Division of
Ecological Resources

Operational Order 113

Divisional Guidelines

The Invasive Species Operations Order 113 Divisional Guidelines for the Division of Ecological Resources have been accepted and approved.

_____ _____

Approved by: Steve Hirsh, Acting Division Director Date

Table of Contents

Purpose and Overview

Minnesota Department of Natural Resources (DNR) Division of Ecological Resources protects and manages the diverse natural resources of Minnesota. Because invasive species have the potential to adversely affect these natural resources, it is the DNR's policy to limit the introduction of invasive species onto DNR managed lands and waters, limit their rate of geographic spread, and reduce their impacts on high value resources. The Division of Ecological Resources Invasive Species Guidelines development meets the requirements of Operations Order 113. The purpose of the Invasive Species Operational Order Guidelines (ISOOG) is to provide direction in the implementation of the Division of Ecological Resources management, granting, and permitting activities in order to meet the following requirements outlined in Operations Order 113:

- Prevent or limit the introduction, establishment and spread of invasive species.
- Implement site-level management to limit the spread and impact of invasive species.
- Provide policy and procedures for prevention and management of invasive species including:
    - Intentional movement of equipment
    - Intentional movement of organisms, organic and inorganic materials
    - Identifying invasive species and implement management strategies to reduce the impact at the site level
    - Monitoring and reporting new invasive species infestations.

The information in the ISOOG does not constitute the full array of management or cleaning techniques that can be used to address invasive species issues. If staff has techniques unique to their management needs they should be brought to the attention of the Operations Order 113 Guidelines team for review. The ISOOG will be continually updated as new information becomes available.

The ISOOG contains:

1. A glossary of terms and acronyms
2. Standard prevention protocols for aquatic activities
3. Detailed prevention information for aquatic activities involving the Division of Ecological Resources staff
4. Standard prevention protocols for terrestrial activities
5. Detailed prevention information for terrestrial activities involving the Division of Ecological Resources staff
6. Project and site level management plan development
7. A table outlining cleaning techniques, requirements, and recommendations that should be used to meet the intention of the ISOOG

Standard Protocols Aquatic Activities

Standard Protocols for invasive species prevention on aquatic sites

The following protocols pertain to any activity carried out by Ecological Resource staff. This list represents standard best management practices for all activities that involve intentional movement of materials or equipment onto or off of a site. These practices should be referred to before any work is completed on site and during the management planning process. This includes all activities carried out by Ecological Resource Staff (survey, site visits, restoration, invasive species treatments, etc), activities permitted or reviewed by the Division Ecological Resources, and all activities using grant money administered by the Division of Ecological Resources. Please reference the specific activity you are planning for specific best management practices unique to that activity.

Intentional movement of materials (water, fish, invertebrates, seeds, plants, etc)

1. Inspect outside of storage containers and materials for visible presence of invasive species.
2. Preserve all sampling material in the field unless the study requires live samples.
3. If live samples must be collected, transport in sealed containers.
4. When possible minimize the use of outside materials.
5. Before disposing of water used to transport, treat with ethyl alcohol or drain on land where water will not enter surface water.

Intentional movement of equipment (trucks, boats, trailers, heavy equipment, etc)

1. When possible maintain separate equipment to use on uninfested sites.
2. If working on multiple sites, work in uninfested sites before infested sites and clean equipment after use.
3. When working within a site with invasive species work in uninfested areas before infested areas and clean equipment after use.
4. Conduct post management treatment monitoring and treat any identified infestations.
5. Minimize area of soil disturbance with equipment.
6. Minimize number of access points to site.
7. Inspect all gear and remove any materials.
8. Clean all sampling equipment via drying, hot water wash or soak or treat with ethyl alcohol.
9. If using artificial substrate samplers, do not use in separate waters until samples are cleaned and dried. Samplers for infested waters should be used only in infested waters.
10. Carry boot brush in or on all vehicles and clean boots and clothing (in a controlled area) when leaving any site.
11. Avoid parking in patches of invasive species. When unavoidable, clean vehicle of all visible evidence of soil and vegetation when leaving site.

Site visits:

1. Carry boot brush in or on all vehicles and clean boots and clothing (in a controlled area) when leaving any site.
2. Use brush to clean gear and equipment such as chainsaws to remove loose soil and plant materials.

3. Avoid parking in patches of invasive species. When invasive species are unavoidable, clean vehicle of all visible evidence of soil and vegetation when leaving site.

Detailed Aquatic Activities

Activity:

- **Nearshore Fish Community Sampling (Lake)**
- **Nongame Fish Sampling (Streams/River)**
- **Zooplankton Sampling (Mississippi River)**

Activity Risk: Moderate

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Preserved fish, invertebrates, and aquatic plants. Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes boats, motors, trailer, canoes, waders, seines, and backpack electrofisher. Equipment may be moved from one site to another within one day. There is an overall **moderate** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes movement of preserved fish, invertebrates and aquatic plants, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 18 co-located offices across the state (Appendix 1.).

Activity:

- **Plant Surveys (Lakes)**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Plant samples. Other materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, boats, motors, trailer, canoes, waders, plant hook, and anchor. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of plant samples, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas wash with water prior to using in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Activity:

- **Purple Loosestrife (PL) Biocontrol Transect Surveys**
- **Purple Loosestrife (PL) Biocontrol Collection and Movement**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, waders and clothing. Equipment may be moved from one site to another within one day. There is an overall **high** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of equipment (PVC poles, clothing and waders):

1. Clean mud and visible plant parts off of clothes and waders before placing in vehicle and wash clothing after survey.
2. Use boot brush to brush off clothing and foot wear.

Specific for PL Biocontrol Transect Surveys

3. Plug bottom of PVC pipe before use.

Activity:

- **Herbicide treatment (lakes)**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Plant samples and herbicide. Other materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, boats, motors, trailer, canoes, waders, plant hook, and anchor. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of plant samples, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of equipment (clothing and waders):

1. Remove plant fragments from boat as work progresses and clean equipment in lake at access.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Choose herbicides, treatment area size, and timing of treatment to maximize native plant survival.

Activity:

- **Purple Loosestrife (PL) Herbicide treatment (Rodeo)**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Herbicide is purposefully moved off sites. Other Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, waders and clothing. Equipment may be moved from one site to another within one day. There is an overall **high** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of herbicide and equipment (sprayers) and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of equipment (clothing and waders):

1. Clean mud and visible plant parts off of clothes and waders before placing in vehicle and wash clothing after survey.
2. Use boot brush to brush off clothing and foot wear.
3. Clean sprayer off with brush to make sure any seed or vegetative parts are removed.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Use hand held sprayer to direct herbicide to purple loosestrife only.

Activity:

- **Collection and possession of invasive plant species for research and other approved activities.**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Live plant samples. Other materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, boats, motors, trailer, canoes, waders, plant hook, collection container and anchor. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of live plant samples, movement of equipment and supplies on and off the site.

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of material (Plants):

1. Transport materials in closed container.
2. Plant material not used for research or other approved activity will be rendered nonviable through autoclaving.

Intentional movement of equipment (clothing and waders)

1. Facilities holding plant material will insure no viable propagules are released. This will include cleaning of clothing and equipment when leaving facility.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Minimize disturbance area when collecting specimens.

Activity:

- **Water quality monitoring (Mississippi River and tributaries)**
- **Continuous in-situ water quality monitoring**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Preserved and unpreserved water samples. Other materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, boats, motors, trailer, canoes, waders, plankton nets, rope, water pump, multiprobe water quality instrument and anchor. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of water samples, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of material (water):

1. Dispose of unpreserved water samples (dump on ground or in drain that does not flow directly to a water body.

Activity:

- **Aquatic Macro Invertebrate Sampling (Benthic Macro Invertebrates)**
- **Aquatic Micro Invertebrate Sampling (Zooplankton Sampling)**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Sediment, vegetation and biota may be moved. Other materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, boats, motors, trailer, canoes, waders, kick nets, grab samplers, artificial substrate sampler, and anchor. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of sediment, vegetation and biota, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Activity:

- **Aeration Program Permitting and Safety Program**

Activity Risk: Low

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, trucks, waders, and other supplies. Equipment may be moved from one site to another within one day. There is an overall **Low** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Activity:

- **Spills/Kills Program**
- **Natural Resources Damage Assessments**

Activity Risk: Low

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, trucks, waders, and other supplies. Equipment may be moved from one site to another within one day. There is an overall **Low** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Activity:

- **Fish Health Inspection (public and private facilities)**

Activity Risk: Low

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, trucks, waders, and other supplies. Equipment may be moved from one site to another within one day. There is an overall **Low** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of equipment:

1. Staff should wear booties to cover shoe or boots.

Activity:

- **Laboratory Activities related to fish health**

Activity Risk: Low

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: All activities are restricted to the lab. There is an overall **Low** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Activity:

- **Processing of Contaminant Fish in MPCA Laboratory**

Activity Risk: Low

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Fish waste is moved into lab and disposed of in lab. Other materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: All activities are performed in lab. There is an overall **Low** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes movement of equipment and supplies on and off the site.

