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Midwest Natural
Resources Group

Document Purpose: The purpose of this document is to provide a list of potential Best Management Practices (BMP) for non-native invasive species (NNIS) management activities that will reduce the burden of impact to federal agencies. The Midwest Natural Resources Group (MNRG) Great Lakes Terrestrial Invasive Species (TISC) Committee encourages you to consider these BMPs to help reduce the spread of invasive species within your program. Every federal employee has a role to play in this important effort. If you have additional comments or suggestions to this document please submit them to the document contact below.

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Recommended Best Management Practices for Non-native Invasive Species

Eastern Region USFS and Midwest Region NPS

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These best management practices (BMPs) are designed to incorporate modified practices or patterns in our day-to-day activity to reduce the threat of non-native invasive species (NNIS) to our managed lands. For BMPs to be the most effective it is important for all aspects of management activity to utilize the following guidelines. Although the outline of these BMPs follows a somewhat sequential order of events, it is important for each individual to be aware of the joint role that we share in BMP activity. Special cases and considerations follow this generalized guidance.

This document was designed to encompass management guidelines from both USFS and NPS. As this is a jointly produced document, the term 'forest' is used to represent any federal land management area regardless of use or dominant vegetation type.

Activities from USFS National Strategy and Implementation Plan for NNIS Management and NPS Invasive Species Action Plan:

1. Prevention, including leadership coordination, education and outreach
2. Early Detection Rapid Response
3. Control and Management, including research and information management
4. Rehabilitation and Restoration

Federal Laws, Regulations, Policy

- Executive Order 13112 - Invasive Species (February 1999)
- Noxious Weed Control and Eradication Act (2004)
- Federal Noxious Weed Act (1974)

USDA/USFS Regulations and Policy

<http://www.fs.fed.us/r9/wildlife/nnis/r9-nnis-laws-regs-policy.shtml>

- Departmental Regulations 9500-010 - Policy on Noxious Weed Management
- Forest Service National Strategy for Invasive Species Management (2004)
- Forest Service Noxious Weed Strategy - Stemming the Tide (1996)
- Forest Service Manual 2080 - Noxious Weed Management
- Forest Service Manual 2150 - Pesticide Use Management and Coordination
- Non-native Invasive Species Framework for Plants and Animals in the U.S.
Forest Service, Eastern Region

DOI/NPS Regulations and Policy

http://www1.nrintra.nps.gov/BRMD/publications/Invasive_Species_Action_Plan.pdf

- DOI Department Manual 517- Integrated Pest Management Policy
- National Park Service Management Policies 2006
- National Park Service Invasive Species Action Plan 2006
- NPS-77 Natural Resources Management Guidelines
- NPS-75 Natural Resources Inventory and Guidelines
- NPS Integrated Pest Management Manual

SITE MANAGEMENT

- Compile a list of known and potential NNIS, locations and sources of NNIS introduction and/or dispersal within the forest. This information will reside within the USFS TERRA/NNIS and NNIS FACTS or NPS GIS databases and should be made available to individuals working, volunteering or recreating within managed lands.
- Conduct NNIS inventories of all lands considered for acquisition.
- Consider NNIS status of lands when making land adjustment decisions.
- Incorporate NNIS prevention provisions in all special use permits, road use permits, and easements.
- Retain bonds until reclamation and restoration is complete for mineral permitting.
- Train personnel (including volunteers and contactors) to watch, identify and treat NNIS.
- Practice Early Detection Rapid Response (EDRR):
 1. Monitor disturbed habitats or pathways of introduction for newly established NNIS.
 2. Map and treat any new and pioneering infestations.
 3. Maintain a record of treatment of NNIS to assist in future management efforts.
 4. Map known infestations and flag NNIS in the field for easy relocation. Search the area for any satellite infestations and mark them.

PRE-PROJECT ASSESSMENTS AND ACTIVITY

- Environmental analysis for road construction and reconstruction will include a NNIS risk assessment and a strategy for NNIS management in construction layout, design, and project alternatives evaluation.
- Consider NNIS risk and spread factors in travel plan (road closure) decisions
- Ensure that NNIS prevention and related resource protection are considered in travel management.
- Check NNIS databases, pre project and enter NNIS information.
- Inventory NNIS infestations both on site and in the adjacent area before initiating ground disturbing activities.

- Remove or treat NNIS seed sources and other viable reproducing plant parts that could be spread by construction disturbance, passing vehicles, or foot traffic.
- Identify (flag) existing NNIS populations to be avoided
- Set up equipment cleaning stations for vehicles and other equipment in project activity.

