Invasive Species Program 2008

by

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EXECUTIVE SUMMARY

The Great Lakes Indian Fish and Wildlife Commission (GLIFWC) is an organization exercising delegated authority from 11 federally recognized Ojibwe 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. The degradation of native ecosystems by invasive species poses a serious threat to the continued exercise of these rights and the traditional lifeways they sustain.

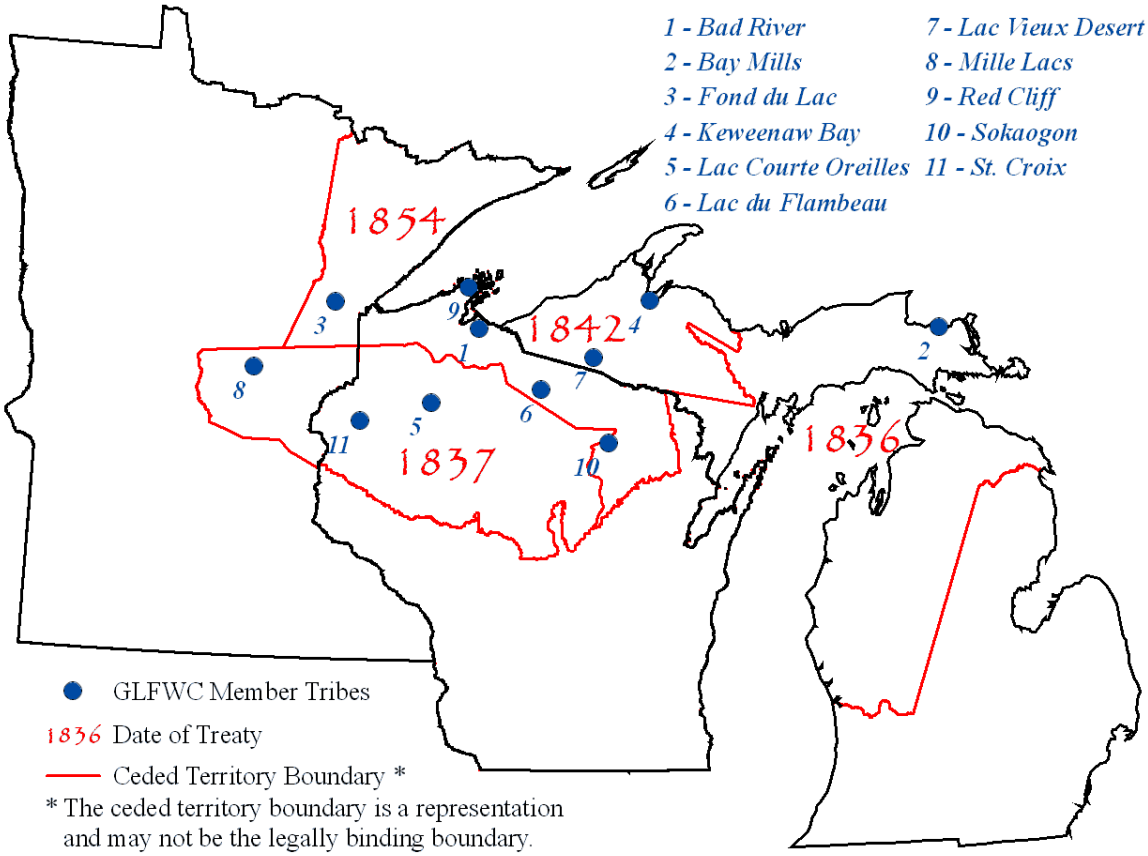

Figure 1. Location of GLIFWC member tribes and ceded territories.

Invasive species are considered by many biologists to be the second most important cause of biodiversity loss and species extinction worldwide, behind habitat destruction (OTA 1993, Wilcove *et al.* 1998, Enserink 1999). Wilcove *et al.* (1998) estimated that 57% of plants on the endangered species list are there at least in part because of invasive species. Besides physical displacement of native flora and fauna, invasive species can alter fire frequency, hydrologic

properties, soil chemistry, and the physical and trophic structure of entire ecosystems (Walker and Smith 1997, Westbrooks 1998). This report summarizes the activities undertaken by GLIFWC staff during 2008 to address the spread of invasive species in the ceded territories. Taxonomic nomenclature cited in this report complies with the Integrated Taxonomic Information System (www.itis.gov).

GLIFWC's invasive species program consists of four comprehensive elements – education outreach, inventory and monitoring, control, and evaluation. Each of these elements is coordinated with local cooperators to maximize the efficient use of limited resources.