Review Standard Protocol Page 7!

Intentional movement of materials (fish waste):

1. PCA is reviewing waste treatment procedures to make sure it is appropriate to kill invasive species. If VHS presents a problem and the waste treatment procedures are not effective, the lab may ask staff to get samples from fish in the field and only bring in small amounts to the lab. This would allow the lab to treat the waste in house.

Activity:

- **Dam Removal**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Erosion control material, and seeds. Other Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, bull dozers, front-end loaders, back how, trucks, waders and clothing. Equipment may be moved from one site to another within one day. There is an overall **high** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of erosion control material, seeds and equipment and supplies on and off the site. This activity involves both aquatic and terrestrial systems; please review both pages of standard protocols.

Review Standard Protocol Page 7 and 28!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Activity:

- **Stream Restoration**

Activity Risk: High

Risk of movement of invasives will vary depending on if the waters sampled are infested. Uninfested waters present little to no risk, while infested waters present higher risk.

Movement of material: Rock, soil, and seeds. Other Materials are not purposefully moved on to site however materials may be moved incidentally through equipment and containers.

Movement of equipment: Equipment moved on and off site includes, bull dozers, front-end loaders, back how, trucks, waders and clothing. Equipment may be moved from one site to another within one day. There is an overall **high** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of rock, soil, seeds and equipment and supplies on and off the site. This activity involves both aquatic and terrestrial systems; please review both pages of standard protocols.

Review Standard Protocol Page 7 and 28!

Trucks, vehicles, boats, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Survey work unit before work is initiated and treat patches (not big patches) of invasive species before work is conducted.
2. Reduce site entry frequency, road/trail width, and area of soil disturbance. If brush is removed to create road minimize the number of piles created. Conduct post construction treatment if a seed flush occurs.
3. Minimize the number of burn piles to reduce sterilization.
4. Avoid entering site under wet conditions to minimize rutting and other soil disturbances.
5. Minimize plant community disturbance.
6. Minimize area of soil disturbance with equipment.

7. Re-seed areas that have exposed and disturbed soil (with native vegetation) immediately after restoration is completed.
8. Conduct post-restoration monitoring and treat any invasive species (such as resprouts and germination).
9. Specifically monitor areas where materials were added for invasive species germination and treat immediately if present.

Standard Protocols Terrestrial Activities

Standard Protocols for invasive species prevention on terrestrial sites

The following protocols pertain to any activity carried out by Ecological Resource staff. This list represents standard best management practices for all activities that involve intentional movement of materials or equipment onto or off of a site. These practices should be referred to before any work is completed on site and during the management planning process. This includes all activities carried out by Ecological Resource Staff (survey, site visits, restoration, invasive species treatments, etc), activities permitted or reviewed by the Division Ecological Resources, and all activities using grant money administered by the Division of Ecological Resources. Please reference the specific activity you are planning for specific best management practices unique to that activity.

Intentional movement of materials (soil, rock, gravel, straw, mulch, seed, plants, etc)

1. Inspect outside of storage containers and materials for visible presence of invasive species.
2. If possible use seeding material, plants, fill, straw, gravel, and mulch that is certified as uninfested.
3. Monitor areas where materials are added for evidence of invasive species germination.
4. When possible minimize the use of outside/offsite materials.

Intentional movement of equipment (trucks, tractors, ATV's, trailers, heavy equipment, etc)

1. When possible maintain separate equipment to use on uninfested sites.
2. If working on multiple sites, work in uninfested sites before infested sites and clean equipment after use.
3. When working within a site with invasive species work in uninfested areas before infested areas and clean equipment after use.
4. Avoid entering site under wet conditions to minimize rutting and other soil disturbances.
5. Minimize area of soil disturbance with equipment.
6. Minimize number of access points to site.
7. When creating roads and trails minimize area of vegetation and soil disturbance.
8. Survey site before management treatment and treat or avoid moving equipment through existing patches of invasive species.
9. Conduct post management treatment monitoring and treat any responding invasive species.
10. Inspect all gear and remove vegetation, soil, and organisms prior to arriving and leaving site.
11. On sites that are known to be infested with species such as garlic mustard, spotted knapweed, leafy spurge, etc (species with small seed that can collect on cloth material) wash clothing after work is complete.
12. Carry boot brush in or on all vehicles and clean boots and clothing, including Personal Protective Equipment (PPE) such as chainsaw chaps, (in a controlled area) when leaving any site.

13. Use brush to clean gear and equipment such as chainsaws to remove loose soil and plant materials.
14. Avoid parking in patches of invasive species. When unavoidable, clean vehicle of all visible evidence of soil and vegetation when leaving site.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Survey site before burning and treat or avoid moving through patches of invasive species before burn is conducted.
2. Avoid entering site under wet conditions to minimize rutting and other soil disturbances.
3. Conduct post-treatment monitoring and treat any invasive species (such as resprouts and germination).

Detailed Terrestrial Activities

Activity:

- **Prescribed Burning**

Activity Risk: High

Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of material: Materials are not purposefully moved on to site however materials may be moved incidentally through equipment.

Movement of equipment: Equipment moved on and off site includes, trucks, ATV, slip-on Pumps/Floating Pumps, drip torches, backpack pumps, chainsaw, swatter, rake, nomex, shoes, radio, harness, leaf blower, trailer, track truck. Equipment may be moved from one site to another within one day. There is an overall **moderate** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, possible stimulation of invasive species due to fire, soil disturbance, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If equipment or vehicles are parked or used in infested areas, wash with water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Survey site before burning and treat or avoid moving through patches of invasive species before burn is conducted.
2. Reduce burn frequency on sites that are susceptible to sterilization; allow piles to dry so that burn speed is rapid and intensity is low; Be prepared to conduct post burn treatment if a seed flush occurs.
3. Burn piles on frozen ground and allow piles to cure for a minimum of 6 months before burning to reduce sterilization.
4. Conduct adequate pre-burn site prep to reduce need for chainsaw during burn.
5. Conduct post-burn monitoring and treat any invasive species (such as resprouts and germination).

Activity:

- **Access road construction/trail construction**
- **Construction and Maintenance of Fences, Gates, Signs, Parking Lots, and Culverts**
- **Site Clean-up (Building Demolition, Garbage Pick-up, Farm Dump Removal)**

Activity Risk: High

Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of material: Seeds, plant material, soil, rock, mulch, straw, and other forms of fill are purposefully moved onto the site. Other materials that are not purposefully moved on to site but may be moved incidentally through equipment include worms in soil, invasive species seeds and plant material.

Movement of equipment: Equipment moved on and off site includes, trucks, ATV, chainsaw, radio, trailer, bulldozer, culverts, stacks, erosion control material. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, soil disturbance, movement of material, equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials: (mulch, fill, gravel, seeds, erosion control materials)

1. Inspect outside of storage containers and materials for visible presence of invasive species.
2. Ensure mulch, gravel, fill, seed is free of invasive species (either buy certified material or monitor after work).

3. Monitor areas of soil disturbance including auger sites for invasive species seed bank stimulation.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Treat any known infestations on site.
2. Survey work unit before work is initiated and treat patches (not big patches) of invasive species before work is conducted.
3. Reduce site entry frequency, road/trail width, and area of soil disturbance. If brush is removed to create road minimize the number of piles created. Conduct post construction treatment if a seed flush occurs.
4. Burn piles on frozen ground allow piles to cure for a minimum of 6 months before burning to reduce sterilization.
5. Avoid entering site under wet conditions to minimize rutting and other soil disturbances.
6. Minimize plant community disturbance.
7. Minimize area of soil disturbance with equipment, demolition and removal, and construction.
8. Re-seed areas that have exposed and disturbed soil (with native vegetation) immediately after construction is completed.
9. Conduct post-construction monitoring and treat any invasive species (such as resprouts and germination).
10. Specifically monitor areas where materials were added for invasive species germination and treat immediately if present.
11. Minimize construction or demolition area and soil disturbance.
12. Avoid storage and parking in infested patches (or treat before work begins).
13. Clean all supplies when leaving site (brush off visible soil and plants).
14. Monitor demolition, dumb, storage areas and other disturbed areas for invasive species.

