



Invasive Non-native Plant Management During 2000

by

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INTRODUCTION

The Great Lakes Indian Fish and Wildlife Commission (GLIFWC) is an organization exercising delegated authority from 11 federally recognized tribes in Minnesota, Wisconsin, and Michigan (Figure 1). These tribes retain hunting, fishing, and gathering rights in the territories ceded to the United States through various treaties (Figure 1). The exercise of these rights may be threatened by the degradation of native ecosystems by invasive non-native plants.

This report summarizes the activities undertaken by GLIFWC staff during 2000 to address the spread of invasive non-native plant species in the ceded territories. GLIFWC staff have conducted annual inventory and control work on purple loosestrife (*Lythrum salicaria*) since 1988 (Gilbert and Parisien 1989, Edblom et al. 1995, Gilbert et al. 1995, Gilbert et al. 1998, Falck et al. 1999, Falck et al. 2000). In 2000, GLIFWC staff identified the need to 1) reassess the distribution of purple loosestrife within the Bad River-Chequamegon Bay watershed to evaluate past control efforts, 2) continue and expand control activities via an ambitious biological control program, 3) continue educational outreach activities aimed at preventing the introduction and spread of additional exotic plants, and 4) continue to coordinate activities with other resource agencies, universities, non-governmental organizations, and the general public.

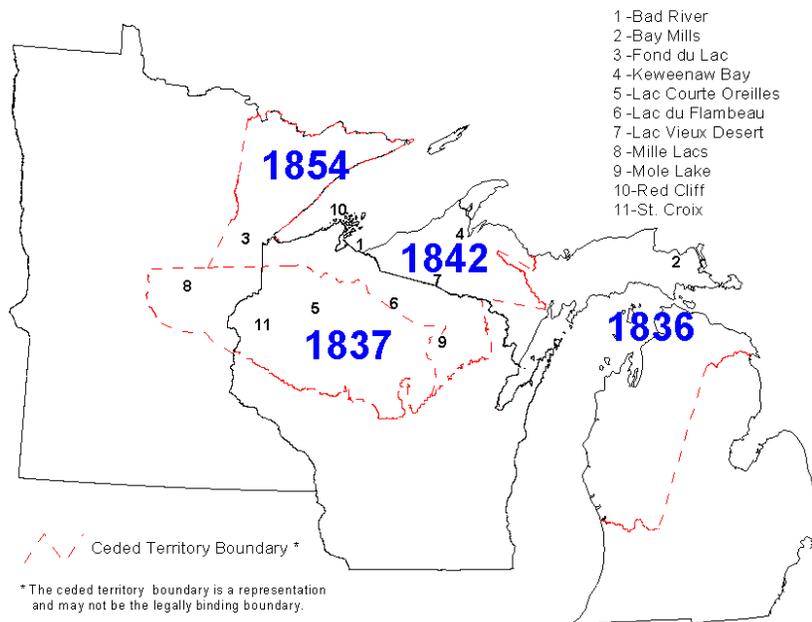


Figure 1. Location of GLIFWC member tribes and ceded territories.

EVALUATION OF PAST PURPLE LOOSESTRIFE CONTROL EFFORTS WITHIN THE BAD RIVER WATERSHED

The primary objectives of the 2000 survey for purple loosestrife within the Bad River - Chequamegon Bay watershed were to evaluate the effectiveness of past control efforts and to gather data to guide future control efforts.

METHODS

Methods were based on similar surveys conducted in 1994 (Edblom et al. 1995) and 1995 (Gilbert et al. 1995) to allow valid comparisons of data. Field surveys were conducted during July, August, and September 2000 following the same routes used in 1994 and 1995 (Figure 2). Observations were made from a truck or boat traveling slow enough to identify flowering loosestrife plants. In stands < 10m in length along their longest axis, all loosestrife plants were counted and categorized by class (Thompson et al. 1987). For stands \geq 10m in length, a transect running parallel to the stand's longest axis consisting of 10 evenly spaced 1m² plots was used to measure density. Areal extent was estimated using a quadrat frame and pacing as a reference where appropriate. Locations were recorded using a hand-held GPS receiver. Additional site attributes were recorded to facilitate correlation of purple loosestrife occurrence with various site attributes to improve the efficiency of future inventory and control efforts (Table 1). All data were compiled into a GIS database for analysis.

RESULTS

A total of 97 discrete populations of purple loosestrife were found along the survey routes in 2000 compared to 217 populations in 1994-95 (Figure 3). Total area decreased by slightly more than 370 acres (Table 2, Figure 4). In contrast, total density increased by 323 plants/m² (Table 2, Figure 5).

DISCUSSION

Purple loosestrife control efforts within the Bad River-Chequamegon Bay watershed have been jointly implemented by GLIFWC, Bad River Natural Resources Department (BRND) and The Nature Conservancy (TNC). Control efforts have focused on Fish Creek Sloughs (GLIFWC), highway 13 rights-of-way between Ashland and Highbridge (GLIFWC), private lands in the Highbridge area (TNC, GLIFWC), and the Kakagon Sloughs (BRND).

Substantial reductions in areal extent were observed in the Highbridge area, the Kakagon Sloughs, and the highway 13 right-of-way between Ashland and Highbridge where past control efforts have been focused. Although these same areas showed increases in the number of discrete populations, this may be the result of the previously larger populations being fragmented

Table 1. Additional site attributes collected during 2000 Bad River - Chequamegon Bay watershed purple loosestrife survey.

