USDA

Environmental Assessment

Chequamegon-Nicolet Invasive Plant Control Project

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Forestwide Project

Chequamegon-Nicolet National Forest

Ashland, Bayfield, Florence, Forest, Langlade, Price, Oconto, Oneida, Sawyer, Taylor, and Vilas Counties, Wisconsin

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Garlic Mustard at Roberts Lake Hardwoods

Roberts Lake Hardwoods after removal of garlic mustard

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Common Abbreviations Used in this document

BE - Biological Evaluation
CNNF - Chequamegon-Nicolet National Forest
EA - Environmental Assessment
LRMP - Land & Resource Management Plan, "Forest Plan"
LRMP FEIS - Land & Resource Management Plan, Final Environmental Impact Statement
NEPA - National Environmental Policy Act
NNIS - non-native invasive species
PF - Project File Record
RFSS - Regional Forester's Sensitive Species
TES - Threatened, Endangered & Sensitive species
USDA - United States Department of Agriculture
USFWS - US Fish and Wildlife Service
WDNR - Wisconsin Department of Natural Resources

1.0 PROPOSED ACTION AND PURPOSE AND NEED

Introduction

The Chequamegon-Nicolet National Forest is proposing to implement a 10-year Forest-wide non-native invasive plant management program on about 1,400 sites within the National Forest. The purpose of the proposed action is to prevent the further spread of non-native invasive species (NNIS) into native ecosystems and to keep these sites in their desired condition. This project will integrate several control methods to achieve results. We propose using manual techniques, biological control insect release, and/or herbicide depending on the situation and results desired.

This action is needed because invasive plants are threat within the Forest, and to meet the requirements of Forest Management Plan direction, law, regulations, and policy. Analysis of the proposed management program is ongoing. We will use this environmental assessment to develop annual weed control activities.

Background

The spread of non-native, invasive plants (weeds) threatens the health of native ecosystems. While about 15% of all the plant species on the Forest are not native to North America, most of these do not pose a threat. The species listed in Table 3.1 are invading native plant communities in the National Forest and elsewhere in Wisconsin. Invasive plants have characteristics that permit them to rapidly invade and dominate new areas, out-competing other vegetation for light, moisture, and nutrients. This changes the composition and functioning of native plant communities. Solid stands of invasive plants can replace these communities and lead to local extinction of native plant species, including threatened, endangered, and sensitive species (Westbrooks 1998, p5).

Some invasive plants, such as spotted knapweed, have poorly-developed root systems that do not have the soil-holding capacity of the plants they replace. This can lead to erosion of soil and siltation into riparian areas (Soll 2004, p4; Tu et al. 2001, p44). Other effects of NNIS infestation include, reducing available forage, reducing tree regeneration, growth, and yield, interfering with recreational activities, and causing adverse health effects on humans (Westbrooks 1998).

1.1 Proposed Action

We propose to reduce weed populations using an integrated combination of control methods based on the species and site. The manual/mechanical, biological, and chemical methods are summarized in section 2.1 for the sites mapped (appendix B). Research and experience have indicated that these treatment options are the most effective for the non-native, invasive plants indicated (Tu et al. 2001; Hoffmann & Kearns 1997; Kind 2003; Mello 2004). Manual methods will be initially preferred over chemical for very small infestations (generally less than .004 acres or the size of a living room) or in close proximity to a known rare plant site. We will consider herbicide for any size site if monitoring proves that manual methods alone are ineffective. There are many currently known sites where we have used manual methods for several years with little success and we would now like to use herbicide (CNNF data). Site location information is stored in the Natural Resource Information System Terra GIS mapping database.

1.2 Purpose and Need

The purpose of this project is to protect and restore native ecosystems on the Forest by controlling or eliminating existing populations of non-native, invasive plant species. This action is needed because invasive plants currently occur on the Forest and are degrading natural communities, and to meet the requirements of the Forest Management Plan, law, regulations, and policy. Past control efforts on the Forest have been limited to manual methods that are labor-intensive and result in moderate to poor success.

Based on research and expert opinion, herbicide should be part of a good integrated weed management plan for NNIS infestations, in part because yearly site visits required for using manual methods are labor-intensive and costly (USDA 1999). The judicious use of effective herbicides will reduce labor costs, reduce soil disturbance, and get the job done more quickly.

The desired forest condition is to reduce, minimize, or eliminate invasive plants across the landscape (USDA 2004 pg i). The CNNF Forest Plan contains goals to ensure healthy and sustainable ecosystems (see Sec 3.2). The Chequamegon-Nicolet National Forest does not have a severe problem with invasive plants; however, control action is needed to prevent a more widespread and costly problem in the future.

Both the USDA Forest Service National and Eastern Region strategy provide a framework to develop our Forest invasive control strategy. The program objectives of the Forest NNIS Strategy will follow the regional strategy and include Prevention, Early Detection and Rapid Response, Control and Management, Restoration, Cooperation, Research, and Education (USDA 2003, USDA 2004).

1.3 Where our actions would occur

Non-native invasive plant control actions would occur across the CNNF wherever NNIS are identified. Most such areas occur along roads, skid trails, and recreation trails, in gravel pits, disturbed sites, and power line corridors but many do occur in pristine areas. Site-specific locations are displayed on the site maps in Appendix B and the corresponding table of sites is listed in Appendix A.

1.4 What Our Decision Will Address

The framework of the decision focuses on control of existing non-native invasive plant infestations, consistent with current management direction. A decision on this proposal is limited to:

- What type of non-native invasive plant control actions, methods, chemicals and tools would be used
- Where on the CNNF that non-native invasive plant control actions would occur
- What non-native invasive plants would be controlled
- What mitigation measures would be required to minimize impacts of our actions

This proposal and decision would consider, but not alter land use objectives, nor will consider amendments to the Chequamegon-Nicolet National Forest Plans. The Responsible Official for this decision will be the Forest Supervisor.

1.5 How we addressed Public Issues

Concerned agencies, local governments, and the public were notified and consulted about this non-native invasive plant control project in the early stages in the summer of 2004 and then throughout the project development process. Early in the project design, we solicited advice from area invasive plant control experts and incorporated their suggestions into the project. Public notification was placed on the Forest's web page and returnable postcards were sent to the Forest Region 9 NEPA mailing list. "Interest" was determined by returning the postcard. On 4/2/2005, a legal notice was published in the Milwaukee Journal Sentinel and interested public, governmental, and other agency parties were mailed notification of this proposal and invited

to comment. Notification consisted of a comment solicitation letter, project description, and maps. In addition to the interested parties, we identified and notified other potentially affected individuals and organizations.

Local Native American tribes were notified of our plans to control weeds. The Great Lakes Indian Fish and Wildlife Commission biologists were consulted and we discussed the need for collaborative efforts to control NNIS.

As a result of public notice efforts, 10 formal responses were received by mail, email and phone. The interdisciplinary team evaluated public responses and any issues brought forth therein. All but one were very supportive of our proposal. One person did not think we should use chemical herbicide or bio-control insects at all on the National Forest. Four respondents were concerned about the vectors of NNIS such as logging activity, ATV use, and other recreation activities and suggested prevention methods. Several people made offers to help pull weeds on the Forest, indicating a high level of concern and support for this effort. A number of comments reiterated the cautions and mitigation measures already anticipated and designed into the project. Several respondents suggested additional control methods including the use of prescribed fire.

1.6 Issues:

In June of 2004, an interdisciplinary team met to consider the potential issues related to the invasive plant control project. At that time, many project design criteria were created to mitigate potential effects (see 2.6.1). Major issues are those resource impacts that are important to analyze so that we can weigh the relative beneficial and adverse merits of each alternative. Non-relevant issues are those found not to be important to comparing resource impacts, or those that have no cause/effect relationship to the proposed or alternative actions. The protection of Heritage Resources was a non-relevant issue. The Forest Archeologist analyzed the project actions and determined that the proposed activities are not *undertakings* and will have no effect on heritage resources (PF 4.G).

Later in Chapter 4, for each issue, we describe how it relates to the proposed action (cause/effect) and how it will be measured (indicates resource impacts). Issues are not a restatement of the project objectives (resource benefits defined by the purpose and need), but express resource tradeoffs that may result from the actions used to attain the project objectives.

We addressed issues in three ways: 1) developing an alternative to alter resource tradeoffs, 2) requiring mitigation measures to reduce impacts to a resource, and 3) disclosing and comparing the relative difference in resource effects between alternatives and to acceptable thresholds. One or more of these methods may be used to address an issue. The following is the list of relevant issues as determined from review by the Responsible Official.

Human Health and Safety Issues:

Concerns relate to the health and safety of workers, nearby residents, and the public who visit the Forest.

- Impacts from manual and mechanical control methods: Injuries to workers could result from tools, falls, weather effects, and insects.
- Concerns related to herbicide: Odor, toxicological and cancer-causing effects of chemical herbicides, drinking and surface water contamination, short-term and long-term exposure of workers or visitors, and effect on local Organic Farm certification.
- Concerns related to health effects of invasive plants themselves: Wild parsnip has a chemical in its juice that can cause a blistering rash on skin that is exposed to the sun (Eagan 1999). Thistles, Japanese barberry, and buckthorn have sharp spines that can scratch and irritate skin.

Vegetation Issues:

Two elements of vegetation are related to the this project.

- Invasive plants out-compete and displace native plants, interfere with tree germination and survival, change soil functions, and contribute to a host of other factors that can dramatically alter vegetation composition and structure.
- Invasive plant control actions may harm non-target plants and native plant communities.

Aquatic Species, Water and Soil Quality Issues:

Three elements of Aquatic Species, Water and Soil Quality may be affected by the NNIS weed treatments.

- Water and soil quality may be degraded by contamination from herbicide chemicals.
- Water and soil quality may be degraded by not treating NNIS plant infestations.
- Aquatic species may be impacted by herbicide chemicals.

Threatened, Endangered, and Sensitive Species Issues:

- Weeds can compete with TES plants for space, light, and nutrients and can affect TES viability.
- TES plants that are growing close to treated weeds can be damaged by accidentally being pulled or by over spray of herbicide.

2.0 ALTERNATIVES

2.1 Alternative 1 (No Action)

The No Action alternative represents the current condition and serves as a baseline to compare the other alternatives. With No Action, we will not implement the proposed action or any other alternative action discussed here. Human Health and safety would not be affected by herbicide use. Invasive plant control activities would not harm non-target plants including TES plants. Water, aquatic vegetation, and soil would not be degraded by chemical use.

However, many weed sites will continue to grow in size and provide a seed source for other infestations. Toxic and injurious plants will affect human health and safety. NNIS infestations will threaten rare plants and native plant communities, including aquatic communities.

There will still be some weed control on the Forest as part of other decisions. Education and prevention efforts on the Forest will continue.

Other actions that will continue:

- 2004 Decision to Control Non-native, Invasive Species at Administrative and Recreation Sites, Roads and Trails
- Control of leafy spurge with release of bio-control beetles as part of the Cayuga EIS
- Purple loosestrife control at Round Lake (Park Falls land base) with bio-control Galerucella beetles released in 1998.
- Weed prevention measures such as equipment cleaning provisions in logging contracts; education efforts, and NNIS surveys

2.2 Alternative 2 (Proposed Action)

Appendix A is a table which lists all the sites to be treated under Alternative 2. Appendix B is a map of all the locations to be treated under Alternative 2.

The proposed action takes an integrated pest management approach. Treatments may include mechanical, chemical, biological methods, or a combination of all three. Factors such as size of plant size, infestation size, type of surrounding vegetation, location of infestation are used to determine the type of method used.

This proposal uses a four-step strategy to reduce the effect on non-target vegetation: 1) if possible, treat NNIS sites while they are still relatively small and mechanical methods can be employed, 2) if chemical

methods are used, choose an application method that directly targets the invasive plant, with little over-spray (basal-bark treatment for example), 3) if a large area must be sprayed, apply herbicide when adjacent native plants are dormant (early spring or late fall), and 4) if herbicide must be applied during the growing season, a broad-leave specific type will not affect grasses and sedges.

2.2.1 Treatment Methods

Manual and Mechanical Control Methods

Table 2.1 describes the manual and mechanical control methods proposed for use on the Chequamegon-Nicolet National Forest.

Table 2.1. Manual/Mechanical Control Methods

Method	Description of action
Pull	Hand-pull entire plant including roots – usually herbaceous plants or shrubs less than 5mm in diameter. Leave plant on site or bag and remove if it has mature flowers or fruit. Used for individuals or small patches of any plant.
Cut	Clip with lopping shears; cut with saw, brush cutter, weed whip, or mower; girdle the bark. This action can be used alone or followed by sponge-applying systemic herbicide.
Root stab	Cut root just below ground level with narrow spade. Plants are usually left on site. Used for individuals and small patches of wild parsnip and thistles.
Scorch (flame)	Use the flame of a propane weed torch to scorch or wilt green leaves. This is done either very early or late in the growing season when exotics are green and native perennials are mostly below ground. It does not start a ground fire. Scorching will kill one year's growth of annual and biennial weeds. Especially useful for garlic mustard and sprouts of buckthorn.

Chemical (herbicide) Control Methods

Herbicides were selected based on their effectiveness and low toxicity. While there may be herbicides with greater effectiveness on the market, some have negative environmental effects or have other properties we found to be undesirable. All herbicides proposed for use are approved by the Environmental Protection Agency and available without special permit (anyone can buy them at a garden supply store). Table 2.2 summarizes the chemicals proposed for use in this alternative and their targeted use.

Herbicides will be hand-applied by several methods. A controlled application method will be dabbing the chemical on the cut stump or brushing it on the basal bark of woody shrubs (Tu et al. 2001). A similar targeted method employs a wand or glove applicator to wipe herbicide on foliage. For foliar spray we will use a backpack or hand-held apparatus that can direct a narrow spray of chemical on the target plant with minimal drift. The timing and number of treatments per year varies by species treated in order to avoid negative impacts on non-target plants. Generally there will be one chemical application per site per year with follow-up monitoring in subsequent years. See the text below for individual species under Treatment Methods by Species. We will apply all herbicide according to the label directions and in compliance with Worker Protection Standards, Forest Service regulations, and the Pesticide-Use Management and Coordination Handbook.

Figure 2.1 illustrates how careful spot-spraying will hit only the target plants. In this photo the glyphosate is dyed purple (center of photo) and does not touch the green plants. This treatment was early in the year when most native plants were dormant.

Table 2.2. Proposed Herbicide Treatment Methods:

Common chemical name	*Some* examples of trade names	Targeted Use	Weeds targeted
triclopyr	Garlon3A®; Brush-B-Gone® Habitat® Vine-X®	Stump and/or basal bark treatment, foliar spot spray; broadleaf-selective	Buckthorn, Barberry, Oriental bittersweet, Autumn olive, Honeysuckle, Wild parsnip
glyphosate	Roundup Pro®; Roundup®; Accord®	Stump treatment, foliar spray; non-selective	Honeysuckle, Barberry, Garlic mustard, Wild parsnip, can be used on all other listed NNIS
glyphosate for near water	Rodeo® Aquamaster®	Foliar treatment, weeds near open water, non-selective	Purple loosestrife, Swamp thistle, Reed canary grass, Common reed or any species near open water
imazapic	Plateau®; Plateau Eco-Pak®; Cadre®	Foliar treatment, non-selective	Leafy spurge
clopyralid	Transline®; Curtail®; Reclaim®	Foliar spray; broadleaf selective- especially composites and legumes	Canada thistle, Swamp thistle, Spotted knapweed Siberian Pea-shrub

We will take every precaution for personal protection and protection of the environment. A spill plan and spill kits are part of this project. All appropriate State permits for pesticide application will be obtained. A licensed applicator will supervise all herbicide work. Herbicide will not be applied by aerial application (plane or helicopter) nor do we plan to use a truck-mounted spray device.

Biological Control Methods

Biological control of invasive plants involves releasing specific insects that feed on specific plant species. The insects are typically native to other parts of the world where the target plant occurs naturally. The United States Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) has permitted the insects listed in Table 2.3 for release in the United States, under the Plant Protection Act of 2000 (7 USC 7701 *et seq.*). Before permitting the release of non-indigenous biological control agents, APHIS thoroughly evaluates the potential risk of adverse impacts to non-target plants and animals (USDA APHIS 2004a and 2004b). Biological control of plants is already a common practice on State, Tribal, County, and private land in Wisconsin, Michigan, and Minnesota. The insects listed in Table 2.3 were released or spread into Wisconsin over the past 10-15 years and have become established (Anderson et al., Lambrecht, pers. comm. 2004, Cruse pers. comm. 2004). All have extensive and successful records of prior use in the United States (Van Driesche et al. 2002). Our actions would be to move them from one location to another.

Table 2.3. Biological Control Insects Proposed

Bio-control insect	Scientific name	Target plant	# of potential sites
Brown-legged leafy spurge flea beetle	*Aphthona lacertosa*	Leafy spurge	2
Black dot leafy spurge beetle	*Aphthona nigriscutis*	Leafy spurge	2(same as above)
Black-margined loosestrife beetle	*Galerucella calmariensis*	Purple loosestrife leaf eater	1
Golden loosestrife beetle	*Galerucella pusilla*	Purple loosestrife leaf eater	1(same as above)
Loosestrife root weevil	*Hylobius transversovittatus*	Purple loosestrife root borer	1(same as above)

Biological control insects can be effective on plant infestations that have a sufficient supply of the target plant as well as other needs of the insect such as moisture, windbreaks, and hiding places (Rees et al. 1996, p.19). Most of the NNIS sites are too small to support a population of bio-control insects. We will consider the use of bio-control for large infestations where eradication is difficult to achieve due to costs or there would be undesirable effects to non-target vegetation, especially rare plants. None of these insects will completely eliminate the target plants (Tu et al. 2001).

These insects are released as adults between June and August. Some releases involve simply emptying a container of insects at a site while some involve placing a potted plant bearing insects in the middle of an infestation site. To be considered successful, the insects will reduce the abundance or impacts of the targeted pest plants to acceptable levels (Tu et al. pg 4.3) and provide wide-ranging control at a low cost to benefit ratio (Louda et al. 2003). Release sites will be monitored for effectiveness. The Forest used purple loosestrife Galerucella beetles on the Park Falls ranger district in 1998 with good success.

2.2.2 Treatment Protocol (specific to target species)

The following factors were considered in determining which treatments to apply at particular NNIS sites.

1. Manual or mechanical methods will be the principle method of control for small spot infestations of shallow-rooted species. For some deeply rooted species, pulling seldom kills the plants.
2. Some chemicals are particularly effective on certain types of plants (for example, clopyralid is most effective on composites such as Canada thistle and spotted knapweed). Some chemicals are more selective than others. For example, clopyralid mainly targets plants in the Composite and Legume family, leaving other plants such as grasses, sedges undamaged.
3. When herbicide is used, it is expected to kill plants in one application with follow-up use in subsequent years to treat sprouted seeds and missed plants.
4. Bio-control release of beetles was chosen for two sites where neither mechanical nor chemical control are expected to be effective or would be inappropriate. One is a purple loosestrife population along a river, large enough to support bio-control insects where mechanical control would be difficult and chemical use undesirable. The other is a large field of leafy spurge growing in among and threatening a population of a rare plant.

Table 2.4 summarizes the types and acreage of the treatments prescribed for each NNIS species. This table lists the initial response treatments only, however, as described below additional treatment methods may eventually prove warranted.

Table 2.4 Prescribed treatments and acreage of treatments for each NNIS.

SPECIES NAME	Total Acres	Acres manual/ mechanical	Acres using herbicide	Herbicide	Acres bio-control
Autumn olive	**0.3**	<1	0.25	glyphosate or triclopyr	
Bishop's goutweed	**3.3**	<1	3.2	glyphosate	
Buckthorns	**0.5**	0	0.5	glyphosate or triclopyr	
Canada thistle	**152.2**	<1	152	clopyralid or glyphosate	
Common reed grass	**0.2**	0	0.2	glyphosate	
Garlic mustard	**4.7**	<1	4.6	glyphosate or triclopyr	
Honeysuckles	**4**	0	4	glyphosate or triclopyr	
Japanese barberry	<1	0	<1	glyphosate or triclopyr	
Leafy spurge	**31**	<1	11	glyphosate or imazapic	20
Oriental bittersweet	**<1**	0	<1	glyphosate	
Purple loosestrife	**30**	<1	1	glyphosate	29
Reed canary grass	**232**	0	232	glyphosate	
Siberian pea shrub	**<1**	0	<1	clopyralid or glyphosate	
Spotted knapweed	**177**	<1	177	clopyralid or glyphosate	
Swamp thistle	**166**	<1	165	clopyralid or glyphosate	
Wild parsnip	**40**	<1	39	glyphosate	

Treatment Methods by Species:

Buckthorns
Asiatic Honeysuckles
Japanese Barberry
Oriental bittersweet vine
Autumn olive

MANUAL/MECHANICAL CONTROL: Small plants (< 5mm diameter or < 0.5 meter tall) with shallow root systems, will be hand pulled and soil will be shaken off at the site. Non-fruiting size plants will be left on site; those with fruit or seeds may be bagged or piled and burned. These methods will require repeat control visits as well as monitoring of the site, perhaps for 4-5 years or longer. If monitoring shows that pulling leaves behind roots that sprout, or is otherwise ineffective, spot sprayed herbicide will be considered on these small plants. Plants may be pulled anytime the ground is not frozen. Scorching small buckthorn sprouts in fall may be used when they come up thickly following death of the parent tree.

CHEMICAL CONTROL: Larger shrubs will be cut and the stump treated with glyphosate or triclopyr, in late summer/fall/early winter. A compatible dye will be added to the herbicide mixture so that the cut stump treatment can be distinguished. Herbicide will be applied with a sponge-type applicator to avoid contacting non-target plants. An alternative method is to paint triclopyr on the basal bark and leave the shrub or vine intact. Thick patches of young seedlings may be spot-sprayed with glyphosate. Herbicide treatment can be applied almost any time of the year. The optimal time would be September through November. We will make a single chemical treatment in one year per site. This will be followed by monitoring in subsequent years and treatment of missed plants and re-sprouts.

Siberian Pea shrub

MANUAL CONTROL: Roots are fairly shallow but fibrous and difficult to dig. Small to medium-sized plants will be pulled. Cut larger stems at base with brush-cutters, chain saws or other tools to remove flowering parts. If not followed by herbicide treatment, cuts made at any time will encourage re-sprouting.

CHEMICAL CONTROL: Larger plants that are cut will require herbicide to prevent re-sprouting. After cutting, stumps will be treated immediately with a glyphosate or clopyralid solution using sponge applicator. Basal

bark treatment with clopyralid is another alternative. Plants can be treated any time of year but cutting in winter followed by herbicide treatment is the most effective. We will make a single chemical treatment in one year per site. We will monitor in subsequent years and treat missed plants and re-sprouts.

Herbaceous Species:

Spotted knapweed
MANUAL & MECHANICAL: Very small populations less than 14X14 ft (.004 acre) will be removed by pulling. Early spring will be the easiest time to pull. Mowing is suggested for roadsides, at the phenological stage just before plants bloom in mid July (Mello 2004). If monitoring shows that pulling small populations is ineffective, we will use chemical treatments.

CHEMICAL CONTROL: Larger infestations (greater than .004 acre) will be spot treated with clopyralid, a broadleaf weed killer, during bolt or bud stage using a backpack sprayer. If the killing of surrounding vegetation, such as in a gravel pit, is not a concern, the area will be spot treated with glyphosate. Knapweed can be chemically treated during all stages of growth from June through September except late when the seed is viable (Mello 2004). Mowing just before flowers bud, prior to herbicide treatment, will stress plants, making the herbicide more effective. We will make a single chemical treatment in one year per site. Sites will be re-visited and hand-pulled several weeks after herbicide treatment. This will be followed by monitoring in subsequent years with chemical and manual treatment of missed plants and re-growth.

Canada thistle
MANUAL & MECHANICAL CONTROL: On smaller sites, less than about .004 acre, the whole plant will be cut or pulled during early bud stage when root reserves are low (usually in early to mid July). This will be repeated, if possible, two more times during the growing season. On very sparse, small sites the root of this perennial can be severed below ground using a narrow shovel. These manual methods will require repeat visits for several years to deplete the seed bank.

CHEMICAL CONTROL: Larger sites will be spot-treated with the broadleaf-specific herbicide, clopyralid applied with a wand applicator (preferred) or spot sprayer in order to avoid non-target vegetation. Also, using this broadleaf-specific chemical will avoid damage to grasses and sedges during treatment (Dow Agrosciences 2004), providing soil stabilization. Follow herbicide application with hand-pulling 1-2 weeks later. Herbicide can also be applied with wand or spray in spring to first year rosettes. Sites will be monitored and re-treated for 3-5 years. If the killing of surrounding vegetation is not a concern, such as in a gravel pit, the area will be spot treated with glyphosate.

Swamp thistle
MANUAL & MECHANICAL CONTROL: Small populations, less than .004 acres (size of a living room) will be root-stabbed (using a spade or other weed digging tool) at a depth of about 2 inches below ground level, cutting the tap root. Follow-up stabbing treatment will be needed for several years. An alternative will be to cut stems while flower heads are in an unopened bud state, twice per season for 2-3 years. If monitoring proves this to be ineffective we will treat with chemical method.

CHEMICAL CONTROL: Larger sites will be spot-treated with the broadleaf herbicide, clopyralid (or glyphosate formulated for use near water, when appropriate) applied with a wand applicator (preferred) or spot sprayer in order to avoid non-target vegetation. Also, using this broadleaf-specific chemical will avoid damage to grasses and sedges during treatment (Dow Agrosciences 2004), providing soil stabilization. Follow herbicide application with hand-pulling 1-2 weeks later. Herbicide can also be applied with wand or spray in spring to first year rosettes. Sites will be monitored and re-treated for 3-5 years. If the killing of surrounding vegetation is not a concern, the area will be spot treated with glyphosate.

Leafy spurge
MANUAL & MECHANICAL CONTROL: Very small populations (less than 100 plants or about .004 acres) will be hand pulled. Hand pulling will require repeat visit for up to seven years (GLIFWC 2003). If monitoring proves this to be ineffective we will spot spray with imazapic. On roadsides, larger populations will be mown

or cut in June to early July to stress population and remove flowering heads (this may be followed up by chemical treatment, as described below).