Activity:

- **Mechanical Brush Removal**
- **Brush Removal with Chainsaw and/or Brush Saw**

Activity Risk: High

Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: No materials are intentionally moved onto or off of site. However materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes, trucks, ATV, trailer, brush machine and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, possible stimulation of invasive species when cut, soil disturbance, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of equipment (chainsaw, brush saw, backpack sprayers, and personal safety gear):

1. Use brush to sweep materials off saws and equipment. On chainsaws remove chain to clean out clutch and clean out saw carrier.
2. Clean Velcro areas and straps on Kevlar chaps and backpack sprayers.
3. Use appropriate spray head and technique for targeted invasive species.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Time management so that invasive species are not bearing seed/fruit at time of activities.

Activity:

- **Chemical Treatment or Hand Pulling of Invasive Species or Chemical Treatment with ATV, tractor and spot sprayer**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: Herbicide and invasive species that have been pulled and bagged are moved off of site. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes, trucks, ATV, backpack herbicide sprayer, hand held herbicide sprayer, weed wrench, hand tools plastic bags, personal protective equipment and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, soil disturbance that might stimulate invasive species seed bank, movement of material, equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials: (pulled invasive species, etc):

1. Extreme care should be taken to make sure that all plant material pulled is securely contained in bag, removed from site and destroyed or remains on site and is destroyed in secure area (burn on site or put in black plastic bag, secure the bag and put it in the trash).
2. Invasive plant material should not be added to compost as a means of disposal. Incineration is the preferred method of disposal.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Use appropriate chemical and application rate for target species.

2. Use appropriate spray head and technique for targeted invasive species and avoid over spray on to non-target native species.
3. Minimize soil disturbance when using weed wrench or pulling especially if native species will be affected.
4. Conduct management at time to maximize effectiveness for targeted species.
5. Fill sprayers on plastic mat to minimize spill over and waste.

Activity:

- **Mowing Fire Breaks**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: No materials are intentionally moved onto or off of site. However materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes, trucks, ATV, mower, brush saw, chainsaw, trailer, personal protective equipment and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, possible stimulation of invasive species when mowing, soil disturbance, movement of equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of equipment (mower, brush and chainsaws):

1. Use brush to sweep materials off saws. On chainsaws remove chain to clean out clutch and clean out saw carrier.
2. Clean Velcro areas and straps on Kevlar chaps.
3. Remove all loose soil and vegetation from mower deck and blade area.

Activity:

- **Seeding**
- **Seed Harvest**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: Seeds are moved onto and off of site and straw and mulch may be moved onto the site. All these materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes: trucks, ATV, trailer, broadcast spreader or other planting equipment, seed stripper, seed bags, and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, soil disturbance, movement of material, equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of equipment (harvesters, spreaders, mower, brush and chainsaws):

1. Use brush or leaf blow to clean broadcast spreader or drill.
2. Use brush or leaf blower to clean seed stripper.
3. Remove shoes/boots and dump out seeds.
4. Remove all seeds from clothing using brush.

Intentional movement of materials (seeds):

1. Ensure seed source is free of invasive species be for harvesting. Avoid harvesting from areas of known invasive species populations.
2. Make sure seed source is weed free.

Activity:

- **Prescribed Grazing**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: Animals, water, feed, seeds, and supplies are moved onto and off of site. These materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes, trucks, ATV, trailer, tractors, and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of material (animals, seed, and water), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (seed, feed, livestock):

1. Ensure feed and seed used for pasture is native and free of invasive species (either buy certified material or monitor after work). Do not allow supplemental feeding on native prairie sites.
2. Make sure supplies are free of invasive species through inspection.
3. Ensure livestock come from a weed free site or quarantine animals for several days prior to placing in desired area. When in quarantine feed weed free supplements to ensure expulsion of existing seeds in stomach.
4. Make sure additional seed source is weed free.
5. Rotate watering area to prevent concentration of cattle and re-seed when necessary with native species.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Use rotational grazing system to minimize soil disturbance.

2. Monitor watering areas and re-seed when necessary.
3. Pre-treat for invasive species.
4. Post-grazing monitoring to catch new infestations.
5. Avoid storage and parking in infested patches (or treat before work begins).

Activity:

- **Watering Facilities**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: water, tanks, and supplies are moved onto and off of site. These materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes, trucks, ATV, trailer, tractors, well auger, and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of material (animals, seed, and water), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (seed, feed, livestock, water):

1. Ensure seed used in re-seeding disturbed areas is native and free of invasive species (either buy certified material or monitor after work). .
2. Make sure supplies are free of invasive species through inspection.
3. Ensure any gravel used in high impact areas is certified weed free or monitor.
4. If possible rotate watering area to prevent concentration of cattle and re-seed when necessary with native species.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Use heavy protection such as gravel around watering tanks or use portable tanks to minimize disturbance.
2. Monitor any areas where fill or gravel was brought into site for invasive species.
3. Monitor watering site for invasive species (invasive species can be stimulated by changes in resources and disturbance).

4. Avoid storage of materials and equipment and parking in infested patches (or treat before work begins).

Activity:

- **Site visits (Land Acquisition, Plant Surveys, Joint Site Visits, Monitoring)**
- **Private Lands Technical Assistance**
- **Public Information/Outreach Workshops**
- **Well Sealing**

Activity Risk: Moderate
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: May move sample vegetation and supplies onto and off of site. These materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes vehicles, ATV, snowmobile, bicycle and clothing. Equipment may be moved from one site to another within one day. There is an overall **Moderate** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of material (samples), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (samples):

1. Ensure all plant and animal materials removed from site are free of invasive species. If samples are invasive species make sure they are secured before transport (press all collected plants on site, place in plastic bag or container).
2. Make sure supplies are free of invasive species through inspection.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Inform audience, landowner or land manager of the concern for invasive species.
2. Recommend monitor watering areas and re-seed when necessary.
3. Minimize area disturbed during soil digging
4. Recommend pre-treat for invasive species.

5. Recommend landowner minimize area disturbed during any activities.
6. Recommend monitoring of disturbed areas for invasive species.
7. Avoid storage and parking in infested patches (or treat before work begins).

Activity:

- **Brush Pile Stacking and Burning**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: There is no intentional movement of materials however materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes vehicles, ATV, ASV, skidsteer, trailer and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Pile woody material on already disturbed site.
2. Make pile as tall and narrow as possible to reduce ground disturbance.
3. Burn piles when ground is frozen to minimize soil sterilization.
4. Control any known populations of invasive species on site.
5. Allow piles to cure for at least 6 months prior to burning.
6. Post-treatment monitoring.

Activity:

- **Research Permits (Endangered Species, Invasive Species, etc)**

Activity Risk: Moderate
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: This activity is varied in many cases materials such as plant or animal will be moved off of the site. Materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes vehicles, supplies (this will vary depending on project) and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity may include, movement of material (samples), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (samples):

1. Ensure all plant and animal materials removed from site are free of invasive species. If samples are invasive species make sure they are secured before transport (press all collected plants on site, place in plastic bag or container).
2. Make sure supplies are free of invasive species through inspection.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Inform landowner or land manager of the concern for invasive species.
2. Inform landowner or land manager of known infestations.
3. Monitor watering areas and re-seed when necessary.
4. Ensure permits state all applicable concerns and procedures for researchers to follow (will depend on project).
5. Avoid storage and parking in infested patches (or treat before work begins).

Activity:

- **Equipment and Facility Maintenance**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: Move plant, animal, etc off of site. These materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes vehicles, ATV, trailer, and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of material (debris and garbage), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (refuse):

1. Ensure all refuse (plant, animal and other materials) removed from site are free of invasive species. If refuse has invasive species in it make sure they are secured before transport (place in plastic bag or container).
2. Make sure supplies are free of invasive species through inspection.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Treat all storage areas and access points for invasive species when found.
2. Avoid storage and parking in infested patches (or treat before work begins).