PROJECT SITE ACTIVITY

- Do not allow the introduction of new NNIS species into project areas (pits, construction etc)
- All individuals working, volunteering or recreating should clean mud, dirt, and plant parts off vehicles, pets, equipment and boots before going onto public lands.
- Use uninfested areas for staging, parking, and cleaning equipment.
- Keep active road construction sites that are in relatively NNIS free areas closed to vehicles that are not involved with construction.
- If possible, begin activities in uninfested areas before operating in infested areas. Clean equipment via equipment cleaning stations before moving to an NNIS free area.
- Minimize contact with roadside sources of NNIS seed and propagules that could be transported to other areas or restrict to those periods when spread of seed or propagules are least likely.
- Minimize soil disturbance and retain desirable vegetation in and around area to the maximum extent possible.
- Minimize the creation of sites suitable for NNIS establishment
- Minimize removal of roadside vegetation during construction, maintenance, and other ground disturbing activities.
- Protect the native seedbank in uninvaded areas.
 - Minimally disturb soil, duff, and litter to keep seed bank intact.
 - Separate top soil for reapplication.
 - Salvage and reapply seedbank (within litter, duff, and topsoil).
 - Do not cover top soil with plastic or other materials that could destroy seeds by heating.

RESTORATION AND FOLLOW-UP

- Check NNIS databases post project completion and enter NNIS information.
- Quickly treat individual NNIS plants or small infestations before they become established, produce seeds, and are able to spread.
- Suppress the growth and/or reduce the reproductive capabilities of NNIS to slow or prevent their establishment.
- When revegetating areas that were previously dominated by invasive plants, attempt to achieve at least 90% control of the invasion before attempting restoration.
- Use certified weed free mulch and hay.

- Use only NNIS free sand, gravel, topsoil, etc.
- Consider the use of NNIS free fiber roll barriers or sediment logs.
- Consider whether a site requires seeding to insure that disturbed soil does not optimize NNIS plant establishment.
- Revegetate using plant materials that have a high likelihood of survival.
- Use locally native material including seed mixes, plugs, and sods where appropriate and available. Use certified NNIS free products.
- Use appropriate seeding guidelines and mixes and realize that many species previously recommended for this purpose now present invasive problems. Cross reference seeding list with list of known or potential NNIS.
- Consider the appropriate seed transfer zones for the native plants used in various restoration projects within – wildlife, fisheries, etc. and follow guidance regarding use of locally native plants in restoration.
- Consider carefully if fertilization is warranted, because addition of fertilizer will increase risk and degree of NNIS invasion.

MONITORING

- Include monitoring and treatment for NNIS in project maintenance programs.
- After a ground disturbing activity, monitor infested areas annually for at least three growing seasons following completion of activities and provide for follow up treatments based on inspection results.
- Monitor and evaluate the success of revegetation in relation to project plan

ROADS, SOIL, AND VEGETATION DISTURBANCE

- Develop training, MOU's etc. by which other local entities who may maintain FS/NPS roads (county, state, etc.) employ the same NNIS protocol as the USFS/NPS.
- 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 propagates are least likely to be viable and to be spread.
- Move sediment to upland or quarantined areas when cleaning around culverts, canals, or irrigation ditches.
- Avoid moving NNIS infested gravel, rock, sand, topsoil and other fill materials to NNIS free locations including soil and gravel pits.
- Eliminate and monitor NNIS within gravel pits and soil piles.
- Do not establish new soil pits in areas where new NNIS are present on NF lands.
- Check the area where pit material is used to ensure that no NNIS are transported and introduced to a new site.
- Where NNIS occur within soil pits, strip at least 8 inches and stockpile the contaminated material.

- Maintain desirable roadside vegetation. If desirable vegetation is removed during blading or other ground disturbing activities, the area should be revegetated with desirable vegetation.
- Reduce NNIS establishment in road obliteration and reclamation projects. Consider treating NNIS in road obliteration and reclamation projects before roads are made undrivable.

RECREATION- General

- Maintain trailheads, boat launches, outfitter and public camps, airstrips, roads and leading trailheads, and other areas of concentrated public use in a NNIS free condition.
- Time mowing of recreational areas and roads to minimize movement of NNIS propagules and to maximize control of NNIS (e.g., time mowing to prevent NNIS from producing seed)
- Reduce NNIS establishment and spread from activities covered by Recreation Special Use Permits.
- Include NNIS educational materials on identification and reporting of NNIS with all Recreation Special Use Permits issued.
- Ensure that rental equipment is free of NNIS seed and propagules before the contracting officer representative accepts it.
- All individuals working, volunteering or recreating should clean mud, dirt, and plant parts off vehicles, pets, equipment and boots before going onto public lands.
- Provide cleaning stations for ATVs, water craft, mountain bikes, animals and footwear.
- Discourage camping and traveling through areas infested with NNIS if they can be avoided.