BIOLOGICAL CONTROL: One site in the Thunder Mountain Barrens (Site # 09130402726) in Oconto County covers 20 acres and is growing intermingled with the rare Missouri rock cress. Here leafy spurge beetles *lacertosa* and *A. nigriscutis* will be released in June or July where spurge stem densities are sparse. Follow-up monitoring will determine the need for repeat releases. Elsewhere on the Forest the *Northwoods Weed Initiative*, a cooperative group in Bayfield County, released approved bio-control flea beetles on privately-owned sites near small National Forest populations of spurge. Therefore, additional beetles could move onto National Forest land from these other release sites. Monitoring will tell us if this occurs.

CHEMICAL CONTROL: Follow up mowing or cutting of larger sites (>.004 acre) or smaller sites where complete eradication is desired, with spot treatment of imazapic (such as Plateau®) or glyphosate. Herbicide can be applied from August to mid-October as long as sap flows from the cut stems. The most effective time to apply herbicide is mid-September. We will make a single chemical treatment in one year per site. This will be followed by monitoring in subsequent years and treatment of missed plants and re-sprouts. Follow-up treatment will take several years until the seed bank is exhausted (GLIFWC 2003).

Purple loosestrife

MANUAL & MECHANICAL CONTROL: Loosestrife plants will be carefully pulled or dug out with shovel, taking care not to leave any root. It may take 2-3 yearly visits to eliminate a site with a few plants as seeds can sprout when the ground is disturbed. If monitoring proves this to be ineffective, we will spot spray glyphosate on individual plants (see below). This is effective on cut stems at the higher concentration listed on the label or as a foliage treatment with a lower concentration (Hoffman & Kearns 1997).

BIOLOGICAL CONTROL: This method will be used at a recently discovered site on the South Fork of the Flambeau River (Site 09130104486), because the plant occurred in scattered places along a large stretch of the river. Forest monitoring shows that Galerucella beetles released in 1998 on the Forest in Price County (Round Lake) produced excellent results. Beetles released on land of other ownership within the CNNF could spread to federal lands.

CHEMICAL CONTROL: If sites expand to over 100 plants, they will be spot-treated with glyphosate (if near open water, a formula suitable for use near water will be used). Plants will be individually sprayed. Application need only cover 25% of the foliage of each plant. Where feasible, we will apply glyphosate to cut stems with a wiping technique, avoiding any overspray. These techniques are designed to minimize the impact to adjacent, non-target plants. Plants can be treated anytime during the growing season but before they set seed in August. The ideal time would be in July when root reserves are low. We will make a single chemical treatment in one year per site. This will be followed by monitoring in subsequent years and treatment of missed plants and re-sprouts with hand-pulling or using herbicide.

Garlic mustard

MANUAL & MECHANICAL CONTROL: For small patches, flowering plants (second year plants) will be hand pulled to prevent seed production (spring). Cutting the plants low with a weed whip, just before flowering, is an option when the patch is dense. Both pulling and cutting plants will prevent flowering of plants. If plants have started to form seed pods when they are cut or pulled, they will be bagged and removed from the site as seed can still be viable. A second site visit a few weeks later will catch any adults missed during the initial treatment. Pulling will continue for five to seven years on a site to deplete the seed bank.

A propane weed torch may be used to scorch first year plants in spring. The weed torch works, not by starting a ground fire, but by using the torch's flame to wilt the target leaves and kill the plant. This can be done in very early spring because the garlic mustard is green and growing while native plants are still under the ground. A wildfire crew on site will be available to guard against ground fire. Repeat the following spring. If monitoring shows this to be ineffective, we will incorporate the use of herbicide as described below.

CHEMICAL CONTROL: Large patches (> .004 acre) will best be controlled with a combination of herbicide, hand-pulling and scorching. To avoid impacts to the native ground layer, apply chemicals in early spring or

late fall plants. Glyphosate is the standard herbicide used for killing garlic mustard. In special situations, an alternative a treatment of triclopyr, which is broad-leaf selective herbicide, may be used so as not to kill grasses, sedges and lilies. The following spring, before plants set seed, hand pull new flowering plants. Following pulling of larger plants, scorch or herbicide all small first year plants. Herbicide may be used on any one site for up to 5 years. As the population is reduced over time, hand pulling with or without weed torching may be all that is needed to deplete the population (Mello pers. comm. 2004)

Wild parsnip
MANUAL & MECHANICAL CONTROL: On small sites with less than 100 or so plants, the root of this biennial will be cut below ground level with sharp, narrow shovel or hand-pulled. Large roadside sites may be mowed just after peak flowering before the seeds are ripe. Areas may be mowed again if plants re-flower. This will decrease the seed bank.

CHEMICAL CONTROL: In high priority areas, such as near high quality natural areas or where public use is common, treat basal rosettes of first year parsnip with spot application of glyphosate. Plants can be treated anytime during the growing season but it is best if treatment occurs before they set seed in August. As an alternative, triclopyr may be used as it is broadleaf specific and will not harm grasses. The ideal time would be in July when root reserves are low. We will make a single chemical treatment in one year per site. This will be followed by monitoring in subsequent years and treatment of missed plants and re-sprouts with hand-pulling or using herbicide.

Reed Canary Grass
MECHANICAL CONTROL: Cut or mow affected area in mid June and again in early October. Once plants have re-sprouted, treat with herbicide (see below).

CHEMICAL CONTROL: Chemical control is often more effective in combination with other treatment methods, such as cutting or burning. Burn or cut affected areas in early spring, let plants re-sprout and then treat it with herbicide (glyphosate). Late season (late Aug - Sept) applications of glyphosate are more effective than spring in producing greater rhizome mortality (Reinhardt and Galatowitsch 2004). For heavy infestations, monitor and treat again if necessary. If standing water is present use a foliar application of glyphosate formulated for use near water.

Common Reed grass
MECHANICAL CONTROL: Cut or mow affected area at the end of July and repeat annually. Gas powered hedge trimmers and circular blade weed trimmers work well. Cut plants below lowest leaf leaving a 6" stump.

CHEMICAL CONTROL: Spray plants with glyphosate (formulated for wetlands) in late summer (August) when reed grass is in full bloom. If plants are too tall to spray, cut back in mid-summer and apply glyphosate when re-growth reaches 2 to 3 feet tall. Repeat in subsequent years. Cut back dead Phragmites stalks several weeks after herbicide application to stimulate growth of native plants previously suppressed (UConn. 2004)

Bishop's Goutweed or Snow-on-the-mountain
MECHANICAL CONTROL: Experience in trying to control goutweed shows that cutting or pulling will not kill the patches but repeated cutting, low with a weed whip may stress the colony.

CHEMICAL CONTROL: There is very little in the literature regarding killing goutweed with herbicide. Glyphosate and triclopyr can both be used to control this plant. Triclopyr is labeled for broadleaf weeds on non-crop areas and has little or no impact on grasses (Tu et al. 2001) and may be the preferred chemical for large patches eliminating the need to re-vegetate a site. Treatment would occur during the growing season (June - September) when plants are most susceptible. We will make a single chemical treatment in one year per site. This will be followed by monitoring in subsequent years and treatment of missed plants and re-sprouts.

2.2.3 Prioritization of Sites for Treatment:

Some NNIS sites are a higher priority for treatment than others. The species, location and size largely determine whether a site is a high or medium priority for treatment.

High Priority Sites: Sites that contain species that are adapted or capable of growing in shade, such as garlic mustard, honeysuckle, buckthorn, and oriental bittersweet are considered high priority sites for treatment because they are capable of invading nearly all upland forested areas. Sites that contain purple loosestrife are also a high priority, in part because there is relatively little on the Forest at this time so a rapid response to this species could actually result in eradication of loosestrife. Sites that contain leafy spurge, Canada thistle, wild parsnip, and spotted knapweed are considered high priority for treatment if they are located near open-land ecosystems because these species are more likely to invade open, sunny areas. These open-land invaders are a particular threat to sandy, barrens habitats. Thus, sites near the Moquah Barrens or Thunder Mountain Barrens are of particular concern. Any sites within or on the edge of Research Natural Areas, Special Management Areas, Old Growth & Natural Feature Complexes, and other special management areas would be high priority.

Medium Priority Sites: Sites that contain open-land invaders are medium priority for treatment if they are not near open-land ecosystems. Treatment is still warranted at such sites, because if untreated these plants will continue to produce seed which can be transported to open-land ecosystems. Other medium priority sites include sites of reed canary grass because treatment is intensive and likelihood of success is not high.

Acres Treated Each Year: We estimate that the CNNF will be able to treat between 200 to 300 acres of NNIS infested areas each year. In the past, the Forest has completed approximately 100 acres of manual/mechanical control per year. Assuming the money allocated to this effort remains relatively constant, the additional tools of herbicides and biological control agent should allow for additional acres treated.

2.3 Alternative 3 (No Bio-Control Alternative)

This alternative is the same as Alternative 2 except that we would not release any bio-control insects to control leafy spurge and purple loosestrife. This alternative was developed in response to concerns of unintended consequences from the release of regionally non-indigenous insects. There were internal and external concerns that releasing a non-native species to control another non-native species was unsound. The concern was that these insects might eat native plants when the invasive population is depleted.

This would not mean that there would be none of these insects present on the Forest. Numerous bio-control insect releases have occurred throughout Wisconsin in the past 5-12 years by the state DNR and private individuals.

As a consequence of this alternative, two NNIS sites would have to be treated with manual/mechanical or chemical means in order to meet the purpose and need of this project. The herbicide cautionary mitigations in Alternative 2 will be utilized. The Leafy Spurge site in Oconto County (Site # 09130402726 in Appendices A and B) described in 2.2 under leafy spurge will have to be treated with herbicide because manual pulling over the past 5 years has been ineffective. The South Fork Flambeau River purple loosestrife site (Site 09130104486 in Appendices A and B) would best be treated with herbicide using the cut and dab method.

2.4 Alternatives Eliminated From Detailed Study

No Herbicide Alternative. We considered creating an alternative that did not use herbicides but only manual and mechanical methods to control invasive plants. We did not pursue this alternative since our experience with manual/mechanical control alone shows that it is not giving us the results we desire and would not sufficiently meet the purpose and need for action. As NNIS continue to be introduced, we can not keep ahead and provide the rapid response required to prevent small infestations from becoming large. Manual/mechanical control of weeds is also labor-intensive and costly. This alternative would not allow us to address the Forest Plan goals to control the spread of NNIS and maintaining the integrity of natural ecosystems.

Other invasive plant control methods or tools were also considered but dismissed. *Prescribed fire* is an effective tool in controlling some invasive plants; however, it was not an appropriate method for any of the sites in this project. Fire could be considered in other project decisions on the Forest where it would fit within the management objectives. The *weed wrench* is a mechanical tool that can pull quite large shrubs out of the ground. We have found that this method disturbs the soil too much, encouraging seed sprout and could disturb historical artifacts if they were present.

2.5 Comparison of the Alternatives

Table 2.5 summarizes the major tradeoffs between the alternatives. Comparisons are based upon the project objectives (Section 1.2) and the Issues (Section 1.6). These tradeoffs are summarized from the resource impacts described in more detail in Section 4. This comparison is provided in tabular form to allow the reader to more readily see the differences and trade-offs between the alternatives.

Table 2.5. Comparison of the differences in how each of the alternatives met project objectives and addressed resource impacts of the major issues.

Objective or Issue	***Alternative 1 (No action)***	***Alternative 2 (Proposed action)***	***Alternative 3 (No bio-control)***
Objective: Protect & restore native ecosystems	NNIS will continue to spread with adverse impacts on native communities	beneficial effect, will work toward restoring native plant communities	beneficial effect, will work toward restoring native plant communities
Objective*:* Reduce or eliminate NNIS sites	No NNIS sites would be reduced or eliminated by our actions	NNIS sites will be reduced and some eliminated over the life of the project	NNIS sites will be reduced and some eliminated over the life of the project
NNIS competition may affect viability of Federally threatened Fassett's locoweed	Competition of NNIS will negatively affect viability of Fassett's locoweed	Removal of NNIS will be beneficial to Fassett's locoweed population	Removal of NNIS will be beneficial to Fassett's locoweed population
NNIS competition may affect viability of Missouri rock-cress in state	Competition of NNIS will negatively affect viability of Missouri rock-cress	Removal of NNIS will be beneficial to Missouri rock-cress population	Removal of NNIS in Missouri rock-cress population will be difficult, viability may be affected
NNIS may have a negative impact on native plant communities	Competition of NNIS will negatively affect native plant communities	Removal of NNIS will be beneficial to native plant communities	Removal of NNIS will be beneficial to native plant communities, risk of negative impact higher on 2 sites
NNIS may degrade water and soil quality	Uncontrolled NNIS may lead to reduction in water (habitat) quality and /or soil erosion	Removing NNIS will improve water and soil quality	Removing NNIS will improve water and soil quality
Herbicide may negatively affect human health	No adverse effects	No measurable effect due to low toxicity and low levels of herbicide use	No measurable effect due to low toxicity and low levels of herbicide use
Herbicide may contaminate water or soil	No direct adverse effects to water or soil	No measurable effect due to small areas and low levels of herbicide use	No measurable effect due to small areas and low levels of herbicide use
Herbicide may negatively impact aquatic species	No adverse effects	No measurable effect due to low toxicity and low levels of herbicide use	No measurable effect due to low toxicity and low levels of herbicide use

2.6 Features Common to All Action Alternatives

2.6.1 Project Design Criteria

All projects will adhere to the following criteria:

- All treatments will be designed to ensure that they do not negatively impact Threatened, Endangered, or Sensitive species. Any non-native invasive plant control measures in and around the known location of Fassett's locoweed at Mountain Lake will be in accordance to the 1991 Fassett's locoweed Recovery Plan and the 1992 Pesticide Management Plan for Fassett's locoweed.
- All control treatments will be designed so that they are effective, based on the species phenology and life history, yet have the fewest impacts on non-target plants, wildlife, water, recreation, and other resources.
- Where it is expected to be effective, manual or mechanical control options will be tried first.
- All treatments will be planned to minimize the undesired impacts on native vegetation.
    - Retain native vegetation and limit soil disturbance as much as possible. If exposed soil results from NNIS control actions, revegetate exposed soils promptly to avoid re-colonization by NNIS. Use only approved seed mixtures and weed seed-free mulch.
    - Field personnel involved in NNIS treatment actions must be able to visually distinguish target NNIS plants from non-target native plants.
- Mechanical or manual control:
    - Mowing will be limited to roadsides or disturbed areas and timed to avoid spreading seeds.
    - Use of the weed torch will be limited to times of low fire danger and when native vegetation is dormant, or only in areas which are already heavily disturbed. Wildland firefighters on site
    - Equipment, boots, and clothing will be cleaned thoroughly before moving from treatment site to ensure that seeds or other propagules are not transported to other sites.
    - NNIS parts capable of starting new plants (seeds, rhizomes, etc) will be disposed of properly.
- Herbicide Use:
    - Herbicide label directions will be carefully followed. This could include temporary closure of treatment areas for public health and safety.
    - Notices will be posted near all areas which have been recently treated with herbicides.
    - Herbicide application will only occur when wind speeds are less than 10 mph, or according to label direction, to minimize herbicide drift.
    - Weather forecasts will be obtained prior to herbicide treatment. Treatment activities will be halted, if necessary, to prevent runoff during heavy rain events.
    - Appropriate protective gear will be worn by herbicide applicators per label direction.
    - Herbicide containers will be disposed of following label specifications, state and federal laws, and Forest Service guidelines.
    - Herbicides stored on-site will have Material Safety Data Sheets per Forest Service guidelines
    - All individuals working with herbicide will review corresponding Material Safety Data Sheets.
    - Rinse water for cleaning or rinsing actions in conjunction with herbicide treatment will be disposed of according to Environmental Protection Agency regulations.
    - Only formulations approved for aquatic use will be applied in or adjacent to aquatic systems, following label directions. Table 4.5 in chapter 4 lists aquatic guidelines for herbicide use.
    - Use of clopyralid is not permitted in areas with a high water table or rapid to very rapid permeability throughout the profile. Appendix F list these sites.
    - Foliar spray applications will mostly occur when native vegetation is dormant, or in areas which are already heavily disturbed.

2.6.2 Prevention and Education

Prevention and education are not a part of this NNIS control project but some explanation of this topic is needed. Prevention is often recognized as a primary mission of the Forest Service relationship to NNIS (See FSM 2080 and the objectives of integrated noxious weed management). National Forests are practicing prevention to varying degrees. Among the most widely-adopted practices are: weed risk analysis in project

National Environmental Policy Act (NEPA); washing equipment before entry to National Forest lands and re-vegetation of treated noxious weed sites. The Forest Service Guide to Noxious Weed Prevention Practices, Version 1.0, was released July 5, 2001. The Guide describes weed prevention techniques for use on projects in all resource areas and two new weed prevention practices required by Forest Service policy (USDA Forest Service 2001). The two new practices involve equipment washing and the posting of weed free feed orders where they exist. Education efforts on the Forest include, public presentations, posting information signs at recreation areas, web site postings, displays at offices and events, and individual contacts.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This section describes the existing condition of the environmental resources that could be affected by the three alternatives if one were implemented. This description of the existing condition, combined with the activities of Alternative 1: No Action, establishes the baseline conditions against which the decision-maker and the public can compare the potential effects if Alternatives 2 or 3 were selected.

The affected areas are all lands on the National Forest susceptible to infestation by non-native invasive plants. The affected area lies in 11 counties in northern Wisconsin: Ashland, Bayfield, Florence, Forest, Langlade, Price, Oconto, Oneida, Sawyer, Taylor, and Vilas.

3.2 Forest Plan Management Direction

The 2004 CNNF Forest plan contains goals, objectives, and management direction aimed at both the prevention and control of non-native invasive species. The following items contain specific direction to "treat" and "reduce the spread" of non-native invasive species:

- **Forest Plan Objective 1.4g**: Annually treat non-roadside and roadside NNIS acres and develop a strategy to guide amounts and locations of treatments (LRMP 2004 pg 1-3)
- **Forest-wide Standards**: Use permissible mechanical, biological, and chemical controls to reduce the spread of non-native invasive species (LRMP 2004 pg 2-25).

3.3 Laws and Policy Direction

Laws and Policies Related to NNIS

The need to control NNIS is directed by federal and state weed laws, executive order, the National Invasive Species Act, and numerous other acts, as well as the CNNF Land and Resource Management Plan. Leafy spurge and Canada thistle are listed by Wisconsin as *noxious*. WI State statute 66.0407 charges public land managers with destroying these two species on the properties they are responsible for. Purple loosestrife is listed by Wisconsin as *nuisance*. WI State statute 23.235 prohibits cultivation, selling, or distribution of purple loosestrife in the state.

Wisconsin Consumer Protection Laws regarding pesticide use (PF 1.A-02) reinforces that it is illegal to use pesticides in a manner inconsistent with label directions. Pesticide label directions will be followed. Other Federal Acts and Authorities pertaining to Invasive species include:

- Executive Order 13112 (1999) - directs all federal agencies to address invasive species and refrain from actions likely to increase invasive species problems
- Forest Service Manual 2150 - Pesticide use management and coordination with the objective of ensuring the proper use of pesticides including: applicator certification and documenting pesticide approval.

- Coordinated Position Statement, Lake States Forest Supervisors (CNNF, Chippewa, Superior, Ottawa, Hiawatha, Huron-Manistee) regarding herbicide EIS's; amended in 2003 to allow herbicide use to treat invasive plants.
- Plant Protection Act (2000) - replaces the Federal Noxious Weed Act
- North American Agreement on Environmental Cooperation (1994) - Council of the Commission on Environmental Cooperation to develop recommendations regarding exotic species which may by harmful
- Endangered Species Act (1973) - when non-native species threaten endangered species
- Federal Insecticide, Fungicide, and Rodenticide Act (1947) - authority to use biological control agents as pesticides

3.4 Description of the Affected Environment by Resources that are Issues

3.4.1 Human Environment: Health and Safety

The Chequamegon-Nicolet National Forest consists of 1.5 million acres of federally-owned land but the Forest boundary contains almost 2 million acres. This means that about 500,000 acres (on over 1200 separate parcels) within the Forest are under the control of state, county, industrial, and private landholders (LRMP FEIS 3-308).
The population in the 11 counties containing National Forest in the year 2000 was 285,904 (LRMP FEIS p 3-333). It is estimated that the CNNF receives over 2.6 million visitors each year for activities such as biking, camping, and motorized sports (LRMP FEIS Appendix B pg 65). Recreation use is measured in "recreation visitor days" (one 12-hour visit by one person). The Forest experienced an average of 140% increase in tourism activities from 1993 to 2002 (LRMP FEIS p 3-318). The number of recreation visitors can be expected to increase by about 10% in the next decade (LRMP FEIS Appendix B pg 65).

3.4.2 Vegetation

The affected areas are all lands on the National Forest susceptible to infestation by non-native invasive plants. The invasive plant species are themselves components of the affected vegetation, in addition to the native plants and plant communities they disrupt. The affected area lies in 11 counties in northern Wisconsin: Ashland, Bayfield, Florence, Forest, Langlade, Price, Oconto, Oneida, Sawyer, Taylor, and Vilas.

3.4.2.1 *Non-native Invasive Plants*

Invasive plants threaten biological diversity all across the nation, with over 100 million acres infested in the United States (National Invasive Species Council 2001). Consequences of invasive plants costs the American public an estimated $138 billion each year (National Invasive Species Council 2001). Public recreational opportunities and experiences have become severely degraded by rapid infestations of invasive species, in many cases hampering access, reducing recreational quality and enjoyment, and decreasing the aesthetic values of public lands (USFS National Strategy and Implementation Plan 2004). They out-compete and displace native plants (Horsley and Marquis 1982) , interfere with tree germination and survival (Frappier et al 2004), change soil functions (Ehrenfeld et al 2001), and contribute to a host of other factors that can dramatically alter vegetation composition and structure (Mack et al. 2000)

A species is considered invasive if it meets these two criteria:

1. It is nonnative to the ecosystem under consideration, and
2. Its introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112 issued 1999).

Forest Service policy identifies prevention of the introduction and establishment of non-native plant species as an agency objective. This policy directs the Forest Service to: 1) determine the factors that favor establishment and spread of NNIS, 2) analyze NNIS risks in resource management projects, and 3) design management practices that reduce these risks (USDA 2001).

Non-Native Invasive Plants on the Chequamegon-Nicolet National Forest

Of the known plant species on the CNNF, 15% (172 species) are not native to northern Wisconsin. However, only 17 species are presently thought to meet the above criteria, are documented on the Forest, and are further documented as currently invading natural communities. We refer to this group of species as the "A list". Table 3.1 lists these species, the ecosystems they threaten, and their abundance on the Forest. Other species are thought to have the potential to be invasive on the Forest, based on findings from other regions; these species (referred to as the "B list") are being monitored at the present time.

Table 3.1 Non-native Invasive Plant List

"**A List" Species:** Species of immediate concern and treatment is warranted. These species are currently invading native plant communities on the Forest.

Species Common Name	Scientific Name	Ecosystems threatened by this invasive plant	# sites / total acres on CNNF
Leafy Spurge Noxious*	*Euphorbia esula*	barrens and other openlands	48 / 44
Canada Thistle Noxious*	*Cirsium arvense*	barrens and other openlands	427 / 200
Purple Loosestrife Nuisance**	*Lythrum salicaria*	wetlands	17 / 31
Buckthorns	*Rhamnus cathartica & R. frangula*	forested areas	12 / 26
Asiatic honeysuckles	*Lonicera tartarica, L. morrowii, and L. x bella*	forested areas, shores of rivers and lakes	42 / 29
Garlic mustard	*Alliaria petiolata*	mesic forest	64 / 33
Spotted knapweed	*Centaurea biebersteinii* other *Centaure*a species possible	barrens and other openlands	395/ 378
Japanese barberry	*Berberis thunbergii*	forested areas	5 / 25
Swamp thistle	*Cirsium palustre*	Openlands, wetlands, wet woods	124 / 170
Wild parsnip (poisonous)	*Pastinaca sativa*	Openlands	43/ 118
Oriental bittersweet	*Celastrus orbiculata*	Forests and edges	2/ <1
Siberian pea-shrub	*Caragana arborescens*	forests, edges, and openings	2 / <1
Eurasian water milfoil	*Myriophyllum spicatum*	lakes	1 lake
Reed canary grass	*Phalaris arundinacea*	open wetlands	85 / 231
Bishop's Gout-weed	*Aegopodium podagraria*	openlands	2 / 2
Autumn olive	*Elaeagnus umbellata*	barrens and openlands	3
Common Reed	*Phragmites australis*	open, wetlands	5/<1

State of WI law: ***Noxious** = prohibited, must be destroyed ****Nuisance** = may not be sold, distributed, or cultivated

Weed inventories and manual control methods have been on-going since 1997. Current inventory on the Forest shows NNIS on over **1278** NNIS sites totaling **1290** acres (0.09% of the Forest). This represents an early stage of infestation. As an example of a late infestation stage, the Kettle Moraine State Forest in southern Wisconsin estimates that 80% of the state forest is infested with one or more species (Kurowski 2004 pers. comm.)

The characteristics and extent of occurrence of these species on the CNNF is listed below. They are categorized by vegetation type (woody shrub, herbaceous, or grass)

Woody shrubs

Buckthorns *(Rhamnus cathartica & R. frangula)* Buckthorn can grow in full shade of a forest canopy. The leaves are still green well into fall, making that an ideal time to treat because they are easily recognized and most native plants are dormant. There are only a few sites currently known on the CNNF. Many private lands within and around the National Forest have larger infestations.

Asiatic Honeysuckles (*Lonicera tartarica, L. morrowii, L. x bella*) At least 3 species of Asiatic honeysuckle occur on the edge of the woods and in shade under a forest canopy. The leaves are still green well into fall, making that an ideal time to treat because they are easily recognized and most native plants are dormant. There are only a few sites currently known on the CNNF. Many private lands within and around the National Forest have larger infestations.

Japanese Barberry *(Berberis thunbergii)* This plant is often used as an ornamental and two of the sites on the forest are part of the landscaping at district offices. Executive direction states to use native (or non-invasive) plants for landscaping which is why we will remove it here. Barberry has also invaded mixed deciduous/coniferous forest on the CNNF. It spreads vegetatively and by birds carrying seeds.