Activity:

- **Woodland Reconstruction (Restoration)**
- **Lakescaping**

Activity Risk: Moderate
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: Move plant, animal, etc may be moved on and off of site. These materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes vehicles, ATV, trailer, tree planter, seed drill, seed spreader, and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of material (seed, trees, samples, mulch), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (mulch, straw, seeds, fabric, and trees):

1. Ensure all plant, animal and other materials brought on to and removed from site are free of invasive species. If any plant material removed form sites are invasive species make sure they are secured before transport (press all collected plants on site, place in plastic bag or container).
2. Make sure supplies are free of invasive species through inspection.
3. Use native seeds and plants.
4. Monitor sites where fabric or mulch was used as erosion control.

Intentional movement of equipment (Drill or seed spreader, tree planter):

1. Empty all seed out of hoppers of seeding devices and spread on site before leaving.
2. Vacuum hopper when returning to shop.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Inform landowner or land manager of the concern for invasive species.
2. Inform landowner where and what invasive species are present.
3. Minimize area disturbed during any activities.
4. Treat for invasive species.
5. Monitoring of disturbed areas for invasive species
6. Avoid storage and parking in infested patches (or treat).
7. Use smallest form of equipment as possible.

Activity:

- **Riprap**
- **Revetment**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: Move riprap material (rock) on and off site. These materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes vehicles, ATV, dump truck, dozer, trailer, and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of material (rock), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (rock, cedar trees):

1. Ensure all materials brought onto and removed from site are free of invasive species. If removing any invasive species from site make sure they are secured before transport (press all collected plants on site, place in plastic bag or container).
2. Make sure supplies are free of invasive species through inspection.
3. If using root wads, remove as much soil as possible from roots.
4. Avoid using roots of trees that can root sprout.

Intentional movement of equipment (canoe/boats, chainsaw, winch, front end loader)

1. Clean out boat and remove all vegetation, soil and seed.
2. Brush clean chainsaw before entering and leaving site.
3. Ensure vegetation is not caught in winch.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Inform landowner or land manager of the concern for invasive species.
2. Inform landowner where and what invasive species are present.
3. Minimize area disturbed during any activities.
4. Treat for invasive species.
5. Monitoring of disturbed areas for invasive species
6. Avoid storage and parking in infested patches (or treat).
7. If possible work, on frozen ground.
8. Do not work under wet conditions.
9. Use smallest form of equipment as possible.

Activity:

- **Animal Surveys**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: Move samples on and off site. These materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes vehicles, ATV, supplies (live and snap traps, Pit-fall traps, drift fences, turtle traps, fish nets, canoe, metal or wood sheets), and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of material (samples), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (rock):

1. Ensure all materials brought onto and removed from site are free of invasive species. If removing any invasive species from site make sure they are secured before transport (press all collected plants on site, place in plastic bag or container).
2. Make sure supplies are free of invasive species through inspection.
3. Don't use birdseed or other non-native seed in bait.

Intentional movement of equipments and supplies:

1. Clean traps before moving to another site.
2. Clean digging equipment before leaving site.
3. Use separate nets for infested waters.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Inform landowner or land manager of the concern for invasive species.
2. Inform landowner where and what invasive species are present.
3. Minimize area disturbed during any activities.
4. Avoid storage and parking in infested patches (or treat).
5. Save native turf when digging hole. Replace spoils and cover with turf when done.
6. Avoid leaving metal or wood sheets on site for long periods of time. This can kill native vegetation and result in are for invasion to occur.
7. Evaluate use of metal or wood sheets in survey, avoid this technique in native sites where exotics are already a difficult management problem.

Activity:

- **Biomass Removal and Collection**

Activity Risk: High
Risk of movement of invasive species will vary depending on the site you are managing. Apparently uninfested sites present less risk, while known infested areas present higher risk.

Movement of materials: Move biomass material off site. These materials have the potential to harbor invasive species. Also, materials may be moved incidentally through equipment, supplies and clothing.

Movement of equipment: Equipment moved on and off site includes vehicles, ATV, dump truck, dozer, trailer, and clothing. Equipment may be moved from one site to another within one day. There is an overall **High** risk that the movement of this equipment from one site to another will result in the movement of invasive species.

Follow standard protocols: This activity includes, movement of material (biomass often invasive species), equipment and supplies on and off the site.

Review Standard Protocol Page 28!

Trucks, vehicles, ATV's, trailers (please refer to Table 1) – Standard cleaning protocols – remove all vegetation and other material, inspect vehicle, trailer prior to leaving access area. If parked or used in infested areas, wash with hot water prior to use in uninfested areas. If multiple sites are to be visited over a period of days, schedule uninfested areas first and end with infested areas. High-pressure hot water sprayers are available at 9 co-located offices across the state (Appendix 1.).

Intentional movement of materials (rock):

1. Ensure all materials removed from site are secured before transport (truck is covered or invasive materials are wrapped, etc).
2. Make sure supplies are free of invasive species through inspection.

Procedures to minimize the risk of increasing the dominance of invasive species on site:

1. Inform landowner or land manager of the concern for invasive species.
2. Inform landowner where and what invasive species are present after work is complete or where present before work was accomplished.
3. Treat invasive species stumps to avoid stump sprouting.
4. Monitoring of disturbed areas for invasive species after work is completed.
5. Avoid storage and parking in infested patches (or treat).
6. If possible work, on frozen ground.
7. Do not work under wet conditions.

8. Monitor biomass removal trails.
9. Monitor and treat pilling sites for invasive species.
10. Use appropriate herbicide and applicator for target species.
11. Minimize collection sites.
12. Minimize entry and removal trails.

Table 1. Prevention

Ensuring equipment is clean and any materials moved as part of DNR, Division of Ecological Resources Projects, activities, grants, and permits are free of invasive species is critical to limiting the spread of invasive species. The following guidelines should be followed to ensure equipment and materials are invasive species free.

Keep in mind:

- It is illegal to transport water from plant infested waters without a permit
- You are required to remove drain plug before reuse on waterbodies with Zebra Mussels and Spiny Water Fleas
- It is illegal to transport materials or equipment containing the propagating parts of noxious weeds, except by permit.

AQUATIC				
Equipment	**All Waters**	**Plant Infested Waters**	**Invertebrate Infested Waters**	**Pathogen Infested Waters**
	Procedures	**Procedures**	**Procedures**	**Procedures**
Boats, Trailers, Anchors, and other boating equipment	• Before arriving to a waterbody or site, ensure equipment (vehicles, trailer, etc) is free of visible plants, seeds, mud soil and animals etc. • Before leaving a waterbody, inspect for and remove all visible plants, seeds, mud, soil and animals from your equipment. • Before leaving a waterbody, drain water from any equipment, tanks, or water retaining components of boats such as motors, live well, bilge, and transom wells onto dry land.		Same as All Waters plus: Before reuse- • Power spray equipment to remove attached water fleas, zebra mussels, or New Zealand mudsnails. -or- • Rinse with hot water to kill the species. -or- • Dry before reuse to kill the species.	Same as All Waters plus: • After working on waters known to harbor pathogens of concern, disinfect equipment prior to using in locations not known to contain pathogens present at the last location visited.

AQUATIC Equipment	All Waters	Plant Infested Waters	Invertebrate Infested Waters	Pathogen Infested Waters
Seaplanes	**Procedures**	**Procedures**	**Procedures**	**Procedures**
	▪ Before leaving a waterbody, inspect for and remove all visible plants, seeds, mud, soil and animals from your equipment. ▪ Avoid trailing through aquatic plants before taking off. ▪ Raise and lower water rudders before and after take off. ▪ Return to lake and remove vegetation that did not free itself from water rudders/wires. ▪ Send out guidelines to contractors and stipulate adherence to guidelines in contracts.	Same as all waters plus: ▪ Return to lake and remove vegetation that did not free itself from water rudders/wires. ▪ Send out guidelines to contractors and stipulate adherence to guidelines in contracts.	Same as all waters plus: ▪ If water is taken from zebra mussel or spiny water flea infested water for fire fighting, aircraft should return to base (except…) and contaminated buckets, tanks and/or aircraft should be rinsed with hot water. ▪ Avoid mooring in invertebrate infested waters –or- scrub areas in contact with water before leaving waters after being moored for _____.	

TERRESTRIAL				
Equipment	**All Places**	**Weed/Terrestrial plant infested sites**	**Worm infested sites (based on visual observation)**	**Forest pest/Invasive Insect infested sites**
Vehicles (Trucks, cars, trailers)	**Procedures**	**Procedures**	**Procedures**	**Procedures**
	▪ Before arriving to a work site, ensure equipment and vehicles are free of viable plants, seeds, mud, soil and animals, etc. ▪ Before leaving a work site, inspect for and remove all visible plants, seeds, muck, soil and animals form your equipment. ▪ Brush (hand remove) off plants, seeds, mud, soil and animals from vehicles including: wheel wells, tracks, hubs, blades, grills, etc.	Same as all places plus: ▪ Power spray vehicles and equipment after returning from site.	Same as all places plus: ▪ Power spray equipment and vehicles to remove organic material. ▪ Dry before use to kill species.	