GLIFWC's noxious weed program started in 1988 with a pilot project to control purple loosestrife (*Lythrum salicaria*) in Fish Creek sloughs near Ashland, WI (Gilbert and Parisien 1989). This project has grown to include annual control efforts for purple loosestrife and leafy spurge (*Euphorbia esula*) populations throughout the Bad River - Chequamegon Bay watershed.

In 2001, GLIFWC initiated annual surveys for terrestrial invasive species (TIS) in an effort to assess the relative threat of the many non-native plants that have become established in the region and prioritize them for management (Falck and Garske 2002, Falck and Garske 2003). This effort continued in 2008 with a focus on the western portion of the 1842 ceded territory.

In 2004, GLIFWC initiated annual surveys for aquatic invasive species (AIS) as part of its invasive species program (Garske and Falck 2005). These surveys are coordinated with surveys conducted by various management partners and target waters with significant treaty resources and high visitation rates. The surveys look for invasive aquatic plants and animals, including zebra mussels (*Dreissena polymorpha*) spiny water fleas (*Bythotrephes cederstroemi*) and rusty crayfish (*Orconectes rusticus*).

GLIFWC's educational outreach efforts center around its web site (www.glifwc.org/invasives) which provides basic information on invasive species and provides access to a regional GIS database (www.glifwc-maps.org) of invasive species survey efforts, distribution records and control efforts. In addition, GLIFWC distributes and develops print material to raise awareness of invasive species issues. In 2008, GLIFWC cooperated with the Invasive Species Education Alliance to develop an AIS training DVD entitled *Stopping Aquatic Hitchhikers.*

Because non-native invasive plants disperse widely across the landscape and administrative boundaries, it is advantageous to work cooperatively with adjacent landowners towards common objectives. GLIFWC strives to coordinate its invasive species activities with local and regional cooperators by providing information on its website and participating in several forums to coordinate and guide invasive species management efforts.

ACKNOWLEDGMENTS

The Great Lakes Indian Fish and Wildlife Commission acknowledges the following government agencies for their financial support of GLIFWC's invasive species program. The BIA continues to provide the foundation for developing new partnerships and leveraging additional resources for invasive species management (Figure 2). The activities summarized in this report were funded by:

- Bureau of Indian Affairs (BIA)
  - GLIFWC's base funding
  - Noxious Weed Program
  - Invasive Species Initiative
  - Supplemental Funding
- Natural Resources Conservation Service (NRCS)
  - Wisconsin Tribal Advisory Council (WTCAC)
- U.S. Fish and Wildlife Service (USFWS)
  - Wisconsin AIS State Management Plan
- Wisconsin Department of Natural Resources (WDNR)
  - Aquatic Invasive Species Control Grants

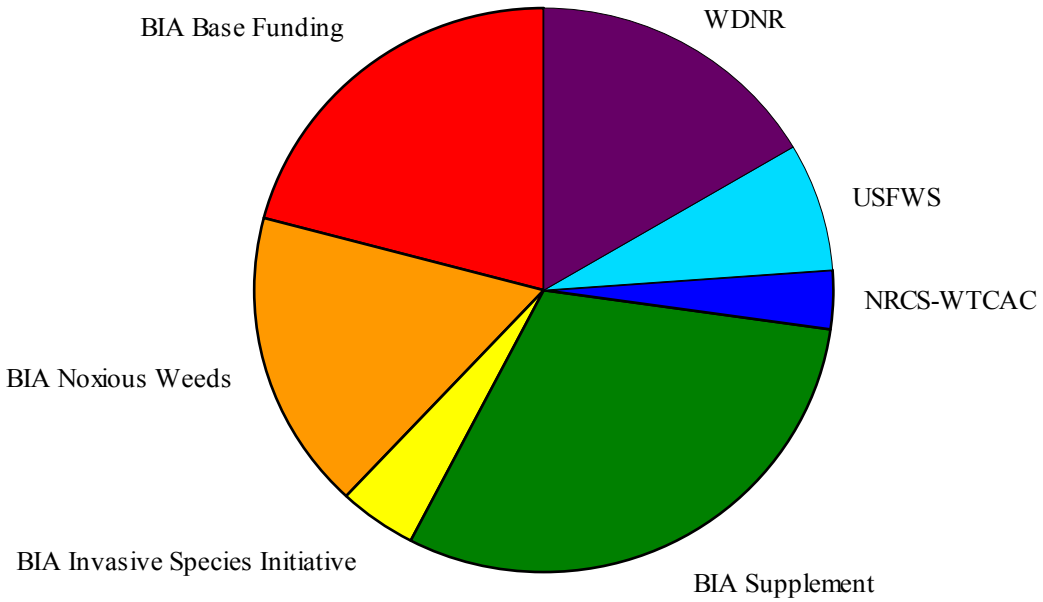

Figure 2. Funding sources for GLIFWC's Invasive Species Program in 2008.