Siberian Pea shrub (*Caragana arborescens*) Siberian pea or pea shrub, a member of the legume family, is planted as an ornamental and for use in shelterbelts. It has a fibrous root system and spreads by animal-dispersed seeds. It can grow under a forest canopy. There is currently only one known site on the Forest.

Oriental bittersweet vine (*Celastrus orbiculata*) Bittersweet is a climbing vine with orange berries in clusters at the leaf axils. This native of Asia can overrun native vegetation, over topping other species and weighing the limbs and crown of trees, making them susceptible to wind and snow damage. The seed is spread by birds. The 2 known sites are on old homesteads.

Autumn olive (*Elaeagnus umbellata*) Autumn olive was introduced from Asia, and widely planted for wildlife habitat and shelterbelts in the south. It is intolerant of shade and prefers drier sites. It spreads by animal-dispersed seeds and can form dense stands in barrens and wildlife openings shading out forbs and grasses. All three known sites are in Bayfield County.

Herbaceous Species:

Spotted knapweed (*Centaurea biebersteinii*) This species is pervasive across the forest and northern Wisconsin and will be impossible to eradicate. Prevention of spotted knapweed in natural areas will be the focus of Forest efforts. We will attempt to suppress or contain knapweed in some areas and tolerate it in others. Knapweed is unpalatable to grazers. It crowds out native forbs and can contribute to erosion due to its poor root system. Treatment priority will be given to areas such as within and adjacent to open-land ecosystems both natural and managed.

Canada thistle (*Cirsium arvense)* Canada thistle is listed in Wisconsin as *noxious* (see sec 3.3). It is native to Europe, not Canada as the name suggests. It is a dioecious perennial that can spread 10-12 feet in one season to form clones that crowd out native plants. It is widespread across the forest.

Swamp thistle (*Cirsium palustre*) Swamp thistle is a biennial that invades disturbed, moist areas. It is more a problem on the Nicolet side of the Forest, but is not a high threat in all areas. Forest inventory and risk analysis indicates that swamp thistle in proximity to high quality natural areas should be higher priority for control.

Leafy spurge (*Euphorbia esula*) Leafy spurge is listed in Wisconsin as a “noxious” species (WI statutes 66.96). This means “public managers are to destroy (it) on properties they are responsible for” (DNR

2003). It has very deep roots (15 feet), is allelopathic, crowds out native plants, and is unpalatable as wildlife forage.

Purple loosestrife (*Lythrum salicaria*) Purple loosestrife is listed as a "nuisance" weed by the State of Wisconsin (see Sec 3.3). Originally introduced as a garden ornamental, it is very aggressive in wetlands. It crowds out native plants and itself does not provide preferred food or cover for wildlife. Most of the sites on the Forest are very small.

Garlic mustard (*Alliaria petiolata*) Garlic mustard is a biennial that can spread prolifically in undisturbed forest under a full canopy. The toothed leaves of the first-year rosettes resemble violets and give off the odor of garlic when crushed. These rosettes remain green through the winter, flowering early in the spring. The white-flowered second year plants are 1 to 4 feet tall. It easily out-competes native forest plants by monopolizing light, moisture, nutrients, and space. Garlic mustard tends to form dense patches. Seeds remain viable for five to seven years (Tu et al. 2001). This plant is considered a major threat to the survival of Wisconsin's woodland herbaceous flora and the wildlife that depend on it (Monroe 2000).

Wild parsnip (*Pastinaca sativa)* This aggressive European weed invades open, disturbed areas. The plant juice contains a chemical that causes severe blistering of the skin when exposed to light. It is persistent on sites that remain disturbed and is more common on the Nicolet side. It resembles Queen Anne's lace, a common roadside plant, but has yellow flowers instead of white.

Bishop's Goutweed or Snow-on-the-mountain (*Aegopodium podagraria***)** Bishop's goutweed is a perennial that is planted as ground cover around homes. It occurs on two old homestead properties, spreading via rhizomes into forest edges and forest openings.

Grasses

Reed Canary Grass *(Phalaris arundinacea)* This large grass forms a thick rhizome sod that dominates the subsurface soil. It can invade any type of wetland and can also grow on uplands. A combination of management strategies over several years will yield the best results in controlling reed canary grass.

Common Reed grass *(Phragmites australis)* This large, non-native genotype of common reed grass invades wetlands and displaces species valued as forage for migratory wildfowl. It can grow 14 feet high and form dense monospecific patches.

3.4.2.1.1 Rate of spread

The number of weed infestations on the Forest has quadrupled since the first inventory was conducted in 1997. While this is mainly due to increased survey effort, we found that the patch size of many known NNIS sites has increased. Without more aggressive control efforts, the number of acres infected will grow rapidly. Invasive plants are often spread by human activities associated with vehicles and roads, recreation, forestry, and agricultural practices, but human disturbance is not always required for establishment of the plants in Table 3.1. Nationally, the rate of spread has been estimated at 3% per year (National Invasive Species Council 2001) and at 8-12% per year (USDA 1999).

3.4.2.1.2 Past control efforts

Since 1997, control efforts each year involved hand-pulling, cutting, or digging. In 2003, 138 acres were treated this way. As an example of the effort involved, we spent about 80 person-hours in 1998 using manual methods at one 25 acre site harboring six NNIS species (Round Lake, Price County). After six more years of work, we have reduced recruitment by removing fruiting adult plants and reduced the total weed population but have not eradicated any species. Invasive plants still persist, some from root-sprouting, others from seed in the soil.

3.4.2.2 *Native Plant Communities*

The Chequamegon-Nicolet National Forest supports a diverse mixture of native plant communities; at least 25 different plant communities occur on the Forest ranging from pine barrens to open bogs (Epstein et al. 2002). Appendix D provides a brief description of the plant communities found on the Forest. If we broadly classify these groups based on drainage, soil (upland/lowland), soil moisture (mesic/dry), and vegetation structure (forested, non-forested/open), we can summarize these types in a very general way. Figure 3.1 displays the relative proportion of the terrestrial vegetation groups across the CNNF. Non-native or invasive species that are currently invading these communities are listed in Table 3.2.

Figure 3.1. Major Vegetation Groups of the Chequamegon-Nicolet (percent of total Forest)

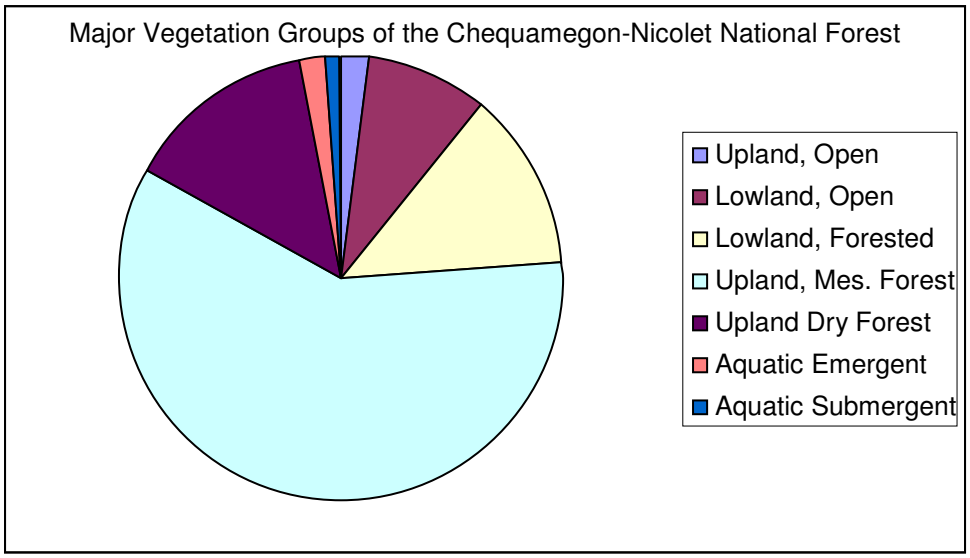

Table 3.2 Major vegetation groups and their NNIS threats.

Vegetation Group	Examples	Percent of the Forest	NNIS threats
Upland, open	Includes pine barrens and wildlife openings	2	Spotted Knapweed, Canada Thistle, Leafy Spurge, Wild Parsnip, Common Reed, Autumn Olive, Bishop's Goutweed
Lowland, open	Bogs, sedge meadows	9	Purple Loosestrife, Swamp Thistle, Reed Canary Grass, Common Reed, Japanese Knotweed
Lowland, forested	Conifer and hardwood swamps	13	Swamp Thistle
Upland, Mesic Forest	Northern Hardwoods, Aspen, Paper Birch	60	Garlic Mustard, Asiatic Honeysuckles, Buckthorns, Oriental Bittersweet, Siberian Pea, Japanese Barberry
Upland, Dry & Dry Mesic Forest	Red Pine, White Pine, Jack Pine, Oak	14	Spotted Knapweed, Oriental Bittersweet, Japanese Barberry, Asiatic Honeysuckles, Buckthorn
Aquatic Emergents	Wild Rice, Cat-tail & Bulrush Marshes,	2	Purple Loosestrife, Common Reed
Aquatic Submergents	Shore grass, pondweeds, bladderworts	<1	Eurasian Water Milfoil

3.4.3 Aquatic Systems

Glacial geology characterizes the Chequamegon-Nicolet National Forests (CNNF) providing variety in landform from hilly glacial moraine to flat or pitted outwash sand plains. This variety in soils provides for a variety of tree species and vegetative communities.

The Forests boast an abundance of water in the form of rivers, lakes, and wetlands. The CNNF is located within 41 different 5th level watersheds averaging 235 square miles. The watersheds fall within two major hydrologic regions with 19 watersheds draining through the Great Lakes to the Atlantic and 22 draining through the Upper Mississippi to the Gulf of Mexico.

3.4.4 Threatened, Endangered & Sensitive Species

In the Biological Evaluation for this project, the effects of the proposed alternatives were analyzed for five Federally Threatened or Endangered Species and 81 Regional Forester Sensitive Species (27 animals, 54 plants). The affected environment for these analyses included the entire Chequamegon-Nicolet National Forest because NNIS locations are scattered across the Forest. Weed treatment actions on lands of other ownership were considered in the analyses but such information is limited. Due to the dispersion of the treatments and their limited spatial extent, effects to areas outside of the Forest boundary are not anticipated.

4.0 ENVIRONMENTAL CONSEQUENCES

This Chapter discloses the environmental impacts that would occur by implementing each alternative described in Section 2. It presents the scientific and analytical basis for the comparison of alternatives presented in Table 2.5. Resource impacts are organized by issue, and occur in the order they are discussed in Sections 1 & 3.

4.1 Effects to Human Health & Safety

The detail of the Human Health and Safety analysis is found in PF doc 4.F-01. The affected environment for this analysis includes the entire Chequamegon-Nicolet National Forest and into all counties that contain National Forest. This is because statistics are available for amounts of herbicide used in the state by county and to account for effects of treatment of weed sites near the borders of the Forest.

The Issues are concerns relate to the health and safety of workers, nearby residents and the public who visit the Forest.

- *Impacts from manual and mechanical control methods:* Injuries to workers could result from tools, falls, weather effects, and insects. Measure: Number of NNIS sites treated per year; addressed by: Adherence to worker safety requirements and project design criteria. Threshold: No manual work attempted without proper safety equipment.
- *Concerns related to herbicide*: Odor, toxicological and teratogenic (cancer-causing)effects of chemical herbicides, drinking and surface water contamination, short-term and long-term exposure of workers or visitors, and Organic Farm certification. Measure: Amount of herbicide used (pounds or other unit of measure) per acre. Number of sites treated. Potential for off-site herbicide drift measured by evidence of toxic effects to non-target plants. Distance of certified organic farms to NNIS control sites. Addressed by: Comparing amount of herbicide used with the limits allowed on the product label and by calculating proximity of certified organic farms to treatment sites. Threshold: The herbicide labels define the limit of amount of chemical that can be applied to an area and how and when it will be applied (including proximity to surface water and water table). Organic farms must be buffered from any applied chemical herbicide.
- *Concerns related to health effects of invasive plants themselves*: Wild parsnip has a chemical in its juice that can cause a blistering rash on skin that is exposed to the sun (Eagan 1999). Thistles, Japanese barberry, and buckthorn have sharp spines that can scratch and irritate skin. Measure: Number of sites of this type of invasive plant. Addressed by: Qualitatively assessment of the chance that a person will encounter this type of plant and expected decrease in this type of plant due to successful eradication. Threshold: Forest Plan (LRMP) implies a general forest-wide reduction in all NNIS including these types.

4.1.1 Alternative 1(no action)

Direct and Indirect effects: This alternative will not use any methods to eliminate weeds. There will be zero acres treated. There will be no direct impacts to human health and safety from any control method.

Indirectly, wild parsnip which has known phyto-photo toxic effects on human skin (Eagan 1999) will continue to grow and spread. There are currently about 40 acres of wild parsnip occurring in 16 sites known on the Forest. This value can be expected to increase with no action. Forest botanists have observed one patch of 100 square feet spread to ¼ mile of infested roadside within 3 years. Even if parsnip only invaded roadsides, the amount of suitable habitat this represents within the Forest is in the tens of thousands of acres. There will be a potential negative human health risk from the no action alternative to people who walk and work in patches of this plant.

Cumulative effects: At the rate wild parsnip is spreading across the Forest and the amount of favorable habitat for its colonization, lack of control of this plant on the National Forest will cumulatively add to the impact. Parsnip has a sap that is toxic to human skin when exposed to sunlight. There is no data on the frequency of exposure to parsnip in the population. Cumulatively, we assume occurrences would be a very infrequent event.

4.1.2 Alternative 2 (proposed action)

Direct and Indirect effects *of Manual/Mechanical methods*

The manual and mechanical control methods would pose little safety risk to workers or the public, if routine safety practices are observed. These safety practices address hazards related to operating mechanical equipment such as brush saws in remote settings as well as exposure of workers to natural hazards such as poison ivy, stinging insects, or falling branches. The public would be excluded from treatment sites while work is in progress so they will not be affected by these methods.

Direct and Indirect effects *of Herbicide*

The herbicides used for this project (Table 4.1) were selected largely for their low toxicity to humans and the environment. There is little risk that the public may unknowingly come into direct contact with treated vegetation as areas will be posted with signs or access otherwise prevented. Since the possible acres treated throughout the life of the project is relatively low, very little herbicide will actually be used (Table 4.2). With the criteria designed into the project (Chapter 2), there will be little drift of herbicide or possibility of off site movement into water or wetlands. The label directions place restrictions on wind speed at the time of spraying. Applications will be made close to the ground surface with backpack style pumps that produce large size droplets that do not carry far.

Odor and vapor drift: Some of the chemical herbicide solutions have an odor that may persist at spray sites for several days. Vapor drift is possible if equipment is calibrated for a small droplet size or fine mist and there is wind present. The chemicals chosen do not readily volatilize, that is vaporize into the air, with the exception of triclopyr (see Table 4.1). Volatilization can be minimized by applying the herbicide according to label directions and with a large droplet size. The odor may persist at spray sites for several days.

Water contamination: The four herbicides selected have short half lives and will not build up in the environment (see Sec 4.3.2, Soils and Hydrology). The herbicides chosen for this project have limited ground mobility and no application near water is proposed. There are no application methods as proposed that pose a risk to ground water and soil contamination (see Aquatics Section 4.3).

Exposure of workers or the public: The Forest experiences 2.6 million recreation visits (Sec 3.4.1) per year and 286,000 people live near and within the Forest and may also recreate on Federal lands (LRMP FEIS). Some of these people walk down forest roads and into remoter areas that may by treated with herbicide. Herbicide treatments will occur on only 710 sites over a 10 year period so the chance of humans even encountering a treated area is low. The greatest risk of exposure to herbicides would be to workers mixing and applying them. Following label directions and Forest Service policy will minimize exposure of workers. The herbicide label places restrictions on re-entry

of people to treated areas. If the herbicide label specifies a re-entry limitation, signs will be posted at treatment areas.

Table 4.1 Herbicide properties

Herbicide	volatilization	odor	dermal LD50 (rabbits)	soil half-life	leach potential
glyphosate	low	weak	5,000 mg/ kg	47 days	very low
triclopyr	high	strong	2,000 mg/ kg	30 days	low
imazapic	low	weak	5,000 mg/ kg	140 days	low
clopyralid	moderate	moderate	2,000 mg/ kg	40 days	moderate

Based on the estimated levels of exposure and the criteria for chronic exposure developed by the U.S. Environmental Protection Agency, there is no evidence that typical or accidental exposures will lead to dose levels that exceed the level of concern. In other words, all of the anticipated exposures - most of which involve highly conservative assumptions - are at or below the reference dose. The use of the reference dose - which is designed to be protective of chronic or lifetime exposures - is itself a very conservative component of this risk characterization because the duration of any plausible and substantial exposures is far less than lifetime (SERA 2003a, 2003b, 2004a, 2004b). None of the application areas will exceed the threshold of amount of herbicide allowed on the label. **Therefore there will be no significant direct effects to human health and safety**.

Table 4.2 *Initial* Herbicide Use proposed for Alternatives 2 & 3

Method	# sites	Acres	Herbicide use rate	max. amount of herbicide*	Herbicide concentration used
glyphosate	up to 164	up to 285	2 lb / acre	570 lbs (see Note below)	1-3 (5-10)% foliar spray 25-50% cut stump
triclopyr	up to 164	up to 285	1 lb /acre	285 lbs (see Note below)	13-44% basal bark or cut stump
imazapic	up to 19	up to 11	0.1 lb / acre	1.1 lbs (see Note below)	8-12 oz/acre
clopyralid	up to 446	up to 494	.25 lb / acre	123 lbs (see Note below)	0.5 - 1.65 pints / acre

* These herbicide amounts are not additive as they represent the maximum possible and triclopyr is an alternative to glyphosate so one or the other will be used, not both.

Note: The pounds of herbicide are somewhat higher than what we expect would actually be used due to the method of reporting acres of infestation. Many sites are listed in acres but consist of scattered plants and clumps of plants within that acreage. There are only a few sites where the NNIS infestation is "solid" with the patch covering the total acreage listed. We will spot treat the individual plants and clumps, not spray the entire acreage.

Direct and Indirect effects *of Parsnip toxicity* - There will be a small indirect decreased risk to human health from removing wild parsnip especially from areas where people are likely to walk through.

Direct and Indirect effects *of Bio-control* - Insects will be placed on three sites, one for purple loosestrife, and two for leafy spurge. None of the literature on bio-control insects proposed shows any negative risks to human health so there will be no direct or indirect effect from insect release on humans.

Direct and Indirect effects *on Organic Farms* - A database search of one of the largest organic farm certifying organizations in the Midwest showed only one certified organic farm within the

National Forest (MOSA 2005). There are no proposed herbicide treatment sites within five miles of this property. The National Organic Program provides standards for a "green buffer" of sufficient size or other features (e.g. windbreak or diversion ditch) to prevent unintended contact by prohibited substances applied to adjacent land (NOP 2005). There should be more than adequate buffers between treatment areas and this farm, so there will be no effect on its certification status. Another 12 farms located in counties shared by the National Forest showed that none of these farms were within at least 5 miles of the Forest boundary (MOSA 2005).

Cumulative effects to Human Health and Safety

The physical and biological control methods would pose only a minimal risk on human health or safety. They would contribute little or no incremental risk when combined with the impacts of similar past, present, and reasonably foreseeable future activities (Appendix E).

This project proposes chemical herbicide use on small patches on 0.06% of the Forest land. As a result of this project, small amounts of herbicide may migrate offsite, and contribute to a negligible increase in cumulative offsite concentrations. Repeated exposures were assessed in the Risk Assessments for all herbicides (SERA references) and all exposures are substantially below the level of concern. Since all herbicides chosen are considered safe when used according to label direction, there should be no measurable effect on human health and safety.

Herbicide use on Federal land: The national forests in Wisconsin have not used herbicides on wild lands for the past 14 years so there is no past effect presumed to exist from the National Forest. One exception is the Oconto River Seed orchard (670 acres) where the CNNF uses chemical herbicides to control weeds in and around the greenhouse and to remove competing vegetation from seed trees (USDA 1997b).

Herbicide use on non-federal land: The extent of NNIS infestation and herbicide use private lands within the Forest is largely unknown. If rates of infestation and herbicide use on these private lands were similar to what the National Forest is proposing to use, approximately 300 acres would be treated (.06% of 500,000 acres private land infested). This number is probably highly inflated since much of the private land within the National Forest boundary is uninhabited land and not likely to be infested. There is no data showing the extent of herbicide use on non-farm private lands within the Forest boundary because there is no required reporting system for private users. Based on data from the National Agricultural Statistics Service, chemicals to control weeds, grass, or brush were used on 150,000 acres of *farmland* in 2002 in those 11 Wisconsin counties that also contain some National forest land (USDA 2002). The Forest use would increase this by 710 acres; by comparison, an insignificant amount. Despite the uncertainty of herbicide use, the low percentage of private land within the Forest and a low NNIS infestation rate means a low use of chemical herbicide is reasonably expected.

In summary, for the four herbicides chosen for this project; the Risk Assessments prepared for the USDA Forest Service describe highly conservative exposure scenarios that might be typical for workers and the general public. They assume that an individual is exposed to the compound either during or shortly after its application. Specific scenarios are developed for direct spray, dermal contact with contaminated vegetation, as well as the consumption of contaminated fruit, water, and fish. None of the scenarios suggest that the general public or workers are at risk from long-term exposure to these herbicides. As with any chemical, absolute safety can not be proven and the absence of risk can never be demonstrated. Used with normal and reasonable care, glyphosate, triclopyr, clopyralid, and imazapic will not pose risks of systemic toxic effects to workers or the general public (SERA: 2003a page 3-48, 2003b pg 3-29, 2004a pg 3-33, 2004b pg 3-22).

If information becomes available over the course of the proposed project that any of the herbicides are not as safe as anticipated, the Forest Service would consider not using it or imposing stricter design criteria for that chemical's use.

4.1.3 Alternative 3 (no biological control)

Direct and Indirect effects: The potential for effects would be the same as those for Alternative 2 except there would be no release of bio-control insects. None of the effects would exceed the threshold (see Sec. 1.7) therefore there would be no direct or indirect effects from this alternative.

Cumulative effects: Since there would be no use of bio-control insects there are no direct or indirect effects to be added to by this method. As the same types of manual/mechanical and herbicides treatments would be use, the potential direct or indirect impacts on human health and safety are expected to be approximately similar to or bounded by the analysis of effects presented for Alternative 2. The two areas that would not be treated by biological control under this alternative will have to receive careful manual and/or herbicide treatments that will add only insignificant amounts to the total chemical used.

4.2 Effects to Vegetation

4.2.1 Alternative 1

Under the No Action Alternative it is expected that non-native invasive species will continue to spread into more areas of the Forest, including less disturbed and better quality ecological habitat. The result will be that the ecological function of the natural communities on the Forests will decline.

Direct and Indirect effects to NNIS species

Under the No Action alternative, none of the 710 NNIS sites shown on Appendix B will be treated. Thus, invasive plants will continue to spread. NNIS prevention practices, such as equipment cleaning may somewhat decrease the spread of NNIS from these sites. However, the vast quantities of seed produced by NNIS makes it extremely likely that it will spread to new areas of the Forest. As it will under all alternatives, non-native invasive plant education will continue, and this may also have some affect on reducing future infestations. Overall, without treatment actions, these NNIS sites will expand and spread to other areas of the Forest.

Cumulative Effects to NNIS species

Under Alternative 1, none of the 710 sites shown on the map in Appendix B will receive treatments to control NNIS. This represents 55% of all the documented NNIS sites on the Forest (65% of documented acres). Thus, more than half of NNIS sites will persist untreated, and will continue to spread, providing a source of seed which may create new infestations.

Direct and Indirect Effects to Native Plant Communities

None of the sites on the map in Appendix B will be treated in this alternative, allowing those non-native invasive plants to persist and probably spread. Native plant communities at those sites will likely decline (Horsley and Marquis 1982, Swearington 2004, National Invasive Species Council 2001). NNIS reduce diversity in natural communities primarily because they occupy space taken by native community components and are often able to out-compete native species for resources. Small structural or functional changes in plant communities caused by NNIS can have large impacts on natural ecosystems. Failure to successfully control NNIS will result in continued infestation thereby decreasing diversity and abundance of native species and plant communities.

Cumulative Effects to Native Plant Communities

Since none of the proposed NNIS control actions will occur under Alternative 1 because most NNIS locations on private lands are currently not being controlled, the failure to control NNIS on the Chequamegon-Nicolet National Forest could indirectly result in increasing spread of NNIS throughout northern Wisconsin, with adverse impacts on native plant communities.

4.2.2 Alternative 2 (proposed action)

Direct and Indirect Effects to NNIS species

Non-native invasive plant sites will are likely to be contained (prevented from spreading) under this alternative. Many of these sites will be completely eradicated, if treated soon. Some NNIS sites, such as spotted knapweed, may persist for several years despite treatment. The treatment actions in the proposed action are expected to result in a substantial reduction of NNIS at the sites shown on the map in Appendix B. Because these sites represent more than one half of all the documented NNIS sites (and acreage) on the Forest, this should further have the effect of reducing NNIS infestation and spread across the entire Forest.

Cumulative Effects to NNIS species

The treatment actions in the proposed action are expected to result in a substantial reduction of NNIS at the sites shown on the map in Appendix B. Because these sites represent more than one half of all the documented NNIS sites (and acreage) on the Forest, this will lead to a major reduction in NNIS infestation and spread across the entire Forest. It further reduces the likelihood that NNIS will be spread to currently un-infested areas on the Forest and across Northern Wisconsin. This alternative will contribute to NNIS control efforts by adjacent landowners such as the Ottawa National Forest, Great Lakes Indian Fish & Wildlife Commission, and Flambeau River State Forests. Actions under this alternative will increase the effectiveness of NNIS control and containment in across Northern Wisconsin.

Direct and Indirect effects to Native Plant Communities

This alternative employs mechanical, chemical, and biological control methods to eradicate or contain NNIS. All of these actions can have a negative impact on native plant communities. However, all control actions will follow the project design criteria listed in Chapter 2, which will greatly minimize the unintentional effects on native plants. Some project design criteria are specific to a particular practice. One criterion, "all treatments will be planned to minimize the undesired impacts on native vegetation", ensures that native vegetation will be a key factor in treatment planning.

