

COUNTY FOREST COMPREHENSIVE LAND USE PLAN

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Rev. 06/06/2019

CHAPTER 600

PROTECTION

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600 PROTECTION

OBJECTIVE

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

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 the forest caused by uncontrolled fire can create an important challenge in the management of the forest. Loss of resource values caused by fire will be minimized through organized prevention, detection and suppression methods. Maintaining a healthy forest is key 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. Price 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 Price County Forest Ordinance, the county may cooperate with the DNR in the interest of fire prevention, detection and suppression on the County Forest. This is accomplished through agreements authorizing the DNR to use County Forest land or to utilize county personnel and equipment for fire protection activities.

605.1.1 Personnel

County Forest personnel, upon request from the DNR, shall be made available for

forest fire control efforts within the county in accordance with an established memorandum of understanding (MOU). The DNR is responsible for training and directing the activities of county personnel in accordance with the rules identified in the Fire Management Handbook, No. 4325.1.

605.1.2 Equipment

County Forest equipment, upon request and as identified in the MOU, shall be available for forest fire control suppression. During periods of high fire hazard, all County Forest vehicles and/or crews should be equipped with one or more back pack cans, axes 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.

605.1.3 Fire Detection

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

605.1.4 Forest Fire Prevention

DNR fire control personnel are authorized by the county to place fire prevention signs at recreational areas and other strategic locations within the forest. The County conducts and controls all operations (including harvesting) on the forest in a manner designed to prevent forest fires. The use of the county forest and the Department will coordinate during high fire danger periods to impose any necessary restrictions. These restrictions may include, but are not limited to, recreation and logging.

605.2 DEBRIS BURNING

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

605.3 CAMP FIRES

During periods of high fire danger, use of campfires may be restricted.

605.4 PRESCRIBED BURNING

All prescribed burning on County Forest lands will follow the DNR recommendations. See Prescribed Burn Handbook No. 4360.5 for details. Prescribed fire may be an effective management tool on the County Forest.

605.5 COUNTY FOREST FIRE HAZARD AREAS

The DNR places primary emphasis will be placed on fire control efforts in pine areas. Maps of these areas are available at the local DNR field office. The County will cooperate with DNR Fire Control in providing for firebreaks or access ways. 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 forest caused by insects, other pests and diseases can adversely affect management of the forest resources. Losses to resource values impacted by forest pests will be minimized through integrated pest management methods, with emphasis on silvicultural prescriptions (timber sales). The detection and control of pest problems will be accomplished by county and DNR personnel in cooperation with other agencies.

610.2 PEST SURVEYS

Pest surveys are conducted under the direction of the DNR's forest health specialists. The County may cooperate by providing personnel and equipment to assist in these operations.

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, 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 County Forest Administrator, and DNR liaison forester in consultation with the DNR district 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

County forests could consider an aerial spray through a private contractor if they desired.

610.3.1.3 Oak Wilt

Oak wilt, *Bretziella fagacearum*, is a destructive disease of oak trees. It is responsible for the death of thousands of oak trees in forests, woodlots, and home landscapes each year. Oak wilt is caused by a fungus that invades and impairs the tree's water conducting system, resulting in branch wilting and tree death. Trees in both the red oak group 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 the best management option and involves avoiding injury to healthy trees and removing dead or diseased trees. Counties should use the [Oak Harvesting Guidelines to Reduce the Risk of Introduction and Spread of Oak Wilt](#) for management guidance. . If pruning is necessary or damage is incurred during the high risk periods, e.g. through construction activities or

storms, the wounds should be painted immediately with a wound paint.

It will be Price County's policy to remove infected trees and debark or chip them when located in a high intensive use area. Once chipped or debarked, the materials shall be covered with plastic for a period of six months to kill the fungus and any insects in the material. A vibratory plow, or similar implement, will also be used to sever root grafts on isolated pockets where feasible. Timber harvest of red oak will be restricted between April 15 and July 15.

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 the population crash. Aerial spraying of insecticides can be an option for control as well. It will be Price County's strategy to employ sound silvicultural practices to combat this cyclic pest.