Horses/Equestrian

- Before entering public lands, horses should be brushed to remove NNIS.
- Purge horses for 12 hours by feeding certified weed free feed before entering public lands.
- Use only certified NNIS weed free forage products.
- Stock should be tied and/or held in such a way as to minimize soil disturbance and avoid loss of native/ desirable vegetation.

Hunting

- Do not plant NNIS for wildlife. Plant native species if planting is deemed essential.
- Disallow access to infested areas.
- Waterfowl hunters should use elliptical, bulb shaped or strap anchors on decoys to avoid collecting submersed and floating aquatic NNIS.
- Monitor food plots for accidental NNIS introduction.
- Use NNIS free materials at game baiting stations.
- Do not allow blinds to be constructed from NNIS.

Fishing and Boating

- Construct new boat launches and ramps at deep water sites.
- Maintain a 100 foot buffer of aquatic NNIS free clearance around boat launches.
- Sign NNIS infested areas, access sites, etc.
- Disallow access to infested areas
- Establish and monitor boat cleaning stations.
- Drain water from boat, motor, bilge, live well, and bait containers before leaving a water access site.
- Remove visible plants, animals and mud from boat before leaving a waterbody.
- Clean and dry boats and equipment before entering another waterbody.
- Dispose of unwanted bait in trash. Do not dump earthworms in the woods even if earth worms are already present. –
- Do not release plants and animals into a waterbody unless they came from that waterbody.
- Involve Lake Associations in NNIS control / establish Cooperative Weed Management Areas/ CWMA's

LANDSCAPING

- Until removal of NNIS is completed, remove and destroy seed heads of NNIS (deadhead).
- Do not share NNIS species with gardeners
- Do not use NNIS or potentially NNIS in landscaping. Cross reference planting lists with NNIS lists.
- Use non invasive or preferably locally native alternatives for landscaping.
- Be aware of where topsoil is collected and transported from when bringing soil in from a different location for a project. Inquire about potential NNIS in topsoil sources.

RANGELAND/PASTURE

- Ensure that NNIS prevention and controls are considered in management of all grazing allotments.
- Minimize or exclude grazing on newly planted or restored areas until vegetation is well established.
- Control the timing, duration and intensity of livestock grazing to maintain and enhance desirable plant vigor and ground cover.
- Purchase only certified weed free forage, hay and other feed.
- If livestock are carrying seed in their hair or digestive tract, quarantine them for five days before moving them from infested to noninfested areas.
- Refrain from grazing or moving cattle through populations of NNIS while NNIS is setting seed or when fruit is ripening.
- Check areas of concentrated livestock use for NNIS establishment and treat new infestations.

FOREST PESTS AND PATHOGENS

- Bait – see Recreation section.
- Do not transport leaves, mulch, compost, or soil from one place to another unless it is certain that there are no earthworms or their cocoons present.
- Landscaping products, soil, and topsoil may contain worms and/or their cocoons and should not be used if there is a concern for the introduction of worms.
- Do not introduce additional earthworms to compost piles in forested areas. If there is concern for the spread of earthworms used in composting (vermicomposting), worm and their egg cases/ cocoons can be killed by freezing the compost for at least one week.
- ATV's and other vehicle with tread that can hold soil should be washed before transporting the vehicle elsewhere.
- Do not move firewood or other materials that may harbor insect pests.
- Follow prescribed monitoring eradication efforts
- Inspect equipment and materials for egg cases before moving.
- Use appropriate replacement tree species and realize that some species previously recommended for this purpose now present invasive problems. Never replace with NNIS.

HUMAN HEALTH

- Follow labeling on pesticide/ herbicide use.
- Provide information on exposure risks to toxic NNIS.

FIRE MANAGEMENT

Aviation Resources

The Forest shall compile a list of known sources of any NNIS. This list will be incorporated into the Forest Air Operations Plan. The Forest AIR Operations Plan will address cleaning and certification procedures.

Mobilization/Demobilization

Pre-Use Inspection. When feasible, upon initial arrival to the incident on the Forest and prior to use, equipment that will have contact with a water source will be washed. A final visual inspection for any mud or aquatic plants will complete the inspection process. If plants or mud are detected, then repeat the process until the bucket, tank or other equipment that will have contact with a water source is completely clean.

1. This process should be done a minimum of 300 ft away from any body of water or in a manner that will prevent contaminated water from reaching surface water, riparian, and wetland areas.
2. When the aircraft is demobilized from the incident, the process will be repeated to ensure that no NNIS species are transported to a new incident at another location. Documentation of cleaning will be issued by the

helicopter manager to the helicopter pilot stating the bucket was cleaned in accordance with the Forest Air Operations Plan.