TERRESTRIAL INVASIVE PLANT INVENTORIES IN THE CEDED TERRITORIES

The objective of the 2008 survey was to quantify the abundance and distribution of terrestrial invasive plants in the western portion of the 1842 ceded territory in Bayfield and Douglas Counties. While any survey for invasive plants over a large area must balance thoroughness and efficiency (Shuster et al. 2005, Rew et al. 2006), the goal was to inventory the surveyed areas as completely as possible. An attempt was made to gain an understanding of the abundance of widespread nonnative species, as well as to detect infestations of new or under-reported species. The data gathered during this survey will be compiled into GLIFWC's regional invasive species database and published on the GLIFWC website (www.glifwc-maps.org). It is intended to be used in the long-term management and control of invasive species across the region.

METHODS

The 2008 invasive species survey began on May 13, and continued through November 7. While the survey was focused primarily on public lands, invasive plant sites on surrounding private lands were also recorded whenever they were visible from the road or access was granted by the landowner. Cities, towns and other residential areas were not surveyed, with the assumption that they already harbored cultivated or naturalized populations of most or all the invasives found.

Roadside invasive plant populations were found by driving at a moderate speed, watching the fields and woods edges for invasives. Once an invasive plant or plant population was spotted, the adjacent area was searched to ascertain its approximate size and extent. The apparent middle of the population was then found, and the population's location and attributes were recorded. Where walking into the patch would present a risk of spreading seeds or other propagules, the location was recorded at the population's edge.

Locations were mapped using a TDS® Recon 400 hand-held computer with a Holux® GM-270 compact flash GPS card. Site locations and attribute data for each site were entered directly into a GIS database using ESRI's® ArcPad software. Custom data entry forms were created using ESRI's® ArcPad Application Builder to increase accuracy and efficiency of data entry. Attributes recorded included scientific name, infestation size, habitat, hydrology, land use, and any relevant comments.

Whenever purple loosestrife or Eurasian bush honeysuckle (*Lonicera* spp.) populations were encountered, the presence or absence of biological control agents was recorded. Purple loosestrife plants were checked for "window paning" of the leaves caused by *Galerucella* larvae. Eurasian bush honeysuckle plants were checked for "witch's brooms" at the ends of the branches, caused by the Eurasian honeysuckle aphid *Hyadaphis tataricae.*

On some occasions where populations of only one or a few individuals of major nonnative plants were found, the plants were dug or pulled up, and any flower or seed heads bagged and removed. If such populations had already gone to seed, or if a seed bank was likely to be present, the site was marked as an invasive plant site, even if the existing plants were destroyed.

Specimens of nonnative and native plants were usually collected whenever plants were found that were previously unknown from that county. Species thought to be uncommon or grossly under-collected in the region were also collected. Specimens of state-listed species were collected whenever appropriate.

Photos were taken in high resolution RAW format, using a 5.5 megapixel Canon EOS digital camera. Most photos were taken of native and introduced plants that were regionally uncommon, or for which photos were lacking in the GLIFWC collections. Photos were also taken of small populations of invasives, that were subsequently removed. Finally, a Rare Plant Field Report was completed and submitted to the WDNR - Bureau of Endangered Resources for each rare species occurrence. Many of the photos were provided to the Wisconsin State Herbarium and the UW-Stevens Point Freckmann Herbarium along with an Excel table giving the file name, species, date, location, and additional information for each photo. Most are also available for download from the GLIFWC website.

RESULTS

A total of 901 invasive plant sites were detected in 2008 (Figure 3, Table 1). However, many nonnative species were very common and/or widespread across the survey area and were not mapped (Table 2.). Some of the most significant findings are described below (Figure 4). Individual records for each site can be accessed at www.glifwc-maps.org.

DISCUSSION

Common valerian (*Valeriana officinalis*) was well-established and sometimes abundant in northern and central Douglas County. This plant was first collected outside of cultivation in the Lake Superior region in Duluth in 1938, where it was noted as being locally common. It is now abundant throughout the Duluth-Superior area, including most of northern and western Douglas County. It was frequent along moist to wet road corridors, and had also invaded fields, meadows and open woods, where it was often the dominant herb.

