

BAYFIELD COUNTY FOREST COMPREHENSIVE LAND USE PLAN

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CHAPTER 600

PROTECTION

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600 PROTECTION

OBJECTIVE

To protect and manage the resources of the County Forest from generally preventable losses resulting from fire, insects, diseases and other destructive elements including those caused by people. Protective measures shall include proper silvicultural practices.

The DNR provides statewide technical guidance that will be used to inform local decisions. This guidance will be referenced to make decisions at the county level.

605 FIRE CONTROL

Damage to natural resources caused by uncontrolled fire can create an important challenge in the management of the County Forest. Potential loss of resource values caused by fire can be minimized through organized prevention, detection and suppression methods. Maintaining a healthy forest is one of the primary keys to fire management.

The DNR is responsible for all matters relating to the prevention, detection and suppression of forest fires outside the limits of incorporated villages and cities, as stated in s.26.11(1), Wis. Stats. The DNR works cooperatively with local fire departments in all fire control efforts.

The Bayfield County Forest is part of the Intensive Forest Fire protection area. The Fire Management Handbook No. 4325.1 and the Area Operations Plan shall serve as the guidelines for fire control activities.

605.1 COOPERATION WITH THE DEPARTMENT OF NATURAL RESOURCES

Pursuant to s. 26.11(4) and s. 28.11(4)(f), Wis. Stats., and of the Bayfield County Forest Ordinance, the County may cooperate with the DNR in the interest of fire prevention, detection and suppression on the County Forest.

This would be accomplished through an agreement or Memorandum of Understanding (MOU) authorizing the DNR to use County Forest land and/or to utilize county personnel and equipment for fire protection activities.

605.1.1 Personnel

County Forest personnel, upon request from the DNR and approval of the Administrator, may be made available for forest fire control efforts within the County in accordance with an established MOU or similar agreement.

If the County agrees to participate in forest fire control efforts, the DNR will be responsible for training and directing the activities of County personnel in accordance with the rules identified in the Fire Management Handbook, No. 4325.1. Also, as per the MOU, the DNR and County will mutually agree on levels of compensation for County personnel.

605.1.2 Equipment

Department equipment, upon request and as identified in the MOU, may be available for forest fire control suppression. During periods of high fire hazard, all applicable Department vehicles and/or crews should be equipped with one or more back pack cans, axes and/or shovels, appropriate personal protective equipment, mobile communication and any other equipment deemed essential by the MOU. All hand tools shall be maintained and provided by the DNR. Also, as per the MOU, the DNR and County will mutually agree on levels of compensation for County equipment.

605.1.3 Fire Detection

Fire detection is the responsibility of the DNR. Department personnel may assist and report any wildfires to the DNR, local Fire Department or 911 Dispatch.

605.1.4 Forest Fire Prevention

DNR fire control personnel, upon collaboration with the Administrator, are authorized, by the County, to place fire prevention signs at recreational areas and other strategic locations within the County Forest.

The County conducts and controls all operations (including timber harvesting) on the County Forest in a manner generally designed to minimize the threat of forest fires. During high fire danger periods, the DNR may impose necessary restrictions to minimize the threat of a wildfire. These restrictions may include, but are not limited to, recreational and logging

activities.

605.2 DEBRIS BURNING

Unauthorized burning of debris, of any kind, will not be permitted on the County Forest pursuant to s. 26.12(5), Wis. Stats.

605.3 CAMPFIRES

During periods of high fire danger, the use of campfires on the County Forest may be restricted.

605.4 PRESCRIBED BURNING

Prescribed fire can be an effective management tool on the County Forest, both in minimizing the impacts of a potential wildfire and achieving various silvicultural, ecosystem and wildlife habitat goals and objectives.

All prescribed burning on the County Forest will be coordinated with the DNR and follow the DNR recommendations.

See the Prescribed Burn Handbook No. 4360.5 for more details on the benefits of prescribed fire.

Also see the Workplan for more details on silvicultural, ecosystem and wildlife habitat goals involving prescribed fire. Additional information on using prescribed fire to achieve various silvicultural objectives can be found in Chapter 800 (in the Jack Pine section), as well as in the Barrens Management Plan (see the Appendix).