TERRESTRIAL				
Equipment	**All Places**	**Weed/Terrestrial plant infested sites**	**Worm infested sites**	**Forest pest/Invasive Insect infested sites**
Heavy equipment (logging machinery, mowers, etc)	**Procedures** ▪ Before arriving to a work site, ensure equipment and vehicles are free of visible plants, seeds, mud, soil and animals, etc. ▪ Before leaving a work site, inspect for and remove all visible plants, seeds, mud, soil and animals form your equipment. ▪ Brush (hand remove) off plants, seeds, mud, soil and animals from vehicles including: wheel wells, tracks, hubs, blades, grills, tracks, etc.	**Procedures** Same as all places plus: ▪ Power spray vehicles and equipment after returning from site. ▪ Designate specific equipment for infested sites.	**Procedures** Same as all places plus: ▪ Power spray equipment and vehicles to remove organic material. ▪ Dry before use to kill species.	**Procedures**

Table 2.

Treatments to Remove or Render Invasive Species Non-viable

April 11, 2007 Draft

Species	Removal Methods	Drying Period	Wash Temp and Duration	Other Treatments
Aquatic Plants:				
Curly-leaf pondweed	• Hand pick plant fragments from equipment • Power spray specific equipment after hand removal if needed	• Unknown for turions	• Unknown for turions	• Freeze in air for 1 week will kill turions
Eurasian watermilfoil	• Hand pick plant fragments from equipment • Power spray specific equipment after hand removal if needed	• Dry 10 days (regs)	≥60˚ C	• Freeze in air for 2 days (regs)
Flowering rush	• Hand pick plant parts from equipment • Power spray specific equipment after hand removal if needed, especially to remove mud and seeds	Unknown	Unknown	?
Purple loosestrife	• Hand pick plant parts from equipment • Power spray specific equipment after hand removal if needed, especially to remove mud and seeds	None	None	

Aquatic Animals:	Removal Methods	Drying Period	Wash Temp and Duration	Other Treatments
New Zealand mudsnail	• Power spray to remove	• Dry 4 days (other treatments are preferred)	• 120 F (49 C)/ 1 min (card/MT)	• Freeze in air for 2-4 hours
Spiny water flea	• Power spray to remove	• 12 hours minimum and 24 hours preferred	• soak for 10 minutes in hot (120-130 F degree) water	• Filter to 250 microns or less to remove resting eggs from water
Zebra mussels	• Power spray to remove • Scraping may be necessary if objects were in the water for extended periods	• Dry 3 days in temperatures over 65 F • Drying is NOT recommended in cool wet weather (<64 F)	• 104 F/ 4 min (hotter temps result in better and shorter kill times)	• Freeze for 2 days • Filter to 40 microns or less to remove veligers from water • Treat water with 750 mg/l KCL for 1 hour, followed by 25 mg/l formalin for 2 hours to kill zebra mussel veligers. Do not use NaCl when completing this treatment.
Terrestrial plants:	**Removal Methods**	**Drying Period**	**Wash Temp and Duration**	**Other Treatments**
All species	• Pull or brush plant material and soil off grills, tires, wheels, axles and other vehicle and equipment parts	• None		

Terrestrial insects/ animals:	Removal Methods	Drying Period	Air Temp and Duration	Other Treatments
Earthworms	• Power spray soil off of vehicles and equipment	• None		
Gypsy moth		• None	• Heat wood to __degrees for ___	
EAB	• Debark and remove sapwood	• None	• Heat to wood __degrees for ___	
Bark beetles		• None	• Heat to wood __degrees for ___	
Pathogens:	**Removal Methods**	**Drying Period**	**Wash Temp and Duration**	**Other Treatments**
Dutch elm disease	• Debark wood?	•	•	•
LMBV **Heterosporis** **VHS**	• None	• VHS - 12 hours without sun / 4 to 6 in the sun (Ling?) • Heterosporis – dry is effective (no time found) Gear must be completely dry for a minimum of 24 hours for desiccation to effectively kill the spores	• True steam cleaning (212 ℉) will inactivate rhabdo viruses within seconds. This may be an option when chemical disinfection is difficult.	• see disinfection table below

Table 3. Fish Pathogen Disinfectants and their Properties

When mixing any of these chemicals, wear eye protection, gloves, and a dust mask if it is a powder. (Concentrations and effective times may change with additional discussion.)

Chemical	Concentration	Contact Time	Safety precautions
Chlorine	200 ppm 1000 ppm	10 min 30 sec – 1 min.	Wear eye protection, rain gear, gloves if spraying. Stay upwind of the spray. Will break down in sunlight and when in contact with organic material. Is corrosive to metal and rubber. Is toxic to fish at these concentrations so rinse well after disinfection or neutralize with sodium thiosulfate*.
Virkon Aquatic	1:100 10,000 ppm 1:200 5,000 ppm	On contact to 1 min 10 minutes	This is a new disinfectant in the peroxygen (hydrogen peroxide) family. It is a powder. It is 99.9% biodegradable and breaks down to water and oxygen. It is not corrosive at the working dilution. Wear eye protection, rain gear and gloves if spraying. Stay upwind of spray.
3.5% Free Iodine	1:20,000 or 50 ppm	30 sec. to 1 min.	Wear eye protection and rubber gloves when handling the concentrate. Wash with soap and water if concentrate gets onto skin. If concentrate gets into eyes, flush with plenty of water and call a physician. This stable, non-flammable liquid is 100% soluble in water and requires no special respiratory protection other than normal ventilation. Very safe product to use.
Quaternary Ammonia	1:833 or 1200 ppm	30 sec. to 1 min.	Wear eye protection and rubber gloves when handling the concentrate. Wash with soap and water if concentrate gets onto skin. If concentrate gets into eyes, flush with plenty of water and call a physician. This is a stable compound readily soluble in water. Vapors of ethanol can be flammable. Product residue can ignite explosively. Prior to use, eliminate ignition sources. Following use, rinse with water. Wear a respirator when normal ventilation is unsatisfactory.

* For neutralizing chlorine or iodine, spray sodium thiosulfate in an 800-ppm solution (3 grams per gallon of water) on all surfaces after the disinfection period is over. Rinse with water from the next lake to remove any remaining sodium thiosulfate.

** It is wise to have all four of these disinfectants available for use and to use them rotationally so as to minimize the chances of producing resistant bacteria, viruses and parasites.

SITE PLANNING AND MANAGEMENT

A key step in managing the spread of invasive species is pre-emptive and appropriate planning. Many of the non-native invasive species that threaten the ecology, economic and recreational values of the state's natural resources respond positively to management focused on regenerating and maintaining native plant communities. Therefore, it is important to understand our management will impact the invasive species on site or in the region. Invasive species are located in all regions of the state and management plans, and project proposals should address the issue of invasive species management. Each project developed should walk through the questions outlined below. This section also provides a decision tree (and sample scenario) to help mangers think through projects and their impacts on invasive species prior to implementation. These recommendations will help managers meet prevention and management requirements outlined in the Invasive Species Operational Order.

I. Management Goals:
- i. What are the specific management goals for the site you are working on?
  1. Habitat enhancement
  2. Restoration
  3. Maintenance

II. Activity proposed to meet management goals:
- i. What activity do you propose to use to accomplish these goals

III. Site condition:
- i. Are there existing invasive species on site?
- ii. What species are on site?
- iii. Where are they located?
- iv. Are there invasive species on adjacent sites?
- v. What species are on adjacent sites?