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. Oaks that are under stress from drought and/or 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 the best management option. Postponing management

activities in stressed stands for two years after severe drought and/or defoliation have ended will provide time for trees to recover and reduce their susceptibility to two-lined chestnut borer attack. Infestations should be salvaged promptly. Price County will strive to maintain healthy trees through sound silvicultural practices to discourage infestation.

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 and can be found in nearly pure stands in some lowland areas. 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. It is Price County's policy to follow the Emerald Ash Borer Silviculture Guidelines.

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 in plantation-grown stands subjected to 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.

[Guidelines for stump treatment to reduce the risk of introduction and spread of Heterobasidion root disease in Wisconsin](#) should be used by the county forests. The HRD guidelines are designed to help property managers and landowners determine whether the preventive pesticide treatment should be used to reduce the risk of introduction and spread of HRD at the time of harvest in a pine and/or spruce stand. It is Price County's policy to follow the "Guidelines for stump treatment to reduce the risk of introduction and spread of Heterobasidion root disease in Wisconsin."

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.

610.3.4 Special Projects

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

610.3 DEER BROWSE

Forest regeneration and reproduction is critical to sustain both timber production and wildlife habitat and the overall health of the deer herd. As a keystone species, deer can affect forest regeneration, long-term forest production, and forest sustainability. This is a concern for all interested in forest production and trying to balance deer numbers with habitat.

Price County Forest may monitor herbivory impacts during forest reconnaissance.

610.5 INVASIVE PLANT SPECIES

Invasive plants can cause significant negative impacts to the forest. Invasive species can displace native plants and hinder the forest regeneration efforts. Preventing them from dominating habitats is critical to the long-term health of the forest. There are a number of invasive plant species in varying densities on the County Forest. Some warrant immediate and continual treatment efforts while others may be allowed to remain due to extent and financial ability to control them. The County will continue to train staff in invasive species identification as well as attempt to secure funding sources to control them as much as is practical. Invasive plants on the forest should be documented as well as potential response to new infestations.

605.5.1 Funding and Partnerships

Grant opportunities for invasive species control funding can be found on the [Financial Assistance webpage](#) of the Wisconsin Invasive Species Council. The number of grants for local governments and county forest is limited, especially for terrestrial invasive plant control. Some grants, such as the Department of Natural Resource's [turkey stamp program](#), support invasive plant control as part of larger efforts to promote certain outcomes and might be applicable.

The Department of Natural Resources 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. The CISMA's of Wisconsin can be found on this [map](#).

605.5.2 Best Management Practices

In 2009, the Department of Natural Resources 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](#) is 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.

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.

605.5.3 Current Plant Invasives

605.5.3.1 Buckthorn

Two species of invasive buckthorn impact Wisconsin's forests. Common buckthorn, *Rhamnus cathartica*, is more often found growing on well-drained soils while glossy buckthorn, *Rhamnus frangula*, 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 has leaves and the natives 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.

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 should be applied directly to plants or broadcast across large areas of infestation. Biological control is also available as part of an integrated pest management plan.

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.

610.6 PRICE COUNTY'S INVASIVE SPECIES MANAGEMENT PLAN

Price County Invasive Species Management Plan

Introduction

Invasive species are defined as “plants, animals, or other organisms (e.g., microbes) that are non-native to the ecosystem under consideration and whose introduction cause or are likely to cause economic or environmental harm or harm to human health” (NISIC 2009). The objective of this document is to identify all current and potential invasive species which are or may impact the integrity of the Price County Forest. Along with identification, control methods and priorities are discussed. Those species with the greatest potential for harm will be monitored and controlled using various methods of removal.

Price County Forest contains approximately 90,000 acres of land, including upland forests and

lowland swamps. Since invasive plant species pose a great threat to the health and sustainability of the forest, they will be the focus of this plan. However, insects such as the Emerald Ash Borer will also have a devastating effect on the forest if and when they arrive, so they will be mentioned as well.

Campgrounds, parks, recreational trails, and timber sale areas create a lot of disturbance to the forest, which many invasive species find inviting. These areas are also vectors for seeds, insects, etc. to become established because of the greater numbers of people and equipment that may have brought them in from long distances. Therefore, these areas will be monitored more intensely. However, during forest reconnaissance activities, any observed invasive species will be recorded as well.