Prior to 2006 common buckthorn (*Rhamnus cathartica*) had been recorded in Douglas County only from Superior, Wisconsin. A 2006 survey of the Brule River State Forest by Horky and Johnson (2006) found several sites of this aggressive shrub / small tree in the northwestern part of the county. The 2008 GLIFWC survey then found 63 additional small to large

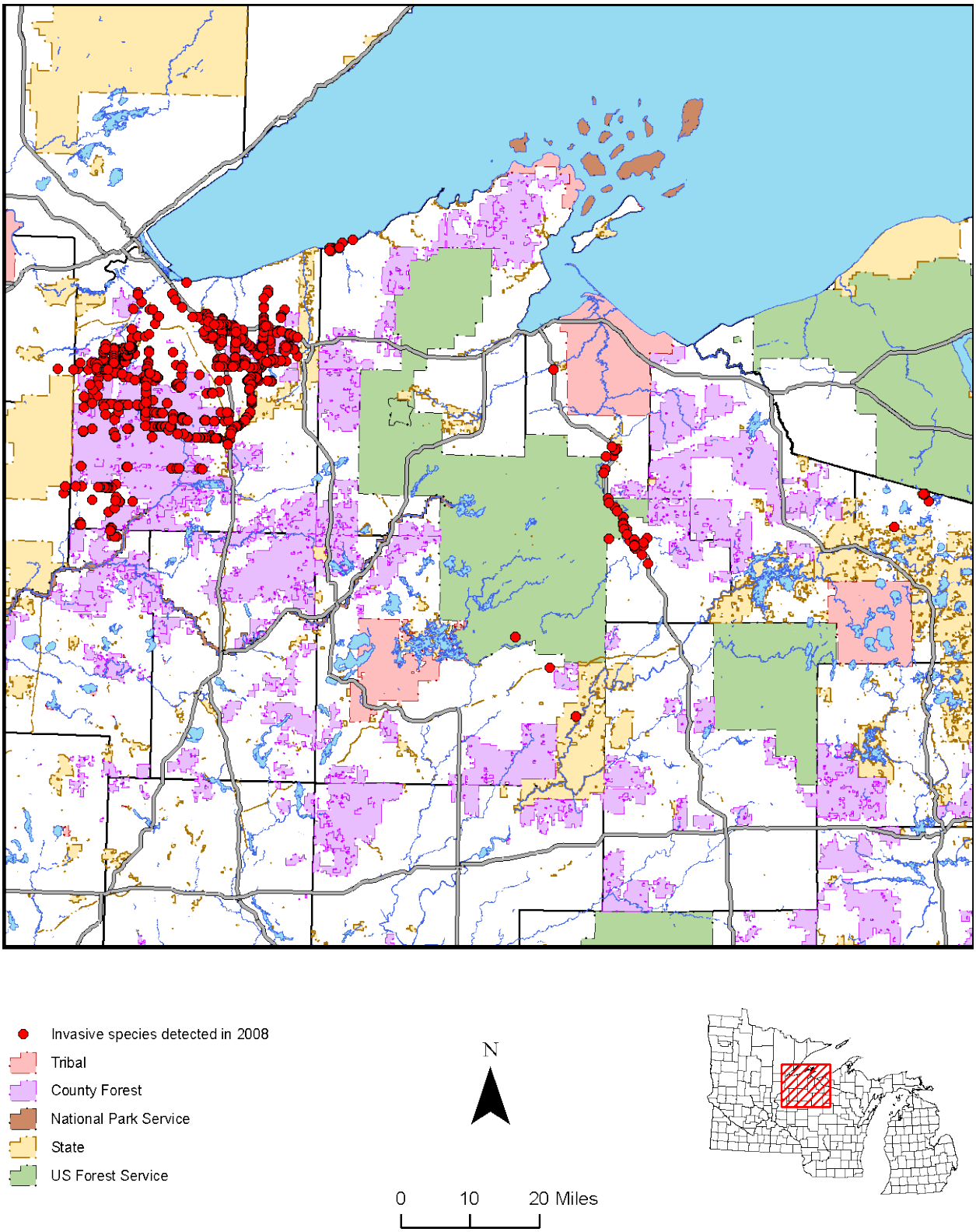

Figure 3.Invasive plant sites detected in 2008.

Table 1. Frequency of invasive plants found during 2008.