605.5 COUNTY FOREST FIRE HAZARD AREAS

The DNR places primary fire control efforts in pine areas. The most significant pine (barrens) areas on the County Forest are located in the Barnes Barrens Management Area, (generally located south of Iron River and north of Barnes, see map in the Appendix), as well as a smaller area of the NW Sands located in the Bayfield Peninsula (generally north of Valhalla and east of County Highway C, see map in the Appendix). Maps of these areas are

also available in the Department's office, as well as the local DNR field office.

The County will cooperate with DNR Fire Control, as well as objectives outlined in local/community management wildfire protection plans (CWPP's), in providing for firebreaks or access ways in areas identified as high fire risks (see the Appendix for links to current Community Wildfire Protection Plans).

Existing access roads, firebreaks and water access points will be maintained as deemed necessary. Secondary emphasis will be placed on hardwood areas with no firebreaks developed or maintained. However, access roads will be maintained as defined in Chapter 700 of this Plan.

610 CONTROL OF FOREST PESTS & PATHOGENS

610.1 DETECTION

Damage to the County Forest caused by insects, other pests and diseases can adversely affect management of the forest resources. Losses to resource values impacted by forest pests and pathogens can be minimized through integrated pest/pathogen management methods, with emphasis on silvicultural prescriptions (timber sales). The detection and control of pest and/or pathogen problems will be accomplished by Department and DNR personnel in cooperation with other agencies.

610.2 PEST SURVEYS

Pest surveys are primarily conducted under the direction of the DNR's Forest Health Specialists. The County may cooperate by providing Department personnel and equipment to assist in these operations, or by conducting internal surveys, in consultation with the DNR.

610.3 SPECIFIC PESTS AND PATHOGENS OF CONCERN

Integrated pest management for the purpose of this Plan, is defined as follows: the maintenance of destructive agents, including insects and disease, at tolerable levels, by the planned use of a variety of preventive, suppressive, or regulatory tactics and strategies that

are ecologically and economically efficient and socially acceptable.

The integrated pest management control and methodology shall be determined jointly by the Administrator and DNR Liaison Forester in consultation with the DNR Forest Health Specialist. Suppression of forest pests may include the following:

1. Silvicultural prescriptions, including timber sales.
2. Biological control.
3. Chemical control.

610.3.1 Specific Pests of Interest

610.3.1.1 Gypsy Moth

Gypsy moth, *Lymantria dispar*, is an introduced pest that has progressed westward from the northeastern United States since the early 1900's. It reached eastern Wisconsin in 1998.

Despite intensive efforts to slow the spread, it steadily moved westerly across the state and has been found in Bayfield County for several years. The insect's primary host is red oak and will also feed secondarily on aspen and maple. As a result, defoliation, at varying degrees and intensities, can be expected during any given year.

Maintaining a healthy and vigorous forest is one of the most effective methods to prepare for a defoliating event. As such, it will be the Department's strategy to employ sound silvicultural practices, throughout all forest types, with a goal of promoting and maintaining healthy and vigorous forested ecosystems.

In addition, suppression spraying with approved insecticides may be considered in high use recreation areas and/or in stands containing a significant percentage of susceptible, high valued timber. Biological controls may also be available for introduction to help reduce outbreak frequency.

The DNR's *Forest Management Strategies to Minimize the Impacts of Gypsy Moth* guide is available to help resource managers make informed stand-level decisions as it pertains to anticipating defoliation from gypsy moth (see the DNR Forest Health website for more information on gypsy moth).

The Department will also consult with the DNR Forest Health Specialist on a routine and regular basis to obtain updates on when/where predicated gypsy moth outbreaks are expected to occur, including compliance with any and all applicable state and/or federal quarantine regulations.

Modifications to the management of some forest types, primarily aspen and red oak, as determined by the Administrator, may be warranted if significant gypsy moth outbreaks are anticipated.

See the Workplan for more detailed information on gypsy moth management strategies.

610.3.1.2 Jack Pine Budworm

Jack pine budworm, *Choristoneura pinus*, is a native needle-feeding caterpillar that is generally considered the most significant pest of jack pine. Red, Scotch and white pine, as well as spruce, can also be defoliated and suffer top-kill and mortality by jack pine budworm.