Species of Greatest Concern

Since the Price County Forest is managed for timber products and recreational opportunities, those species that most negatively affect management are given the highest priority for control and removal. These species tend to be more shade tolerant and can out-compete native vegetation, including tree regeneration which is important to the sustainability of the forest. Species of lesser concern include those that are more shade intolerant but can affect wildlife openings, recreational trails and disturbed areas. These species, though still harmful, have less of an impact on management activities.

1) Garlic Mustard (*Alliaria petiolata*)

Garlic mustard is a biennial herb that produces a large amount of seed in its second growing season. It has been known to chemically alter the soil which inhibits anything else from growing in an infested area. Tree seedlings and herbaceous vegetation can be entirely excluded from an area that it is growing in. It is also shade tolerant and can invade even undisturbed hardwood stands.

Thankfully, as of late 2009, no garlic mustard populations have been observed on any Price County Forest lands. Two populations are known on private property within the county, but these are not adjacent to any County Forest property. Also, several populations are known from the Flambeau River State Forest located just to the west of Price County in Sawyer County.

Early detection of garlic mustard is critical. If any populations are discovered,

the following control measures will be taken:

- a) Pull all 2nd year plants in the spring preferably when they are flowering. If seed is starting to set in the pods, bagging, then disposing or burning of the plants will be necessary to prevent new seed from being released.
- b) Immediately after pulling (within a few weeks at most), torch all of the seedlings using a propane torch. Fire is very effective at killing the small basal rosettes. Torching also helps to burn some of the old seed and exposes the soil more by removing dead leaves and other vegetation. This will enhance germination of the seeds remaining in the soil and will exhaust the seed bank more quickly.
- c) In the fall or early spring, return to the site and spray any new seedlings with herbicide. A solution of glyphosate or any pre-emergent herbicide that will kill seedlings will work. Some managers suggest spraying the rosettes when the native plants are dormant so they are not killed, and the site is not so disturbed that it will be quickly reinfested. Since garlic mustard populations are so isolated in this region, it may not be necessary to wait until the natives are dormant.
- d) Repeat this process for up to 10 years as seeds may lie dormant in the soil for 7 years or more.
- e) If garlic mustard becomes more widespread as it is in southern Wisconsin, biological control agents may need to be obtained. Research is currently being conducted on host specific insects that will at least control garlic mustard populations to some degree and should be available in the coming years.

2) Common (European) and Glossy Buckthorns (*Rhamnus cathartica*, *Rhamnus frangula*)

Common and glossy buckthorns are shrubs to small trees that have spread from ornamental plantings (hedges, etc.) into natural areas. Both species produce large amounts of berries that are spread by birds and other animals. Common buckthorn tends to invade more upland sites (although it has been observed on black ash hummocks), whereas glossy buckthorn tends to invade wetter sites. Both species are relatively shade tolerant and can out-compete native vegetation, impacting and

severely limiting tree regeneration in infested areas.

As of late 2009, glossy buckthorn has not yet been observed on Price County Forest land. It has the capacity to invade many acres of land because much of the forest has poorly drained soils and wetlands.

Common buckthorn, on the other hand, is becoming well-established in many parts of the county. It currently is only a minor component of the County Forest but has the potential to infest many more acres and become a management problem. It may especially be of concern in stands of timber that are periodically thinned, such as northern hardwoods and pine stands. The thinnings create more light and disturbance, allowing populations to become established. Once buckthorn gets old enough to produce seed, it may infest the entire stand, crowding out or eliminating tree regeneration. Larger infestations are common around the cities of Phillips and Park Falls. Isolated individuals have been observed generally near the Highway 8 and 13 corridors (and a few miles from them). Wisconsin Concrete Park and Tuscobia Trailhead Park have fairly large populations which have been worked on in the past to keep them in check.