Manual/mechanical control: Most of the proposed mechanical treatments are highly selective, with very little potential to harm adjacent non-target plants. These include hand-cutting, hand-pulling, or root-stabbing. These practices will be selected in areas where non-target plants are present. In addition, using operators who are trained to distinguish between NNIS and native species further reduces the likelihood of negative impacts to non-target plants. This is particularly true in areas where rare species are known. This combination of highly selective techniques and trained operators should greatly reduce the impacts to non-target plants.

Other mechanical actions are less selective. Mowing is one such method. Mowing may reduce the vigor and reproductive ability of native plant species. In this proposal, mowing is limited to those highly-disturbed areas such as road-sides because it disturbs most of the vegetation in the treated area. Although mowing can be timed in such a way that it favors native or desired plants, and discourages NNIS plants, mowing is generally detrimental to non-target plants. Limiting this practice to road-sides (project design criteria) and targeting the treatment to the infested areas will reduce this impact . In addition, many of these sites are already mowed as part of normal road-maintenance programs. Scorching (with a propane weed torch) is another largely non-selective method that has the potential to impact non-target plants. For this reason, this activity will be conducted only very early or very late in the growing season when non-target plants are dormant (project design criteria).

Overall the negative effects of manual/mechanical control on non-target plants will be minimized by project design criteria. Further, these impacts are generally outweighed by the highly beneficial effect to the native plant community as a result of reducing NNIS.

Chemical control: All of the herbicides proposed in this alternative are capable of killing or injuring non-target plants. Five factors can greatly influence the degree to which this may occur: 1) application

method, 2) application conditions, 3) season of application, 4) choice of herbicide (based on selectivity), and 5) operator training.

1) In this alternative, herbicide will be applied by hand through one of several methods. Some methods are very direct; the operator is able to selectively and directly apply herbicide to the target plants. These methods include 1) cut-stump or basal bark of woody shrubs, and 2) the wand-applicator method which directly wipes herbicide on targeted foliage. Because contact with non-target plants is highly unlikely, neither method will have undesired affects on non-target plants. The foliar spray method is slightly less direct and selective. This method, which typically uses a hand-held or backpack apparatus, directs a narrow spray of herbicide on the target plant with minimal drift. With this method, there is some possibility that non-target plants can be sprayed with herbicide. This method is prescribed at sites which are highly disturbed with little native vegetation (such as roadsides), or will be used only when non-target plants are dormant (early spring or late fall) (project design criteria).

2) Weather conditions can affect the potential for herbicides to affect non-target plants. Windy days can cause spray drift, and heavy rainfall can wash herbicides off treated plants and carry them in surface runoff to non-target plants. To minimize this risk, herbicide application will only occur when wind speeds are less than 10 mph to reduce herbicide drift , and when heavy rain events are not anticipated (both are project design criteria)

3) Applying herbicide during the growing season can kill or injure non-target plants if the application method is not highly selective. Project design criteria limit foliar herbicide spray in areas which are not heavily disturbed to times of the year when native plants are dormant, such as very early spring or late in the fall. At those times, the native plants are not susceptible to the herbicide, so no damage can occur. For example, garlic mustard is typically green and growing very early in the spring while the native plants are dormant and largely still below-ground. Spraying the garlic mustard with the foliar spray at that time of the year will kill the garlic mustard plants while leaving the native plants unaffected.

4) Some herbicides are more selective than others. For example, clopyralid is the most selective herbicide (among those proposed in this alternative), affecting only plants in the sunflower (*Asteraceae*,) buckwheat (*Polygonaceae*), and pea (*Fabaceae*) families. Triclopyr is a broadleaf-specific herbicide; it has little effect on grasses and other monocots. Therefore, application of these herbicides will leave more of the non-target, native vegetation unaffected than a non-specific herbicide such as glyphosate.

5) All herbicide applicators will be licensed or supervised by licensed pesticide applicators. At NNIS sites where herbicide treatment must occur during the growing season, applicators are required to be able to visually distinguish the target NNIS from non-target species (project design criteria).

The application of project design criteria, in combination with the five factors described above, will greatly minimize the effects of control actions on non-target, native vegetation. Although herbicide use may kill some individual native, non-target plants, the overall effect to the native plant community will be positive because it will prevent the loss of species diversity due to uncontrolled NNIS spread.

Biological Control: In this alternative, a total of 49 acres are proposed for treatment with biological control agents (twenty acres of leafy spurge, and twenty-nine acres of purple loosestrife).

Three insects are proposed as bio-controls for purple loosestrife. These *Galerucella* beetles feed preferentially on purple loosestrife, but also feed on other members of the genus *Lythrum* (both native and non-native), the related swamp loosestrife (*Decodon verticillatus,* known to occur on the CNNF*),* sandbar willow (*Salix interior*, known to occur on the CNNF), and several plants in the rose family. Pre-introduction studies of *Galerucella calmariensis* and *G. pusilla* determined that normal feeding, egg laying, and development of the beetle was confined to purple loosestrife, but some feeding by occurred on member of the Lythraceae family when no other choice was available (Blossey et al. 1994). A post-release study in Michigan which further tested 40 species in 14 previously untested families supported the pre-release study, but did note some transient feeding on selected non-targets (Kaufman and Landis 2000). Minor damage was observed on five members of the Roseaceae family (*Fragaria x. ananassa, Filipendula rubra, Rosa setigera, Alchemilla mollis,* and *Rubus idaeus*.) (Kaufman and Landis 2000). Another study noted feeding by *Galerucella* beetles for very brief periods on red osier dogwood (*Cornus*

stolonifera) and speckled alder (Alnus rugosa), but no non-target species were substantially impacted during these periods (Albright et al. 2004). Damage to all non-target species has been shown in additional studies to be minor (Schooler et al 2003, Illinois Natural History Survey 1999, and Tewksbury 2004). This minor feeding is unlikely to result in a decline of any non-target species. Potential negative impacts to non-target plants caused by the *Galerucella* beetles is far outweighed by the positive benefits of reducing purple loosestrife on the Chequamegon-Nicolet National Forest.

All three of these beetles were previously released CNNF in 1997 on the Park Falls unit of the CNNF (at the outlet of Round Lake into the South Fork Flambeau River). Monitoring shows that the beetles are still present and the purple loosestrife has been effectively controlled (CNNF Purple Loosestrife Monitoring Project, 1997-2004). Overall in Wisconsin, 6-8 million beetles have been released in Wisconsin (WDNR News, 2004). In addition, releases have occurred throughout Michigan since 1994 (Michigan Sea Grant 2003).

Because repeated studies have shown only minor damage to non-target native plants, and because the *Galurucella* beetles already occur on the Forest and at many other release sites in Wisconsin and Michigan, the proposed action has little potential for adverse effects to non-target vegetation.

Two flea beetles of the genus *Aphthona* are proposed as biological control agents for control of leafy spurge, *Aphthona lacerosa* and *Aphthona nigriscutis.* These species were released in the United States in 1985 (Nowierski and Pemberton 2002). During the required quarantine period, these *Aphthona* beetles were tested for potential to damage to crops or economically important plants; none were found (USDA Team Leafy Spurge 2003). During this period, the *Aphthona* beetles were determined to feed only on a narrow range of host plants, specifically those in the subgenus *Escula* of the genus *Euphorbia* (USDA Team Leafy Spurge; Hansen 2004). In the Wyoming, leaf feeding of a native euphorbia (*E. robusta*) by *Aphthona nigriscutis* was reported at one leafy spurge site. However, the native plant was actually increasing at the site due to the beetle's control of leafy spurge (Nowierski and Pemberton 2002). No feeding by *A. lacerosa* has yet been documented under field conditions (Hansen 2004). There are no native members of the subgenus *Escula* in northern Wisconsin. Some members of this subgenus do occur in far sourthern Wisconsin, including *Euphorbia cummutata* and *E. obtusa*. Both of these plants are considered species of special concern, but neither are found in or near the CNNF (they are both are restricted to the southern border of Wisconsin where the beetles are already well established). There are a few native members of the *Euphorbia* genus (though, not in the Escula subgenus) that occur in northern Wisconsin, and could potentially be hosts for beetles. These include *E. corollata* (flowering spurge), *E. glyptosperma* (ridge-seeded spurge), and *E. nutans* (eye-bane, found in Oconto County). Again, there is little evidence to suggest that beetles would feed upon these species, but the risk does exist. However, as was the case in Wyoming these species may actually increase overall due to the control of leafy spurge, particularly *E. corollata* (flowering spurge) which is known to co-occur with leafy spurge on the CNNF in at least one location.

Releases of Aphthona beetles in Wisconsin have been made in many locations including areas adjacent to the CNNF Forest boundary. Most recently, these flea beetles were released by a cooperative weed control organization near Washburn, Wisconsin, very near the Washburn District of the CNNF. The Great Divide Ranger District of the CNNF recently approved the release of flea beetles at three leafy spurge sites on Hwy GG in Ashland County (USDA 2003). The Ottawa National Forest recently approved the release of the beetles on their Forest in order to control leafy spurge.

The biological control agents proposed for release in this alternative have been very carefully selected, studied, and screened by APHIS. These insects, which are already present on the Forest or immediately adjacent to the Forest, have a very low potential for adverse effects to non-target plants.

Overall, the control actions in this alternative, guided by project design criteria and integrated weed management methods, will have minimal negative effects on non-target native species. The 710 sites proposed for treatment in this alternative represent only 0.06% of the Forest, so any impacts to native plants at these sites would not affect the species abundance, distribution, or population viability on the CNNF. Further, although there may be negative impacts to individual native plants, the overall effect to the native plant community is highly beneficial due to the reduction in NNIS.

Cumulative Effects to Native Plant Communities

The project design criteria, application method, application conditions, season of application, choice of herbicide (based on selectivity), and operator training will be carefully controlled in order to reduce any deleterious effects on non-target plants. Because herbicide impact on non-target plants and plant communities is expected to be relatively small, herbicide treatments will contribute only a small adverse incremental effect when combined with impacts of other past, present and reasonably foreseeable future activities described in Appendix E. Therefore, herbicide use in Alternative 2 is not expected to result in adverse cumulative effects to non-target plants.

The effects from manual/mechanical control activities on non-target plants and plant communities is expected to be minimal, and thus will have little or no incremental effect when combined with the impacts of other past, present, and reasonably foreseeable future activities described in Appendix E.

The effects of biological control agents on non-target species are also considered to be minimal in this alternative and would therefore have little or no incremental effect when combined with the impacts of other past, present, and reasonably foreseeable future activities.

Although non-target native plants could be affected by the control activities in this alternative, there is a far greater potential for loss of these species and their habitats if no treatment occurs and NNIS continue to spread.

4.2.3 Alternative 3

Direct and Indirect Effects to NNIS species (site-specific):

Because Alternative 3 is the same as Alternative 2, with the exception that biological control agents will not be released, the effects to NNIS species are the same for all but two sites.

South Fork of the Flambeau River purple loosestrife site:

In this alternative, no additional biological agents will be released at the South Fork of the Flambeau River purple loosestrife site on Medford-Park Falls Ranger District. Biological control of purple loosestrife has been demonstrated to be effective. In Michigan, studies have shown that Galerucella beetles released in 1994 caused 100% defoliation by the year 2000 and reduced purple loosestrife stem height by 73 to 85% (Michigan Sea Grant 2003). At a the Round Lake purple loosestrife site, just north of the proposed South Fork site, the Galerucella beetles proved to be quite effective. In 1997, at the time of the beetle release, this site was estimated to contain between 500 and 1000 flowering plants; no flowering purple loosestrife plants were noted in 2004 (CNNF Purple Loosestrife Monitoring Project, 1997-2004). See photo 4.1 taken at this site in 2002.

Photo 4.1: Dead purple loosestrife stalks (previous year's growth) photo taken at Round Lake on the Park Falls District in 2002 (headwaters of the South Fork Flambeau River), four years following the release of *Galerucella* beetles (dead stalks are in the center of the picture).

The South Fork of the Flambeau River is a long, linear, patchily-distributed area infested with purple loosestrife (totaling 29 acres). Under this alternative, biological control agents will **not** be released. This site is too large to effectively treat with manual control methods. Thus, glyphosate herbicide will be applied instead. Control of such a large patch will require many successive years of herbicide application. The herbicide treatment may take longer to control the loosestrife, as compared to biocontrol agents (Albright et al 2004).

Because the South Fork purple loosestrife infestation is within 10 miles of the Round Lake release site, it is possible that the *Galerucella* beetles will eventually disperse to the South Fork site. One study in New York found *Galerucella* beetles dispersed to two new loosestrife stands, moving distances of 0.4 miles and 5.6 miles. There is no indication that the beetles have yet dispersed to the S.F. Flambeau River site.

Overall, the likelihood of control of purple loosestrife along the South Fork of the Flambeau River is much reduced without the aid of *Galerucella* beetles. While, there is a good chance that the beetles will eventually invade this site, it is uncertain when that might happen.

Thunder Mountain Barrens Leafy Spurge Site:

The Thunder Mountain Barrens leafy spurge site (Lakewood-Laona Ranger District), is a unique pine/oak barrens ecosystem. Leafy spurge now occupies at least 20 acres at this site. Widespread application of herbicide is not possible due to the presence of an RFSS plant (Missouri rockcress) and other native plants unique to the Barrens ecosystem. Herbicide (Imazapic) will be applied, by hand, to individual leafy spurge stems. However, due the large size (20 acres) and heavy leafy spurge infestation, this method may prove highly impractical and inefficient. Although Imazapic is considered to be highly effective in treating leafy spurge, the need to individually apply the herbicide to every individual stem is unlikely to be effective since many plants may be missed. Thus, the likelihood of controlling leafy spurge at the Thunder Mountain Barrens site under this alternative is poor. However, the herbicide treatments may reduce the spread of leafy spurge.

The Cayuga Vegetation Management Project decision approved the release of leafy spurge biocontrol beetles at a site on Hwy GG in Ashland County on the Great Divide Ranger District (CNNF). The release was approved in 2004 (USDA 2003). This release site is such a long distance away from the Thunder Mountain Barrens site that it is unlikely that the biocontrol beetles will spread there in the near future.

Cumulative Effects to NNIS Species

Because Alternative 3 is the same as Alternative 2, with the exception of biological control agents at 2 locations) the cumulative effects to NNIS species are similar.

Direct and Indirect Effects to Native Plant Communities

Alternative 3 is the same as the proposed action (Alternative 2), with the exception that biological control methods will not be used. Thus, none of the risks to non-target native plants from biological control agents described under Alternative 2 are applicable. Although biocontrol agents would not be released under this alternative, they are still highly likely to move into the Forest (as is the case for the leafy spurge controlling beetles which occur adjacent to the Forest), or continue to spread across the Forest (as is the case for the purple loosestrife controlling *Galerucella* beetles which already occur on the Forest).

The South Fork of the Flambeau River purple loosestrife site is too large for manual control and would require repeated herbicide treatment to eradicate the loosestrife. All project design criteria will apply and efforts will be made to minimize the effects on non-target native plants. However, there is a higher probability of non-target plants being damaged or killed by herbicide at the South Fork site, than in Alternative 2 which would instead use biocontrol agents.

Under this alternative, the Thunder Mountain Barrens leafy spurge site (20 acres) would not be treated with the biocontrol beetles. This site contains a rare, RFSS-listed plant species (*Arabis missouriensis* or Missouri rockcress), which is highly intermixed with the leafy spurge. In addition, many other native plants, unique to the Barrens ecosystem are found at this site, therefore widespread application of herbicide is not possible at this site. Mechanical methods such as mowing are also not possible due to probable impacts to rare and native plants. Hand pulling at this site has proven to be unsuccessful at controlling its spread. In this alternative, herbicide will be applied, by hand, to individual leafy spurge stems. Because of the density of leafy spurge at this site, this method is unlikely to be highly effective as many stems may be missed, and there is a greater change of unintentional application of herbicide to non-targets. Thus, the risks to non-target native plants are higher in this alternative. This is due, in part,

to the reduced likelihood of eradication of leafy spurge, and to the increased risk of damage to non-targets from the use of herbicides in an area highly intermixed with native plants.

Cumulative Effects to Native Plant Communities

Because alternative 3 is the same as alternative 2 with the exception of biological control agents, the cumulative effects to native plant communities are the largely the same.

4.3 Effects to Aquatic Systems

The detail of the Aquatics Specialist Report regarding soils & hydrology, water quality and aquatic organisms is found in PF doc 4.D-01. Potential effects of the different alternatives will be determined by herbicide persistence in the soil (half-life) and movement through the soil, toxicity to aquatic species, and the potential for contamination of ground and surface water. Potential effects will also be determined by compliance with the Clean Water Act and all applicable state and local regulations.

4.3.1 Alternative 1

Direct and Indirect effects to Soils and Hydrology (Alt. 1)

Taking no action to control NNIS infestations would not result in any direct or immediate adverse impacts to soils or geological features. However, NNIS infestations can adversely impact soils by removing nutrients and increasing soil erosion (Olson 1999). Invasion of wetlands by dense stands of purple loosestrife can alter hydrological flow patterns. Alleopathic chemicals released by certain NNIS, such as exotic buckthorns or spotted knapweed, into the soil could inhibit the establishment of native plants. Therefore, failure to control NNIS infestations on the CNNF could eventually result in adverse impacts to these resources.

Direct and Indirect effects to Water Quality (Alt. 1)

Taking no action to control NNIS infestations would have no potential direct adverse impacts on water quality. However, effective control of NNIS plants, especially species such as purple loosestrife that form dense uniform stands in shallow waters or wetlands, could help improve water quality in the long term. Although monocultures can stabilize soils and sediments, mixed stands of vegetation are generally less susceptible to rapid die-off that could suddenly leave large areas of unstable soil or sediment until new vegetation can reestablish. Therefore, taking no action could indirectly result in some adverse long-term negative effects on water quality.

Direct and Indirect effects to Aquatic Organisms (Alt. 1)

The No-action Alternative would not have any direct effect on aquatic organisms. However, purple loosestrife forms dense, single species stands in wetland and riparian habitat, thus degrading habitat for native aquatic organisms (WDNR 1999; USFWS, 1989). Without treatment of the purple loosestrife, habitat for native aquatic organisms would continue to be degraded. Herbicide treatment and biological control agents may be the only effective tools to control infestations of purple loosestrife on the CNNF.

Cumulative Effects (Alt. 1)

No adverse impacts would directly occur to soil and water resources or aquatic organisms as a result of taking no new action (Alternative 1); consequently, **Alternative 1 would not directly contribute to any cumulative effects to these resources.**

4.3.2 Alternative 2

Direct and Indirect effects to Soils and Hydrology (Alt 2)

Some ground disturbing activities associated with control methods such as hand pulling could temporarily increase the potential for soil erosion. Project design criteria call for areas of soil left bare of vegetation following treatment to be re-seeded with a mix of fast growing grasses or native plants recommended for soil stabilization and erosion control. These include native plants or annual cover crops intended to stabilize the soil until longer-lived native species re-colonize the site.

Because biological control and herbicides kill but do not physically remove plants and their root systems, their use would not increase the potential for soil erosion. The dead plants would be expected to offer short-term soil stabilization to protect against erosion until new plants re-establish naturally. Where control methods kill most of the standing vegetation, re-seeding as described above would help stabilize the soil and to prevent NNIS plants in the seed bank from re-establishing. Treating cut stumps of woody NNIS species such as exotic buckthorns and honeysuckles with herbicides would discourage re-sprouting without the soil disturbance required to physically grub the stumps out.

Spraying herbicides inevitably results in the short-term accumulation of herbicide residues in soil. Once in the soil, herbicides can migrate via gravity, leaching, and surface runoff to other soils, groundwater, or surface water. To determine the level of risk from accumulation of herbicide residues on soils and possible contamination of ground and surface water, factors such as persistence (measured in half-life), mobility, and mechanisms for degradation have been reviewed (Table 4.4). Factors influencing herbicide persistence include leaching potential, soil moisture content, amount of organic matter in the soil, micro-organisms present in the soil, and molecular binding of chemicals to organic and soil particles. Precipitation patterns following application also heavily influence potential effects to soil, and potential contamination of groundwater and surface water.

Table 4.4 Behavior of proposed herbicides in water (including toxicity data on fish and aquatic animals)

Herbicide	Solubility	Half Life in Water	Toxicity
Glyphosate	Rapidly dissipated through adsorption to suspended and bottom sediments.[1]	12 days to 10 weeks.[1]	Technical grade is moderately toxic to fish. A formulation is registered for aquatic use that is practically non-toxic to fish, aquatic invertebrates, and amphibians.[1] Does not bioaccumulate in fish.[3]
Imazapic	Soluble in water. Is not degraded hydrolytically in aqueous solutions.[1]	Rapidly degraded in sunlight, with a half-life of 1-2 days.[1]	Moderate toxicity to fish by itself. But, in an aqueous solution it is relatively safe for aquatic animals due to its rapid degradation. Not registered for use in aquatic systems.[1] According to other studies, imazapic has a low order of toxicity to fish and aquatic invertebrates with exposures of 100 mg/L unlikely to be associated with mortality or reproductive effects.[1] * It is rapidly excreted and does not bioaccumulate in animals.[1]
Triclopyr	Salt formulation is water-soluble. The ester formulation is insoluble in water.[1]	Salt formulation can degrade in sunlight with a half-life of several hours. The ester formulation takes longer to degrade.[1]	Ester formulation is extremely toxic to fish and aquatic invertebrates. Acid and salt formulation is slightly toxic to fish and aquatic invertebrates.[1] The hydrophobic nature of the ester formulation allows it to be readily absorbed through fish tissues where it is converted to triclopyr acid which can be accumulated to a toxic level. However, most authors have concluded that if applied properly, triclopyr would not be found in concentrations adequate to harm aquatic organisms.[1]
Clopyralid	Highly soluble in water and will not bind with particles in water column.[1]	8 to 40 days.[1]	Low toxicity to aquatic animals.[1] Does not bioaccumulate in fish tissues.[4]

[1]Tu et al., 2001a [3] USDA Forest Service Pacific Northwest Region, 2004. [4] USDA Forest Service, Unknown date, Pesticide Fact Sheet.

The persistence of a herbicide is defined as the length of time that residues from an application remain active in the soil. A concept known as half-life is commonly used to measure persistence. Half-life is the period of time it takes for 50 percent of an applied herbicide to degrade to relatively harmless components. With a half-life of several weeks or less, the herbicides proposed for use under this alternative have short persistence in the soil; some of the proposed herbicides have half-lives as short as a few days. Soil microbes readily degrade each of the proposed herbicides. More persistent herbicides

can offer longer suppression of invasive plants, including less re-establishment from existing seed in the soil, but they are not proposed for use on the CNNF because of their longer persistence in the soil and higher overall toxicity.

Soil mobility (movement through the soil) of the proposed herbicides is varied. Glyphosate and ester formulations of triclopyr bind rapidly to the soil. Clopyralid does not bind strongly to the soil and has a longer half life of 40 days in soil, and thus could leave longer lasting residues in the soil. However, as long the proposed herbicides are used as directed by label specifications and in accordance with the design criteria (and further outlined in Table 4.5 and Appendix F) no long-term impacts to soils or hydrologic resources are anticipated.

Table 4.5 Aquatic Guidelines for Herbicide Use on the CNNF

Herbicide	Use on aquatic Weeds and in Wetlands Allowed	Use on soils with a rapid or very rapid permeability and or a high water table allowed.[2]	Use Adjacent to Water Allowed
Glyphosate	Yes [1]	Yes	Yes [1]
Imazapic	No	Yes	No
Triclopyr	No	Yes	No[3]
Clopyralid	No	No	No

[1] Rodeo® is the only proposed formation of glyphosate labeled for aquatic use
[2] See table (Appendix F) for these locations
[3] Stump and/or basal bark treatment allowed with ester formation, no restrictions on acid and salt formations

Direct and Indirect effects to Water Quality (Alt. 2)

Physical and biological control methods would have little potential to directly or indirectly affect water quality. Mechanical work performed in aquatic or wetland settings could temporarily suspend sediment in the water. But considering the small areas that would be treated each year, effects would be brief and localized. Mowers and other vehicles would not be operated in wetlands.

Chemical control methods involving herbicides could expose soils and surface water to herbicides, even if applied following label directions. Herbicides that fall on soil during spray operations can leach into groundwater or be transported in surface runoff. However, the small areas proposed for treatment each year under this alternative would not allow for more than localized migration of small quantities of herbicides. Herbicides would be applied only by personnel supervised by a licensed pesticide applicator. Licensed pesticide applicators are trained to properly maintain application equipment to prevent leaks and to apply herbicide in a manner that minimizes drift. Furthermore, modern herbicides are designed to rapidly break down into inactive products in soils and water (see herbicide half life data in Table 4.4) and the discussion under soils above).

Should herbicides enter surface water, their concentration would quickly decline because of mixing and dilution, volatilization, and degradation by sunlight and microorganisms (Van Es 1990). Most of the herbicides proposed for use under Alternative 2 are of low toxicity to fish and aquatic invertebrate species and have been demonstrated to pose little toxicological risk to fish and wildlife when used at lower application rates typical for the Forest Service. However, some formulations of triclopyr are toxic to fish and aquatic invertebrates. Care would be taken during application to ensure that this herbicide does not enter aquatic resources.

Label direction would be followed to prevent or minimize any groundwater and surface water contamination from mobile chemicals. Herbicide treatment in riparian areas would follow label direction, specified design criteria, and the guidelines presented in Table 4.5 and Appendix F to protect aquatic resources. When herbicides are used according to label specifications, no substantial long-term impacts to groundwater or surface waters are expected.

Water quality in CNNF and Wisconsin remains good. However, some issues of special concern to the state include eutrophication, aquatic nuisance species, and mercury contamination from atmospheric deposition (WDNR 2003). None of the herbicides proposed to be used contain, or are formulated with, mercury. This

alternative is therefore not expected to have any appreciable effect on mercury concentrations in streams or lakes. This alternative would also help address some of the state's concerns with eutrophication and aquatic nuisance species.