Attribute	Categories
Habitat	open wooded shoreline woodland edge
Hydrology	wet dry seasonally wet
Land Use	natural area agricultural urban
Disturbance	unknown none travel corridor cultivation logging mowing construction
Land Ownership	private county federal tribal

into numerous smaller populations from control activities. This hypothesis is supported by the fact that the mean area of each loosestrife population has decreased substantially between 1995 and 2000 ($O_{94-95} = 6966.4 \text{ m}^2$ vs. $O_{2000} = 67.9 \text{ m}^2$). Similarly, total density within the survey area increased dramatically, however, Class I plants were responsible for the greatest increase in plant density. Class I plants are small pioneering plants that typically emerge from the residual seed bank following control measures that release young seedlings from competition. This was corroborated by a substantial decrease in the density of Class II plants and only a slight increase in the density of Class III plants whose mature flowering spikes were the primary targets of chemical control crews searching for areas to treat.

Reductions in areal extant along highway 13 between Ashland and Washburn probably reflect the impacts of recent highway construction activities. During the summer of 2000, a passing lane was added to this stretch of highway and the adjacent loosestrife-infested right-of-way was entirely excavated. Increases in loosestrife areal extant were detected at Beartrap Creek on the

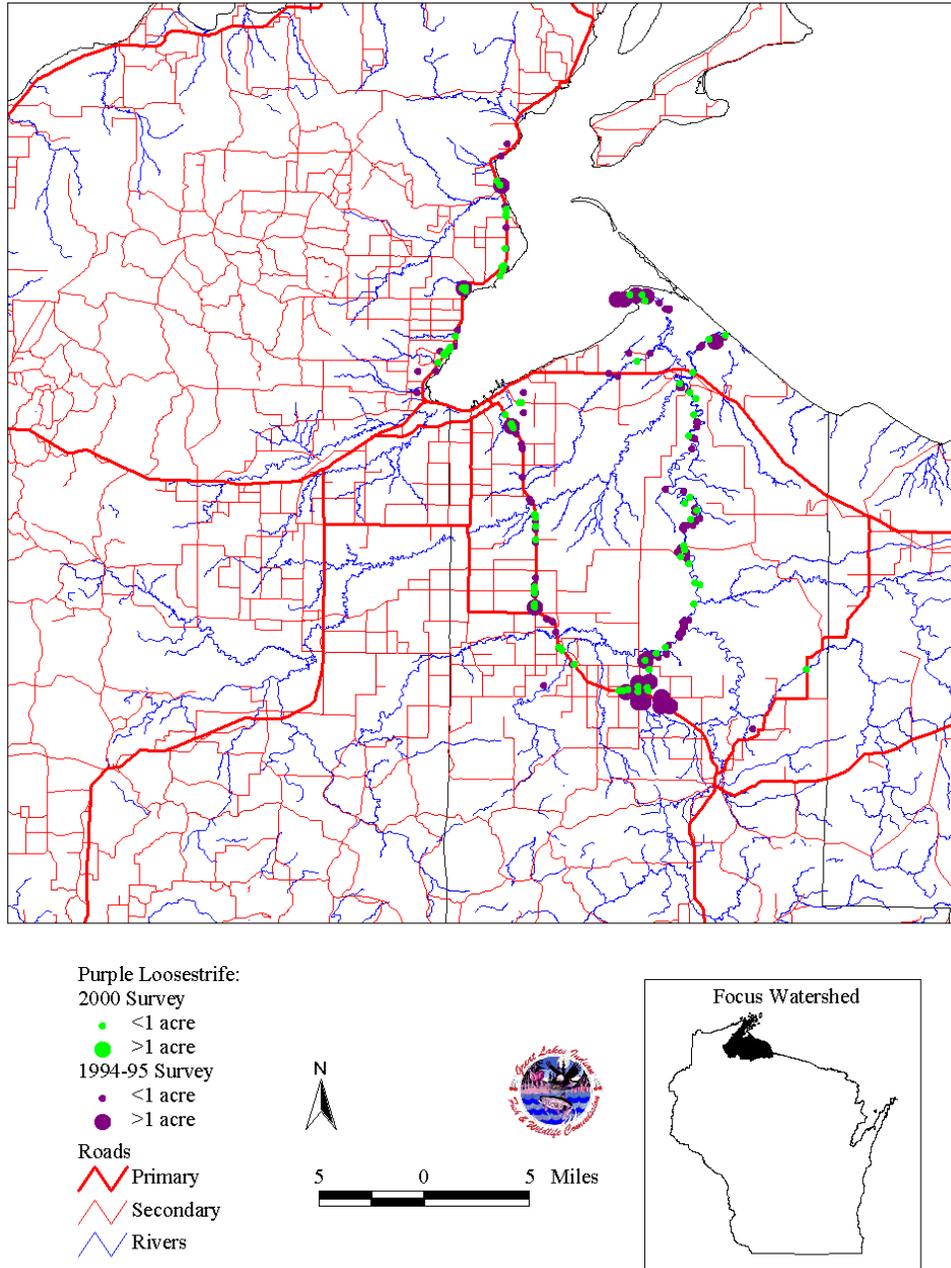


Figure 3. Location and areal extant of purple loosestrife, 1994-95 vs. 2000.