Control of buckthorn is optimum during the fall. Leaves stay green later than native shrubs and trees. Herbicide may also be more effective since it will be pulled into the roots as the shrubs go dormant for the winter. Control measures for buckthorn include:

- a) Remove all larger buckthorns that are bearing fruit. Use a chainsaw or other tool to cut down to stump level. Spray the stump, especially the outer cambium layer using a solution of glyphosate or triclopyr mixed with an oil-based surfactant. This will prevent resprouting. If possible, burn the tops containing the berries and seeds. If it is not feasible to burn the tops, leave them near the stumps (old seeds probably are laying in the soil already anyway).
- b) Manually pull the smaller seedlings, making sure to pull out the roots. Lay them in a way so that the roots will dry out and there is no opportunity to re-root into the soil. Seedlings up to a pencil size diameter and possibly larger should pull fairly easily, especially if the soil is damp.

- c) For larger stems that don't contain fruit, either cut the stems and spray (as in a) above); or use the basal bark method of applying herbicide. Do this by using a solution of triclopyr mixed with an oil-based surfactant. Spray the lower 6 to 18 inches of the stem around the entire base to the ground. Smaller squirt bottles work well for this. Results may not be immediate, as it occasionally takes a few months for full mortality to occur. This method is typically less time-consuming than the cut-stump method and is also very effective. Follow-up monitoring will be necessary to ensure that the herbicide worked (weather or other factors may effect the mortality rate, but it is usually well over 90%).
- d) Re-visit areas every few years to ensure that no fruit-producing plants have been missed. Pull all seedlings and re-treat larger stems that weren't killed until the seed bank is exhausted (this may not occur with *R. cathartica* since populations are quite widespread in the county).
- e) Long-term control may only be possible with the release of biological control agents. Research is currently being done to determine acceptable control organisms that won't negatively affect native buckthorn populations or switch to other beneficial native species. Bio-control for buckthorns may be available in the coming years, but until then, manual and chemical control will be needed.

3) Exotic Bush Honeysuckles (*Lonicera morrowii*, *L. tatarica*, *L. x bella*)

Exotic bush honeysuckles share a similar history as the buckthorns. They were widely planted as ornamentals and have escaped into natural areas via birds and other animals. They produce large amounts of berries as well. Honeysuckles tend to invade more semi-open habitats that have a sandier soil type but can be found in many other areas as well. They appear to be less shade tolerant than the buckthorns. They are especially troublesome invaders of old fields, wildlife openings, and disturbed forests. In southern Wisconsin, they have been observed to invade thinned pine plantations as well.

Bush honeysuckles have been observed on some Price County Forest land. They tend to be an isolated bush here or there, but no dense populations have been

found. Larger infestations occur to the west in Sawyer County. The southern parts of the Flambeau River State Forest, especially along the Flambeau River and areas where severe windthrow have occurred, contain larger populations.

Control of honeysuckles is similar to that of buckthorns. These bushes also tend to hold onto their green leaves longer than most natives in the fall, so this is the optimum time of year for documenting their populations and treating them. The same control measures will be used for honeysuckles as for buckthorns (see 2) a) through d) above). Biological control is more difficult with honeysuckles because there are many native *Lonicera* species which any insect or disease could attack if it were to be released. However, an aphid from Europe has become naturalized in some parts of the region, and it has had a negative impact on flower and fruit production of honeysuckles. It seems to prefer the exotic species, so this could help with control efforts in the more heavily infested areas.

4) Emerald Ash Borer (*Agrilus planipennis*)

The emerald ash borer (EAB) has recently appeared in the state of Wisconsin. It is a small, green, metallic, wood-boring beetle whose larvae chew through the cambium of ash trees. Within a short time, the larvae will girdle the tree, causing it to die. Even healthy ash trees are attacked and ultimately killed.

As of late 2009, at least seven populations have been detected in the state, mainly in southern areas. Due to illegal firewood hauling and other possible wood hauling vectors, EAB could and probably will show up in Price County in the future. The county forest contains at least 3500 acres of nearly pure black ash swamp (swamp hardwoods), as well as many acres of northern hardwoods and other types that have an ash component in them. Therefore, EAB was ranked as a high-priority invasive species for the county forest.