Scientific Name	Common Name	Frequency
Valeriana officinalis	garden valerian	202
Lonicera X *bella*	Bell's honeysuckle	86
Rhamnus cathartica	common buckthorn	63
Lupinus polyphyllus	bigleaf lupine	46
Lythrum salicaria	purple loosestrife	45
Campanula rapunculoides	European bellflower	43
Salix X *rubens*	hybrid crack willow	38
Frangula alnus	glossy buckthorn	23
Euphorbia esula	leafy spurge	22
Myosotis scorpioides	common forget-me-not	14
Lonicera morrowii	Morrow's honeysuckle	12
Molinia caerulea	purple moorgrass	12
Populus alba	white poplar	12
Leucanthemella serotina	giant daisy	11
Robinia pseudoacacia	black locust	11
Solanum dulcamara	nightshade	11
Convallaria majalis	European lily-of-the-valley	10
Hemerocallis fulva	orange daylily	9
Rumex acetosa ssp. *thyrsiflorus*	narrow-leaved sorrel	9
Sorbaria sorbifolia	false spiraea	9
Coronilla varia	crown vetch	8
Miscanthus sacchariflorus	Amur silvergrass	8
Aegopodium podagraria	bishop's goutweed	7
Hesperis matronalis	dame's rocket	7
Myosotis sylvatica	garden forget-me-not	7
Salix alba	white willow	7
Salix fragilis	crack willow	7
Achillea ptarmica	sneezeweed	6
Caragana arborescens	Siberian peashrub	6
Galium mollugo	white bedstraw	6
Pinus sylvestris	Scotch pine	6
Poa nemoralis	European woodland blue grass	6
Polygonum X *bohemicum*	Bohemian knotweed	6
Berberis thunbergii	Japanese barberry	5
Symphytum officinale	common comfrey	5
Juncus ensifolius	swordleaf rush	4
Acer ginnala	Japanese maple	3
Linaria vulgaris	butter and eggs	3
Lonicera tatarica	Tartarian honeysuckle	3
Lysimachia nummularia	creeping Jenny	3
Picea abies	Norway spruce	3
Salix pentandra	laurel willow	3
Secale cereale	perennial rye	3
Typha X *glauca*	hybrid cattail	3

Table 1. Frequency of invasive plants found during 2008 (continued).

Scientific Name	Common Name	Frequency
Ajuga genevensis	blue bugle	2
Allium schoenoprasum	wild chives	2
Draba verna	spring whitlowgrass	2
Euonymus alata	burning bush	2
Euphorbia cyparissias	cypress spurge	2
Helictotrichon pubescens	alpine oat grass	2
Hylotelephium telephium ssp. *telephium*	witch's moneybags	2
Knautia arvensis	blue buttons	2
Phlox paniculata	garden phlox	2
Robinia hispida	bristly locust	2
Rosa rugosa	Japanese rose	2
Sedum spp	Stonecrop	2
Tanacetum vulgare	common tansy	2
Thlaspi arvense	Fanweed	2
Borago	borage	1
Centaurea biebersteinii	spotted knapweed	1
Centaurea jacea	brown knapweed	1
Dianthus barbatus	sweet William	1
Elaeagnus umbellata	autumn olive	1
Filipendula ulmaria	queen of the meadow	1
Ipomoea purpurea	common morning-glory	1
Iris pseudacorus	yellow iris	1
Lapsana communis	nipplewort	1
Lilium lancifolium	tiger lily	1
Malva moschata	musk mallow	1
Mentha X gracilis	gingermint	1
Myosotis arvensis	field forget me not	1
Pachysandra terminalis	Japanese spurge	1
Pastinaca sativa	wild parsnip	1
Phalaris arundinacea	reed canary grass	1
Phragmites australis ssp. *australis*	common reed	1
Poa bulbosa	bulbous bluegrass	1
Polygonum cuspidatum	Japanese knotweed	1
Potamogeton crispus	curly leaf pondweed	1
Rorippa nasturtium-aquaticum	watercress	1
Saponaria officinalis	bouncing bet	1
Silene armeria	sweet William silene	1
Sonchus arvensis	creeping sowthistle	1
Sorbus aucuparia	European mountain ash	1
Tripleurospermum perforata	scentless false mayweed	1
Typha angustifolia	narrowleaf cattail	1
Ulmus pumila	Siberian elm	1
Vinca minor	periwinkle	1

Table 2. Nonnative plant species that were too common and/or widespread to map in 2008.