Bad River Indian Reservation and the Sioux River Sloughs near Washburn where no active control measures have occurred in the past. *Galerucella* beetles, a biological control, were released at the Sioux River Sloughs in 2000 and the Bad River Tribe is currently weighing control options for the Beartrap Creek site. The Bad River corridor was treated for the first time in 2000 after the survey was conducted. Changes in loosestrife abundance detected along the Bad River probably resulted from natural erosion along the river's banks.

Overall, it appeared that chemical control efforts have been used successfully to reduce the abundance and areal extent of purple loosestrife where these measures have been employed on a consistent annual basis. The increase in the density of Class I plants at these sites illustrates the point that chemical control is a long term commitment and the decision to use this method requires careful consideration of this fact prior to implementation. GLIFWC proposes to continue the use of chemical control on small sites that are the easiest to eradicate and to use biological controls where large populations would dictate a substantial annual commitment to treat with herbicides.

Table 2. Change in number of populations and density from 1994-2000 for purple loosestrife in the Bad River - Chequamegon Bay watershed.

Location	No. Populations	Area (acres)	Density (plants/m ²)			
			Class I ^a	Class II ^b	Class III ^c	Total
Highway 13 North	-58	-10.4	37.6	-271.0	-60.6	-267.8
Highway 13 South	0	-11.2	160.7	10.5	19.7	190.6
Bad River	-29	-0.7	61.2	7.5	32.7	101.4
Beartrap Creek	-4	0.5	33.6	-22.7	-1.0	7.3
County Rd. A	0	-0.2	121.1	-7.1	-1.4	125.6
Highbridge	-5	-144.5	-0.4	0.9	7.6	9.2
Honest John Sloughs	-2	-2.6	1.0	-0.2	6.4	7.2
Kakagon Sloughs	-6	-110.4	27.0	3.6	0.3	14.9
Marengo River	-13	0.0	25.0	-2.0	1.0	24.0
Silver Creek	-2	-92.3	52.3	9.1	35.0	136.4
Highway 169	0	0.0	-17.0	-5.0	-3.0	-25.0
Highway 2	-1	0.0	0.0	-0.2	0.0	-0.2
Totals	-120	-371.8	+502.1	-276.6	+36.7	+323.6

a Small scattered plants with 1-5 flowering stems/rootstock.

b Mature plants with 10 flowering stems/rootstock, clumps sometimes forming aggregate floral masses.

c Aggregates closing to form large monospecific patches or stands.