Direct and Indirect effects to Aquatic Organisms (Alt 2)

Potential effects to aquatic organisms from NNIS weed management are largely associated with the herbicide application on and around streams, lakes, or wetlands. Contamination can occur through direct application to surface water, by herbicides leaching through the soils into groundwater, or by herbicides carried away in runoff to surface waters. Aerial spraying has the greatest potential to expose aquatic organisms to contaminants. This method is not proposed under this analysis. Herbicides from ground-based equipment may also enter streams, but risk of contamination is greatly reduced because application occurs more slowly and applicators are able to recognize problems and adjust application techniques. It is important to note that most of the herbicides would be absorbed into the plant with ground application. However, if herbicide residues originating from ground application reach stream channels or wetlands, it is most likely through surface runoff. The potential for surface runoff and impacts to groundwater is dependent on the behavior of the herbicides in soil. The mechanisms of degradation, persistence, and mobility in the soil are explored in the soils and hydrology effects analysis above. These properties directly influence the possibility of herbicide residues leaching into groundwater or surface waters.

Surfactants used in some formulations of glyphosate can be toxic to fish and aquatic species. Therefore we would use Rodeo® near open water. This aquatic formulation of glyphosate is practically non-toxic to fish and aquatic invertebrates. Purple loosestrife, reed canary grass, and other wetland species would only be treated with this aquatic formulation of glyphosate. Less toxic formulations such as Rodeo® result in hazard quotients that do not approach a level of concern for any species. (SERA 2003a). A large spill of Rodeo® in water can, however, cause oxygen depletion from decomposition of dead plants, leading to fish suffocation (Dow Agrosciences 2002)

Most of the herbicides proposed for use under Alternative 2 are of low toxicity to fish and aquatic invertebrate species and have been demonstrated to pose little toxicological risk to fish and wildlife when used at lower application rates typical for the Forest Service (see Table 4.4). However, some formulations of triclopyr and glyphosate are toxic to fish and aquatic invertebrates. Care would be taken during application to ensure that these herbicides do not enter aquatic habitats.

Summary of Direct and Indirect Effects Alternative 2

Based on the data presented in Table 4.4, the soil and hydrology analysis in this section, and on the guidelines listed in Table 4.5 and Appendix F, it is unlikely that there would be a measurable effect on the water quality of the streams, lakes or wetlands on CNNF, or to aquatic organisms within these water bodies. It is highly unlikely that any herbicide would be detected in surface water as a result of these NNIS treatments, because of the very small areas to be treated and low levels of use. Should herbicide enter the water, its concentration would quickly decline because of mixing and dilution, volatilization, and degradation by sunlight and microorganisms.

With responsible application procedures and mitigation measures listed in Table 4.5 and Appendix F, it is highly unlikely that there would be an effect on the aquatic resources on the CNNF from the implementation of Alternative 2. Because of the very small area to be treated (<300 acres annually), and ground application techniques it is highly unlikely that any of the proposed herbicide chemicals would be measurable in surface or ground water as a result of NNIS weed treatment on the CNNF.

Aquatic organisms are expected to benefit from the use of biological control agents. The proposed biological control agents have been demonstrated through research to adversely affect only the targeted NNIS species and other very closely related taxa. It is therefore unlikely that native plants upon which aquatic organisms depend for food or cover would be adversely affected. Introductions of biological control agents targeting purple loosestrife would be expected to reduce dominance by purple loosestrife and open infested areas to greater dominance by native plants of greater value as food and cover for aquatic organisms.

Cumulative Effects to Soils & hydrology, Water quality, and Aquatic organisms (Alt. 2)

Physical and biological control methods proposed as part of Alternative 2 might result in some relatively short-term effects such as increased soil erosion. Existing water quality issues include mercury in lakes from aerial deposition and sedimentation in streams caused by erosion. However, the proposed NNIS control activities from Alternative 2 would not affect sedimentation or mercury levels in streams and lakes. As the impacts from the proposed control activities are essentially negligible, they would contribute little or no incremental effect when combined with impacts of other past, present, and reasonably foreseeable future activities. Consequently, they are not expected to contribute substantially to any measurable increase in cumulative degradation to soil or hydrologic resources.

With respect to chemical controls described in Alternative 2, areas that would be affected by herbicide treatment are relatively small in size. Only herbicides registered for aquatic use would be used over open water. The proposed herbicides are expected to degrade quickly in soil or water, within weeks or several months, by natural processes (Tables 4.4) All herbicides chosen exhibit low toxicity to fish and aquatic invertebrates, and do not bioaccumulate. As the impacts from these activities are essentially small to negligible, they would have little or no incremental effect when combined with the impacts of other past, present, and reasonably foreseeable future activities outlined in Appendix E. Therefore, application of herbicides is not expected to result in any appreciable increase in cumulative herbicide concentrations to potentially affected soil and water resources.

4.3.3 Alternative 3

Direct and Indirect effects to Soils and Hydrology (Alt 3)

Because biological control would not be used under this alternative, greater use of physical and chemical control methods would be needed to achieve satisfactory control of some NNIS infestations. Infestation sites of purple loosestrife and leafy spurge that could be effectively treated by biological control agents under Alternative 2 would be treated using physical or chemical methods only under Alternative 3. Temporary patches of soil disturbance and exposure of soils to herbicides could occur at those sites under Alternative 3, however, areas of exposed soils would be promptly seeded, thereby avoiding any substantial potential for erosion. Herbicides would be carefully directed at target plants following the design criteria outlined in Chapter 2 and Appendix F preventing substantial exposure of soils to herbicide spray streams. Thus, any increased use of physical or herbicide treatments resulting from the inability to use biological control would result in only minimal additional effects to soils.

Direct and Indirect effects to Water Quality (Alt. 3)

Because of the greater use of physical and chemical control methods would be needed as noted earlier. This could result in a somewhat greater potential for sedimentation of waters or exposure of waters to herbicides, especially in wetland habitats infested by purple loosestrife. However, the design criteria outlined in Chapter 2 would ensure that wetland and aquatic habitats are not substantially exposed to sedimentation or herbicide spray streams.

Direct and Indirect effects to Aquatic Organisms (Alt. 3)

Impacts from physical and chemical control methods would generally be the same as those described for Alternative 2. While some areas that might be treated with biological control under Alternative 2 would instead be treated by physical methods or herbicides under Alternative 3, the affects on aquatic organism should still be minimal, as described for physical and chemical control methods for Alternative 2.

Cumulative Effects to Soils & hydrology, Water quality, and Aquatic organisms (Alt. 3):

Since the total number of acres treated and the number of chemicals and physical methods would be essentially the same as Alternative 2, the cumulative impacts on soil, water quality, or aquatic organisms are also anticipated to be similar to those described for Alternative 2. Because effects of Alternative 3 would be

the same as Alternative 2 (with the exception of no biological controls), the cumulative effects would be similar to those described under Alternative 2.

4.4 Effects to Threatened, Endangered & Sensitive Species

In the Biological Evaluation for this project (PF 4.E-01) the effects of the proposed alternatives were analyzed for five Federally Threatened or Endangered Species. The affected environment for these analyses included the entire Chequamegon-Nicolet National Forest because NNIS locations are scattered across the Forest. Weed treatment actions on lands of other ownership were considered in the analyses but such information is limited. Due to the dispersion of the treatments and their limited spatial extent, effects to areas outside of the Forest boundary are not anticipated.

The analyses determined that there will be no effect to the Gray Wolf, Canada Lynx, or Bald Eagle no matter which alternative is chosen because the proposed treatments would not directly or indirectly affect the species or their habitat. Analysis for Fassett's Locoweed determined that the No Action Alternative may affect/is likely to adversely affect the existing populations of this species and its critical habitat because non-native invasive plants currently pose a threat to these populations and, in the absence of action, Fassett's Locoweed may lose some of its habitat to Canada Thistle. Analysis of Alternatives 2 and 3 determined that these control actions may affect/may have a beneficial affect to Fassett's Locoweed by reducing the competition that Fassett's Locoweed faces in its habitat and by keeping suitable habitat for Fassett's Locoweed as close to a weed-free condition as possible. Finally, effects to the American burying beetle were not analyzed in detail because the species, although known from Wisconsin, has not been documented to occur on the Chequamegon-Nicolet National Forest.

The effects of the Alternatives were analyzed for 27 animal Regional Forester's Sensitive Species (RFSS) and 54 plant RFSS; six species from each group were analyzed in detail. Detailed analysis was warranted in these cases because 1) the species is found within or in close proximity to a site proposed for treatment or 2) the NNIS site may provide habitat to the RFSS species, or 3) the biology of the RFSS or NNIS are related such that one depends on or is limited by the other. No effects are anticipated to those species not analyzed in detail. The effects to an additional 4 animal and 12 plant species that are listed as Likely-to-Occur Regional Forester Sensitive Species (LRFSS) were analyzed, only one of which was analyzed in detail.

For the species for which effects of the proposed treatments were analyzed in detail, it was determined that for Alternative 1 (No Action) two plant species (Missouri Rockcress and Butternut) and one animal (West Virginia White) may have individuals that are affected but this is unlikely to lead to a loss of viability or causing a trend toward federal listing. It was also determined that for one plant species (Alpine milk vetch) individuals may be affected and it is likely to lead to a loss of viability or trend toward federal listing. For all other the RFSS and LRFSS, a determination of "No Effect" was made.

For Alternatives 2 and 3, the determinations were identical. Analysis determined that two plant species (Missouri Rockcress and Alpine Milk Vetch) may have affected individuals but that the proposed action is unlikely to lead to a loss of viability causing a trend toward federal listing. In addition, it was determined that either Alternative 2 and 3 may have a beneficial effect on the West Virginia White Butterfly. For all other the RFSS and LRFSS, a determination of "No Effect" was made.

A summary of the analysis for likely affected species is provided below. Please refer to the Biological Evaluation (PF 4.E-01) for more information on these and other species. A summary of the determinations for Federally listed species and RFSS species analyzed in detail is provided in Tables 4.6 to 4.9. Determinations for all of the species analyzed did not differ between Alternatives 2 and 3 therefore the determinations for those two alternatives are displayed together (Tables 4.7 and 4.9).

Table 4.6. Federally listed species - Determination of Effects Summary for **Alternative 1** (No Action)

Species evaluated	May affect/ beneficial effect	No effect	Not likely to adversely affect	Likely to adversely affect
Fassett's locoweed				X

Timber wolf		**X**		
Bald eagle		**X**		
Canada lynx		**X**		

Table 4.7. Federally listed species - Determination of Effects Summary for **Alternatives 2 and 3**

Species evaluated	May affect/ beneficial effect	No effect	Not likely to adversely affect	Likely to adversely affect
Fassett's locoweed	**X**			
Timber wolf		**X**		
Bald eagle		**X**		
Canada lynx		**X**		

Table 4.8. RFSS and LRFSS - Determination of Effects Summary for **Alternative 1** (No Action)

	No impact	Beneficial impact	May impact indiv., not likely to cause trend to listing*	May impact indiv., likely to cause trend to listing*
Alpine Milk Vetch				**X**
Missouri Rockcress			**X**	
Butternut			**X**	
Large-leaved Avens	**X**			
Canada Mountain Ricegrass	**X**			
Ginseng	**X**			
Wood Turtle	**X**			
Northern Blue Butterfly	**X**			
Chryxus Arctic Butterfly	**X**			
West Virginia White Butterfly			**X**	
Tawny Crescent Butterfly	**X**			
Henry's Elfin Butterfly	**X**			
Likely to occur				
Auricled Twayblade	**X**			

* Complete determination statements: "May impact individuals but not likely to cause a trend toward federal listing or loss of viability." "May impact individuals and likely to result in a trend toward federal listing or loss of viability."

Table 4.9. RFSS and LRFSS - Determination of Effects Summary for **Alternatives 2 and 3**

	No impact	Beneficial impact	May impact indiv., not likely to cause trend to listing*	May impact indiv., likely to cause trend to listing*
Alpine Milk Vetch			**X**	
Missouri Rockcress			**X**	
Butternut	**X**			
Large-leaved Avens	**X**			
Canada Mountain Ricegrass	**X**			
Ginseng	**X**			
Wood Turtle	**X**			
Northern Blue Butterfly	**X**			
Chryxus Arctic Butterfly	**X**			
West Virginia White Butterfly		**X**		
Tawny Crescent Butterfly	**X**			
Henry's Elfin Butterfly	**X**			
Likely to occur				
Auricled Twayblade	**X**			

4.4.1 Effects to Threatened and Endangered Species

Fassett's Locoweed

Fassett's Locoweed, a member of the legume family Fabaceae, is an herbaceous perennial that appears to reproduce entirely by seed as there is no evidence of vegetative reproduction. Populations of this species appear to persist indefinitely in a zone above the high water line along landlocked lakes. Since the water level in these lakes may fluctuate greatly from one year to the next, Fassett's locoweed is

present above ground only in this upper zone during times of high water. This species is found on open shoreline and, to a lesser extent, on higher ground under the partial shade of adjacent vegetation. It grows on gentle, sand-gravel slopes and is absent from flat, low mucky shorelines. Because of periodic fluctuations in lake levels, the amount of exposed, open shoreline varies, from being virtually nonexistent during times of high water, to about 30m wide when the water level is low.

Fassett's locoweed is endemic to Wisconsin and was only known from the shores of ten lakes in Wisconsin; seven of those lakes occur in Waushara County, two from Bayfield County and one from Portage County; the two from Bayfield county both occur within the CNNF boundary. Currently of those ten occurrences, three sites no longer support populations; this includes the loss of one known population from Bayfield County.

Suitable habitat for this species within the Forest boundary is limited to the shoreline of groundwater seepage lakes on the Washburn Ranger District. Surveys have indicated that fourteen of fifty evaluated sites have moderate potential with the remaining sites having low potential. The Forest's only documented occurrence of Fassett's locoweed is within the area of influence of a proposed treatment. Annual surveys and monitoring of this population indicate that the species occurs with an increasing population of Canada thistle.

General threats to the survival of Fassett's locoweed state-wide include modification and destruction of habitat. In addition to these threats and perhaps the greatest long-term threat to the species on CNNF land is competition from non-native or weedy plant species that readily infest exposed shoreline and easily out-compete many other native plant species. According to Wisconsin's State botanist the majority of the known locoweed sites are threatened by the encroachment of spotted knapweed and Canada thistle among other weedy species into locoweed habitat. Threats specific to the Mountain and Pigeon Lake area include encroachment of Canada thistle and a bulrush (*Schoenoplectus tabernaemontani*) into locoweed habitat. Because of the aggressive life history traits of Canada thistle, this species has the potential to negatively impact native species diversity at these two sites.

A recovery plan for Fassett's locoweed was developed in 1991 and the following year a Pesticide Management Plan recommended by the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) Endangered Species Program was instituted to complement the recovery plan. Objectives of the 1991recovery plan for Fassett's locoweed include "management to maintain appropriate habitat, including such activities as fencing populations in certain areas or removing invading, nonnative species". The Pesticide Management Plan restricts the type of activities for controlling or removing nonnative species in locoweed recovery efforts.

If the **No Action Alternative** is selected Fassett's locoweed would have an extremely difficult time competing with the aggressive and invasive characteristics of Canada thistle. Locoweed currently occupies 4 acres of its suitable habitat around Mountain Lake. If left uncontrolled, conservative estimates indicate that in 6 years Canada thistle could inhabit 2 percent of occupied locoweed habitat at Mountain Lake and could continue to expand throughout locoweed habitat. The long term indirect effect of the presence of Canada thistle to locoweed populations and habitat may lead to a decrease in population numbers and viability of Fassett's locoweed on Forest Service lands.

There are seven sites in Wisconsin that have known populations of Fassett's locoweed. These sites are the only known sites in the nation and the world, thus it is designated imperiled nation-wide. Many of these sites are located on privately owned lands; some of which have protection agreements negotiated by Wisconsin Department of Natural Resources but are not necessarily transferable to subsequent owners. There is only one site on Chequamegon-Nicolet National Forest and is the only known site in northern Wisconsin. The locoweed population at Pigeon Lake has not been seen for over a decade, but the Mountain Lake population consistently is the second or third largest in the state, depending on the year.

The small number of Canada thistle plants at Mountain and Pigeon Lake may not present a significant problem to locoweed viability in the short-term. However, the longer Canada thistle is left uncontrolled the higher the risk that locoweed populations and habitat will be compromised. Although the Mountain Lake locoweed population is relatively small (14 percent of the species' population), this population is the only

publicly owned and protected population in Wisconsin. The loss of the local locoweed population at the Mountain Lake may threaten its survival and viability nationally and globally.

Under **Alternative 2 and 3** approximately 0.04 acres of occupied and 4 acres of locoweed habitat are proposed to be treated. The 1992 Fassett's locoweed Pesticide Management Plan prohibits the use of herbicide within 15 feet of known populations, thus, 0.04 acres of occupied habitat will be treated by manual/mechanical methods (cutting, pulling, and root stabbing) only.

In terms of quality of habitat, cutting, pulling, and root stabbing of Canada thistle have the potential to be beneficial to locoweed habitat. Manual removal of Canada thistle within locoweed habitat will eventually decrease competition pressure. However, due to the proximity of Canada thistle to individuals in the locoweed population, the soil disturbance associated with pulling and root stabbing may have direct negative impacts.

To minimize these direct effects of the soil disturbing activities, the proposed project is designed to use hand cutting methods only. Cutting the thistle prior to seed dispersal will eventually deplete the food resources of the plant and will be an effective method of control without the soil disturbance associated with pulling or root stabbing. Although clipping is labor intensive and may take several years to be totally effective, this method will control the small thistle population at Mountain Lake while minimizing any direct impacts to the locoweed population. The manual removal of Canada thistle from the site will relieve competition pressure above and below ground.

In addition to the occupied habitat, approximately 4 acres of locoweed habitat will be treated with herbicides. Spot treatment of glyphosate is proposed for Canada thistle. Glyphosate is a non-selective herbicide that has little to no soil mobility and depending on the soil texture and organic matter content will not persist in the soil longer than 130 days. A focused application of glyphosate using a sponge, wick or glove application will minimize the potential for indirect impacts such as off-site drift to the locoweed population at Mountain Lake. Indirect impacts of off-site drift from the focused application of glyphosate on unoccupied locoweed habitat around Pigeon Lake would be negligible. Glyphosate readily binds to soil thus, potential run-off would be minimal and indirect effect to the locoweed population is not anticipated at either Mountain or Pigeon Lake.

The hand cutting and removal of Canada thistle from occupied locoweed habitat and focused application of glyphosate on Canada thistle in locoweed habitat will reduce competition pressure and be beneficial to locoweed populations in the long-term.

4.4.2 Effects to Regional Forester Sensitive Species

Alpine Milk Vetch

The alpine milk vetch is a perennial that belongs to the pea family and blooms in mid April and continues to fruit through August. The seeds of this species are too heavy to rely on wind for dispersal, thus proximity to the seed source may be an important factor in establishment of new populations indicated by the isolated populations in the Midwest. Common in the Rocky Mountains, it is locally rare in Wisconsin with only two known locations both occurring on the Washburn Ranger District on the CNNF.

Suitable habitat for this species is limited to the fluctuating shoreline of Mountain and Pigeon Lakes on the Washburn Ranger District. There is one documented occurrence of Alpine milk vetch within the area of influence of a proposed treatment. This occurrence coincides with Fassett's locoweed and the associated Canada thistle infestation as described in the above paragraphs.

Road development, forest cover alteration and disturbance associated with ATV use are significant threats to the species. In addition, habitat loss due to development of shoreline, mechanical damage, competition by non-native invasive plants and hydrologic changes also pose threats. To date the most significant threat to the two sites on the Chequamegon-Nicolet National Forest is the presence of Canada thistle. Because alpine milk vetch occurs with Fassett's locoweed, management decisions that are applied to the locoweed population are applicable to the alpine milk vetch population.

Alpine milk vetch co-exists with Fassett's locoweed populations thus, direct and indirect effects of the **No Action Alternative** will be similar to those described in the Fassett's locoweed analysis summarized above. The small number of Canada thistle present at the Mountain and Pigeon Lake sites may not

present a significant problem to alpine milk vetch viability in the short-term; however, the long-term impact from this invasive species may eventually lead to a decrease in its population and habitat state-wide. The longer Canada thistle is allowed to go uncontrolled the more difficult it will be to remove it from alpine milk vetch habitat. Because the only two known populations in Wisconsin are at risk from Canada thistle, the loss of these populations and habitat at Mountain and Pigeon Lake may affect the statewide viability of the species.

Because of the proximity of alpine milk vetch to Fassett's locoweed, direct and indirect effects from mechanical, manual and chemical control methods of Canada thistle under **Alternatives 2 or 3**, would be similar to those described in the Fassett's locoweed analysis summarized above. The removal of Canada thistle from alpine milk vetch populations and habitat may be beneficial to the species due to the reduction of competition pressure by the thistle.

Missouri Rockcress

Missouri Rockcress, a member of the mustard family (Brassicaceae), is a biennial species that blooms in early June. Fruits are produced in July into August. At this time little information regarding pollinators, predators, and other components of this species life history have been researched. In Wisconsin, Missouri rockcress has been documented in 16 counties, most of which occur in the northeastern portion of the state. There are several sites within the Forest boundary. It is known from one location on the Medford/Park Falls Ranger District in Taylor County, one location on the Great Divide District, and 33 locations on the Lakewood/Laona District in Oconto County

Suitable habitat for this species is most commonly found on the Lakewood and southeastern portions of the Laona landbases within the Forest. There are two exceptions, which occur in gravel pits on the Great Divide and Medford/Park Falls Districts. The encroachment of leafy spurge and spotted knapweed into rockcress habitat currently threatens the existing populations and suitable habitat on the Forest.

There are two documented occurrences of Missouri rockcress within the area of influence of a proposed treatment. Surveys indicate that spotted knapweed and leafy spurge infestations occur within Missouri rockcress populations on the Medford/Park Falls and Lakewood/Laona Districts respectively. Currently, spotted knapweed infests a four-acre gravel-pit and leafy spurge infests a twenty-acre site that is intermixed with Missouri rockcress.

If the **No Action Alternative** is selected, the continued expansion of leafy spurge and spotted knapweed into rockcress habitat would have a long term indirect effect on existing rockcress populations and habitat. There are 51 sites within 16 counties in Wisconsin that have occurrences of Missouri rockcress with the majority of these counties adjacent to the Forest. However, of the 51 sites it is unknown how large the rockcress populations are, whether these populations are still extant (76 percent of the records are over 20 years old), and whether these rockcress populations are experiencing competition pressure from invasive plants. In comparing state herbarium records, seven of the 16 counties that have rockcress populations also contain leafy spurge populations. It is unknown if there is spatial overlap with these recorded sites. On the Forest approximately 20 percent of occupied rockcress habitat is infested predominantly by leafy spurge with spotted knapweed occupying a smaller portion (0.1 acres). While it may be uncertain how many individual rockcress plants are needed to maintain the viability of this species, the continued consumption and modification of its habitat by leafy spurge and spotted knapweed increase the risk that local populations will decrease. Whether adjacent rockcress populations can absorb the impact of the loss of the Forest population and still maintain its viability is unknown at this time.

In **Alternative 2** approximately 21 acres of occupied rockcress habitat are proposed for weed control treatment. The control treatments, which includes manual/mechanical, chemical and biological controls, will decrease competition pressure and allow Missouri rockcress populations to flourish. However, the cost effectiveness and soil disturbance associated with manual/mechanical and chemical treatments alone may diminish the beneficial aspects of these treatments. Release of biological controls may be the best long-term solution in controlling and preventing the spread of leafy spurge in Missouri rockcress habitat on the Forest.

Hand pulling of leafy spurge and spotted knapweed is only effective where there are a few plants in their first year of growth. While this approach will eventually exhaust the root system, hand pulling would need to be repeated every three weeks or so from spring until winter for several years. In addition to the extensive labor and cost of pulling, leafy spurge and spotted knapweed are often intertwined with existing Missouri rockcress populations, thus it is possible that individual rockcress plants adjacent to a leafy spurge and spotted knapweed will be pulled up along with them.

Mowing alone is also ineffective for reducing leafy spurge and spotted knapweed infestations and can directly impact Missouri rockress seed production. The seasonal window for most effective leafy spurge and spotted knapweed mowing is during late spring. This window overlaps Missouri rockcress blooming period, which could impact rockcress seed production and potentially lead to a decline in the local population.

On the other hand, chemical treatment of leafy spurge and spotted knapweed infestations can be effective in controlling small infestations but like the manual/mechanical control methods, treatment of large infestations can be costly and the chemicals can have unintended direct and indirect effects.

Herbicides such as glyphosate, imazapic and clopyralid can be used to effectively treat small leafy spurge and spotted knapweed infestation if focused herbicide applications, such as glove or wick application, are implemented. However in larger infestations, focused application methods needed to treat individual leafy spurge and spotted knapweed plants would be costly, labor intensive and in the case of clopyralid, have unintended indirect effect from run-off.

Use of biological controls appears to be the most cost effective control method for leafy spurge. the flea beetles proposed for biological control are restricted to *Euphorbia esula* thus, no impact to Missouri rockcress is anticipated. In addition to the cost effectiveness of this method, use of the flea beetles will not have the soil disturbance associated with the manual/mechanical methods

The manual/mechanical and chemical control methods proposed in **Alternative 3** would have similar direct, indirect impacts as in the above Alternative 2. While chemical control methods can be effective for small populations of leafy spurge, this control method alone may not be adequate for long-term control of infestations. Yearly application of herbicides needed to control large infestations, increases the likelihood of accidental herbicide application and trampling of non-target plants. Thus, direct and indirect impacts on Missouri rockcress may lead to a long-term decrease in local population numbers.

Butternut

Butternut (*Juglans cinerea*) is a deciduous tree reaching nearly 100 ft. in height. It typically grows in rich mesophytic forests, lower slopes, ravines, and various types of bottomland, including banks and terraces of creeks and streams, and floodplain forests. This species achieves its best growth in well-drained bottomland and floodplain soils. Suitable habitat for butternut can be found on the Lakewood/Laona, and Medford/Park Falls Ranger Districts on the Forest.

The most significant threat to this species is a canker fungus which is spreading rapidly throughout its range with few stands remaining uninfected. Contributing to this threat is competition pressure from non-native species such as buckthorns and honeysuckles. Surveys indicate that one common buckthorn (*Rhamnus cathartica*) shrub occurs within 100 feet of a butternut population on the Medford/Park Falls Ranger District.

The lack of action within the **No Action Alternative** may not have any short term direct effects on the butternut population but the long term direct and indirect effects could lead to a decrease in the local population. If allowed to go uncontrolled dense thickets of buckthorn can shade out butternut seedlings which may lead to a decline in the local butternut population. Indirectly, the continued spread of buckthorn both vegetatively and through seed dispersal threatens the surrounding suitable butternut habitat. The combination of competition pressure from buckthorn and butternut canker disease will reduce butternuts ability to establish seedlings and add to the decline of butternut Forest–wide.

