive plant awareness was promoted at general public events.

Action Required: Obtain annual community and/or school event calendars detailing special events and/or planned activities. Request to be speaker(s) and/or exhibitor(s) at events, showcasing invasive plant awareness.

- **Action 1.6:** Develop and submit press releases announcing the NCSWMA outreach projects and programs; detailing the project's purpose, ecological and economic impacts, and worst-case invasion scenarios. Periodically submit editorials and/or public announcements highlighting management successes, and problem areas/plants.

Progress Report: In spring 2008, community media resources were contacted via email regarding recent media coverage recognizing the tree of heaven.

Action Required: Develop and submit monthly media releases detailing project events, ecological and/or economic impacts, landscaping alternatives, etc... Request media space for least wanted plants of the month. Submit media releases for public announcements or radio spots. Utilize the media resources within the Sandhills community to invite the general public to "show and tell" plots, volunteer work days, community events, public meetings, etc...

- **Action 1.7:** Encourage NRCS, NCDOT, NCDA and other agencies to take invasive species off their lists of approved plants.
 - **Action 1.8:** Work with NC Cooperative Extension Master Gardener program and local garden clubs to promote elimination of invasive plants and use of native species in landscaping.
 - **Action 1.9:** Work with retailers to reduce the sale and use of invasive plant species in the region.
 - **Action 2.0:** Formulate a list of frequently asked questions and appropriate responses related to invasive species, their biological and economic impacts, and methods of prevention and control.
- **Objective 2:** Develop, maintain and update a website to communicate NCSWMA issues and facilitate member communication.

- **Action 3.2:** Photograph invasive species impacts within the region and post them on the NCSWMA webpage.

Progress Report: In February 2008, a NCSWMA website, www.ncswma.org was created and brought online mid month. The February 26, 2008 Leadership Committee designated Susan Miller with assistance from Scott Hartley and Kerry Brust as key contacts for the website.

Action Required: Maintain and update periodically NCSWMA issues on the website, notifying members when new information is posted.

5.5 Fundraising

GOAL: Raise funds to support the implementation of NCSWMA actions.

- **Objective 1:** Apply for grants from governmentally and privately administered funding sources.
 - **Action 1.1:** Identify grants that are potential funding sources for invasive species management.

Progress Report: Funding sources have been identified.

- **Action 1.2:** Develop a timeline for proposal deadlines from 2007-2012.

Progress Report: TNC has developed a timeline for years 2009-2011.

- **Action 1.3:** Develop and submit proposals for grants.

Progress Report: Limited grant research was compiled in fall 2007 through spring 2008 submitted and submitted to BASF (\$14,000), Legacy (\$98,000), and Z. Smith Reynolds Foundation (\$55,000).

- **Objective 2:** Define the process of submitting, accepting, and distributing funds from grants within the NCSWMA.

- **Action 3.1:** Develop a list of financial POCs at member organizations.

Progress Report: Sandhills Ecological Institute is the recipient of proposed Legacy, BASF, and Z. Smith Reynolds grant money.

6.0 Implementation

This management plan details specific actions, which if implemented, will develop NCSWMA into an effective group that promotes the cooperative management of invasive plants in the NC Sandhills. If implemented as described, this plan will guide the NCSWMA to eradicate highly invasive NIS from the region; reduce overall NIS populations; prevent new NIS introductions; protect threatened and endangered species habitat; and sustain the Sandhills ecosystem.

The first key step to implementing the described actions is to recruit active members. Without active members, the NCSWMA cannot achieve the stated goals. Early efforts should primarily focus on creating an active Recruitment Council that recruits active members and leaders from all key invasive plant species stakeholders in the region. They should particularly seek out individuals who can contribute to the development of the WMA by serving as active participants in key leadership roles.

With active members and leaders established, the NCSWMA can begin planning and implementing the actions described in this plan.

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