Vigorous, young jack pine stands are less likely to be damaged during outbreaks. The most vigorous stands are generally well stocked, evenly spaced, fairly uniform in height, and less than 45 years old. Stands older than 45 years that are growing on very sandy sites or otherwise suffering from drought or other stresses are more vulnerable to damage. Tree mortality and top-kill are more likely to occur in these stands.

In addition, stressed stands are more susceptible to attack by secondary pests like the Ips bark beetle. Mortality from Ips can occur for 2 to 3 years after the jack pine

budworm outbreak subsides. The level of mortality and top-kill caused by these outbreaks can produce a significant amount of fuel (i.e. dead, dry wood) and increase the potential for more intensive wildfires.

It will be Bayfield County's strategy to promote jack pine on sites best suited for the species, manage/harvest jack pine at or near the appropriate rotation age and maintain adequate stocking levels, whenever practical, throughout the stand (minimizing overcrowding).

Healthy, vigorous, well stocked stands will help minimize budworm-caused tree mortality and reduce the threat of damaging wildfires, while providing suitable conditions for jack pine regeneration. Prompt salvage following an outbreak will also help reduce the possibility of wildfire.

Aesthetic strips and/or islands, green tree retention, or maintaining older trees within a stand, post harvest, should not be applied when managing jack pine. Doing so can create a vector for future outbreaks and/or can prolong an existing event by providing the budworm areas for breeding. The use of insecticides is generally not required, or overly effective, in combating this pest on the County Forest, but can be an option in certain situations.

See Chapter 800 for more information on jack pine management. Also see the Annual Workplan for more information of specific goals for the management of jack pine (and associated barrens).

See the DNR Forest Health webpage for more detailed information on jack pine budworm, including methods of control (a link to the webpage can be found in the Appendix).

Also see the jack pine section of the DNR Silvicultural Handbook for more information on jack pine management, as well as the various insects and diseases that impact jack pine (a link to the Silvicultural Handbook can be found in the

Appendix).

610.3.1.3 Oak Wilt

Oak wilt, *Bretziella fagacearum*, is one of the most destructive diseases impacting oak trees in Wisconsin and the single most destructive disease that impacts oaks in Bayfield County. It was officially confirmed in Bayfield County in 2018.

Oak wilt is caused by a fungus that invades and impairs the tree's vascular system, thus restricting the tree's ability to transport water and nutrients. Rapid death of an infected tree can occur in a few short months. Trees in both the red oak and white oak group are affected. There is no known cure once a tree has oak wilt.

Prevention of new oak wilt infection centers is generally considered to be the best management option. This can involve avoiding injury to healthy trees, especially during the time of year when infection rates are the highest; removing and treating diseased trees or those that have already succumbed to oak wilt; and maintaining healthy and vigorous oak stands through timber management.

On all known and future confirmed positive oak wilt infection sites/centers, the Department will consult with the DNR Forest Health Specialist and refer to the *DNR Oak Harvesting Guidelines to Reduce the Risk of Introduction and Spread of Oak Wilt* for management guidance or similar document (a link to the Oak Wilt guidelines can be found in the Appendix).

It will be the Department's policy to remove (cut/harvest) and/or chemically treat trees and/or stands of trees confirmed to be infected with oak wilt, as soon as possible, within the realm of feasibility, as determined by the Administrator. If oak wilt is confirmed, the Department will collaborate with the DNR Forest Health Specialist on the most effective course of action/treatment, including compliance with any and all applicable state and/or federal quarantine regulations.

In general, when oak wilt has been detected on the County Forest, the following

procedures will be considered by the Department:

- Known pockets of oak wilt will be aggressively treated with the “frill-girdle” technique and/or other control methods that have shown success. When feasible, infected trees will be either removed from the site, covered, chipped, burned, or buried. Highest priority areas for infected tree sanitation are high-value oak stands where mechanical access is good and few to no known untreated disease spore sources exist within a quarter mile distance.