3. An exemption to the washing requirement can be granted if documentation is presented to verify that the visiting equipment was treated prior to arrival to the Forest.

During Actual Suppression Operations

1. Known NNIS sites should be avoided as a first precautionary measure. Private ponds will be considered suspect unless tested otherwise.
2. During the operational period if an NNIS infected dip site is used to provide water to the fire via aerial delivery, the equipment contacting the water will be cleaned and inspected before moving to a new dip site if feasible.
3. If using NNIS contaminated waters, aerial drops will occur at a minimum of 50 feet away from any live body of water.
4. When situations permit safe operations, aircraft should dip or draft water from the deepest portion of a lake or stream to avoid picking up bottom sediments from the water source. Aircraft operation safety takes precedence.
5. Resource advisors should be assigned by the local unit for extended attack operations and multiple aircraft situations to ensure prevention practices are being adhered to.
6. Tarps should be placed under NNIS infested cargo areas and net loading areas if NNIS exists and can not be removed or avoided.
7. Minimize soil disturbance to no more than needed vegetation management objectives. Prevention practices to reduce soil disturbance include, but are not limited to: treating fuels in place instead of piling; minimizing heat transfer to soil in burning; minimizing fireline construction.

Ground Equipment - Standard Prevention Guidelines

The Forest shall compile a list of known sources of any NNIS. The Forest Fire Management Plan or equivalent will address NNIS prevention and mitigation procedures.

This list will be incorporated into the Standard Operations Plan, as will these mitigation procedures. None of these procedures will take precedence over protection of human life.

Mobilization/Demobilization

Pre-Use Inspection. When feasible, upon initial arrival to the Forest or Incident and prior to use, equipment (fire trucks, water tenders, pumps, intake hoses and screens, etc) that will have contact with a water source will be washed and inspected for plant parts and soil. If plants or soil are detected, then repeat the process until the equipment is completely clean.

1. This process should be done a minimum of 300 ft away from any body of water or in a manner that will prevent contaminated water from reaching surface water, riparian, and wetland areas.
2. When the equipment is mobilized from the Forest or Incident, the process will be repeated to ensure that no NNIS species are transported to a new incident at another location. On contracted equipment, the equipment manager, contracting officer representative or designated inspector will issue documentation to the equipment user as to verify equipment is cleaned in accordance with the Forest NNIS plan.
3. A bleach solution will be circulated through pumps, intake hoses, and screens.
4. An exemption to the washing requirement can be granted if documentation is presented to verify that the visiting equipment was treated prior to arrival to the Forest.
5. Equipment that is moved from one water source to another will require re-treatment.

During Actual Suppression Operations

1. Avoid sucking organic and bottom material into water intakes when drafting from stream or ponds.
2. Avoid entering waterbodies or contacting mud and aquatic plants. Avoid transferring water between drainages or between unconnected waters with in the same drainage.

Post Fire Restoration/ BAER

- See restoration above

Forestry Vegetation Removal/ Prescribed Burning Activity

- Clean equipment to avoid the spread of NNIS.
- Use equipment cleaning sites where proper disposal of waste water or other waste material can take place. The method chosen must be selected based on the type of NNIS believed to be present on the equipment and availability of cleaning operations.
- After being at a site with NNIS, personal sanitation measures include: cleaning shoes and clothing of plant parts, insects, insect eggs, larvae, and mud.
- During intermediate treatments remove NNIS when possible.
- Minimize time of mineral soil exposure.
- Ground disturbance should be minimized and monitored.
- Ground disturbance should not extend beyond the area where regeneration is desired. NNIS can become established (even via wind) and existing populations can expand.
- Reestablish vegetation on bare ground and exposed soil as soon as possible after objectives have been met. Consider the prospect for the reestablishment of vegetation via native seed bank.

- Before conducting soil exposing activities such as scarification, logging, roller chopping, prescribed burning, or tilling consider the NNIS at the site or likely to arrive. If there is an NNIS seed bank or if NNIS seed producing individuals are nearby, it may be desirable to treat the NNIS and/ or seed bank before disturbing the soil.
- Some NNIS are limited by the availability of sunlight; before conducting activities that remove part or the entire canopy, treat NNIS in the understory to prevent them from dominating after harvest.
- Encourage operators to maintain NNIS free mill yards, equipment parking, and staging areas.
- Time ground disturbing activities (including prescribed burns) to reduce NNIS.
- Recognize that prescribed fire can increase annual and biennial NNIS and plan for the additional control measures that will be necessary after the fire.