Scientific Name	Common Name	Scientific Name	Common Name
Agrostis gigantea	redtop	*Melilotus alba*	white sweet clover
Agrostis stolonifera	creeping bent	*Melilotus officinalis*	yellow sweet clover
Amaranthus retroflexus	redroot pigweed	*Mollugo verticillata*	carpet weed
Anthoxanthum odoratum	sweet vernal grass	*Phalaris arundinacea*	reed canary grass
Arctium minus	burdock	*Phleum pratense*	Timothy
Asparagus officinalis	asparagus	*Plantago lanceolata*	lance-leaved plantain
Berteroa incana	hoary alyssum	*Plantago major*	common plantain
Bromus inermis	smooth brome	*Poa annua*	annual bluegrass
Cerastium fontanum ssp. *vulgare*	mouse-eared chickweed	*Poa compressa*	Canada bluegrass
Centaurea biebersteinii	spotted knapweed	*Poa pratensis*	Kentucky bluegrass
Chenopodium album	lamb's quarters	*Potentilla argentea*	silvery cinquefoil
Cichorium intybus	chicory	*Potentilla recta*	sulfur cinquefoil
Cirsium arvense	Canada thistle	*Prunella vulgaris* ssp. *vulgaris*	heal-all
Cirsium vulgare	bull thistle	*Ranunculus acris*	common buttercup
Dactylis glomerata	orchard grass	*Rumex acetosella*	sheep sorrel
Daucus carota	Queen Anne's lace	*Rumex crispus*	curly dock
Dianthus armeria	sweet William	*Rumex obtusifolius*	bitter dock
Echinochloa crusgalli	barnyard-grass	*Setaria glauca*	yellow foxtail
Elymus repens	quackgrass	*Silene latifolia*	white campion
Festuca rubra	red fescue	*Silene vulgaris*	bladder campion
Galeopsis tetrahit	hemp nettle	*Sonchus arvensis*	sow thistle
Gnaphalium uliginosum	low cudweed	*Syringa vulgaris*	common lilac
Glechoma hederacea	creeping Charlie	*Tanaceum vulgare*	Common tansy
Hieracium aurantiacum	orange hawkweed	*Taraxacum officinale*	dandelion
Hieracium caespitosum	yellow king-devil	*Taraxacum laevigatum*	red-seed dandelion
Hieracium piloselloides	glaucus king-devil	*Tragopogon pratensis*	yellow goat's beard
Hypericum perforatum	common St. John's wort	*Trifolium arvense*	rabbit clover
Leucanthemum vulgare	ox-eye daisy	*Trifolium aureum*	hop clover
Lolium perenne	rye grass	*Trifolium campestre*	low hop clover
Lolium pratense	smooth fescue	*Trifolium hybridum*	alsike clover
Lotus corniculatus	bird's foot trefoil	*Trifolium pratense*	red clover
Malus sylvestris	apple	*Trifolium repens*	white clover
Matricaria discoidea	pineapple weed	*Verbascum thapsus*	giant mullein
Medicago lupulina	black medick	*Veronica officinalis*	common speedwell