In addition, once oak wilt has been confirmed in an area, various regulations will be adopted by the Department that restrict or limit the type and/or level of activity that can occur on the County Forest, in stands or areas that contain significant amounts of red oak. In general, once confirmed, the follow restrictions and/or conditions will apply or be considered:

1. Within a six (6) mile radius of the confirmed location of oak wilt, no timber harvesting will be allowed between April 15 and July 15, in stands where red oak comprises 15 square feet or more of the total basal area or where red oak could be damaged as part of the timber sale process, unless otherwise authorized by the Department. This restriction will be adopted on all County Forest timber sales within that six mile radius.
2. Also, within the same six mile radius, no pruning, trimming, or cutting of red oak trees will be allowed between April 15 and July 15, anywhere on the County Forest (within that radius), for recreational trail maintenance activities, utility corridor maintenance, road and trail construction (including access permits), firewood collection/gathering or any other similar activity that has the potential to damage oak trees.
3. The Department will collaborate with the DNR Forest Health Specialist on annual aerial detection flights to search for new oak wilt pockets. The Department will also organize internal monitoring efforts utilizing Department staff and equipment (i.e. drones).
4. The County may assist private landowners adjacent to the County Forest,

with treating oak wilt if the infection poses a risk/threat to the County Forest, as time, budgets and other resources allow, as determined by the Administrator.

5. The pre-salvage of infected, or soon to be infected, scrub oak stands may be considered. A conversion to other forest types less susceptible to the aggressive disease like aspen, red pine, jack pine or white pine, or a mix thereof, may also be considered
6. Aggressive intermediate thinning schedules in scrub oak stands with the goal of reducing oak densities (and minimizing the potential for root grafting) and increasing species diversity, may also be considered.
7. Underplanting conifers or encouraging/promoting the establishing of other trees species should be considered in areas where the threat of oak wilt infection is high and the ability to effectively control the spread of infection is low.

The period between April 15 and July 15 is generally the time when the primary vector for overland spread of the disease, the sap feeding beetle, is most active. Any oak trees wounded during this time period or the most susceptible to contracting the disease.

The restrictions listed above are subject to change based on the best available science and/or recommendations from the DNR Forest Health Specialist.

See the DNR Forest Health webpage for more details on Oak Wilt disease, including the various vectors of spread/transmission of the disease and management/prevention options (a link to the DNR webpage and Oak Wilt guidelines can be found in the Appendix).

See the Workplan and Chapter 800 of this Plan for more information on the management of red oak, as well as the monitoring for, and/or treatment of, stands infected with Oak Wilt. Also see the Red Oak section of the DNR Silvicultural Handbook for more detailed information on the insects and diseases that impact

oak trees.

610.3.1.4 Forest Tent Caterpillar

Forest tent caterpillar, *Malacosoma disstria*, can be found throughout the United States and Canada wherever hardwoods grow. The favored hosts in Wisconsin are aspen and oak. This native insect causes region-wide outbreaks at intervals from 10 to 15 years; outbreaks usually last 2 - 5 years in the Lake States.

Severe and repeated defoliation can lead to dieback and/or reduced growth of affected trees, which in some instances may be significant. Populations are often controlled by natural enemies, helping to re-stabilize the population. Aerial spraying of insecticides and/or similar agents can be an option for control as well. Also, since both gypsy moth and forest tent caterpillar prefer aspen and oak trees, outbreaks of each occurring around the same time, or in successive years, can have devastating impacts on a forest.

In general, one of the best options to prepare for inevitable outbreaks of forest tent caterpillar, and minimize the resulting impacts, is to maintain healthy and vigorous forests, especially in stands and/or landscapes dominated by aspen and/or oak, or where aspen and oak are significant components.

It will be Department's strategy to employ sound silvicultural practices, throughout all forest types, with a goal of promoting and maintaining healthy and vigorous forested ecosystems.

The Department will also consult with the DNR Forest Health Specialist on a routine and regular basis to obtain updates on when/where predicated outbreaks are expected to occur. Modifications to the management of some forest types, primarily red oak, as determined by the Administrator, may be warranted if outbreaks are anticipated. See the Workplan for more detailed information.

610.3.1.5 Two-lined Chestnut Borer

The two-lined chestnut borer, *Agrilus bilineatus*, is a common secondary pest in trees which have been severely defoliated several years in a row, or are otherwise under some form of stress.

Oaks that are under stress from factors such as drought, flooding, or over maturity, as well as defoliation by insects such as gypsy moth (*Lymantria dispar*), fall cankerworm (*Alsophila pometaria*), and forest tent caterpillar (*Malacosoma disstria*), can be infested and killed by two-lined chestnut borer. Prevention of two-lined chestnut borer through sound silvicultural practices is often the best management option.