The county forest has taken a proactive approach with respect to EAB for a few years and will continue with future timber sale establishment. More sales have been recently set up in aging black ash (swamp hardwood) stands, and ash has been more heavily favored for removal during selection harvest thinnings. In this way, if

and when EAB arrives, fewer trees will need to be salvaged (or will die) and more of the land will remain forested (since species other than ash will have time to get established in their absence). Ash seedlings are fairly common in many places, so the species will continue to add a component to the forest, but it is too early to tell if it will be a much-reduced component after EAB arrives.

Also, since EAB can arrive in firewood, Solberg and Smith Lake Campgrounds offer free local firewood to registered campers. This way, campers do not have to haul firewood from distant locations, lessening the chance of EAB or any insect or disease getting released at the campground.

Biological control agents will be the only feasible long-term solution for controlling EAB. A great deal of research is currently being conducted in order to determine what types of insects, microbes, etc. predate on EAB so that populations can be at least controlled to some degree. Hopefully some reliable form of bio-control will be available by the time EAB appears in Price County, but until then, we will continue taking preventative measures.

Species of Lesser Concern

Some invasive species are of a lower priority than the 4 listed above in terms of managing PCF lands. They can still be quite invasive in many plant communities and will still be documented and monitored. Some tend to invade open wetlands, dry prairies and sandy soils, or disturbed areas such as along roads and trails. Others are invasive in other parts of the state, but no known populations occur in this region. Due to limited resources, not all invasive species can be given the same attention. Since forest and recreation management is of the foremost importance on Price County Forest lands, these species may not pose as great a risk to tree health and regeneration or recreational opportunities. However, as stated earlier, they are still invasive in their own way and could become a higher priority in the future. A list of these species can be found in the appendix of this management plan. For more information on these or other species not listed, go to the Wisconsin Department of Natural Resources website on invasive species (dnr.wi.gov/invasives/).

PLANTS

1) Reed Canarygrass (*Phalaris arundinacea*)

Reed Canarygrass is a perennial grass that grows thick mats in wetlands and other poorly drained soils. It can completely displace other vegetation. Since it is already so widespread throughout Price County, not much can be done to control its invasiveness. The good news is that it prefers more open areas so most forest management activities won't have a huge impact. It may invade disturbed areas that have wet or moist soils such as swamp hardwood stands and poorly drained northern hardwood stands. It has been observed on some woods roads on PCF land, as well as disturbed open meadows and ditches.

2) Giant Reed (*Phragmites australis*)

Giant Reed is another perennial grass that can grow to very impressive heights of well over 10 feet. It usually invades a disturbed wetland and then spreads quickly with its rhizome, forming very large clones if left unchecked. It appears to be even less shade tolerant than reed canarygrass so most forest management activities won't be affected. However, the vast open wetlands and impoundments on PCF lands could be invaded in the future. Only a few small populations have been observed throughout the county so treating any new patches quickly could prevent this species from taking over as reed canarygrass has.

3) Japanese Barberry (*Berberis thunbergii*)

Japanese Barberry is an ornamental shrub with small thorns that produces many berries spread by animals. It has been known to invade hardwood stands and other forested settings. Ashland County currently has 2 known populations, and it is undoubtedly grown in many yards throughout Price County as an ornamental. This species will need to be monitored closely as it may someday spread into northern hardwood stands, limiting tree regeneration and displacing native vegetation.

4) Canada, Bull and European Marsh Thistles (*Cirsium arvense*, *C. vulgare*, *C. palustre*)