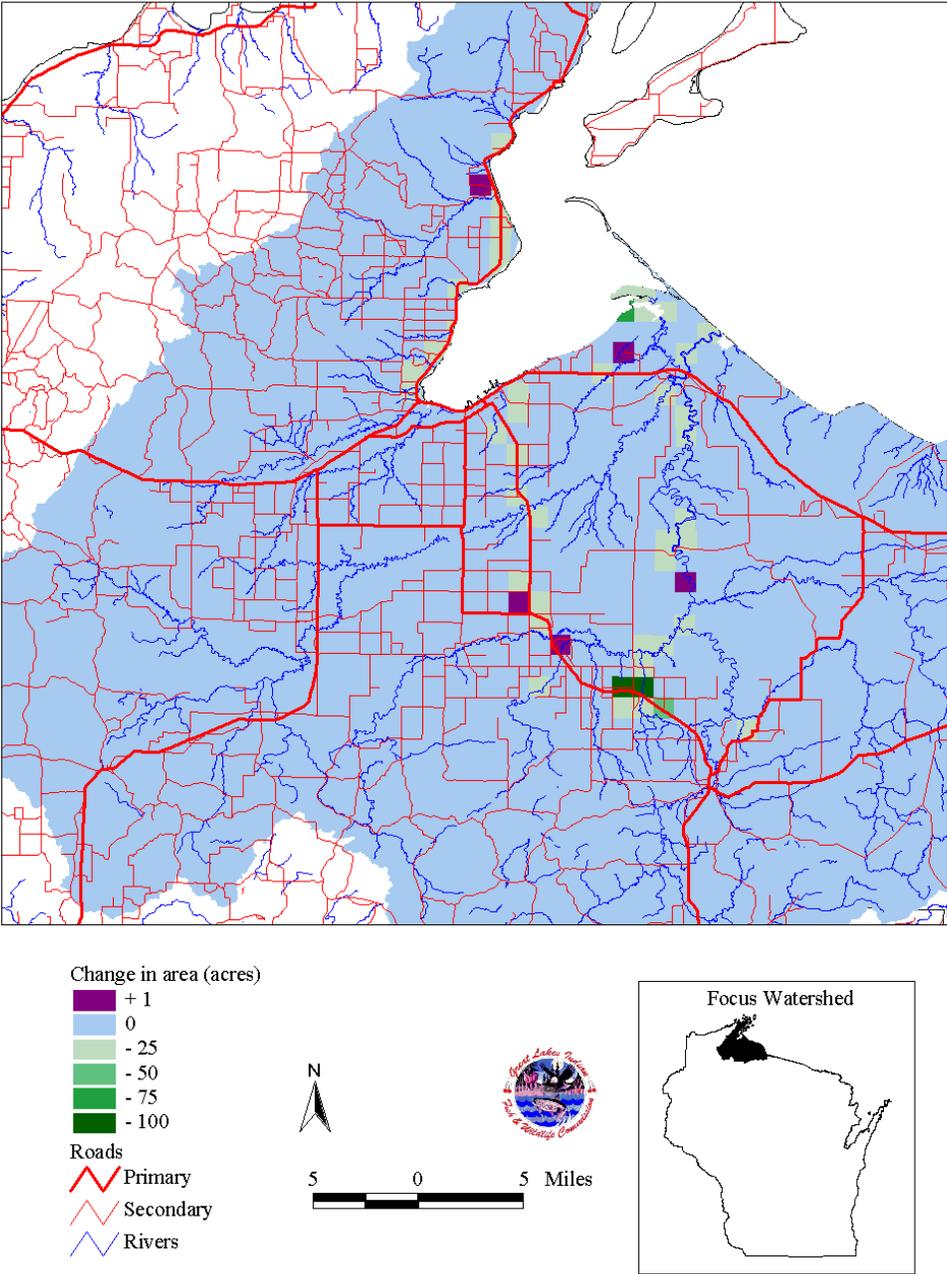


Figure 4. Change in areal extant of purple loosestrife by section, 1994-2000.

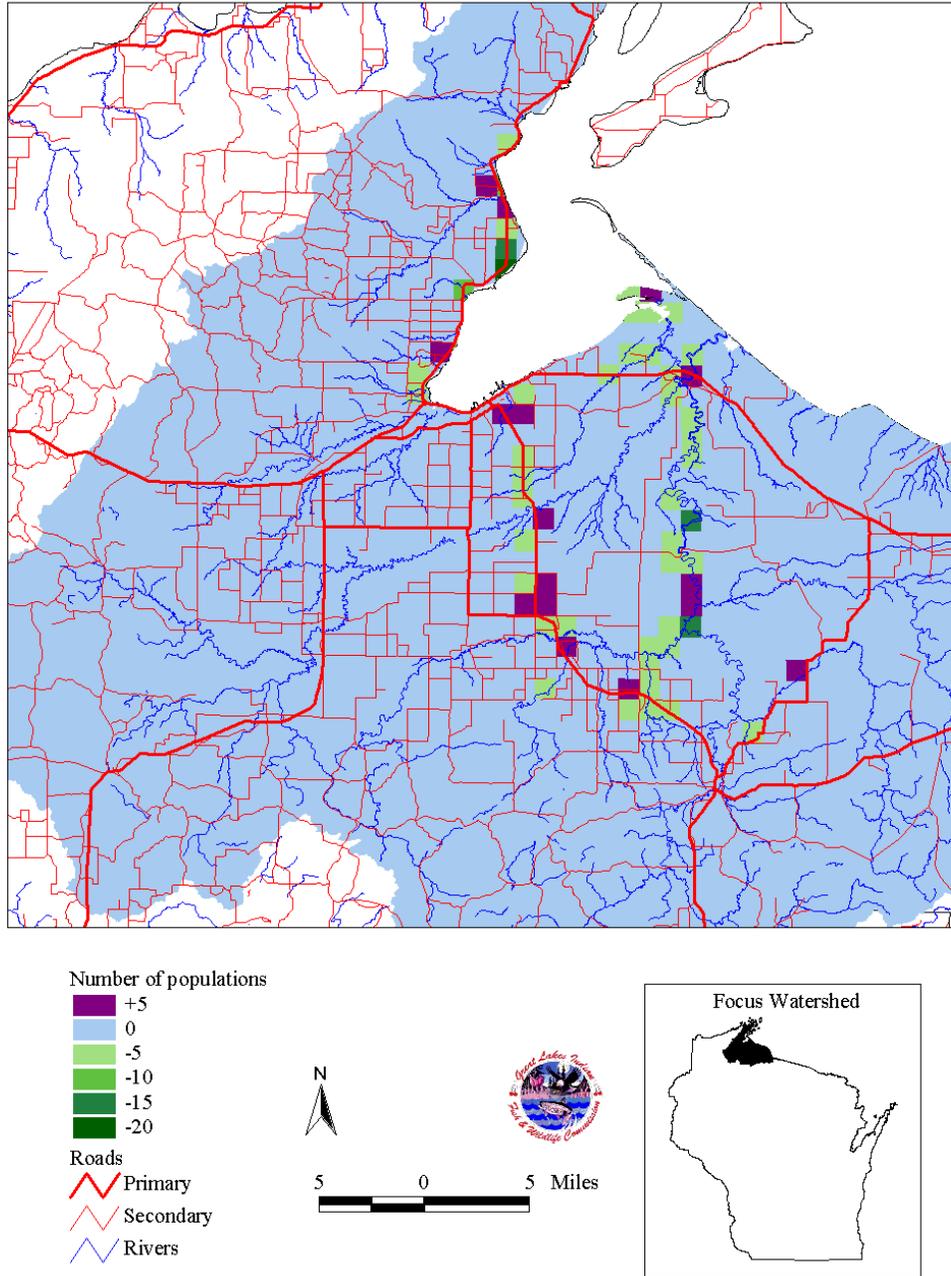


Figure 5. Change in number of purple loosestrife populations by section, 1994-2000.