Under **Alternative 2 and 3** approximately 0.8 acres of occupied butternut habitat are proposed for treatment. With proper identification of the species being treated and because of the focused application

methods for glyphosate and triclopyr and because these herbicides are not mobile in the soil, it is unlikely that there will be any direct, indirect or cumulative effects of the proposed manual, mechanical and chemical control treatments of buckthorn on butternut.

West Virginia White Butterfly

The West Virginia White Butterfly relies on the host plant, toothwort, which is a understory plant found in mesic hardwoods with a closed canopy. On the Forest, this butterfly species is known from approximately 30 occurrences across the forest with the majority of those occurrences on the Nicolet landbase. Habitat loss (loss of host plant) and invasion of its habitat by Garlic Mustard are the biggest threats to the species.

If the **No Action Alternative** is selected, garlic mustard, due to its persistence in the landscape would have an increased likelihood of invading habitats where the host plant and West Virginia Whites are known to occur, or may occur in the future. While the garlic mustard is not a suitable host of the West Virginia White, ovipositing females do accept it and will lay eggs on it. The larvae are poisoned by garlic mustard tissue thus having a negative impact on the fitness of West Virginia Whites that encounter garlic mustard. Furthermore, garlic mustard is a superior competitor and may directly lead to decreases in toothwort populations on which the West Virginia White depends.

Currently, the known garlic mustard sites that are proposed for treatment under **Alternatives 2 or 3** are at least three miles from known occurrences of the West Virginia White butterfly and treatment of those sites (whether by mechanical or chemical means) will not have an affect on this species. Over the long term, however, suppression of garlic mustard on the Forest will at least allow the West Virginia to maintain its current population levels because garlic mustard will not 1) compete with the butterfly's host plant and 2) contribute to failed reproduction of the butterfly. Seventeen sites totaling 4.67 acres of garlic mustard are proposed for mechanical or chemical treatment in this project. All but one (0.10 ac) of those sites is on the Nicolet landbase from which the majority of the West Virginia Whites on the Forest are known. No effects of biocontrol insects would occur because no biocontrol methods are proposed in West Virginia White habitat and the insects would not interact with the WV White should they encounter each other.

5.0 AGENCIES AND PERSONS CONSULTED

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

5.1 ID TEAM MEMBERS:

Linda R. Parker - Forest Ecologist (ID Team Leader, Writer) - Vegetation Specialist Report
Marjory Brzeskiewicz - Ecologist, NEPA Writer/Analyst - Human Health & Safety Report, Project File
Daniel Eklund - Forest Wildlife Biologist - Animal BE, BA
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5.2 FEDERAL, STATE, AND LOCAL AGENCIES:

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WDNR: Darcy Kind, Private Lands Specialist TES species & Invasives
Great Lakes Indian Fish and Wildlife Commission, Odanah, WI: Karen Danielson, Botanist; Steven Garske, biologist; Miles Faalck, biologist

5.3 TRIBES:

To save paper, the project package was sent to the tribal resource manager directly when possible.

Ervin	Soulier	Natural Resource Manager	Bad River Band of Lake Superior Chippewa Indians
Peter	Defoe	Tribal Chairman	Fond du Lac Chippewa Tribe
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5.4 OTHERS:

Experts and agencies consulted in designing the Invasive Plant Control project.

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Kelly Kearns, Native Plant Cons. Program Mgr., WI Department of Natural Resources
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6.0 LITERATURE CITED

Albright, M.F., W.N. Harman, S.S. Fickbohm, H. Meehan, S.Groff, and T. Austin. 2004. Recovery of Native Flora and behavioral responses by Galerucella spp. Following biocontrol of purple loosestrife. The American Midland Naturalist: Vol. 152, No. 2, pp. 248-254.

Anderson, G.L., E.S. Delfosse, N.R. Spencer, C.W. Prosser, and R. D. Richard. (date unknown, post 1999). Biological control of leafy spruge: an emerging success story. Team Leafy Spurge

Blossey, B., D. Shroeder, S.D. Hight, and R.A. Malecki. 1994. Host specificity and environmental impact of two leaf beetles (*Glaerucella calmariensis* and *G. pusilla*) for biological control of purple loosestrife (*Lythrum salicaria*). Weed Sci. 42, 134-140.

Chequamegon-Nicolet National Forest. 2004. Purple Loosestrife Monitoring Project files, 1997-2004. Available upon request.

Cruse, Joann M. 2004. Wisconsin State Plant Health Director, USDA, APHIS. Personal communication (email dated 04/07/2004) with Marjory Brzeskiewicz regarding insects released in Wisconsin for bio-control.

DATCP. **2005**. Department of Agriculture, Trade and Consumer Protection. Wisconsin Consumer Protection Laws - Pesticides. Available online at: www.datcp.state.wi.us/cp/consumerinfo/cp/cp_laws/pesticide_use.pdf

Dow Agrosciences. 2002. Rodeo Specimen Label, Dow Agrosciences, Indianapolis, IN 46268 EPA Registration number 62719-324

Dow Agrosciences. 2004. Transline Specimen Label, Dow Agrosciences, Indianapolis, IN 46268 EPA Registration number 62719-259

Eagan, David. J. 1999. Burned by wild parsnip. Wisconsin Natural Resources Magazine, June 1999. Wisconsin Department of Natural Resources, Madison, WI.

Ehrenfeld, Joan G, P. Kourtev, and W. Huang. 2001. Changes in soil functions following invasions of exotic understory plants in deciduous forests. Ecological Applications, 11(5), pp. 1287-1300.

Executive Order 13112 - Invasive Species (1999)

Epstein, Eric, E. Judziewicz, and E. Spencer. 2002. Wisconsin Natural Heritage Inventory Natural Community descriptions. Wisconsin Department of Natural Resoucres, Bureau of Endangered Resources. http://www.dnr.state.wi.us/org/land/er/communities/descriptions.htm#P

Frappier, Brian, Robert T. Eckert, and Thomas D. Lee. 2004. Experimental removal of the non-indigenous shrub Rhamnus frangula (Glossy Buckthorn): effects on native herbs and woody seedlings. Northeastern Naturalist. 11(3):333-342.

FSM 2150. Forest Service Manual Title 2100 - Environmental Management Chapter 2150 - Pesticide use management and coordination, December 6, 1994.

FSH 2109.14. Pesticide use management and coordination handbook, effective 12/06/1994.

Gleason, H.A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada (2nd Edition). New York, NY. The New York Botanical Garden. 910p.?

GLIFWC. 2003. Great Lakes Indian Fish and Wildlife Commission and the Natural Resources Conservation Service. Target: Leafy Spurge (brochure). Available from GLIFWC P.O. Box 9 Odanah, WI 54861.

Hansen, Rich. 2004. Aphthona nigriscutis.USDA-APHIS-PPQ, Forestry Sciences Lab, Montana State University, Bozeman, MT 59717-0278. In, Biological Control: A guide to natural enemies in North America. C.R. Weeden, A.M. Shelton, Y. Li, and M.P. Hoffman, editors. Located online at: http://www.nysaes.cornell.edu/ent/biocontrol/

Hoffman, R. and K. Kearns. 1997. Wisconsin manual of control recommendations for ecologically invasive plants. Bureau of Endangered Resources, Department of Natural Resources, Madison, WI 53707

Horsley, S.B and D.A. Marquis. 1982. Interference by weeds and deer with Allegheny hardwood regeneration. Canadian Journal of Forest Research. 12:61-69.

Illinois Natural History Survey. 1999. Biocontrol of Purple Loosestrife Program, Summary of no-choice host specificity tests for Galerucella calmariensis. Web page available at: www.inhs.uiuc.edu/cee/loosesstrife/hostspec.html

Louda, S.M., R.W. Pemberton, M.T. Johnson, and P.A. Follett. 2003. Nontarget effects - The Achilles' Heel of Biological Control? Retrospective analyses to reduce risk associated with biocontrol introductions. Annual Review of Entomology, 2003, 48:365-96.

Kaufman, L.N. and D.A. Landis. 2000. Host specificity testing of *Galerucella calmariensis* L. on wild and ornamental plant species. Biological Control 18, 157-164.

Kind, Darcy. 2003. Chequamegon-Nicolet National Forest NNIS Control Recommendations - Draft Summary. Prepared by Darcy Kind, WI DNR Bureau of Endangered Resources, contract to USDA Forest Service. 07/08/2003. Copy on file at Park Falls office, CNNF.

Kurowski, Ronald. 2004. Biologist, Kettle Moraine State Forest, Wisconsin. Personal communication with Marjory Brzeskiewicz 08/29/05.

Lambrecht, Krista L. 2004. Wisconsin Department of Agriculture, Trade and Consumer Protection. Personal communication (email dated 03/22/2004) with Ian Shackleford, botanist, Ottawa NF. Regarding biocontrol insects approved for release in Wisconsin.

LRMP 2004. Land and Resource Management Plan - Chequamegon-Nicolet National Forest available at Forest offices and online: http://www.fs.fed.us/r9/cnnf/natres/final_forest_plan/index.html

LRMP FEIS. 2004. Land and Resource Management Plan, Final Environmental Impact Statement - Chequamegon-Nicolet National Forest available at Forest offices and online: http://www.fs.fed.us/r9/cnnf/natres/final_forest_plan/index.html

Mack, R.N., Simberloff, D. , Lonsdale, W.M., Evans , H., Clout, M and others. 2000. Biotic invasions: causes, epidemiology, global consequences, and control. Ecological Applications 10(3):689-710.

Mello, Kim. 2004. Wildlife Biologist, Invasive Species Control Coordinator, Fort McCoy, WI. Personal communication with Marjory Brzeskiewicz regarding effective NNIS control methods and techniques.

MOSA. 2005. Midwest Organic Services Organization website: http://www.mosaorganic.org

Michigan Sea Grant. 2003. Beetles take a bite out of purple loosestrife; native plants recover in some Michigan wetlands. **Webpage available at:** http://miseagrant.umich.edu//news/loosestrife03.html

National Invasive Species Council 2001. Management plan: meeting the invasive species challenge. Available online: http://www.invasivespecies.gov/council/mpfinal/pdf

NOP 2005. National Organic Program Regulations, Definitions available online at: http://www.ams.usda.gov/nop/indexIE.htm

Nowierski, R.M. and R.W. Pemberton. 2002. In: Van Driesche, R. et al, 2002. Biological control of invasive plants in the eastern united states, USDA Forest Service Publication FHTET-2002-04, pg 189.

Olson, B. E. 1999 Impacts of noxious weeds on ecologic and economic systems. In: R. L. Sheley and J. K. Petroff (eds.). Biology and Management of Noxious Rangeland Weeds. pp. 4-18. Oregon State University Press. Corvallis, Oregon.

Rees, N.E., P.C. Quinby, Jr., G.L. Piper, E.M. Coombs, D.E. Turner, N.R. Spencer, and L.V. Knutson (eds). 1996. Biological Control of Weeds in the West. Western Society of Weed Science, in cooperation with USDA Agricultural Research Service, Montana Dept. of Agriculture, and Montana State University.

Reinhardt, C. and S. M. Galatowitsch. 2004. Best Management Practices for the Invasive Phalaris arundinacea L. (Reed canary-grass) in Wetland Restoration. Minnesota Dept. of Transportation, St. Paul MN.

Schooler, S.S., E. M.Coombs, and P.B. McEvoy. 2003 Non target effects on crepe myrtle by Galerucella pusilla and G. calmariensis, used for biological control of purple loosestrife (Lythrum salicaria). Weed Science 51:449-455.

SERA. 2003a. Glyphosate - Human Health and Ecological Risk Assessment - Final Report. Prepared for USDA Forest Service, Forest Health Protection, March 1, 2003. Available online at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

SERA. 2003b. Triclopyr - Human Health and Ecological Risk Assessment - Final Report. Prepared for USDA Forest Service, Forest Health Protection, March 15, 2004. Available online at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

SERA. 2004a. Clopyralid - Human Health and Ecological Risk Assessment - Final Report. Prepared for USDA Forest Service, Forest Health Protection, December 5, 2004. Available online at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

SERA. 2004b. Imazapic - Human Health and Ecological Risk Assessment - Final Report. Prepared for USDA Forest Service, Forest Health Protection, December 23, 2004. Available online at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

Swearingen, J. 2004. WeedUS: Database of Invasive Plants of Natural Areas in the United States. http://www.nps.gov/plants/alien

Tewksbury. L. 2004. Biological control of purple loosestrife in Rhode Island. Posted on http://www.uri.edu/ce/ceec/ipm_web/action/purple. Accessed April 4, 2005

Tu, Mandy, C. Hurd, and J.M. Randall. 2001. Weed Control methods Handbook: Tools and Techniques for Use in Natural Areas. The Nature Conservancy, Wildland Species Team. Version April 2001.

U Conn. 2004. Phragmites, Common Reed (Phragmites australis). Web page of the University of Connecticut Invasive control manual. Available online at http://www.hort.uconn.edu/cipwg/art_pubs/GUIDE/x02phragmites.htm accessed September 2004.

USDA 2004. Forest Service Pacific Northwest Region, Invasive Plant Program, Preventing and Managing Invasive Plants. Draft Environmental Impact Statement. USDA Forest Service, Pacific Northwest Region.

USDA. 1997b. Pest Management for Oconto River Seed Orchard, Final Environmental Impact Statement.USDA Chequamegon-Nicolet National Forest

USDA. 1999. U.S. Department of Agriculture, Forest Service, Stemming the invasive tide: Forest Service strategy for noxious and nonnative invasive plant management.

USDA. 2001. USDA Forest Service Guide to Noxious Weed Prevention Practices. Version 1.0 25 pp. available on the web at http://www.fs.fed.us/rangelands/ftp/invasives/documents/guidetonoxweedprevpractices_07052001.doc

USDA. 2002. 2002 Census of Agriculture - county data, USDA National Agricultural Statistics Service. Available online at www.nass.usda.gov/census/census02/volume1/index2/htm

USDA. 2003. Forest Service, Chequamegon-Nicolet National Forest Record of Decision: Cayuga Project. Glidden, WI

USDA. 2004. USDA Forest Service, Chequamegon-Nicolet National Forest, Non-native, Invasive Species Control Project, Administrative and Recreation Sites, Roads and Trails Decision Memo, October 22, 2004.

USDA Team Leafy Spurge. 2002. Biological Control of Leafy Spurge. USDA-Agricultural Research Service Northern Plains Agricultural Laboratory, Sidney, Montana. Found online at www.team.ars.usda.gov/biocontrolmanual.pdf

USDA Forest Service. 2003a. Glyphosate - Human Health and Ecological Risk Assessment Final Report. pp. xi to xxiii, 3-36 to 3-37. Submitted by Patrick R. Durkin, Syracuse Environmental Research Associates, Inc. SERA TR 02-43-09-04a. http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

USFWS. 1989. U.S. Fish and Wildlife Service Waterfowl Management Handbook, Control of Phragmites or Common Reed. Fish and Wildlife Leaflet 13.4.12, 1989. Washington, D.C.

U.S. Fish and Wildlife Service. 1991. Fassett's Locoweed Recovery Plan. Twin Cities, Minnesota. 57pp.

Van Driesche. R.V., S.Lyon, B. Blossey, M. Hoddle, R. Reardon. 2002. Biological Control of Invasive Plants in the Eastern United States. USDA Forest Service Publication FHTET-2002-04.

Van Es, H. M. 1990.Pesticide Management For Water Quality: Principles and Practices. Pesticide Management Education Program, Cornell University. http://pmep.cce.cornell.edu/

WDNR. 1999. Reed canary-grass (Phalaris arundinacea). http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/reed.htm. Accessed 3/30/05

WDNR. 2003. Wisconsin Water Quality Assessment Report to Congress 2002. PUB-WT-254-2003

WDNR. 2004. DNR News, August 2004. Wisconsin DNR, Madison, WI. Available online at http://dnr.wi.gov/org/caer/ce/news/on/2004/on040803.htm#art2

Westbrooks, R. 1998. Invasive plants, changing the landscape of America: Fact book. Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW), Washington, D.C. 109 pages.

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Table of Treatment sites **CNNF Non-native Invasive Plant Control Project Environmental Assessment**

SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130100129	Buckthorns	0.0100	Medford-Park Falls	Cut	Glyphosate	Triclopyr	
09130100139	Spotted knapweed	1.1000	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130100140	Canada thistle	1.1000	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130100147	Spotted knapweed	5.4300	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130100148	Spotted knapweed	5.4300	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130100150	Canada thistle	0.0400	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913010059	Swamp thistle	0.0400	Medford-Park Falls	Root-stab	Clopyralid	Glyphosate	
0913010060	Swamp thistle	0.0400	Medford-Park Falls	Root-stab	Clopyralid	Glyphosate	
0913010061	Spotted knapweed	2.2000	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010062	Spotted knapweed	0.0400	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010063	Swamp thistle	0.2000	Medford-Park Falls	Root-stab	Clopyralid	Glyphosate	
09130102120	Reed canarygrass	1.1000	Medford-Park Falls	Cut/mow	Glyphosate		
09130102121	Reed canarygrass	1.1000	Medford-Park Falls	Cut/mow	Glyphosate		
09130102122	Reed canarygrass	1.1000	Medford-Park Falls	Cut/mow	Glyphosate		
09130102123	Reed canarygrass	1.1000	Medford-Park Falls	Cut/mow	Glyphosate		
09130102124	Reed canarygrass	1.1000	Medford-Park Falls	Cut/mow	Glyphosate		
09130102125	Reed canarygrass	1.1000	Medford-Park Falls	Cut/mow	Glyphosate		
09130102130	Spotted knapweed	0.0400	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
09130102135	Canada thistle	0.0400	Medford-Park Falls	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130102138	Spotted knapweed	0.2000	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
091301022	Spotted knapweed	0.0400	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010220	Spotted knapweed	1.8100	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010221	Spotted knapweed	1.8200	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010222	Reed canarygrass	0.2000	Medford-Park Falls	Cut/mow	Glyphosate		
091301023	Reed canarygrass	2.0000	Medford-Park Falls	Cut/mow	Glyphosate		
0913010249	Reed canarygrass	1.1000	Medford-Park Falls	Cut/mow	Glyphosate		
0913010257	Honeysuckles	2.1500	Medford-Park Falls	Cut	Glyphosate	Triclopyr	
091301031	Reed canarygrass	2.2000	Medford-Park Falls	Cut/mow	Glyphosate		
0913010312	Spotted knapweed	0.4000	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010314	Spotted knapweed	0.0400	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010316	Spotted knapweed	0.0400	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010318	Bishop's goutweed	0.0400	Medford-Park Falls		Glyphosate	Triclopyr	
0913010322	Spotted knapweed	0.4000	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010324	Spotted knapweed	0.0400	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010326	Spotted knapweed	8.5100	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
0913010332	Wild parsnip	0.0040	Medford-Park Falls	Root-stab/mow	Glyphosate	Triclopyr	
091301034	Common reed grass	0.0400	Medford-Park Falls	Cut/mow	Glyphosate		
0913010347	Purple loosestrife	0.0400	Medford-Park Falls	Pull/cut	Glyphosate		yes
0913010351	Bishop's goutweed	0.0040	Medford-Park Falls		Glyphosate	Triclopyr	
0913010352	Bishop's goutweed	2.1540	Medford-Park Falls		Glyphosate	Triclopyr	
091301037	Bishop's goutweed	1.0770	Medford-Park Falls		Glyphosate	Triclopyr	
091301038	Spotted knapweed	0.1000	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
091301041	Buckthorns	0.1000	Medford-Park Falls	Cut	Glyphosate	Triclopyr	
09130104153	Common reed grass	0.0100	Medford-Park Falls	Cut/mow	Glyphosate		
091301042	Common reed grass	0.1100	Medford-Park Falls	Cut/mow	Glyphosate		
091301044	Common reed grass	0.0600	Medford-Park Falls	Cut/mow	Glyphosate		
09130104451	Oriental bittersweet vine	0.0032	Medford-Park Falls	Cut/pull	Glyphosate	Triclopyr	
09130104453	Honeysuckles	0.6000	Medford-Park Falls	Cut	Glyphosate	Triclopyr	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130104454	Canada thistle	0.0003	Medford-Park Falls	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130104462	Leafy spurge	0.0016	Medford-Park Falls	Pull/mow	Imazapic	Glyphosate	
09130104463	Eurasian watermilfoil	23.8851	Medford-Park Falls				
09130104464	Siberian peashrub	0.0005	Medford-Park Falls	Cut/pull	Glyphosate	Clopyralid	
09130104465	Oriental bittersweet vine	0.0150	Medford-Park Falls	Cut/pull	Glyphosate	Triclopyr	
09130104466	Canada thistle	0.0004	Medford-Park Falls	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130104468	Thistle spp.	0.0001	Medford-Park Falls	Cut/pull/mow/root-st	Clopyralid	Glyphosate	
09130104469	Thistle spp.	0.0001	Medford-Park Falls	Cut/pull/mow/root-st	Clopyralid	Glyphosate	
09130104483	Spotted knapweed	0.0001	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
09130104484	Spotted knapweed	0.0020	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
09130104486	Purple loosestrife	0.0039	Medford-Park Falls	Pull/cut	Glyphosate		
09130104486	Purple loosestrife	0.0039	Medford-Park Falls	Pull/cut	Glyphosate		
09130104487*	Purple loosestrife	29.0300	Medford-Park Falls		Glyphosate		Galerucella beet
09130104488	Spotted knapweed	0.0960	Medford-Park Falls	Pull/mow	Clopyralid	Glyphosate	
091301045	Garlic mustard	0.1000	Medford-Park Falls	Cut/pull/torch	Glyphosate	Triclopyr	
09130105 ??	Autumn olive	0.0500	Washburn	Cut	Glyphosate	Triclopyr	
0913019748	Purple loosestrife	0.0400	Medford-Park Falls	Pull/cut	Glyphosate		
09130200166	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202158	Spotted knapweed	0.2000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202159	Spotted knapweed	1.1000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202160	Spotted knapweed	0.2000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202161	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202163	Spotted knapweed	2.2000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202164	Canada thistle	0.2000	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130202168	Spotted knapweed	1.1000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202171	Reed canarygrass	0.0400	Great Divide	Cut/mow	Glyphosate		
09130202172	Honeysuckles	0.0800	Great Divide	Cut	Glyphosate	Triclopyr	
09130202173	Honeysuckles	0.0800	Great Divide	Cut	Glyphosate	Triclopyr	
09130202180	Spotted knapweed	0.2000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202183	Reed canarygrass	202.0000	Great Divide	Cut/mow	Glyphosate		
09130202184	Canada thistle	0.2000	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130202185	Reed canarygrass	0.0400	Great Divide	Cut/mow	Glyphosate		
09130202189	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202190	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202192	Spotted knapweed	0.2000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130202193	Reed canarygrass	0.0400	Great Divide	Cut/mow	Glyphosate		
09130202194	Reed canarygrass	0.0400	Great Divide	Cut/mow	Glyphosate		
09130202195	Reed canarygrass	0.0400	Great Divide	Cut/mow	Glyphosate		
09130202196	Reed canarygrass	0.0400	Great Divide	Cut/mow	Glyphosate		
0913020238	Spotted knapweed	10.8600	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020240	Spotted knapweed	3.6200	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020317	Canada thistle	0.0100	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913020318	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020319	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
091302032	Spotted knapweed	1.0000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020320	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020322	Spotted knapweed	0.2000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020323	Canada thistle	0.0400	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913020324	Canada thistle	0.0400	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
0913020325	Canada thistle	0.0400	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913020327	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020328	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020329	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
091302034	Spotted knapweed	0.0400	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020352	Spotted knapweed	1.0800	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020353	Spotted knapweed	0.2300	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020358	Spotted knapweed	0.0040	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020359	Spotted knapweed	0.0040	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020360	Canada thistle	0.0040	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913020363	Canada thistle	0.0020	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913020365	Spotted knapweed	0.0040	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020366	Canada thistle	1.1000	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913020367	Canada thistle	0.2000	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
091302037	Canada thistle	0.0400	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913020370	Spotted knapweed	1.0000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020372	Spotted knapweed	0.0020	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020376	Spotted knapweed	1.0000	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020377	Spotted knapweed	0.0230	Great Divide	Pull/mow	Clopyralid	Glyphosate	
09130204102	Purple loosestrife	0.0001	Great Divide	Pull/cut	Glyphosate		
09130204103	Honeysuckles	0.0001	Great Divide	Cut	Glyphosate	Triclopyr	
09130204151	Canada thistle	0.0020	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130204458	Leafy spurge	0.6516	Great Divide	Pull/mow	Imazapic	Glyphosate	
09130204459	Canada thistle	0.0180	Great Divide	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130204471	Wild parsnip	0.0001	Great Divide	Root-stab/mow	Glyphosate	Triclopyr	
09130204489	Spotted knapweed	0.3960	Great Divide	Pull/mow	Clopyralid	Glyphosate	
0913020456	Honeysuckles	0.0400	Great Divide	Cut	Glyphosate	Triclopyr	
0913020457	Honeysuckles	0.0500	Great Divide	Cut	Glyphosate	Triclopyr	
0913020460	Purple loosestrife	0.0040	Great Divide	Pull/cut	Glyphosate		
0913020462	Honeysuckles	0.0010	Great Divide	Cut	Glyphosate	Triclopyr	
0913020464	Honeysuckles	0.0040	Great Divide	Cut	Glyphosate	Triclopyr	
0913020467	Leafy spurge	0.0040	Great Divide	Pull/mow	Imazapic	Glyphosate	
0913020468	Honeysuckles	0.0010	Great Divide	Cut	Glyphosate	Triclopyr	
0913020469	Purple loosestrife	0.0020	Great Divide	Pull/cut	Glyphosate		
0913020470	Purple loosestrife	0.1500	Great Divide	Pull/cut	Glyphosate		
0913020471	Spotted knapweed	0.0300	Great Divide	Pull/mow	Clopyralid	Glyphosate	
091302371	Spotted knapweed	0.0190	Great Divide	Pull/mow	Clopyralid	Glyphosate	
091303001	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030010	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300100	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300104	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300105	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300106	Canada thistle	1.8000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030011	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300110	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300111	Canada thistle	20.0000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300115	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300117	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130300118	Canada thistle	3.6300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300119	Canada thistle	2.7200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030012	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300120	Canada thistle	12.7000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300123	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300125	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300126	Canada thistle	1.0000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300128	Canada thistle	5.4500	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300129	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130300130	Canada thistle	7.2600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
091303002	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030021	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030022	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030023	Spotted knapweed	2.2000	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030024	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030025	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030026	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
091303003	Garlic mustard	0.0400	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
0913030030	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030032	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030033	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030035	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030037	Canada thistle	2.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030038	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
091303004	Garlic mustard	0.0400	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
0913030040	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030041	Canada thistle	1.0000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030044	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030046	Spotted knapweed	0.0400	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030048	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030049	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030051	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030060	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030063	Spotted knapweed	2.0000	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030064	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
091303007	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030071	Spotted knapweed	0.2000	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030072	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
091303008	Canada thistle	30.0000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030080	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030084	Canada thistle	1.0000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030085	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030089	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
091303009	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030093	Canada thistle	1.0000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301138	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301139	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301140	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301144	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	