Members of this collection are all non-native thistles originating from Eurasia. Canada and bull thistle have been around for a long time, and are especially troublesome in agricultural fields and disturbed areas. Populations sometimes become established following soil disturbances including timber sales. However, bull thistle is quite shade intolerant and does not persist once the canopy closes. Canada thistle may persist longer but also appears to reduce in density after other plants become abundant. The greatest threat of the thistles for PCF lands comes from the newly introduced European marsh thistle. This thistle seems to be more shade tolerant and invades moist to swampy areas (much of PCF lands), including bogs. It usually gets established following a disturbance, but can then spread rapidly even into undisturbed natural areas. A population was recently discovered (Sept. 2009) in the Town of Emery on PCF land and basal rosettes are quite numerous. It is one of the first known populations from Price County, but the thistle has infested all areas east and north (including the Upper Peninsula of Michigan). Since it is a biennial, control could include removing or cutting all flowering plants so they don't produce seeds, and spraying all of the basal rosettes (seedlings) with herbicide. It may not be feasible to treat this species if it becomes too widespread. Logging activities and other avenues of disturbance should be cautious of any populations so the seeds are not spread to remote areas. It is not known whether marsh thistle excludes tree regeneration from areas (it definitely has a negative effect on herbaceous vegetation and to some degree tree regen), but it could be a cause for concern in swamp hardwood, tamarack and black spruce stands (possibly moist upland sites as well). Research for biological control of Canada and bull thistle has been ongoing for years with limited success. As for marsh thistle, no known bio-control currently exists.

5) Common Tansy (*Tanacetum vulgare*)

Common Tansy is a perennial herb that produces clusters of yellow flowers and plenty of seeds. It is fairly common throughout the county along roads and in other disturbed areas. It is not a significant concern to forestry activities but may invade open and semi-open areas of the forest such as wildlife openings and woods

roads.

6) Japanese Knotweed (*Polygonum cuspidatum*)

Japanese Knotweed is a perennial plant that grows 5-10 feet tall and forms large clonal groups. The root system grows incredibly large, and it is very difficult to remove once it has been growing in an area for some time. It occasionally spreads down ravines and creeks, crowding out all other plants in its way. Control requires a number of applications of herbicide and cutting of the stems. It has been observed growing on private property but not on county lands.

7) Wild Parsnip (*Pastinaca sativa*)

Wild Parsnip is a biennial herb that was originally brought over for food (its yearling tuber can be eaten) but has spread due to the large amount of seeds it produces. Parsnip often takes over wet ditches and other open, disturbed areas with moist soil. The sap from its stem can produce severe blisters and burns if it comes in contact with the skin. Control includes pulling or mowing of 2nd year plants, and applying herbicide to basal rosettes.

8) Spotted Knapweed (*Centurea biebersteinii*)

Spotted Knapweed is a biennial herb that produces pinkish-purple flowers and many seeds. It is common in dry, disturbed areas, such as sandy roadsides, gravel pits and gravel roads. It tends to be much more invasive in open, dry sites such as sand prairies. Since the soils of Price County tend to be more heavily textured, and knapweed is shade intolerant, forestry activities should not greatly facilitate its invasiveness. It has and may become established along ATV trails, gravel roads, and possibly drier wildlife openings. Treating it with herbicide and preventing seed set may be an option in wildlife openings since game animals tend to avoid it, adding to its invasion of an area.

9) Black Locust (*Robinia pseudoacacia*)

Black Locust is a tree that not only produces many seed pods, but also produces root suckers, especially when cut (similar to the native aspens). It is quite invasive in open, sandy areas. It is grown in some yards as an ornamental throughout the county, but has not been found on any PCF lands.

10) Oriental Bittersweet (*Celastrus oribulatus*) and Japanese Honeysuckle (*Lonicera japonica*)

These two aggressive vines both grow very quickly, produce large amounts of berries, twine around (often girdling) and overtop trees, sometimes crushing them with their weight. Neither species have been found in Price or the counties surrounding, but they are both quite invasive in areas to the south. It is not known whether Japanese Honeysuckle is winter hardy to our climate, but it appears that Oriental Bittersweet is.

11) Russian and Autumn Olive (*Elaeagnus angustifolia*, *E. umbellatus*)

These large, non-native shrubs to small trees generally in more open to semi-open areas. They often persist when the canopy closes over them. Autumn olive has not been observed in the county, and only a few Russian olives are known to exist (planted as ornamentals in yards).

12) Multiflora Rose (*Rosa multiflora*)

Multiflora Rose is a perennial bush with very stout, recurving thorns, and brambles that often vine up into trees. It produces a large number of berries which birds eat and spread. It is a troublesome invader in southern Wisconsin but has not been observed in Price County. Rose rosette disease is showing some promise of control throughout the region.