CONTROL ACTIVITIES IN THE BAD RIVER-CHEQUAMEGON BAY WATERSHED

METHODS

Purple loosestrife populations within the Bad River - Chequamegon Bay watershed were inventoried in 1994, 1995, 1999, and 2000 (Gilbert et al. 1995, Edblom et al. 1995, Falck et al. 2000). Data from these surveys were used to prioritize effort and select control methods based on the area of the site, number of plants, and the site's location within the watershed. Small sites with few plants that threatened to infest downstream reaches were given the highest priority for chemical control (Figure 6). Large sites (\$ 1 acre or \$1,000 plants) were given low priority for chemical control but high priority for biological control (Figure 6).

Chemical Control:

Prior to conducting field applications of herbicide, all loosestrife control workers attended a 1 day training workshop conducted by GLIFWC staff. Participants learned or reviewed safe handling, storage, and application procedures, applicable state and federal regulations, and received training on equipment operation and maintenance.

Herbicides were applied to loosestrife stands using back pack sprayers. Glyphosate, a non-selective herbicide, was used in very dense stands or over-water. The dicot-specific herbicide triclopyr was used on dry sites including road-side ditches and fields. Efforts were focused primarily on Fish Creek Sloughs, and the highway 13 right-of-way between Highbridge and Washburn. Private uplands in the Highbridge area were treated primarily by staff from TNC with assistance from the GLIFWC crew after consent forms were signed by the landowner.

Biological Control:

In 2000, GLIFWC initiated a biological control program, rearing approximately 70,000 *Galerucella* beetles for distribution within the watershed. The release of *Galerucella* beetles (native to Europe) in the United States for biological control of purple loosestrife was approved by USDA - APHIS in 1992. The beetles were reared following methods outlined by Loos and Ragsdale (1998). Mature purple loosestrife root stock was transplanted into pots from a population on WI DNR property at the mouth of the Sioux River. The UW-Extension's Ashland Agricultural Research Station provided space for rearing the *Galerucella* beetles. Ninety potted plants were placed in small wading pools filled with 4-6 inches of water. In late May and early June, adult *Galerucella* beetles were collected from previous release sites and placed on the potted plants. Approximately 10 beetles were placed on each plant and a mesh net bag was placed over each plant to protect the beetles and larvae from bird and insect predation (Figure 7). An estimated 750 adult beetles were reared in each pot.