Modifying, staging and/or postponing forest management activities (timber harvests) in oak stands that have been stressed for two years or more, either through site level stressors and/or defoliation events, as described above, may provide enough time for trees to recover and reduce their susceptibility to two-lined chestnut borer attack. Stands that are infested with two-lined chestnut borer should be salvaged promptly.

The Department will strive to maintain healthy stands through sound silvicultural practices in attempts to discourage infestation.

The Department will also continue to consult with the DNR Forest Health Specialist on a routine and regular basis. Modifications to the management of some forest types, primarily red oak, as determined by the Administrator, may be warranted if outbreaks occur and/or are anticipated. See the Workplan for more detailed information.

610.3.1.6 Emerald Ash Borer

The emerald ash borer, *Agrilus planipennis*, was accidentally introduced to North America from Asia in 2002. Emerald ash borer (EAB) infestations in Wisconsin have resulted in widespread mortality to *Fraxinus* species including green, white,

and black ash. It is expected that 99% of the ash trees in Wisconsin will die.

Ash comprises a significant component in the northern hardwood timber type (primarily as white ash) and can be found in nearly pure stands in some lowland areas (primarily as black ash and classified as swamp hardwoods on the County Forest). Adult EAB beetles feed on foliage but it is the larvae that cause mortality, by feeding on the phloem and outer sapwood of the ash trees.

The *Emerald Ash Borer Silviculture Guidelines* are available to help resource managers make informed stand-level decisions to manage forests that are not yet infested by EAB, as well as implement salvage harvests and rehabilitation in stands that have already been impacted by EAB.

The Department will continue to collaborate with the DNR Forest Health Specialist with regards to early detection methods and overall readiness for inevitable EAB infestation.

Once EAB is discovered on the County Forest, the Department will continue to collaborate with the DNR regarding the best methods to address the infestation, including compliance with any and all applicable state and/or federal quarantine regulations (see the DNR Forest Health website for more information on EAB; a link to which is located in the Appendix).

In the meantime, in an attempt to control and influence the natural regeneration/ reforestation of stands that will eventually succumb to EAB, the Department will develop and implement pre-EAB salvage operations in most ash dominated stands on the County Forest. The Department's strategy for EAB management/mitigation is as follows:

Lowland Sites / Swamp Hardwood

Many of the swamp hardwood sites within the County Forest contain ash (primarily black ash) of poor quality and vigor, generally from fluctuating water levels associated with drought and wet cycles, along with beaver activity.

Management of these sites, prior to the arrival of EAB, is important since a complete mortality of ash, in these stands (as is predicted), will likely result in the “swamping” of the areas and subsequent conversion to non-forest cover (e.g., alder). Given this potential, the following strategies will be utilized when managing all swamp hardwood stands:

- Consider the pre-salvage management of all swamp hardwood stands where black ash is a major component, especially stands containing any commercially viable ash sawlogs.
- Look for opportunities to promote and enhance swamp hardwood species other than black ash, including, but not limited to, red maple, yellow birch, elm and swamp conifer species.
- Participate in, conduct, and/or glean information from various DNR silvicultural trials, or similar research, to better understand different methods of conversion, or other reforestation options, with the goal of transitioning these stands away from black ash as the dominant or primary species.
- Given the difficulties operating in these traditionally very wet sites and the inherent problems associated with marketing swamp hardwood timber sales in general, the Department may be forced to allow EAB to impact some stands without subsequent salvage or other management efforts.

Upland Sites / Northern Hardwood

Upland northern hardwood sites generally contain varying components of white ash within the stands. However, white ash is often a very minor associate in some northern hardwood stands on the County Forest, or not present at all. While EAB is likely to devastate most of the ash within these stands, research does suggest some level of resistance in white ash to infestation. Given these characters, the following strategies will be utilized in upland northern hardwood sites:

- When managing northern hardwood stands, the Department will look for opportunities to harvest/target sawlog sized ash with economic value as part of the order of removal (or a pre-salvage of commercially valuable ash trees).
- Ash poletimber and small sawlogs may be left if needed for spacing and if they are otherwise healthy and vigorous. If it is determined that some EAB resistance is possible, it will be important to retain a level of white ash in these stands, provided the individual trees are not of high economic value.
- A timber sale would generally not be written to target the removal of all white ash in the stand.