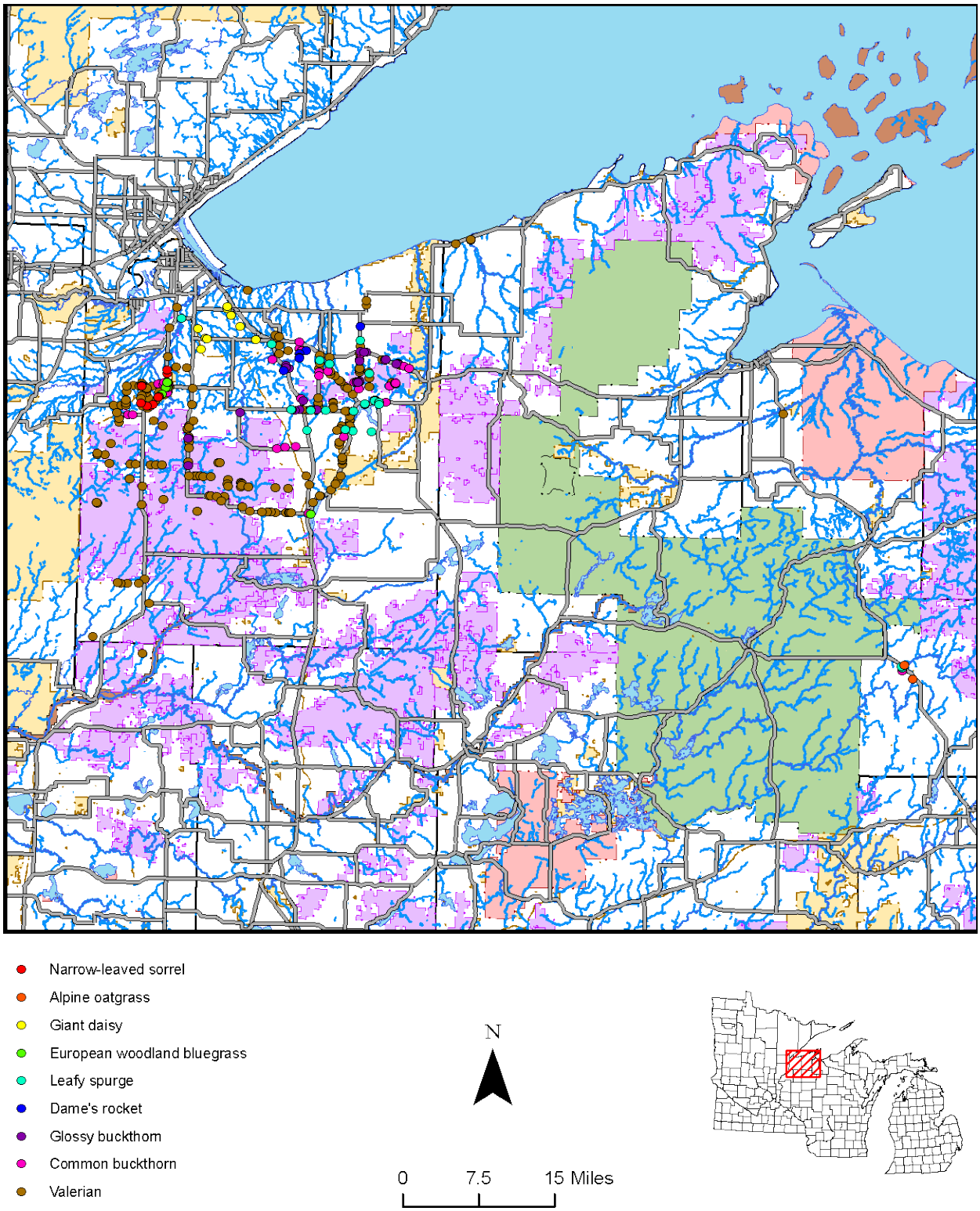

Figure 4. Species of concern detected in 2008.

populations of common buckthorn scattered across much of north central Douglas County. A large population was found around the town of Lake Nebagamon. The 2008 survey revealed 23 small to large populations to the west of their sites, including a population inhabiting many acres of wetlands and wet woods, east of and along a portion of Hwy 53. Another extensive population was found in and around the village of Maple. The combined data shows that this highly invasive plant is well-established across most of northeast and north central Douglas County.

Seven populations of dame's rocket (*Hesperis matronalis*) were found in north central Douglas County. This plant was abundant along the Middle River floodplain. Only relatively small patches of Dame's rocket were found in previous surveys.

Small to moderate patches of leafy spurge (*Euphorbia esula*) were fairly frequent along roadsides across north central Douglas County. This plant will presumably continue to spread in the region, as the seeds are carried by plowing, ditching, mowing, and other human activities.

Six populations of European woodland bluegrass (*Poa nemoralis*) were found, including large populations in Pattison State Park and Lucius Woods County Park in Douglas County. This invasive grass is established (but very under-recorded) across the Lake Superior region.

Eurasian bush honeysuckles (*Lonicera* spp.) were well-established and often common across the survey area, with 102 sites recorded in 2008, all but one in Douglas County.

Eleven populations of giant daisy (*Leucanthemella serotina*) were found in the northern part of Douglas County, southwest of Superior. This large, deep-rooted perennial (often 3ft or more tall) had apparently escaped from local plantings. It had not been encountered in previous surveys and is apparently still uncommon in the upper Great Lakes region. In Douglas County it was forming dense patches along road corridors, in wetlands and in open wet woods. It had even invaded a large area of remnant speckled alder swamp. Giant daisy appears to have the potential to become an aggressive invader of natural and semi-natural habitats across the region.

Two well-established plants not previously recorded from Wisconsin were found during the 2008 survey: alpine oatgrass (*Helictotrichon pubescens*) and narrow-leaved sorrel (*Rumex acetosa* ssp. *thyrsiflorus*). Alpine oatgrass is native from Europe west to central Asia. In Europe it is a common inhabitant of grasslands and open woods, as well as gravel pits, roadsides, and railway banks. Two populations were found, both on the outskirts of Glidden (Ashland County). The largest seemed to be centered in a young red pine plantation, where it covered more than an acre. This plant was previously known in North America only from several Canadian provinces and four New England states.

Narrow-leaved sorrel was found a few miles northeast of the village of Patzau in Douglas County. This Eurasian plant was previously known in North America only from Michigan and several Canadian provinces. Near Patzau it was locally abundant along several miles of roadside

and power corridors and in old fields, with scattered plants occurring northward for several miles along Hwy 35. The high local abundance of this species indicates that it is well adapted to natural and human-disturbed habitats in the upper Great Lakes region. It appears to be well on its way to becoming a significant invasive across the region.