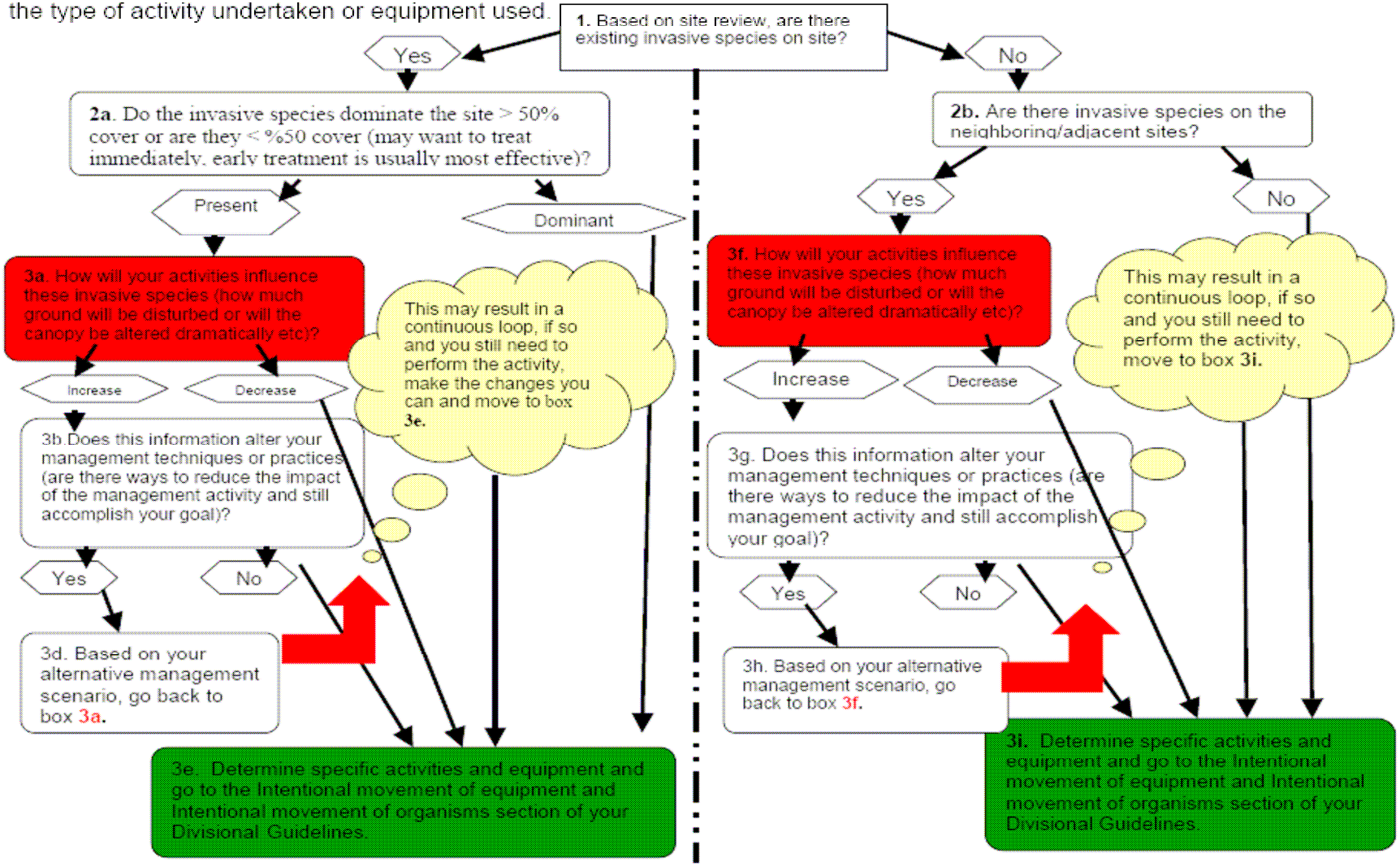
IV. Impact of activity on site:
- i. Will your proposed activity alter resources (light, nutrients, moisture)?
- ii. Will your proposed activity disturb soil?
- iii. Do these changes have the potential in stimulate the growth of existing or adjacent invasive species?

V. Alternative management techniques available:
- i. Are there alternative techniques that could be used to accomplish the goals but not stimulate the invasive species to the same degree as the original activity?

VI. Proposed follow-up activities:
- i. Most activities have the potential to stimulate the growth of invasive species or provide an avenue for these species to move onto a site, therefore monitoring and evaluation of the management outcomes in important.
- ii. Will there need to be follow-up control activities planned?

iii. What will be the monitoring protocols followed after activities are completed?

Example of decision tree to guide staff through site pre-planning process: (See management scenario as example)
This example starts with gathering information about the site where the activity will take place; other examples may include a focus on the type of activity undertaken or equipment used.



Management Scenario (Trail construction) for decision tree example: Follow the Boxes on flow chart

The following example is one scenario that could occur during a trail construction project. This example is designed to provide you with an outline of how a manager can develop and use a decision tree. Your specific decision tree may differ from this example depending on the objective of the decision tree.

Box 1. Survey the site and surrounding areas for invasive species and estimate the percent cover of these species on site and on the adjacent areas. In the decision tree, answer Box 1.

A. If based on your review of the site, your answer is yes (there are invasive species on the site, Buckthorn), go to the Box 2a.

Box 2a. Based on your rough estimate of percent cover answer yes or no to 2a.

A. If your answer is yes (Dominant > 50%, the site is already dominated by invasives), you should proceed to your divisional guidelines for detailed information regarding prevention of spread (Box 3e).

B. If your answer is no (Present, the site is not dominated by invasive species) you should move to Box 3a.

Box 3a. You should be aware of how your management activities may increase or decrease the spread of the existing invasive species (If you are not, review the life history of the species present). For example, creating a wide trail through a woodland community may result in increased light allowing the existing species (buckthorn) to increase or the timing of your work may result in increased spread of seed.

If your activity will decrease the risk of increasing the invasive species on site, you should proceed to your divisional guidelines for detailed information regarding prevention, control, and monitoring (Box 3e.).

If your activities or techniques will increase the risk of increasing the invasive species on site, you should move to Box 3b.

Box 3b. If after review you decide your activity will increase the existing invasive species, determine if you can alter your planned activities or techniques (create a narrower trail or reduce mowed area around trail) in a way that will reduce this risk.

A. If you choose not to alter your activities, proceed to your divisional guidelines for detailed information regarding prevention, control, and monitoring (Box 3e.).

B. If you choose to alter your activities or techniques move to Box 3d.

MAPPING AND REPORTING

The following outlines the need and benefits of mapping and reporting invasive species. This section also provides a guide to managers regarding the DNR standard techniques and equipment used in the process of mapping and reporting invasive species.

To effectively prevent the movement and reduce impacts of invasive species, it is important to know the distributions of important invasive species. This information can be used to develop plans to minimize the spread from infested sites, tailor land use practices or management activities to prevent spread within a site and develop plans for managing invasive species.

The most important species to survey and report on are those species listed in this handbook (section III. List of Invasive Species). For aquatic invasive species, it is important to report all findings of listed species. Due to the large number of terrestrial invasive plants, it is important to survey for species that are of most concern to the land manager. This will vary depending on the location and habitat that is being managed.

Mapping Invasive Species
Division and Bureau Operations Managers who are responsible for overseeing the collection of invasive species information in the field, are the primary contacts for field staff. This includes ensuring that staff meet recommended standards for data collection and knowledge of hardware and software needs. Operations managers can work with the Division of Ecological Services - Invasive Species Program, to implement invasive species data collection.

DNR staff planning to carry out surveys for invasive species should follow the standardized monitoring protocols developed for terrestrial and aquatic invasive species. The standardized attribute data to be collected can be found in the meta data available in the DNR intra net at: http://jmaps.dnr.state.mn.us/mdreporter/dp_full_record.jsp?mpid=39000482&ptid=2&fcid=3&dsid=null (for terrestrial) and "coming soon" (for aquatic) (Table XX). When collected in this format, the data can be readily appended to the two centralized databases for terrestrial and aquatic invasive species.

PDA/GPS used in collecting invasive species data

The preferred method of data collection is electronic, using a GPS capable handheld computer or PDA using standardized forms in the field. For terrestrial invasive species, standardized forms have been developed, that can be utilized by both palm based PDA and handheld PC. Pendragon software is currently being used to develop electronic data forms and manage the terrestrial invasive species data. These forms are available to any staff wishing to survey for terrestrial invasive species. Specific information is recorded for each invasive population including location, date, observer, invasive species name, number of plants, plant distribution, acres of infestation, site type, and GPS coordinates.

Using the current standardized forms, the data collected in the field (Fig. 2) is automatically downloaded and stored in a centralized database. The data is reviewed and updated and made available to state land managers through quick themes in Arcview or Arc GIS (Fig. 3).

Figure 2. Mapping invasive species in the field.