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Table of Treatment sites **CNNF Non-native Invasive Plant Control Project Environmental Assessment**

SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130301146	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301147	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301148	Canada thistle	1.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301149	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301150	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301151	Canada thistle	0.2000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301161	Honeysuckles	0.0400	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130301162	Reed canarygrass	2.2000	Lakewood-Laona	Cut/mow	Glyphosate		
09130301163	Reed canarygrass	0.2000	Lakewood-Laona	Cut/mow	Glyphosate		
09130301164	Reed canarygrass	1.1000	Eagle River-Florence	Cut/mow	Glyphosate		
09130301166	Reed canarygrass	0.2000	Eagle River-Florence	Cut/mow	Glyphosate		
09130301167	Reed canarygrass	1.1000	Eagle River-Florence	Cut/mow	Glyphosate		
09130301168	Reed canarygrass	0.0400	Eagle River-Florence	Cut/mow	Glyphosate		
09130301169	Reed canarygrass	0.2000	Eagle River-Florence	Cut/mow	Glyphosate		
09130301170	Reed canarygrass	1.1000	Eagle River-Florence	Cut/mow	Glyphosate		
09130301171	Spotted knapweed	2.2000	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130301172	Spotted knapweed	0.0400	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130301179	Wild parsnip	0.0400	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130301181	Swamp thistle	0.2000	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301182	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301183	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301186	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301187	Purple loosestrife	0.2000	Eagle River-Florence	Pull/cut	Glyphosate		
09130301188	Spotted knapweed	0.0400	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130301189	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301190	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301191	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301192	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301193	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301194	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301195	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301196	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130301197	Canada thistle	0.1000	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130301199	Swamp thistle	0.3200	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130302102	Spotted knapweed	0.2000	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302203	Spotted knapweed	0.1200	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302204	Spotted knapweed	0.1200	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302209	Spotted knapweed	0.1200	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302210	Spotted knapweed	0.1200	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302212	Spotted knapweed	0.1200	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302216	Spotted knapweed	0.1200	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302221	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302222	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302223	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302226	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302228	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030223	Spotted knapweed	2.0000	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302231	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130302240	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302241	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302245	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302247	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302249	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302251	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302255	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302256	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302258	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302260	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302261	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302265	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302266	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302276	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302277	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302279	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302282	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302284	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302285	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302294	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302298	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302299	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302306	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302315	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302318	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302320	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302326	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302337	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302338	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302339	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302340	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302342	Spotted knapweed	0.1300	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302346	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302360	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302361	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302363	Canada thistle	0.1300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030238	Canada thistle	0.0500	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302404	Spotted knapweed	0.0100	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302407	Canada thistle	0.0100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302408	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302409	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302410	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302416	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302417	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302419	Canada thistle	0.0600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302421	Canada thistle	0.0600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302435	Canada thistle	0.0600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302441	Canada thistle	0.0100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302451	Canada thistle	0.0600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130302505	Spotted knapweed	0.3600	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302506	Spotted knapweed	0.1800	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302510	Spotted knapweed	0.1800	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302513	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302514	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302516	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302520	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302521	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302523	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302527	Canada thistle	0.5400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302528	Canada thistle	0.5400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302531	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302532	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302534	Canada thistle	0.5400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302535	Canada thistle	0.5400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302536	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302537	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302542	Canada thistle	0.5400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302543	Canada thistle	0.5400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302546	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302547	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302548	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302549	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302550	Canada thistle	0.1800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302551	Canada thistle	1.0800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302552	Canada thistle	1.0800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302553	Canada thistle	2.7200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302554	Canada thistle	2.7200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302559	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302560	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302563	Canada thistle	0.7200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302572	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302578	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302579	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302580	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302581	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302582	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302583	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302584	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302585	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302586	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302587	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302592	Wild parsnip	3.6300	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302593	Wild parsnip	3.6300	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302594	Wild parsnip	10.8900	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302595	Wild parsnip	10.8900	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302598	Wild parsnip	1.0800	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302599	Wild parsnip	1.0800	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130302600	Wild parsnip	2.1700	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302601	Wild parsnip	2.1700	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302602	Wild parsnip	1.6300	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302603	Wild parsnip	1.6300	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130302606	Canada thistle	0.5400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302607	Canada thistle	0.5400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302612	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302613	Canada thistle	0.3600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302628	Leafy spurge	1.2700	Eagle River-Florence	Pull/mow	Imazapic	Glyphosate	
09130302629	Leafy spurge	1.2700	Eagle River-Florence	Pull/mow	Imazapic	Glyphosate	
0913030265	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302652	Purple loosestrife	0.0400	Eagle River-Florence	Pull/cut	Glyphosate		
0913030267	Garlic mustard	0.8600	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130302670	Garlic mustard	0.0400	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130302675	Spotted knapweed	0.0100	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302683	Spotted knapweed	0.0100	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302685	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302691	Canada thistle	0.0100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302693	Canada thistle	0.0700	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302695	Spotted knapweed	0.0800	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302698	Canada thistle	0.0100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302700	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302701	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130302702	Spotted knapweed	0.0100	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302704	Spotted knapweed	0.0800	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130302723	Spotted knapweed	0.0400	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130303001	Garlic mustard	0.4200	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130303011	Garlic mustard	0.0500	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130303017	Reed canarygrass	0.0800	Eagle River-Florence	Cut/mow	Glyphosate		
09130303018	Reed canarygrass	0.1200	Eagle River-Florence	Cut/mow	Glyphosate		
09130303026	Canada thistle	0.0300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303029	Reed canarygrass	0.0900	Eagle River-Florence	Cut/mow	Glyphosate		
09130303030	Reed canarygrass	0.1200	Eagle River-Florence	Cut/mow	Glyphosate		
09130303036	Reed canarygrass	0.0500	Eagle River-Florence	Cut/mow	Glyphosate		
09130303038	Swamp thistle	0.0400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303039	Leafy spurge	0.0100	Eagle River-Florence	Pull/mow	Imazapic	Glyphosate	
09130303041	Reed canarygrass	0.0800	Eagle River-Florence	Cut/mow	Glyphosate		
09130303042	Reed canarygrass	0.0200	Eagle River-Florence	Cut/mow	Glyphosate		
09130303043	Reed canarygrass	0.0900	Eagle River-Florence	Cut/mow	Glyphosate		
09130303044	Reed canarygrass	0.3700	Eagle River-Florence	Cut/mow	Glyphosate		
09130303050	Swamp thistle	0.6400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303055	Reed canarygrass	0.0600	Eagle River-Florence	Cut/mow	Glyphosate		
09130303056	Reed canarygrass	1.0700	Eagle River-Florence	Cut/mow	Glyphosate		
09130303060	Garlic mustard	0.0400	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130303063	Swamp thistle	0.7600	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303064	Canada thistle	1.4400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303065	Garlic mustard	0.0200	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130303073	Reed canarygrass	0.0500	Eagle River-Florence	Cut/mow	Glyphosate		
09130303080	Swamp thistle	0.2000	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130303081	Swamp thistle	0.0900	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303082	Canada thistle	0.4200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303083	Canada thistle	0.2200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303085	Swamp thistle	0.0200	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303089	Canada thistle	3.3300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303090	Swamp thistle	1.0100	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303092	Reed canarygrass	0.0200	Eagle River-Florence	Cut/mow	Glyphosate		
09130303093	Reed canarygrass	0.0200	Eagle River-Florence	Cut/mow	Glyphosate		
09130303094	Reed canarygrass	0.0100	Eagle River-Florence	Cut/mow	Glyphosate		
09130303095	Garlic mustard	0.0200	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130303096	Canada thistle	0.1200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303098	Swamp thistle	0.0100	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303099	Canada thistle	0.3400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303101	Canada thistle	1.2100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303102	Swamp thistle	65.4200	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303103	Swamp thistle	0.0100	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303104	Canada thistle	0.0600	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303105	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303107	Swamp thistle	0.4900	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303108	Swamp thistle	87.4900	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303111	Swamp thistle	0.0200	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303112	Canada thistle	0.0100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303113	Swamp thistle	0.0100	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303115	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303116	Swamp thistle	0.1100	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303117	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303118	Swamp thistle	0.1800	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303119	Canada thistle	0.0100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303120	Swamp thistle	0.1100	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303121	Canada thistle	0.3100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303122	Swamp thistle	1.5400	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303123	Reed canarygrass	0.0400	Eagle River-Florence	Cut/mow	Glyphosate		
09130303124	Canada thistle	0.2300	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303125	Canada thistle	0.0100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303126	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303127	Swamp thistle	0.1700	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303128	Canada thistle	0.4800	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303129	Swamp thistle	0.0700	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303130	Swamp thistle	0.2300	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303131	Swamp thistle	0.0500	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303132	Canada thistle	0.0200	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303133	Swamp thistle	0.1000	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303134	Canada thistle	0.0100	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303136	Swamp thistle	3.2700	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303137	Canada thistle	0.1500	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303138	Swamp thistle	0.0200	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130303139	Reed canarygrass	0.0100	Eagle River-Florence	Cut/mow	Glyphosate		
0913030319	Reed canarygrass	0.0400	Eagle River-Florence	Cut/mow	Glyphosate		

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
0913030362	Garlic mustard	0.0400	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
0913030366	Canada thistle	0.0400	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130303747	Reed canarygrass	0.0700	Eagle River-Florence	Cut/mow	Glyphosate		
09130303843	Swamp thistle	0.1200	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304100	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304101	Swamp thistle	0.0004	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304103	Swamp thistle	0.0290	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304104	Swamp thistle	0.1030	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304105	Spotted knapweed	0.0270	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130304106	Canada thistle	0.0030	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130304107	Swamp thistle	0.0090	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304110	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304112	Spotted knapweed	0.0040	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
09130304117	Swamp thistle	0.0310	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304118	Reed canarygrass	0.0940	Eagle River-Florence	Cut/mow	Glyphosate		
09130304119	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030412	Reed canarygrass	0.2600	Eagle River-Florence	Cut/mow	Glyphosate		
09130304120	Swamp thistle	0.0020	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304122	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304123	Swamp thistle	0.0110	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304124	Swamp thistle	0.0030	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304125	Swamp thistle	0.0040	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304126	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304151	Garlic mustard	0.0008	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130304152	Garlic mustard	0.0014	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130304153	Bishop's goutweed	0.0045	Eagle River-Florence		Glyphosate	Triclopyr	
09130304154	Garlic mustard	0.0005	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130304155	Honeysuckles	0.0018	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130304156	Honeysuckles	0.0008	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130304157	Buckthorns	0.1000	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130304158	Honeysuckles	0.0005	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130304159	Swamp thistle	0.0100	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304161	Swamp thistle	0.0298	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304162	Wild parsnip	0.4800	Eagle River-Florence	Root-stab/mow	Glyphosate	Triclopyr	
09130304163	Swamp thistle	0.0060	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304164	Canada thistle	0.0110	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030420	Spotted knapweed	0.0070	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030422	Reed canarygrass	0.0002	Eagle River-Florence	Cut/mow	Glyphosate		
0913030428	Reed canarygrass	2.0510	Eagle River-Florence	Cut/mow	Glyphosate		
091303043	Reed canarygrass	0.0020	Eagle River-Florence	Cut/mow	Glyphosate		
09130304301	Garlic mustard	0.0001	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
09130304303	Honeysuckles	0.0020	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130304304	Swamp thistle	0.0004	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130304305	Honeysuckles	0.0010	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130304306	Honeysuckles	0.0050	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130304308	Garlic mustard	0.0001	Eagle River-Florence	Cut/pull/torch	Glyphosate	Triclopyr	
0913030432	Canada thistle	0.1130	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130304327	Buckthorns	0.0001	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
09130304328	Swamp thistle	0.0006	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130304329	Buckthorns	0.0001	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
0913030433	Canada thistle	0.0410	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130304330	Spotted knapweed	0.1250	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030436	Canada thistle	0.0160	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030437	Swamp thistle	0.0006	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030438	Swamp thistle	0.0580	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030439	Swamp thistle	0.0220	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030440	Swamp thistle	0.2290	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030442	Swamp thistle	0.9220	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030443	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030447	Reed canarygrass	0.0100	Eagle River-Florence	Cut/mow	Glyphosate		
0913030448	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030449	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030450	Swamp thistle	0.0060	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030451	Spotted knapweed	0.0170	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030452	Swamp thistle	0.0280	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030453	Canada thistle	0.0002	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030455	Spotted knapweed	0.0002	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030456	Swamp thistle	0.0052	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030457	Reed canarygrass	0.0020	Eagle River-Florence	Cut/mow	Glyphosate		
0913030458	Swamp thistle	0.0090	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030461	Spotted knapweed	0.0002	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030466	Swamp thistle	0.0520	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030467	Swamp thistle	0.0870	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030468	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030469	Spotted knapweed	0.0100	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030470	Spotted knapweed	0.0002	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030472	Honeysuckles	0.0120	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
0913030473	Swamp thistle	0.0020	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030474	Swamp thistle	0.0120	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030475	Reed canarygrass	0.0002	Eagle River-Florence	Cut/mow	Glyphosate		
0913030476	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030480	Swamp thistle	0.0580	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030481	Swamp thistle	0.0070	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030482	Swamp thistle	0.0640	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030483	Swamp thistle	0.0260	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030484	Reed canarygrass	0.3640	Eagle River-Florence	Cut/mow	Glyphosate		
0913030485	Swamp thistle	0.1390	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030486	Swamp thistle	0.0560	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030488	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030489	Swamp thistle	0.0050	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030490	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
0913030491	Honeysuckles	0.0080	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
0913030492	Buckthorns	0.0010	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
0913030493	Honeysuckles	0.0002	Eagle River-Florence	Cut	Glyphosate	Triclopyr	
0913030494	Canada thistle	0.0010	Eagle River-Florence	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913030496	Reed canarygrass	0.4770	Eagle River-Florence	Cut/mow	Glyphosate		
0913030497	Spotted knapweed	0.0002	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
0913030498	Spotted knapweed	0.0160	Eagle River-Florence	Pull/mow	Clopyralid	Glyphosate	
0913030499	Swamp thistle	0.0002	Eagle River-Florence	Root-stab	Clopyralid	Glyphosate	
09130400107	Spotted knapweed	1.1000	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
0913040013	Canada thistle	0.0400	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040014	Spotted knapweed	0.0400	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
0913040015	Canada thistle	0.0400	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040017	Spotted knapweed	0.2000	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
0913040031	Canada thistle	1.1000	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040055	Canada thistle	0.0400	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040056	Spotted knapweed	0.2000	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
0913040075	Canada thistle	1.1000	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040076	Canada thistle	0.2000	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040077	Spotted knapweed	0.2000	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
0913040087	Canada thistle	0.0400	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040088	Canada thistle	2.0000	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040095	Purple loosestrife	0.2500	Lakewood-Laona	Pull/cut	Glyphosate		
0913040096	Canada thistle	0.0400	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913040098	Spotted knapweed	1.1000	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130402630	Leafy spurge	0.9000	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402631	Leafy spurge	0.9000	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402632	Leafy spurge	0.2700	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402633	Leafy spurge	0.2700	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402634	Leafy spurge	1.2700	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402635	Leafy spurge	1.2700	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402638	Leafy spurge	0.3800	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402639	Leafy spurge	0.9050	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402639	Leafy spurge	0.3800	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402640	Leafy spurge	0.4500	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402641	Leafy spurge	0.4500	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402647	Spotted knapweed	0.0800	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130402648	Spotted knapweed	0.0800	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130402673	Leafy spurge	0.2000	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130402682	Spotted knapweed	0.0800	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130402726	Leafy spurge	20.0000	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	Flea beetles
09130403001	Garlic mustard	3.0000	Lakewood-Laona	Cut/pull/torch	Glyphosate	Triclopyr	
09130403002	Reed canarygrass	0.0300	Lakewood-Laona	Cut/mow	Glyphosate		
09130403003	Reed canarygrass	0.0300	Lakewood-Laona	Cut/mow	Glyphosate		
09130403005	Swamp thistle	0.0500	Lakewood-Laona	Root-stab	Clopyralid	Glyphosate	
09130403054	Reed canarygrass	0.0800	Lakewood-Laona	Cut/mow	Glyphosate		
09130403056	Reed canarygrass	0.1100	Lakewood-Laona	Cut/mow	Glyphosate		
09130403059	Swamp thistle	0.0100	Lakewood-Laona	Root-stab	Clopyralid	Glyphosate	
09130403060	Reed canarygrass	0.0200	Lakewood-Laona	Cut/mow	Glyphosate		
09130403061	Reed canarygrass	0.1100	Lakewood-Laona	Cut/mow	Glyphosate		
09130403065	Reed canarygrass	0.0800	Lakewood-Laona	Cut/mow	Glyphosate		
09130403067	Reed canarygrass	0.0200	Lakewood-Laona	Cut/mow	Glyphosate		
09130403068	Reed canarygrass	0.0100	Lakewood-Laona	Cut/mow	Glyphosate		
09130403069	Spotted knapweed	0.0100	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130403070	Spotted knapweed	0.0600	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130403071	Spotted knapweed	0.2300	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130403074	Reed canarygrass	0.0100	Lakewood-Laona	Cut/mow	Glyphosate		
0913040353	Canada thistle	0.0400	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130403867	Reed canarygrass	0.0800	Lakewood-Laona	Cut/mow	Glyphosate		
0913040410	Reed canarygrass	0.0170	Lakewood-Laona	Cut/mow	Glyphosate		
0913040411	Reed canarygrass	0.0030	Lakewood-Laona	Cut/mow	Glyphosate		
0913040412	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040418	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040419	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
091304042	Spotted knapweed	0.0070	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
0913040420	Reed canarygrass	0.0130	Lakewood-Laona	Cut/mow	Glyphosate		
0913040421	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040422	Reed canarygrass	0.0200	Lakewood-Laona	Cut/mow	Glyphosate		
0913040423	Reed canarygrass	0.0250	Lakewood-Laona	Cut/mow	Glyphosate		
0913040427	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040428	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040429	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040430	Spotted knapweed	0.0002	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130404309	Spotted knapweed	0.0954	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130404311	Spotted knapweed	0.0442	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130404313	Leafy spurge	0.0200	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130404314	Spotted knapweed	0.0020	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130404315	Leafy spurge	0.0012	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130404316	Leafy spurge	0.0028	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130404317	Spotted knapweed	0.0200	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130404318	Spotted knapweed	1.0860	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130404319	Swamp thistle	0.0100	Lakewood-Laona	Root-stab	Clopyralid	Glyphosate	
09130404321	Canada thistle	0.0040	Lakewood-Laona	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130404322	Swamp thistle	0.0002	Lakewood-Laona	Root-stab	Clopyralid	Glyphosate	
09130404324	Honeysuckles	0.0001	Lakewood-Laona	Cut	Glyphosate	Triclopyr	
09130404325	Leafy spurge	0.0500	Lakewood-Laona	Pull/mow	Imazapic	Glyphosate	
09130404326	Wild parsnip	0.2000	Lakewood-Laona	Root-stab/mow	Glyphosate	Triclopyr	
0913040433	Reed canarygrass	0.0150	Lakewood-Laona	Cut/mow	Glyphosate		
0913040434	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040435	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040436	Reed canarygrass	0.0002	Lakewood-Laona	Cut/mow	Glyphosate		
0913040438	Spotted knapweed	0.0030	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
0913040442	Reed canarygrass	0.0010	Lakewood-Laona	Cut/mow	Glyphosate		
0913040444	Reed canarygrass	0.0500	Lakewood-Laona	Cut/mow	Glyphosate		
091304045	Spotted knapweed	0.0002	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
091304046	Spotted knapweed	0.0002	Lakewood-Laona	Pull/mow	Clopyralid	Glyphosate	
09130500111	Spotted knapweed	1.1000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050014	Spotted knapweed	3.6200	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050016	Spotted knapweed	7.2400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050027	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050028	Spotted knapweed	5.4300	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050029	Spotted knapweed	7.2400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050032	Spotted knapweed	9.0500	Washburn	Pull/mow	Clopyralid	Glyphosate	
091305007	Spotted knapweed	23.5300	Washburn	Pull/mow	Clopyralid	Glyphosate	

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Table of Treatment sites **CNNF Non-native Invasive Plant Control Project Environmental Assessment**

SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
091305008	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050091	Spotted knapweed	0.0020	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050117	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050210	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130502101	Spotted knapweed	0.4400	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130502104	Spotted knapweed	0.2500	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130502107	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050213	Spotted knapweed	14.4800	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130502143	Canada thistle	0.0400	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130502145	Canada thistle	0.2000	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130502146	Canada thistle	0.2000	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130502152	Canada thistle	0.0400	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913050223	Spotted knapweed	0.7200	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050224	Spotted knapweed	4.0600	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050225	Spotted knapweed	6.5100	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050230	Spotted knapweed	9.7700	Washburn	Pull/mow	Clopyralid	Glyphosate	
091305025	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050268	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050269	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050273	Spotted knapweed	0.0010	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050275	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050276	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050277	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050284	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
091305029	Spotted knapweed	3.6200	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050293	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050293	Spotted knapweed	0.4771	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050294	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050295	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050296	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050297	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050298	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050310	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050313	Spotted knapweed	0.5000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050314	Spotted knapweed	0.5000	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050315	Canada thistle	0.0400	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913050331	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050332	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050337	Spotted knapweed	0.0400	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050338	Canada thistle	0.0400	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913050339	Canada thistle	0.0400	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913050340	Reed canarygrass	0.0400	Washburn	Cut/mow	Glyphosate		
0913050341	Canada thistle	5.0000	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913050342	Reed canarygrass	5.0000	Washburn	Cut/mow	Glyphosate		
0913050343	Spotted knapweed	5.0000	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504152	Canada thistle	0.0010	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
09130504256	Spotted knapweed	0.0250	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504258	Leafy spurge	0.0040	Washburn	Pull/mow	Imazapic	Glyphosate	
09130504259	Spotted knapweed	0.0200	Washburn	Pull/mow	Clopyralid	Glyphosate	

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SITE_ID	COMMON NAME	Infested Acres	DISTRICT	Manual Mechanical	CHEMICAL 1	CHEMICAL 2	Bio-control
09130504260	Honeysuckles	0.1000	Washburn	Cut	Glyphosate	Triclopyr	
09130504261	Honeysuckles	0.0002	Washburn	Cut	Glyphosate	Triclopyr	
09130504262	Japanese barberry	0.0001	Washburn	Cut/pull	Glyphosate	Triclopyr	
09130504263	Spotted knapweed	0.0002	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504267	Spotted knapweed	0.0001	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504268	Honeysuckles	0.1200	Washburn	Cut	Glyphosate	Triclopyr	
09130504452	Leafy spurge	0.1400	Washburn	Pull/mow	Imazapic	Glyphosate	
09130504470	Honeysuckles	0.0036	Washburn	Cut	Glyphosate	Triclopyr	
09130504472	Spotted knapweed	0.4887	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504473	Spotted knapweed	0.0869	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504474	Spotted knapweed	0.0650	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504476	Spotted knapweed	0.1267	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504477	Spotted knapweed	0.1700	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504478	Spotted knapweed	0.0072	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504479	Spotted knapweed	0.1014	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504480	Spotted knapweed	0.0108	Washburn	Pull/mow	Clopyralid	Glyphosate	
09130504481	Spotted knapweed	0.0217	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050451	Autumn olive	0.0040	Washburn	Cut	Glyphosate	Triclopyr	
0913050452	Siberian peashrub	0.0900	Washburn	Cut/pull	Glyphosate	Clopyralid	
0913050453	Autumn olive	0.2000	Washburn	Cut	Glyphosate	Triclopyr	
0913050457	Spotted knapweed	0.0040	Washburn	Pull/mow	Clopyralid	Glyphosate	
0913050458	Honeysuckles	0.0010	Washburn	Cut	Glyphosate	Triclopyr	
0913050459	Honeysuckles	0.5000	Washburn	Cut	Glyphosate	Triclopyr	
0913050460	Canada thistle	0.2500	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913050461	Canada thistle	0.0040	Washburn	Cut/pull/root-stab	Clopyralid	Glyphosate	
0913050463	Spotted knapweed	0.2000	Washburn	Pull/mow	Clopyralid	Glyphosate	
09131804251	Honeysuckles	0.3000	N. Great Lakes Visitor Ctr	Cut	Glyphosate	Triclopyr	
09131804252	Buckthorns	0.3000	N. Great Lakes Visitor Ctr	Cut	Glyphosate	Triclopyr	
09131804253	Wild parsnip	0.0050	N. Great Lakes Visitor Ctr	Root-stab/mow	Glyphosate	Triclopyr	
09131804254	Canada thistle	0.1000	N. Great Lakes Visitor Ctr	Cut/pull/root-stab	Clopyralid	Glyphosate	
09131804255	Buckthorns	0.0020	N. Great Lakes Visitor Ctr	Cut	Glyphosate	Triclopyr	
09131804467	Canada thistle	0.2500	N. Great Lakes Visitor Ctr	Cut/pull/root-stab	Clopyralid	Glyphosate	

Public Involvement Report

Introduction

The Chequamegon-Nicolet National Forest is proposing to implement a 10-year Forest-wide non-native invasive plant management program on about 1,400 sites within the National Forest. The purpose of the action is to prevent the further spread of non-native plants into native ecosystems and to keep these sites in their desired condition. We propose to reduce weed populations using an integrated combination of control methods based on the species and site. Methods include: manual/mechanical such as cutting or pulling; herbicide foliar spraying or stump treatment; and release of bio-control insects.