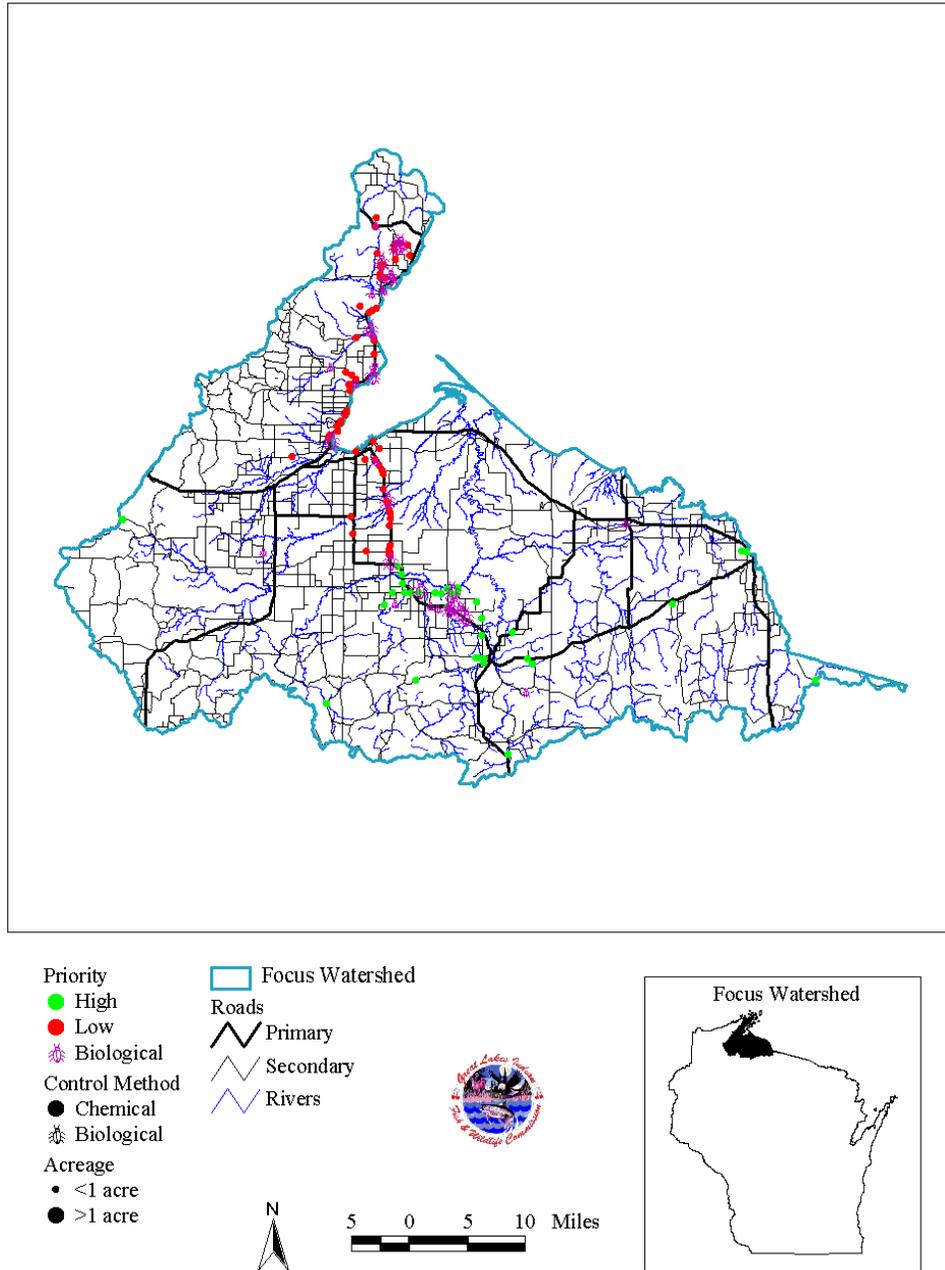


Figure 6. Control priority and method for off-reservation purple loosestrife sites, 2000.



Figure 7. Rearing *Galerucella* beetles.

Evaluation

Spatial data collected during annual surveys were used to quantify the progress of control efforts. Treated loosestrife patches were identified on maps and coded for control in 2000. Each *Galerucella* release site was photographed during the peak of purple loosestrife's blooming period to document the pre-treatment condition of each site. Summary statistics of treated patches were determined with ArcView GIS.

RESULTS

A total of 88 sites comprising 46 acres of purple loosestrife were treated in 2000. Biological control was used on 14 sites comprising 6 acres, and chemical controls were applied to 74 sites comprising 40 acres (Figure 8). A partnership between the Natural Resources Conservation Service (NRCS), The Nature Conservancy (TNC), and GLIFWC helped provide funding for control work on private lands within the watershed. GLIFWC crews treated 35 sites comprising 6 acres and TNC crews treated 53 sites comprising 40 acres (Figure 8).

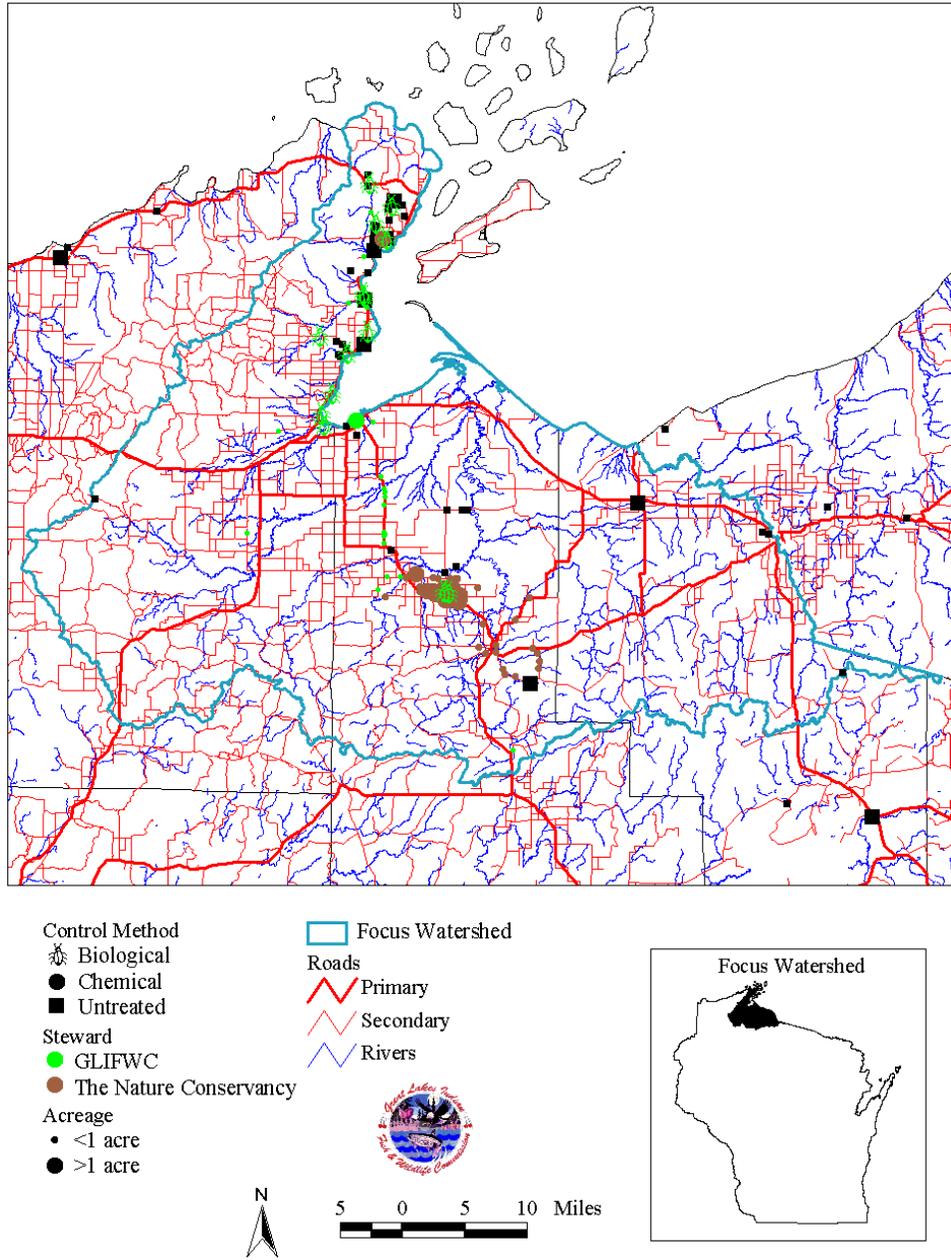


Figure 8. Purple loosestrife control activity in the Bad River - Chequamegon Bay watershed, 2000.