The Department will also refer to the *Emerald Ash Borer Silviculture Guidelines* for various management options and alternatives.

See the Workplan and Chapter 800 of this Plan for more detailed information on the management of ash dominated stands (swamp hardwoods), as well as the monitoring for, and/or treatment of, stands infested by EAB. Also see the Swamp Hardwood and Northern Hardwood sections of the DNR Silvicultural Handbook for more detailed information on the insects and diseases that impact ash trees.

610.3.1.7 HRD

Heterobasidion root disease (HRD, previously called annosum root rot), is caused by the fungus, *Heterobasidion irregulare*. It is a serious disease that causes pine and spruce mortality in Wisconsin, but over 200 woody species have been reported as hosts.

Red and white pine trees are most commonly affected, primarily in plantation-grown stands that are subjected to routine and regular thinning. The disease was first confirmed in Wisconsin in 1993 and has since been found in a number of counties throughout Wisconsin.

Diseased trees, including overstory trees and understory seedlings and saplings, will show fading, thin crowns with tufted foliage, and eventual mortality. Currently there are no curative treatments to eliminate the HRD pathogen from a stand once it is infested, so preventing disease introduction is the best approach.

Infection most often occurs when HRD spores land and germinate on a freshly cut stump. The pathogen then grows into the root tissue and progresses underground from tree to tree through root contact. As the pathogen spreads, and trees decline and die, an ever-expanding pocket of mortality is formed. HRD fruit bodies, or conks, may be found at the base of dead trees and old stumps. Fruit bodies are most commonly observed in the fall but can be found any time of the year.

Once located in, or in proximity to, Bayfield County, the Department will collaborate with the DNR Forest Health Specialist regarding the best methods of treatment. The *Guidelines for Stump Treatment to Reduce the Risk of Introduction and Spread of Heterobasidion Root Disease in Wisconsin*, and similar documents, will also be consulted by the Department.

The HRD guidelines are designed to help property managers and landowners determine whether the preventive pesticide treatment, or other forms of management, should be used to reduce the risk of introduction and spread of HRD at the time of harvest in pine and/or spruce stands (see the DNR Forest Health webpage for more information on HRD; a link to the webpage and to the HRD management guidelines can be found in the Appendix).

See the Workplan and Chapter 800 of this Plan for more information on the management of pine dominated stands, as well as the monitoring for, and/or treatment of, stands infested by HRD. Also see the various pine sections of the DNR Silvicultural Handbook for more detailed information on the insects and diseases that impact pine trees.

610.3.2 Funding

The County Forest will make all reasonable efforts to secure funding for control efforts, through county funds, or other state, federal or private funding sources.

610.3.3 Special Projects

The County may cooperate with other agencies in forest pest research.

610.3 DEER BROWSE

Achieving adequate levels of forest regeneration and reproduction is a critical component of any forest management program and a core building block required to sustain both quality timber production and a diversity of wildlife habitat. As a keystone wildlife species, white tailed deer, through over browsing, have the potential to significantly and negatively impact and/or alter levels of forest regeneration, as well as influence natural ecosystem functions.

Repeated levels of over browsing can result in a decrease of short and long-term forest production, reduce the quality and diversity of habitat suitable for other wildlife species and threaten the overall sustainability and/or viability of the various County Forest management programs.

As part of routine reforestation/regeneration monitoring, the Department will continue to evaluate levels of deer browse as part of the various inventory and analysis programs (see Chapter 800 for more information on the Department's various efforts to monitor the County Forest).

In the event that over browsing has been determined, by the Administrator, to be an issue, to the point where continued actions will potentially threaten the sustainability of the County Forest, a report/summary will be prepared by the Administrator and presented to the Committee. As part of the process, the Administrator will collaborate with the local DNR Wildlife Biologist and/or other DNR Forestry and/or Wildlife professionals to review the various methods and/or alternatives available, to the County, to address the issue of deer browse.