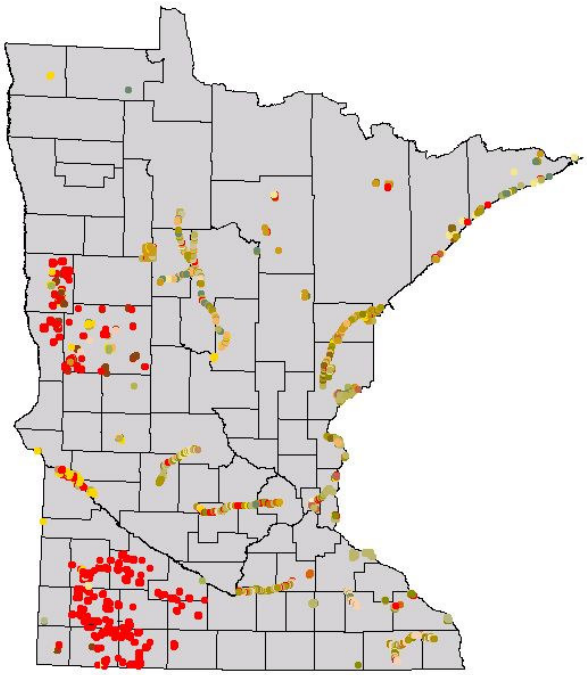


Figure 3. Example of invasive species data displayed

Reporting Invasive Species Observations

If you are mapping invasive species electronically with the standardized protocols, your data is automatically submitted to the database and no further action is required. If you observe an invasive species infestation (one or several), these observations can be reported using the reporting form on page 31. Depending on the abilities of the observer to accurately identify the invasive species, a sample of the invasive species may be needed to confirm the observation. Digital images can sometimes be substituted for actual specimens.

Accessing Data on Invasive Species Observations

Currently, there are two databases that can be access through quick themes in Arcview or Arc GIS under the theme class “Environmental Quality”. The themes are named “Terrestrial Invasive Species Observations” and “Aquatic Invasive Species Observations.”

GLOSSARY

Key terms and acronyms mentioned in the Invasive Species Operational Order and the Handbook are identified in the following list.

Clean – The removal of plants, invertebrates and pathogens by physical, chemical or biological methods from the target. Recommended cleaning practices for each invasive species, groups of species, and pathogens can be found in the Handbook.

Emergency – A sudden occurrence of a serious and urgent nature that threatens life or property that requires immediate action.

Infested site – A site or area that has a known population of a listed invasive species.

Infested water – Waters designated by the Commissioner of Natural Resources that contain a population of an aquatic invasive species that could spread to other waters if use of the water and related activities are not regulated to prevent this. (Note: waters containing pathogens are not designated as infested waters as of 5/30/07.)

Inspect – The visual examination of equipment for the presence or absence of aquatic invasive organisms plants and viable plant pieces.

Invasive species – A nonnative species that causes or may cause economic or environmental harm or harm to human health; or threatens or may threaten natural resources or the use of natural resources in the state (M.S. 84D).

Invasive Species-Free – Means free of those invasive species listed in the Handbook. Materials which contain any listed invasive species, may be considered invasive species-free if the following requirements are met:

a. Site upon which the materials were obtained was treated to reduce the likelihood of spreading the invasive species as outlined in discipline guidelines.

b. Treatment method can include but is not limited to: 1) burning, 2) mowing, 3) cutting, 4) mechanical methods, or 5) chemicals.

Listed invasive species – An invasive species that is listed in the Handbook and is subject to the Invasive Species Operational Order.

Native species – An animal or plant species naturally present and reproducing within this state or that naturally expands from its historic range into this state (M.S. 84D).

Nonnative species – A species that is not a native species (M.S. 84D).

Noxious weed – See state prohibited and restricted noxious weeds.

Pathogen – Any organism capable of producing a disease state.

Pathogens of Concern – Diseases as determined by the Commissioner of Natural Resources that could impact populations of aquatic life.

Plant pests – Includes, but is not limited to, an invasive species or any pest of plants, agricultural commodities, horticultural products, nursery stock, or non-cultivated plants by organisms such as insects, snails, nematodes, fungi, viruses, bacterium, microorganisms, mycoplasma-like organisms, weeds, plants, and parasitic plants.

Prohibited invasive species (of wild animals and aquatic plants) – an invasive species that has been designated as a prohibited exotic species in a rule adopted by the commissioner [of Natural Resources] under section 84D.12 (M.S. 84D).

Regulated invasive species (of wild animals and aquatic plants) – an invasive species that has been designated as a regulated exotic species in a rule adopted by the commissioner [of Natural Resources] under section 84D.12 (M.S. 84D).

State prohibited and restricted noxious weeds – an annual, biennial, or perennial plant that the commissioner [of Agriculture] designates to be injurious to public health, the environment, public roads, crops, livestock, or other property (MS 18.77, subdivision 8 and MR 1505.0750 subpart 8);

Work Site – any specific site where work activities are taking place. This includes both aquatic and terrestrials sites.

LIST OF INVASIVE SPECIES

The following list represents the invasive species covered by the ISOO and the ISOH. This list is current as of the development of the ISOO and ISOH and will be updated as needed.

Fish		
bighead carp	*Hypophthalmichthys nobilis*	Prohibited Invasive Species (M.R. 6216)
black carp	*Mylopharyngodon piceus*	Prohibited Invasive Species (M.R. 6216)
grass carp	*Ctenopharyngodon idella*	Prohibited Invasive Species (M.R. 6216)
round goby*	*Neogobius melanostomus*	Prohibited Invasive Species (M.R. 6216)
rudd	*Scardinius erythrophthalmus*	Prohibited Invasive Species (M.R. 6216)
ruffe*	*Gymnocephalus cernuus*	Prohibited Invasive Species (M.R. 6216)
sea lamprey*	*Petromyzon marinus*	Prohibited Invasive Species (M.R. 6216)
silver carp	*Hypophthalmichthys molitrix*	Prohibited Invasive Species (M.R. 6216)
white perch*	*Morone americana*	Prohibited Invasive Species (M.R. 6216)
zander	*Stizostedion lucioperca*	Prohibited Invasive Species (M.R. 6216)
alewife	*Alosa pseudoharengus*	Regulated Invasive Species (M.R. 6216)
common carp, koi*	*Cyprinus carpio*	Regulated Invasive Species (M.R. 6216)
goldfish*	*Carassius auratus*	Regulated Invasive Species (M.R. 6216)
rainbow smelt*	*Osmerus mordax*	Regulated Invasive Species (M.R. 6216)
tilapia	*Tilapia, Oneochromis, Sartheradon* spp.	Regulated Invasive Species (M.R. 6216)
Aquatic Invertebrates		
zebra mussel*	*Dreissena polymorpha*	Prohibited Invasive Species (M.R. 6216)
New Zealand mudsnail*	*Potamopyrgus antipodarum*	Prohibited Invasive Species (proposed)
Chinese mystery snail*	*Cipangopaludina* spp.	Regulated Invasive Species (M.R. 6216)
rusty crayfish*	*Orconectes rusticus*	Regulated Invasive Species (M.R. 6216)
spiny water flea*	*Bythotrephes cederstroemi*	Regulated Invasive Species (M.R. 6216)
Banded mystery snail	*Viviparus georgianus*	?
Aquatic Plants		
African oxygen weed	Lagarosiphon major	Prohibited Invasive Species (M.R. 6216)
Australian stonecrop	*Crassula helmsii*	Prohibited Invasive Species (M.R. 6216)
brittle naiad	*Najas minor*	
curly-leaf pondweed*	*Potamogeton crispus*	Prohibited Invasive Species (M.R. 6216)
Eurasian water milfoil*	*Myriophyllum spicatum*	Prohibited Invasive Species (M.R. 6216)
European frog-bit	*Hydrocharis morsus-ranae*	Prohibited Invasive Species (M.R. 6216)
flowering rush*	*Butomus umbellatus*	Prohibited Invasive Species (M.R. 6216)
giant salvinia	*Salvinia molesta*	Prohibited Invasive Species (M.R. 6216)
hydrilla	*Hydrilla verticillata*	Prohibited Invasive Species (M.R. 6216)
Indian swampweed	*Hygrophila polysperma*	Prohibited Invasive Species (M.R. 6216)
purple loosestrife*	*Lythrum salicaria, L. virgatum*	Prohibited Invasive Species (M.R. 6216)
water aloe or water soldier	*Stratiotes aloides*	Prohibited Invasive Species (M.R. 6216)
water chestnut	*Trapa natans*	Prohibited Invasive Species (M.R. 6216)
Federal noxious weed list. aquatic plants listed in Code of Federal Regulations, title 7, section 360.200		Prohibited Invasive Species (M.R. 6216)
Carolina fanwort or fanwort	*Cabomba caroliniana*	Regulated Invasive Species (M.R. 6216)

parrot's feather	*Myriophyllum aquaticum*	Regulated Invasive Species (M.R. 6216)
nonnative waterlilies hybrid, or cultivar thereof.	*Nymphaea* spp or any variety,	Regulated Invasive Species (M.R. 6216)
yellow iris or yellow flag*	*Iris pseudacoris*	Regulated Invasive Species (M.R. 6216)