The addition of biological control as a management tool has allowed GLIFWC to expand the scope of its control efforts significantly because the application of biological controls requires far less time than chemical control methods. In addition, one-time applications of biological controls are far more palatable to private landowners who have concerns about annual treatments with herbicides. The result has been significantly increased cooperation from private landowners.

FUTURE WORK

In 2001, GLIFWC plans on expanding its biological control efforts and continuing to use chemical controls on small isolated populations that can be easily eradicated. All biological control sites will be monitored closely for overwinter survival and relative loosestrife density to evaluate the effectiveness of this treatment method.

EXOTIC PLANT EDUCATION AND OUTREACH ACTIVITIES

BACKGROUND

Human activities are responsible for the vast majority of new introductions of invasive non-native plants. Unfortunately, the general public is largely unaware of the negative ecological impacts caused by invasive weeds and the role humans play in their spread. Consequently, numerous invasive plants continue to be dispersed across the landscape by people enjoying outdoor activities. Therefore, effective weed prevention and control is dependent upon the cooperation and assistance of an informed public. To address this problem, GLIFWC implemented an educational outreach program in 1998 that provided current and relevant information to inform the general public of this important issue and the steps to take to minimize the spread of exotic plants.

PROGRAM OVERVIEW

A suite of educational materials was utilized during 2000 to reach a broad range of audiences. This material included brochures, slide presentations, and a comprehensive website that highlighted several exotic plant species of concern in the upper Great Lakes region. GLIFWC distributed brochures and slide shows to the public primarily via cooperating state, federal, county, and tribal resource management agencies throughout the upper Great Lakes region. Other audiences were reached through our website (www.glifwc.org/epicenter/) which has received over 1,900 visits since July 2000. In addition, several presentations were conducted over the summer in conjunction with local environmental events.

ACCOMPLISHMENTS

Brochures

Over 2,400 purple loosestrife brochures were distributed to cooperating resource management agencies, non-government organizations, and private citizens (Table 3). A new brochure/poster titled *Plants Out Of Place* was completed with the editorial and financial assistance of several county, state, and federal agencies, non-government organizations, and private companies (Table 4). The poster provides general information on the ecological, social, and economic impacts of invasive non-native plants in general and how they spread across the landscape. The reverse side highlights several invasive plants of concern in the upper Great Lakes and provides suggestions for slowing their spread and contact information for more information. *Plants Out Of Place* received a warm welcome from resource professionals working to spread the word about exotic plants and over 46,000 were distributed in 2000 (Table 4).

Table 3. Summary of purple loosestrife brochure distribution, 2000.

Organization	No. Brochures
Apostle Islands National Lakeshore	100
TNC- Ashland	100
TNC - MI	150
Michigan Technological University	200
Polk County Land & Water Dept.	200
Hiawatha National Forest	250
WI DNR - Superior	300
Adopt-A-Lake, UWSP	550
UW Extension	600
Total	2,450

Outreach

Over 500 people attended presentations by GLIFWC staff at local events (Table 5). Most of the presentations consisted of the slide show *What You Should Know About Purple Loosestrife* followed by a 15 minute discussion period. A purple loosestrife display was also set up at many of the engagements and brochures were made available for participants to take with them.

REMAINING NEEDS

In addition to purple loosestrife, there are scores of additional exotic plants present throughout the upper Great Lakes region. However, they vary in their impact to natural ecosystems and feasibility of control. GLIFWC staff are currently evaluating these species to determine which ones pose the greatest threats to local ecosystems and have the greatest likelihood for successful control. Preliminary results suggest that spotted knapweed, leafy spurge, garlic mustard, bush honeysuckles, and buckthorn will rank in the top ten for species which merit additional management activities.

A need for additional educational materials is anticipated for those species that rank high in the evaluation and for which suitable educational materials are presently unavailable. The development of additional educational materials will begin in 2002 and will follow the same process used for purple loosestrife:

- 1) searching for and acquiring existing educational materials if available
- 2) identifying gaps in existing educational efforts
- 3) identifying the most appropriate audience to target
- 4) selecting appropriate media formats
- 5) translating scientific documents into language suitable for a general audience, and
- 6) presenting the information in an organized and visually appealing format

Table 4. Partners and distributors of brochure/poster *Plants Out Of Place*, 2000.