If action is determined, by the Committee, to be necessary, the Department will collaborate with the DNR and present a summary of findings, including options and recommended courses of action, to the Committee. The public may also be notified and encouraged to provide input/comment.

See the Workplan for more information on deer browse mitigation efforts; also see Chapter 800 for more information on regeneration/reforestation inventory and monitoring, as well as wildlife management projects.

610.5 INVASIVE PLANT SPECIES

Invasive plants can cause significant negative impacts to the County Forest. Invasive species can displace native plants and hinder various forest regeneration efforts. Preventing invasive species from dominating habitats is critical to the long-term health of the County Forest.

There are a number of invasive plant species in varying densities located on the County Forest. The level and intensity of management, treatment and/or control of invasive species is generally based on the degree to which the infestation is negatively impacting, or has the potential to impact, the County Forest, and/or the amount of resources available to the Department to address the threat e.g. staff time, funds, etc.

The Department will continue to collaborate with the DNR regarding various options to address invasive species. The Department will also continue to train staff in invasive species identification and pursue various means to control known infestations, including securing adequate funds, when available, and/or hiring resource professionals to treat impacted areas, when practical. The Department will also develop a database and/or method of inventory and monitoring of known infestations. Treatment plans will also be developed by the Department, when deemed necessary by the Department.

See the Workplan for more information on the control and monitoring of invasive species on the County Forest.

605.5.1 Funding and Partnerships

Grants and other funding opportunities for the control of invasive species can be found on the Financial Assistance webpage of the Wisconsin Invasive Species Council. The number of grants for local governments and County Forests is limited, especially for terrestrial invasive plant control. Some grants, such as the DNR's turkey stamp program, support invasive plant control as part of larger efforts to promote certain outcomes, and might be applicable.

The DNR promotes the formation of cooperative invasive species management areas (CISMAs) through its Weed Management Area – Private Forest Grant Program. While activities funded by this grant are restricted to non-industrial private forests, CISMAs are encouraged to partner with other groups in their area and some can provide technical support to county forests. A link to the CISMA's of Wisconsin map can be found in the Appendix.

605.5.2 Best Management Practices

In 2009, the DNR and many stakeholder groups approved a series of Best Management Practices (BMPs) for minimizing the spread of forest invasive plants. The full text of the BMPs can be found on the Wisconsin Council on Forestry website.

Voluntary use of the BMPs during forestry stewardship activities reduces the spread of invasive plants that can impede forest regeneration in county forests. A link to the BMP manual for Invasive Species can be found in the Appendix.

BMPs used before, during and after a harvest promote forest regeneration. Reasonable efforts to clean vehicles, equipment, footwear and other clothing

helps reduce the spread of seeds and plant fragments to un-infested forests. Planning the sequence and timing of stewardship activities to reduce contact with invasive plants during forestry operations is another helpful strategy.

Similarly, controlling populations of invasive plants before logging reduces the risk of spreading them. Follow-up monitoring of disturbed stands can detect populations of invasive plants while they are still small and more easily managed.

The Department will continue to consult the BMP Manual for Invasive Species (and similar documents), as well as collaborate with DNR Invasive Species Specialists, whenever invasive species are encountered on the County Forest or when treatment assistance and/or alternatives are required.

605.5.3 Current Invasive Plants

Below is a list of the more common invasive plants found on Wisconsin's county forests. Of the list below, Buckthorn, Spotted Knapweed and Honeysuckle are the most common on the County Forest. See the Workplan for more detail on the Department's treatment of invasive species on the County Forest.

605.5.3.1 Buckthorn

Two species of invasive buckthorn impact Wisconsin's forests. Common buckthorn, *Frangula cathartica*, is more often found growing on well-drained soils while glossy buckthorn, *Frangula alnus*, favors wetter soils. Both species grow in shade or sun, quickly form dense, even-aged thickets that shade out understory plants, including tree seedlings, and hinder forest regeneration. Their dark colored fruits are eaten by birds who disperse them long distances. Both buckthorns green-up before native plants and remain green after the natives drop their leaves.

Buckthorn can be controlled by taking advantage of the longer period in which they retain their leaves. Foliar applications of herbicide, applied

when buckthorn still has leaves and the other native plants are leafless, will minimize damage to native plants. Other control options include mowing the shrubs and then treating re-sprouts with foliar herbicide, basal bark herbicide applications, and cut stump herbicide applications. The Department will utilize all forms of herbicide applications, and other methods proven to be successful, when treating infestations of buckthorn.