Public Involvement Process

Concerned agencies, local governments, and the public were notified and consulted about this non-native invasive plant control project in the early stages in the summer of 2004 and then throughout the project development process. Early in the project design, we solicited advice from area weed experts and incorporated their suggestions into the project. Public notification was placed on the Forest's web page and returnable postcards were sent to the Forest Region 9 NEPA mailing list. "Interest" was determined by returning the postcard.
On 4/2/2005, a legal notice was published in the Milwaukee Journal Sentinel and interested public, governmental, and other agency parties were mailed notification of this proposal. Notification consisted of a solicitation letter, project description, and maps. In addition, we identified and notified other potentially affected parties such as County agriculture agents.
Local Native American tribes were notified of our plans to control weeds. The Great Lakes Indian Fish and Wildlife Commission biologists were consulted and we discussed the need for collaborative efforts to control NNIS.

Number of Comments Received

As a result of public notice efforts, 10 formal responses were received. They represent the Wisconsin DNR, two organizations and 7 individuals. The responses included written letters and phone statements.

Process for Grouping Comments

All responses were dated (receipt date), assigned a unique identity number for tracking, and entered into a database for processing. Attachment 1 is a report from this database, and displays the result of our process. Each response was reviewed and divided into separate comments based upon identifiable subject area. These "comments" were then coded into pre-defined content categories.

Categories of Comments Received

Of the 10 responses received, 9 were overall supported the need for action and the Forest Service project, as proposed. A number of these supporters reiterated the cautions and mitigation measures already anticipated and designed into the project. One stated opposition to herbicides and bio-control and felt that natural processes should drive our response, but then offered a manual control method. No other rationale was given for the opposition to herbicides so there was no way to address this concern in the Decision Notice. We assume this responder would favor a manual control only alternative which we cover in the EA (Sec2.4 - Alternatives eliminated from detailed study)

Several people made offers to help pull weeds on the Forest, indicating a high level of concern and support for this effort. Several respondents suggested additional control methods including the use of prescribed fire. Prevention of weed infestation was a concern of 3 respondents who encouraged the Forest to reduce the types of man-made disturbance that degrade ecosystems and introduce weed seeds.

The interdisciplinary team grouped all responses into the following subject areas and categories (see Attachment 1 for more details):

1. Planning Processes (Forest Plan, NEPA, Purpose & Need, Range of Alternatives)
2. Physical Environment (Water Quality, Heritage Resources)
3. Biological Environment (Vegetation, Wildlife, Natural Succession, Insect and Disease)
4. Ecological Processes (Forest Health)
5. Resource Use (Timber Management, Pesticide Use, Fuel Management, Roads)

How Comments Were Considered

Since there were so few, all comments in the database were brought to the responsible official to be evaluated for substantive content on 05/10/2005 (see PF doc 3.A-03). No Substantive comments were identified in any of the responses (pursuant to 36 CFR 215. 2). While there were no substantive comments, rationale for comment dismissal is provided in the Content Analysis Report in Attachment 1.
When a comment was not pertinent to the proposed action, rationale was provided as to why this issue was not within the scope of the decision to be made.

Prepared by Marjory Brzeskiewicz May 2005

Natural Communities of the Chequamegon-Nicolet National Forest

Descriptions written by Epstein, Judziewicz, and Spencer 2002.

Alder Thicket

These wetlands are dominated by thick growths of tall shrubs, especially speckled alder (*Alnus incana*). Among the common herbaceous species are Canada bluejoint grass (*Calamagrostis canadensis*), orange jewelweed (*Impatiens capensis*), several asters (*Aster lanceolatus*, *A. puniceus*, and *A. umbellatus*), boneset (*Eupatorium perfoliatum*), rough bedstraw (*Galium asprellum*), marsh fern (*Thelypteris palustris*), arrow-leaved tearthumb (*Polygonum sagittatum*), and sensitive fern (*Onoclea sensibilis*). This type is common and widespread in northern and central Wisconsin, but also occurs in the southern part of the state.Black Spruce Swamp (A split from Curtis' Northern Wet Forest)

An acidic conifer swamp forest characterized by a relatively closed canopy of black spruce (*Picea mariana*) and an open understory in which Labrador-tea (*Ledum groenlandicum*) and sphagnum mosses (*Sphagnum* spp.) are often prominent, along with three-leaved false Solomon's-seal (*Smilacina trifolia*), creeping snowberry (*Gaultheria procumbens*), and three-seeded sedge (*Carex trisperma*). The herbaceous understory is otherwise relatively depauperate. This community is closely related to Open Bogs and Muskegs, and sometimes referred to as Forested Bogs outside of Wisconsin.

Boreal Forest

In Wisconsin, mature stands of this forest community are dominated by white spruce (*Picea glauca*) and balsam-fir (*Abies balsamea*), often mixed with white birch (*Betula papyrifera*), white cedar (*Thuja occidentalis*), white pine (*Pinus strobus*), balsam-poplar (*Populus balsamifera*) and quaking aspen (*Populus tremuloides*). Mountain-ash (*Sorbus* spp.) may also be present. Common understory herbs are large-leaved aster (*Aster macrophyllus*), bluebead lily (*Clintonia borealis*), Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), and bunchberry (*Cornus canadensis*). Most Wisconsin stands are associated with the Great Lakes, especially the clay plain of Lake Superior, and the eastern side of the northern Door Peninsula on Lake Michigan. Of potential interest from the perspectives of vegetation classification and restoration, white pine had the highest importance value of any tree in the Lake Superior region, as recorded during the original land survey of the mid-1800's.

Boreal Rich Fen

Neutral to alkaline cold open peatlands of northern Wisconsin through which carbonate-rich groundwater percolates. Sphagnum mosses are absent or of relatively minor importance, as calciphilic species (especially the "brown" mosses) predominate. Dominant/characteristic plants include woolly sedge (*Carex lasiocarpa*), twig rush (*Cladium mariscoides*), beaked bladderwort (*Utricularia cornuta*), rushes (*Juncus* spp.), and Hudson Bay cotton-grass (*Scirpus hudsonianus*). Shrubby phases also occur, with bog birch (*Betula pumila*), sage willow (*Salix candida*), and speckled alder (*Alnus incana*) present in significant amounts.

Dry Cliff (Exposed Cliff of Curtis' community classification)

These dry vertical bedrock exposures occur on many different rock types, which may influence species composition. Scattered pines, oaks, or shrubs often occur. However, the most characteristic plants are often the ferns, common polypody (*Polypodium vulgare*) and rusty woodsia (*Woodsia ilvensis*), along with herbs such as columbine (*Aquilegia canadensis*), harebell (*Campanula rotundifolia*), pale corydalis (*Corydalis sempervirens*), juneberry (*Amelanchier* spp.), bush-honeysuckle (*Diervilla lonicera*), and rock spikemoss (*Selaginella rupestris*).

Emergent Aquatic

These open, marsh, lake, riverine and estuarine communities with permanent standing water are dominated by robust emergent macrophytes, in pure stands of single species or in various mixtures. Dominants include cat-tails (*Typha* spp.), bulrushes (particularly *Scirpus acutus*, *S. fluviatilis*, and *S. validus*), bur-reeds (*Sparganium* spp.), giant reed (*Phragmites australis*), pickerel-weed (*Pontederia cordata*), water-plantains (*Alisma* spp.), arrowheads (*Sagittaria* spp.), and the larger species of spikerush such as (*Eleocharis smallii*).

Emergent Aquatic - Wild Rice

This open community is an emergent macrophyte type, with wild rice (*Zizania aquatica* or *Z. palustris*) as the dominant species. The substrate usually consists of poorly-consolidated, semi-organic sediments. Water fertility is low to moderate, and a slow current is present. Wild rice beds have great cultural significance to native peoples, and are important wildlife habitats.

Ephemeral Pond

These ponds are depressions with impeded drainage (usually in forest landscapes), that hold water for a period of time following snowmelt but typically dry out by mid-summer. Common aquatic plants of these habitats include yellow water crowfoot (*Ranunculus flabellaris*), mermaid weed (*Proserpinaca palustris*), Canada bluejoint grass (*Calamagrostis canadensis*), floating manna grass (*Glyceria septentrionalis*), spotted cowbane (*Cicuta maculata*), smartweeds (*Polygonum* spp.), orange jewelweed (*Impatiens capensis*), and sedges. Ephemeral ponds provide critical breeding habitat for certain invertebrates, as well as for many amphibians such as frogs and salamanders.

Mesic Cedar Forest

This is a rare upland forest community of mesic sites in northern Wisconsin, characterized by white cedar (*Thuja occidentalis*) and various associates including hemlock (*Tsuga canadensis*), white spruce (*Abies balsamea*), yellow birch (*Betula alleghanensis*), and white pine (*Pinus strobus*). The herb layer may contain canada mayflower (*Maianthemum canadense*), twinflower (*Linnaea borealis*), clubmosses (*Lycopodium* spp.), and others. More information is needed on this community type

Moist Cliff (Shaded Cliff of the Curtis community classification)

This "micro-community" occurs on shaded (by trees or the cliff itself because of aspect), moist to seeping mossy, vertical exposures of various rock types, most commonly sandstone and dolomite. Common species are columbine (*Aquilegia canadensis*), the fragile ferns (*Cystopteris bulbifera and C. fragilis*), wood ferns (*Dryopteris* spp.), rattlesnake-root (*Prenanthes alba*), and wild sarsaparilla (*Aralia nudicaulis*). The rare flora of these cliffs vary markedly in different parts of the state; Driftless Area cliffs might have northern monkshood (*Aconitum noveboracense*), those on Lake Superior, butterwort (*Pinguicula vulgaris*), or those in Door County, green spleenwort (*Asplenium viride*).

Muskeg

Muskegs are cold, acidic, sparsely wooded northern peatlands with composition similar to the Open Bogs (*Sphagnum* spp. *mosses, Carex* spp., and ericaceous shrubs), but with scattered stunted trees of black spruce (*Picea mariana*) and tamarack (*Larix laricina*). Plant diversity is typically low, but the community is important for a number of boreal bird and butterfly species, some of which are quite specialized and not found in other communities.

Northern Dry Forest

This forest community occurs on nutrient-poor sites with excessively drained sandy or rocky soils. The primary historic disturbance regime was catastrophic fire at intervals of decades to approximately a century. Dominant trees of mature stands include jack and red pines (*Pinus banksiana* and *P. resinosa*) and/or Hill's oak (*Quercus ellipsoidalis*). Large acreages of this forest type were cut and burned during the catastrophic logging of the late 19th and early 20th century. Much of this land was then colonized by white birch (*Betula papyrifera*) and/or quaking aspen (*Populus tremuloides*), or converted to pine plantations starting in the 1920s. Common understory shrubs are hazelnuts (*Corylus* spp.), early blueberry (*Vaccinium angustifolium*) and brambles (*Rubus* spp.); common herbs include bracken fern (*Pteridium aquilinium*), starflower (*Trientalis borealis*), barren-strawberry (*Waldsteinia fragarioides*), cow-wheat (*Melampyrum lineare*), trailing arbutus (*Epigaea repens*), and members of the shinleaf family (*Chimaphila umbellata*, *Pyrola* spp.). Vast acreages of open "barrens" were also planted to pine, or naturally succeeded to densely stocked “dry” forests.

Northern Dry-Mesic Forest

In this forest community, mature stands are dominated by white and red pines (*Pinus strobus* and *P. resinosa*), sometimes mixed with red oak (*Quercus rubra*) and red maple (*Acer rubrum*). Common understory shrubs are hazelnuts (*Corylus* spp.), blueberries (*Vaccinium angustifolium* and *V. myrtilloides*), wintergreen (*Gaultheria procumbens*), partridge-berry (*Mitchella repens*); among the dominant herbs are wild sarsaparilla (*Aralia nudicaulis*), Canada mayflower (*Maianthemum canadense*), and cow-wheat (*Melampyrum lineare*). Stands usually occur on sandy loams, sands or sometimes rocky soils.

Northern Hardwood Swamp (formerly Hardwood Swamp, split from Curtis’ Northern Wet-Mesic Forest)

These are northern deciduous forested wetlands that occur along lakes or streams, or in insular basins in poorly drained morainal landscapes. The dominant tree species is black ash (*Fraxinus nigra*), but in some stands red maple (*Acer rubrum*), yellow birch (*Betula allegheniensis*), and (*formerly*) American elm (*Ulmus americana*) are also important. The tall shrub speckled alder (*Alnus incana*) may be locally common. The herbaceous flora is often diverse and may include many of the same species found in Alder Thickets. Typical species are marsh-marigold (*Caltha palustris*), swamp raspberry (*Rubus pubescens*), skullcap (*Scutellaria galericulata*), orange jewelweed (*Impatiens capensis*), and many sedges (*Carex spp.*). Soils may be mucks or mucky sands.

Northern Mesic Forest

This forest complex covered the largest acreage of any Wisconsin vegetation type prior to European settlement. Sugar maple (*Acer saccharum*) is dominant or co-dominant in most stands, while hemlock (*Tsuga canadensis*) was the second most important species, sometimes occurring in nearly pure stands with white pine (*Pinus strobus*). Beech (*Fagus grandifolia*) can be a co-dominant with sugar maple in the counties near Lake Michigan. Other important tree species were yellow birch (*Betula allegheniensis*), basswood (*Tilia americana*), and white ash (*Fraxinus americana*). The groundlayer varies from sparse and species poor (especially in hemlock stands) with woodferns (especially Dryopteris intermedia), bluebead lily (*Clintonia borealis*), clubmosses (*Lycopodium* spp.), and Canada mayflower (*Maianthemum canadense*) prevalent, to lush and species-rich with fine spring ephemeral displays. After old-growth stands were cut, trees such as quaking and bigtoothed aspens (*Populus tremuloides* and *P. grandidentata*), white birch (*Betula papyrifera*), and red maple (*Acer rubrum*) became and still are important in many second-growth Northern Mesic Forests. Several distinct associations within this complex warrant recognition as communities, and draft abstracts of these are currently undergoing review.

Northern Sedge Meadow

This open wetland community is dominated by sedges and grasses. There are several common subtypes: Tussock meadows, dominated by tussock sedge (*Carex stricta*) and Canada bluejoint grass (*Calamagrostis canadensis*); Broad-leaved sedge meadows, dominated by the robust sedges (*Carex lacustris* and/or *C. utriculata*); and Wire-leaved sedge meadows, dominated by such species as woolly sedge (*Carex lasiocarpa*) and few-seeded sedge (*C. oligosperma*). Frequent associates include marsh bluegrass (*Poa palustris*), manna grasses (*Glyceria* spp.), panicled aster (*Aster lanceolatus*), joy-pye-weed (*Eupatorium maculatum*), and the bulrushes (*Scirpus atrovirens* and *S. cyperinus*).

Northern Wet Forest (revised from Curtis, with Black Spruce and Tamarack Swamps split out)

These weakly minerotrophic conifer swamps, located in the North, are dominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*). Jack pine (*Pinus banksiana*) may be a significant canopy component in certain parts of the range of this community complex. Understories are composed mostly of sphagnum (*Sphagnum* spp.) mosses and ericaceous shrubs such as leatherleaf (*Chamaedaphne calyculata*), Labrador-tea (*Ledum groenlandicum*), and small cranberry (*Vaccinium oxycoccos*) and sedges such as (*Carex trisperma* and *C paupercula*). The Natural Heritage Inventory has split out two entities, identified (but not strictly defined) by the two dominant species (see Black Spruce Swamp and Tamarack Swamp).

Northern Wet-Mesic Forest (revised from Curtis, with Northern Hardwood Swamp split out)

This forested minerotrophic wetland is dominated by white cedar (*Thuja occidentalis*), and occurs on rich, neutral to alkaline substrates. Balsam fir (*Abies balsamea*), black ash (*Fraxinus nigra*), and spruces (*Picea glauca and P. mariana*) are among the many potential canopy associates. The understory is rich in sedges (*such as Carex disperma and C. trisperma*), orchids (*e.g., Platanthera obtusata and Listera cordata*), and wildflowers such as goldthread (*Coptis trifolia*), fringed polygala (*Polygala pauciflora*), and naked miterwort (*Mitella nuda*), and trailing sub-shrubs such as twinflower (*Linnaea borealis*) and creeping snowberry (*Gaultheria hispidula*). A number of rare plants occur more frequently in the cedar swamps than in any other habitat.

Open Bog

These non-forested bogs are acidic, low nutrient, northern Wisconsin peatlands dominated by Sphagnum spp. mosses that occur in deep layers, often with pronounced hummocks and hollows. Also present are a few narrow-leaved sedge species such as (*Carex oligosperma* and *C. pauciflora*), cotton-grasses (*Eriophorum* spp.), and ericaceous shrubs, especially bog laurel (*Kalmia polifolia*), leatherleaf (*Chamaedaphne calyculata*), and small cranberry (*Vaccinium oxycoccus*). Plant diversity is very low but includes characteristic and distinctive specialists. Trees are absent or achieve very low cover values as this community is closely related to and intergrades with Muskeg. When this community occurs in southern Wisconsin, it is often referred to as a Bog Relict.

Pine Barrens

This savanna community is characterized by scattered jack pines (*Pinus banksiana*), or less commonly red pines (*P. resinosa*), sometimes mixed with scrubby Hill's and bur oaks (*Quercus ellipsoidalis* and *Q. macrocarpa*), interspersed with openings in which shrubs such as hazelnuts, (*Corylus* spp.) and prairie willow (*Salix humilis*) and herbs dominate. The flora often contains species characteristic of "heaths" such as blueberries (*Vaccinium angustifolium* and *V. myrtilloides*), bearberry (*Arctostaphylos uva-ursi*), American hazelnut (*Corylus americana*), sweet fern (*Comptonia peregrina*), and sand cherry (*Prunus pensylvanica*). Also present are dry sand prairie species such as june grass (*Koeleria macrantha*), little bluestem (*Schizachyrium scoparium*), silky and sky-blue asters (*Aster sericeus* and *A. azureus*), lupine (*Lupinus perennis*), blazing-stars (*Liatris aspera* and *L. cylindracea*), and western sunflower (*Helianthus occidentalis*). Pines may be infrequent, even absent, in some stands in northern Wisconsin and elsewhere because of past logging, altered fire regimes, and an absence of seed source.

Poor Fen

This acidic, weakly minerotrophic peatland type is similar to the Open Bog, but can be differentiated by higher pH, nutrient availability, and floristics. Sphagnum (*Sphagnum* spp.) mosses are common but don't typically occur in deep layers with pronounced hummocks. Floristic diversity is higher than in the Open Bog and may include white beak-rush (*Rhynchospora alba*), pitcher-plant (*Sarracenia purpurea*), sundews (*Drosera* spp.), pod grass (*Scheuchzeria palustris*), and the pink-flowered orchids (*Calopogon tuberosus, Pogonia ophioglossoides and Arethusa bulbosa*). Common sedges are (*Carex oligosperma*, *C. limosa*, *C. lasiocarpa*, *C. chordorrhiza*), and cotton-grasses (*Eriphorum* spp.).

Shrub-Carr

This wetland community is dominated by tall shrubs such as red-osier dogwood (*Cornus stolonifera*), meadow-sweet (*Spiraea alba*), and various willows (*Salix discolor*, *S. bebbiana*, and *S. gracilis*). Canada bluejoint grass (*Calamagrostis canadensis*) is often very common. Associates are similar to those found in Alder Thickets and tussock-type Sedge Meadows. This type is common and widespread in southern Wisconsin but also occurs in the north.

Submergent Aquatic

This herbaceous community of aquatic macrophytes occurs in lakes, ponds, and rivers. Submergent macrophytes often occur in deeper water than emergents, but there is considerable overlap. Dominants include various species of pondweeds (*Potamogeton spp.*) along with waterweed (*Elodea canadensis*), slender naiad (*Najas flexilis*), eel-grass (*Vallisneria americana*), and species of water-milfoil (*Myriophyllum*) and bladderworts (*Utricularia*).

Submergent Aquatic - Oligotrophic marsh (formerly called Submergent Aquatic - Oligotrophic)

This herbaceous community of distinctive highly specialized submersed, rosette-forming aquatic macrophytes occurs in clear, deep soft-water lakes in northern Wisconsin. The plants grow at depths ranging from the beach line to several meters. Species in this community include American shore-grass (*Littorella americana*), pipewort (*Eriocaulon septangulare*), yellow hedge-hyssop (*Gratiola aurea*), aquatic lobelia (*Lobelia dortmanna*), a milfoil (*Myriophyllum tenellum*), brown-fruit rush (*Juncus pelocarpus*), and quillworts (*Isoetes* spp.).

Tamarack (poor) Swamp (formerly called Tamarack Swamp, this is a split from Curtis' Northern Wet Forest)

These weakly to moderately minerotrophic conifer swamps are dominated by a broken to closed canopy of tamarack (*Larix laricina*) and a frequently dense understory of speckled alder (*Alnus incana*). The understory is more diverse than in Black Spruce Swamps and may include more nutrient-demanding species such as winterberry holly (*Ilex verticillata*) and black ash (*Fraxinus nigra*). The bryophytes include many genera other than Sphagnum. Stands with spring seepage sometimes have marsh-marigold (*Caltha palustris*) and skunk-cabbage (*Symplocarpus foetidus*) as common understory inhabitats. These seepage stands have been separated out as a distinct type or subtype in some nearby states and provinces.

List of Principal Past, Present, and Reasonably Foreseeable Actions (that could affect resources).

Note: Cumulative Effects Analysis Area: Eleven Counties in Northern Wisconsin that contain National Forest Lands (Ashland, Bayfield, Florence, Forest, Langlade, Price, Oconto, Oneida, Sawyer, Taylor, and Vilas Counties, Wisconsin)

RESOURCE ISSUE	PRINCIPLE PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS THAT COULD AFFECT RESOURCES
Vegetation (including Native Plant Communities and Non-native Invasive Plants)	• Chequamegon-Nicolet National Forest herbicide applications authorized under CNNF non-native Invasive Plant Control Project to maintain roads, trails, and recreation and administrative sites decision (signed October, 2004), to occur between 2005-2015 (450 acres) • Other Federal and Non-federal Non-Native Invasive Species (NNIS) control activities in northern Wisconsin: Apostle Islands National Lakeshore (NPS), Whittlesey Creek National Wildlife Refuge (FWS), purple loosestrife control by Great Lakes Indian Fish & Wildlife Commission in Fish Creek and Kakagon Sloughs, Leafy Spurge biocontrol release by Northwood Invasive Species Council treatments in Bayfield County, garlic mustard control at Flambeau River State Forest, future treatments within Northern Highland American Legion State Forest, and purple loosestrife biocontrol projects coordinated by various Lake Associations. • Past federal NNIS control activities on CNNF, such as manual/mechanical control (1995-2005), and biocontrol release at Round Lake logging dam (1994). • Future release of leafy spurge biocontrol in Ashland County(flea beetles) approved in the Cayuga Project ROD (signed in May 2004, release has not occurred yet). • Herbicide applications to control NNIS by private landowners. • Non-federal mechanical control of NNIS, such as mowing of roadsides. • Additional future projects designed to control NNIS.
Soils, Hydrology, Water Quality, and Aquatic Organisms	• Non-point source agricultural chemical runoff from private lands. • Agricultural and other physical activities on private lands and in campground and developed areas of CNNF contributing to sedimentation. • Other activities contributing to point source and non-point source discharges of contaminants such as mercury • Chequamegon-Nicolet National Forest herbicide applications authorized under CNNF non-native Invasive Plant Control Project to maintain roads, trails, and recreation and administrative sites decision (signed October, 2004), to occur between 2005-2015 (450 acres)
Human Health & Safety	• No herbicide use for silvicultural site preparation since 1990 on Chequamegon & Nicolet National Forests. • Chequamegon-Nicolet National Forest herbicide applications authorized under CNNF non-native Invasive Plant Control Project to maintain roads, trails, and recreation and administrative sites decision (signed October, 2004) to occur between 2005-2015 (450 acres). • Oconto River Seed Orchard in Langlade County uses herbicide on a portion of 670 acres (EIS 1997) • Public and private herbicide applications; amount and locations uncertain. • Farm agricultural use of herbicides; 150,000 acres in 11 Counties in

	2002. • Federal, State, County, and private pesticide spraying activities that might expose individuals to pesticide residues. • Traffic accidents, work place and hand tool accidents.
Threatened, Endangered, & Sensitive Species	• Chequamegon-Nicolet National Forest herbicide applications authorized under CNNF non-native Invasive Plant Control Project to maintain roads, trails, and recreation and administrative sites decision (signed October, 2004), to occur between 2005-2015 (450 acres). • Past federal NNIS control activities on CNNF, such as manual/mechanical control (1995-2005), and biocontrol release at Round Lake logging dam (1994) • Other Federal and Non-federal Non-Native Invasive Species (NNIS) control activities in northern Wisconsin: Whittlesey Creek National Wildlife Refuge (FWS) buckthorn and honeysuckle chemical and mechanical treatment, purple loosestrife control by Great Lakes Indian Fish & Wildlife Commission in Fish Creek and Kakagon Sloughs, Leafy Spurge biocontrol release by the Northwoods Weed Initiative in Bayfield County, garlic mustard control at Flambeau River State Forest, Northern Highland American Legion State Forest, and purple loosestrife biocontrol projects coordinated by various Lake Associations and Wisconsin DNR, Apostle Islands National Lakeshore (NPS) NNIS control. • Past federal NNIS manual/mechanical control activities on CNNF, such as manual/mechanical control (1995-2005). • Use of biocontrol agents by the Forest Service to control purple loosestrife (Round Lake logging dam,1994). • Future release of leafy spurge biocontrol (flea beetles) approved in the Cayuga Vegetation Management Decision (signed in 2004, release has not occurred yet). • Management activities, including natural succession, which are designed to protect rare species. • Timber harvesting and other forest management activities that can result in negative impacts to species and habitat (CNNF, State, County, Private lands).

Sites where Clopyralid Herbicide cannot be used

List of NNIS weed sites with high water table or rapid to very rapid permeability throughout the profile where no herbicides containing Clopyralid would be used.

Site ID
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091302034
091302371
091303002
091303008
0913010312
913010326
0913020238
0913020240
0913020317
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0913040075
0913040088

Site ID
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Site ID
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