Organization / Agency	Partner/Distributor	# Brochures
USFWS	Distributor	50
Sigurd Olsen Environmental Institute	Distributor	50
Adopt-A-Lake, UWSP	Distributor	100
St. Croix Band	Distributor	100
Bad River Band	Distributor	100
Bay Mills Indian Community	Distributor	100
Cable Natural History Museum	Distributor	100
Sokaogon Chippewa Community	Distributor	100
Fond du Lac Reservation	Distributor	100
Lac Courte Oreilles Band	Distributor	100
Red Cliff Band	Distributor	100
Northern Forest Restoration Workshop	Distributor	100
Keweenaw Bay Indian Community	Distributor	100
Lac Vieux Desert Band	Distributor	100
Lac du Flambeau Band	Distributor	100
Mille Lacs Band	Distributor	100
Apostle Islands National Lakeshore	Distributor	200
Michigan Technological University	Distributor	200
Northern Great Lakes Visitor Center	Distributor	300
UW Extension	Distributor	500
Polk County Land & Water Dept.	Distributor	500
ACE High School	Partner	600
Vilas Co. Land, Air & Water Conserv. Dept.	Partner	600
GLIFWC	Partner	900
Applied Ecological Services	Partner	1,000
Wis. Electric & Power Co.	Partner	1,000
Mich. Assoc. of Conserv. Dists.	Partner	1,000
NRCS	Partner	1,020
The Nature Conservancy	Partner	2,250
MN DNR	Partner	3,000
Chequamegon-Nicolet National Forest	Partner	3,000
Huron-Manistee National Forest	Partner	3,000
PRI-RU-TA RC, & D	Partner	3,000
Ottawa National Forest	Partner	3,000
Hiawatha National Forest	Partner	3,000
WI DOT	Partner	3,000
MI DEQ	Partner	4,000
WI DNR	Partner	4,900
MI DNR	Partner	5,000
Total		46,470

Table 5. Summary of educational outreach engagements , 2000.

Event / Location	Location	Sponsor	Date	Attendance
Home & Garden Show	Ashland Civic Center	GLIFWC	04/01/00	> 100
Environmental Extravaganza	Ashland High School	Northland College	04/08/00	> 50
Earth Day	Northern Great Lakes Visitor Center	GLIFWC	04/21/00	> 100
Celebrating Wildflowers Day	Northern Great Lakes Visitor Center	GLIFWC	05/27/00	> 50
Biological Control Workshop	Ashland Agricultural Research Station	GLIFWC	06/03/00	2
Landscaping With Wildflowers	Northern Great Lakes Visitor Center	GLIFWC	07/08/00	12
Ashland County Fair	Ashland County Fair Grounds	Ashland County 4-H	07/13/00	> 100
Bayfield County Fair	Bayfield County Fair Grounds	Bayfield County 4-H	08/10/00	> 100
Total				> 514

COORDINATION WITH OTHER AGENCIES AND ORGANIZATIONS

An ad hoc forum called the “Northwoods Weed Initiative” (NWI) has met regularly to share information, coordinate activities, and discuss future collaborations to address invasive non-native plants in northern Wisconsin and Michigan. Participants include GLIFWC, Lac Courte Oreilles Band of Lake Superior Ojibwa, the Chequamegon-Nicolet National Forest, the Ottawa National Forest, The Nature Conservancy, PRI-RU-TA RC & D, the Natural Resources Conservation Service, and the WI DNR. The Northwoods Weed Initiative recognizes the inherent problems (i.e. labor intensive, cross jurisdictional boundaries, etc.) associated with managing invasive exotic plants and strives to address these obstacles by working together in a coordinated manner (see Appendix A).

In 2000, NWI was instrumental in completing the *Plants Out Of Place* poster/brochure described above. In addition, NWI helped organize a regional conference on invasive non-native plants in Eau Claire, WI. GLIFWC staff were responsible for administering the conference web site. Plans are currently being developed to revise several agency technical guidelines that provide guidance for re-vegetation and erosion control activities. NWI participants plan to review these documents to insure that the use on non-native plants are not encouraged and suggest revisions where appropriate.

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Northwoods Weed Initiative

*An interagency forum to protect the integrity of native ecosystems
in northern Wisconsin and Michigan*

Participants:

*Chequamegon - Nicolet National Forest
Great Lakes Indian Fish & Wildlife Commission
Lac Courte Oreilles Band of Lake Superior Ojibwe
Leech Lake Band of Ojibwe
Natural Resources Conservation Service*

*Ottawa National Forest
PRI-RU-TA RC & D
The Nature Conservancy
Wisconsin DNR*

Invasive non-native plants can have devastating impacts on native plant communities, fish and wildlife habitat, agricultural yields, recreational and subsistence opportunities, and ultimately, local economies. Purple loosestrife, reed canary grass, spotted knapweed, Canada thistle, Eurasian water milfoil, and common buckthorn are examples of invasive non-native plants that negatively impact local natural areas and agricultural lands.

Because these plants disperse widely across the landscape and administrative boundaries, it is advantageous to work cooperatively towards management and control objectives. In addition, the number of new exotics being introduced into local ecosystems continues to out-pace control activities, and is too much for any one agency to manage alone.

The present status of the Northwoods Weed Initiative is an informal consultative body with formal partnerships developed on a project specific basis. The Northwoods Weed Initiative provides a forum to share information and collaborate on planning initiatives for exotic plant issues in northern Wisconsin and Michigan. Initial plans for the Northwoods Weed Initiative include 1) planning a regional conference that will present information on local exotic plant issues, provide a forum for sharing information, and identify common objectives and 2) development and distribution of an informational poster to raise public awareness of this important issue.

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