605.5.3.2 Garlic Mustard

Garlic mustard (*Alliaria petiolata*) is an herbaceous, biennial, native to Europe. During the first year a basal rosette of only leaves develops. The second year, several stems from 1 – 4 feet tall grow from the basal rosette. The leaves have a distinct garlic fragrance when crushed. From the stems grow several small white flowers. Each plant can produce 100's of tiny seeds inside long, narrow capsules.

Garlic mustard can quickly colonize disturbed forests as it often follows corridors such as game trails or man-made roads/paths. As garlic mustard spreads, it quickly displaces native plants and is known to radiate chemicals into the soil that disrupt associations between mycorrhizal fungi and native plants.

Small populations can be hand pulled, while larger populations are better controlled with prescribed fire and/or herbicide. All pulled plant materials should be bagged and removed from the forest as seeds have been known to mature on dead plants left on site. Treatment should be repeated until the seed bank is depleted, which takes multiple years. Garlic mustard sites should be monitored annually, until no plants are discovered for several years.

605.5.3.3 Honeysuckle

Bush Honeysuckles (*Lonicera maackii*, *L. tatarica*, *L. morrowii*, *L. X bella*) were introduced from Eurasia as ornamentals, wildlife cover and soil erosion control. Bush honeysuckles are upright deciduous shrubs, ranging from 5 - 12 feet tall with gray shaggy bark. The leaves are opposite, simple, oval and

untoothed and can be smooth, to velvety depending on species. Flowers are fragrant and tubular ranging in colors of white, red and pink. They bloom May through June and then form red to yellow berries that are found as pairs on the leaf axils.

Honeysuckles replace native forest shrubs and herbaceous plants by inhibiting growth of understory plants due to early leaf-out which shades out herbaceous ground cover and depletes soil moisture. Control options include hand pulling small infestations and prescribed burning which kills seedlings and top kills mature shrubs. Herbicide options include cut stump treatment and foliar spraying. With all control efforts repeated monitoring is needed.

605.5.3.4 Spotted Knapweed

Spotted knapweed (*Centaurea stoebe*) is an herbaceous, short-lived perennial native to Eurasia that can grow 2 – 4 feet tall. This plant first appears as a basal rosette of somewhat silvery leaves and may persist this way for several years before developing pink-purple flowers on long spreading stems. The flowers are thistle-like with many petals and stiff bracts.

Knapweed invades dry-upland areas including disturbed sites such as forest trails and openings. The roots exude an allelopathic chemical which inhibits establishment of other plants; hindering forest regeneration. Small populations can be hand pulled provided the entire tap root is removed. Gloves, long sleeves and pants should be worn when handling this plant as it may cause skin irritation.

Chemical control is the most effective way to combat spotted knapweed and will be the primary method of treatment applied by the Department. Chemical can be applied directly to individual plants or broadcast across large areas of infestation. Biological control is also available as part of an integrated pest management plan and will be considered by the Department, where practical and feasible.

605.5.3.5 Japanese Barberry

Japanese barberry (*Berberis thunbergii*) was introduced from Japan around 1875 and now ranges across most of North America. It is a compact, spiny, deciduous shrub with arching branches of dense foliage. It commonly grows 2 - 3 feet tall and has been known to reach heights of 6 feet.

Japanese barberry regenerates by seed, creeping roots and branches that root freely when they touch the ground; which increases its overall spread. Small, rounded, smooth edged leaves are clustered in tight bunches close to the spiny branches and small yellow flowers bloom through May forming red oblong berries that mature in mid-summer and persist into winter.

This plant is highly adapted to growing in young forests where it forms thorny thickets that shade out and limit the growth of native plants and spreads easily under the shade of established forests.

The primary method of mechanically controlling barberry is hand pulling or digging early before seed set in areas where there are only a few plants. It has shallow roots but resprouting may occur if the entire root system is not removed. Larger populations may be controlled by herbicides with a cut stump treatment and repeated monitoring for both seedlings and roots re-sprouting.

605.5.3.6 Other

This list will be updated periodically as more invasive species are discovered on the county forest.