* species established in the state

Terrestrial Plants

Bull Thistle*	*Cirsium vulgare*	Prohibited noxious weed (M.R. 1505)
Canada Thistle*	*Cirsium arvense*	Prohibited noxious weed (M.R. 1505)
Field bindweed*	C*onvolvulus arvensis*	Prohibited noxious weed (M.R. 1505)
Garlic Mustard*	*Allaria petiolaria*	Prohibited noxious weed (M.R. 1505)
Leafy Spurge*	*Euphorbia escula*	Prohibited noxious weed (M.R. 1505)
Musk Thistle*	*Carduus nutans*	Prohibited noxious weed (M.R. 1505)
Perennial Sowthistle*	*Sonchus arvensis*	Prohibited noxious weed (M.R. 1505)
Plumeless Thistle	*Carduus acanthoides*	Prohibited noxious weed (M.R. 1505)
Purple Loosestrife*	*Lythrum salicaria*	Prohibited noxious weed (M.R. 1505)
Spotted Knapweed*	*Centaurea maculosa*	Prohibited noxious weed-some counties
European Buckthorn	*Rhamnus cathartica*	Restricted Noxious Weed (M.R. 1505)
Glossy Buckthorn (all cultivars)	*Frangula alnus*	Restricted Noxious Weed (M.R. 1505)
Amur Maple*	*Acer ginnala*	MISAC Moderate Threat – established
Autumn Olive*	*Eleagnus umbellata*	MISAC Severe Threat – established
Bela Honeysuckle*	*Lonicera x bella*	MISAC Severe Threat – established
Bird's-foot trefoil*	*Lotus corniculatus*	MISAC Severe Threat – established
Black Locust*	*Robinia pseudocacia*	MISAC Severe Threat – established
Crown Vetch*	*Coronillavaria*	MISAC Severe Threat – established
Giant Knotweed*	*Polygonum sachalinense*	MISAC Severe Threat – established
Grecian Foxglove*	*Digitalis lanata*	MISAC Severe Threat – established
Japanese knotweed*	*Falopia japonica*	MISAC Severe Threat – established
Morrow's Honeysuckle*	*Lonicera morrowii*	MISAC Severe Threat – established
Norway Maple*	*Acer platanoides*	MISAC Severe Threat – established
Reed canary grass*	*Phalaria arundinacea*	MISAC Severe Threat – established
Siberian Elm*	*Ulmus pumila*	MISAC Not yet assessed
Siberian Pea Shrub*	*Caragana arborescens*	MISAC Not yet assessed
Tansy*	*Tanacetum vulgare*	MISAC Severe Threat – established
Tartarian Honeysuckle*	*Lonicera tatarica*	MISAC Severe Threat – established
Wild Parsnip*	*Pastinaca sativa*	MISAC Not yet assessed

Terrestrial Animals

Asian raccoon dog	*Nyctereutes procyonoides*	Prohibited Invasive Species (M.R. 6216)
Egyptian goose	*Alopochen aegyptiaus*	Regulated Invasive Species (M.R. 6216)
Eurasian swine, European wild boar	S*us scrofa scrofa*	Prohibited Invasive Species (M.R. 6216)
European rabbit	*Oryctolagus cuniculus*	Prohibited Invasive Species (M.R. 6216)
nutria, any strain	*Mycocastor coypu*	Prohibited Invasive Species (M.R. 6216)
mute swan*	*Cygnus olor*	Regulated Invasive Species (M.R. 6216)
Sichuan pheasant	*Phasianus colchicus strachi*	Regulated Invasive Species (M.R. 6216)

Terrestrial Insects

Asian Longhorn Beetle	*Anoplophora glabripennis*	MISAC Severe Threat – not in state
Emerald ash borer	*Agrilus planipennis*	MISAC Severe Threat – not in state
Mountain Pine Beetle	*Dendroctonus ponderosae*	MISAC Severe Threat – not in state

Spruce Engraver Beetle	*Ips typographus*	MISAC Severe Threat – not in state
Wood wasp	*Sirex noctilio*	MISAC Severe Threat – not in state
European Gypsy Moth	*Lymantria dispar*	MISAC Severe Threat – invading

Pathogens of Concern

Coldwater
Viral Hemorrhagic Septicemia Virus
Infectious Pancreatic Necrosis Virus
Infectious Hematopoietic Necrosis Virus
Whirling disease (Myxobolus cerebralis)
Heterosporis
Bacterial Kidney Disease (*Renibacterium salmoninarum*)

Warm/cool water
Channel catfish virus
Spring Viremia of Carp virus*?
White Sturgeon Iridovirus
Asian Tapeworm
Heterosporis

* species established in the state

The criteria for adding a species to the list of invasive species includes species that the DNR has identified as prohibited invasive species or regulated invasive species through rulemaking, species that the Minnesota Department of Agriculture has identified as state prohibited and restricted noxious weeds, pathogens of concern, determined by the Commissioner, that could impact populations of aquatic life, and species that were deemed to be a severe threat by the Minnesota Invasive Species Advisory Council.

The Minnesota Invasive Species Advisory Council (MISAC) worked with a panel of experts (from within MN) to rank the level of threat of numerous nonnative species to Minnesota. The species, list in this appendix, were ranked as a severe threat to the environment and whether the species was established in the state. Five panels, one for each of group of species (aquatic plants, aquatic animals, terrestrial plants, terrestrial animals, and insects), included representation invited from the following areas: agriculture, conservation / environmental groups, industry, natural resources, local / tribal government, federal government, and at-large.

The rankings are according to the following threat categories:

- Severe (established), Severe (invading), Severe (not yet in the state)
- Moderate (established), Moderate (invading), Moderate (not yet in the state)
- Minimal (established), Minimal (invading), Minimal (not yet in the state)
- Watch / Unknown
- Considered but not listed
- Severe pests in other areas, but could not establish in Minnesota

For more about MISAC go to: http://www.mda.state.mn.us/misac/default.htm

STATUTES AND RULES

The Minnesota Statutes and Rules listed below govern management and other activities as they pertain to selected invasive species. The full Statute or Rule language can be found at the websites listed below.

Please refer to the following websites for current information:

MN Statutes, Chapter 18.75-18.88:
http://ros.leg.mn/bin/getpub.php?pubtype=STAT_CHAP&year=2006&section=18

MN Statutes, Chapter 18G:
http://ros.leg.mn/bin/getpub.php?pubtype=STAT_CHAP&year=2006&section=18G

MN Statutes, Chapter 84D: http://www.revisor.leg.state.mn.us/stats/84D/

MN Rules, Chapter 1505.0730-1505.0750:
http://www.revisor.leg.state.mn.us/arule/1505/

MN Rules, Chapter 6216: http://www.revisor.leg.state.mn.us/arule/6216/

More information on species of concern can be found at the Invasive species web page at: http://www.dnr.state.mn.us/ecological_services/invasives.html

Table 4. Aquatic Invasive Species Standardized Data Fields.

Field Name	Attribute	Description
ACRES_INFESTED	Number of Acres infested	classification of the infestation size, i.e. <1, 1-5, 6-10,11-50, >50 acres
CONFIDENCE_CODE	confidence code	indicator of our confidence in this observation
DOWLKNUM	DOW number	the official identifying number maintained by DNR Division of Waters
NUM_INDV	Number of individuals	categories of species numbers i.e. 1-20, 21-99, 100-999
OBSERVATION_YEAR	year first observed	the year the infestation was discovered
SITE_TYPE	Site type	classification of the site type, i.e. lake, pond, river, wetland
SPP_COMMON_NM	common name	the preferred common name of the species
SPP_DIST	Species Distribution	classification of the distribution, i.e. occurs singly, scattered pockets, Continuous/Extensive
SPP_SCIENTIFIC_NM	scientific name	the scientific name of the species
WATER_NM	water body	the DNR preferred name of the water body (from Waters)
X, Y	x,y coordinates	the UTM Zone 15N grid coordinates of the center of the water body of interest