13) Leafy and Cypress Spurge (*Euphorbia esula*, *E. cyparissias*)

This pair of closely related perennials forms large colonies due to their fast spreading rhizomes. They are similar to spotted knapweed in that they prefer dry, sunny locations. They could become a problem in wildlife openings or along ATV

trails if they are accidentally introduced there. Bio-control is available but probably not necessary given our moist, shady habitats, where these spurses will likely be out-competed.

DISEASES, INSECTS, MICROBES

1) Hemlock Woolly Adelgid (*Adelges tsugae*)

This small insect is similar to an aphid that feeds on hemlock needles causing dieback, often killing the tree after a period of time. The adelgid is widespread in the Appalachian Mountains and the Pacific Northwest, but has not been found in Wisconsin or Michigan. Some predatory insects may offer some control before it reaches our area.

2) Gypsy Moth (*Lymantria dispar*)

This moth is a defoliator of many different types of trees in the eastern United States. Populations have been steadily moving west, and Price County is just on the edge of its distribution. The gypsy moth caterpillars can nearly defoliate entire stands of trees when their populations are high. Repeated defoliation weakens the trees, opening them up to other insects and diseases. Many eventually die. Oak seems to be the preferred species, but gypsy moths feed on over 200 species of trees (both deciduous and evergreen). The native friendly fly and a fungal disease often kill the larvae, but don't have a substantial effect on the population during an outbreak.

3) Asian Long-horned Beetle (*Anoplophora glabripennis*)

This large beetle's larvae infest primarily maple trees. The larvae chew through the cambium of branches, causing dieback and sometimes eventual death of the tree. Because maples are quite prevalent in our area, this insect deserves some attention. Thankfully, no populations have been observed in Wisconsin, and other populations in the country have appeared to be somewhat contained at the present time.

4) Oak Wilt (*Ceratocystis fagacearum*)

This fungus causes the water-conducting tissues (xylem) in oaks to become plugged, causing the tree to die often within weeks of infection. The red oak group is much more susceptible to mortality than the white oak group. Underground root grafting can cause whole stands of oaks to eventually die. Since oaks are not very common in our immediate area (compared to others in the state), pure stands are relatively scarce. However, care should be taken not to cut or prune oaks from April through at least July. This is the time when open wounds can spread the disease around to healthy trees via beetles.

5) Butternut Canker (*Sirococcus clavignenti-juglandacearum*)

This fungus infects butternuts, causing black fungal mats to form on them, eventually killing them. Since butternut is not a very common tree in most areas, regeneration should be promoted where possible so that the species is not lost forever.

6) Dutch Elm Disease (*Ophiostoma sp.*)

DED is caused by a group of fungi similar to the oak wilt fungus in that they cause infection in the vascular system of the tree, causing the leaves to wilt and the tree to die. Bark beetles are primarily responsible for transmitting the fungi to healthy trees, although root grafting can spread the disease in a grove of elms. The disease affects American, rock, and to a lesser extent slippery elm species. The fungi were accidentally introduced from infected elm logs (from Europe) prior to 1930. It is not known where the disease originated because European elms were succumbing to the disease around the same time period. Even within individual elm species, resistance to the disease varies, and some trees can become infected yet still survive. On the Price County Forest, elms are generally reserved as leave trees in clearcuts to maintain biodiversity, although stressed trees may be cut out of hardwood stands through intermediate thinnings. Due to the prolific seed production and the fact that not all trees are killed by this disease, elm will continue to be a component of our forest but will likely not achieve its former glory.

Invasive Species Grant (Sustainable Forestry Grant, 2009)

The invasive species grant will be used for monitoring, control, and revisiting of areas treated. A GIS layer will be developed for invasive species' populations along with a table describing the number of plants, treatment, etc. for each particular GPS waypoint. All populations will be added to the DNR WISFIRS reconnaissance database as well. Control will be focused on the more isolated populations as opposed to infested areas. Small, isolated populations can be more easily controlled if invasives are detected early enough, whereas large, infested areas may take years or may be reinfested within a short time period. If time and funds permit, some of these more heavily infested areas will be treated as well. Ultimately, biological control will be needed to treat these areas with any long-term success.