AQUATIC INVASIVE SPECIES INVENTORIES IN THE CEDED TERRITORIES

Since the early 1800s, at least 183 species of fish, plants, invertebrates, algae, and pathogens have been introduced into the riparian and aquatic habitats of the Great Lakes (GLERL 2006). Many of these organisms have since invaded inland lakes and rivers in the ceded territory, and others are poised to do so. The most destructive of these invasives have caused major environmental and economic impacts - the economic cost of zebra mussels alone has been estimated at $1 billion since its introduction (Pimentel *et al.* 2005).

GLIFWC staff surveyed select ceded territory waters in 2008 to 1) assess and document the scope of the problem, 2) detect small populations of the worst invasives before they become large, environmentally damaging populations, and 3) prioritize education and management efforts.

METHODS

In 2008, 32 lakes were chosen for survey in coordination with the Wisconsin Department of Natural Resources (WDNR), UW-Madison Center for Limnology and Sawyer, Vilas and Washburn county efforts. Surveys targeted lakes important to the tribes for *ogaa* (walleye) and *manoomin* (wild rice) harvest, as well as lakes with high visitation rates (Table 3, Figure 5). While choosing lakes, comments and suggestions were requested from the Keweenaw Bay Indian Community Natural Resources Department, Lac Courte Oreilles (LCO) Ojibwe Community College Extension, Lac du Flambeau Natural Resources Department, St. Croix Natural Resources Department, Upper Chippewa Cooperative Weed Management Area (CWMA), Northwoods CWMA and Bayfield, Sawyer, Vilas and Washburn County Aquatic Invasive Species (AIS) Coordinators.

An effort was made to visit each lake twice during the summer to increase the chances of detecting zebra mussel (*Dreissena polymorpha*) veligers and plants with varying phenology. Due to time constraints, Gordon, Galilee and Stone lakes were only visited once.

Eurasian water-milfoil (*Myriophyllum spicatum*) was detected on Lac Vieux Desert by the Watersmeet Aquatic Nuisance Species Coalition late in the season. The final week of surveys was spent on Lac Vieux Desert to assess the extent of this Eurasian water-milfoil population. Consequently, the lakes in the Baraga area were only surveyed once. Baraga area lakes are scheduled to be surveyed again during the 2009 field season.

Surveys targeted the most likely areas for introductions. Boat landings were a high priority. All public and some private boat landings on each lake were surveyed. Shorelines, shallow water areas, pier supports, rocks, floating fragments and beach debris in the vicinity of the landings were inspected for invasive plants and animals. The presence of aquatic invasive

Table 3. Lakes surveyed for aquatic invasive species in 2008.

State	County	Lake Name	WBIC	Acres	Dates Surveyed
MI	Baraga	Beaufort		467.3	7/15
		Big		118.8	7/17
		Parent		183.9	7/16
	Houghton	Otter		863.3	7/14
	Houghton/Baraga	Prickett		747.2	7/16
MI/WI	Gogebic/Vilas	Lac Vieux Desert	1631900	4260.0	8/25-27
WI	Ashland	Day	2430300	578.2	7/2, 8/6
		Galilee	2935500	211.5	7/1
		Gordon	2406500	132.3	6/30
		Mineral	2916900	227.1	7/1, 8/7
	Bayfield	Atkins	2734000	169.6	7/3, 8/4
	Burnett	Big Sand	2676800	1433.9	6/10, 7/22
		Devils	2461100	974.9	6/12, 7/23
		Sand	2495100	900.3	6/10-11, 7/22-23
	Burnett/Washburn	Middle McKenzie	2706500	527.1	6/9, 7/21
	Iron	Upson	2908500	49.2	7/1, 8/6
	Price	Lac Sault Dore	2236800	600.8	6/25, 8/14
		Musser Flowage	2245100	503.4	6/25, 8/12-13
		Solberg	2242500	843.6	6/26, 8/12
	Price/Ashland	Butternut	2283300	983.2	6/24, 8/11
	Sawyer	Durphee	2396800	197.6	6/18, 7/29
		Lake of the Pines	2275300	272.7	6/23, 8/13
		Lower Clam	2429300	213.7	7/2, 8/5
		Nelson	2704200	2715.9	6/17, 7/31
		Sissabagama	2393500	805.4	6/18, 7/29
		Whitefish	2392000	799.6	6/19, 7/30
	Vilas	Ballard	2340700	502.6	7/9, 8/19
		Big Arbor Vitae	1545600	1070.3	7/8, 8/20
		Clear	2329000	515.1	7/10, 8/21
		High	2344000	741.0	7/7, 8/18
		Little Arbor Vitae	1545300	540.3	7/9, 8/20
	Washburn	Stone	1884100	489.9	7/24
	Washburn/Sawyer	Birch	2113000	364.0	6/16, 7/28

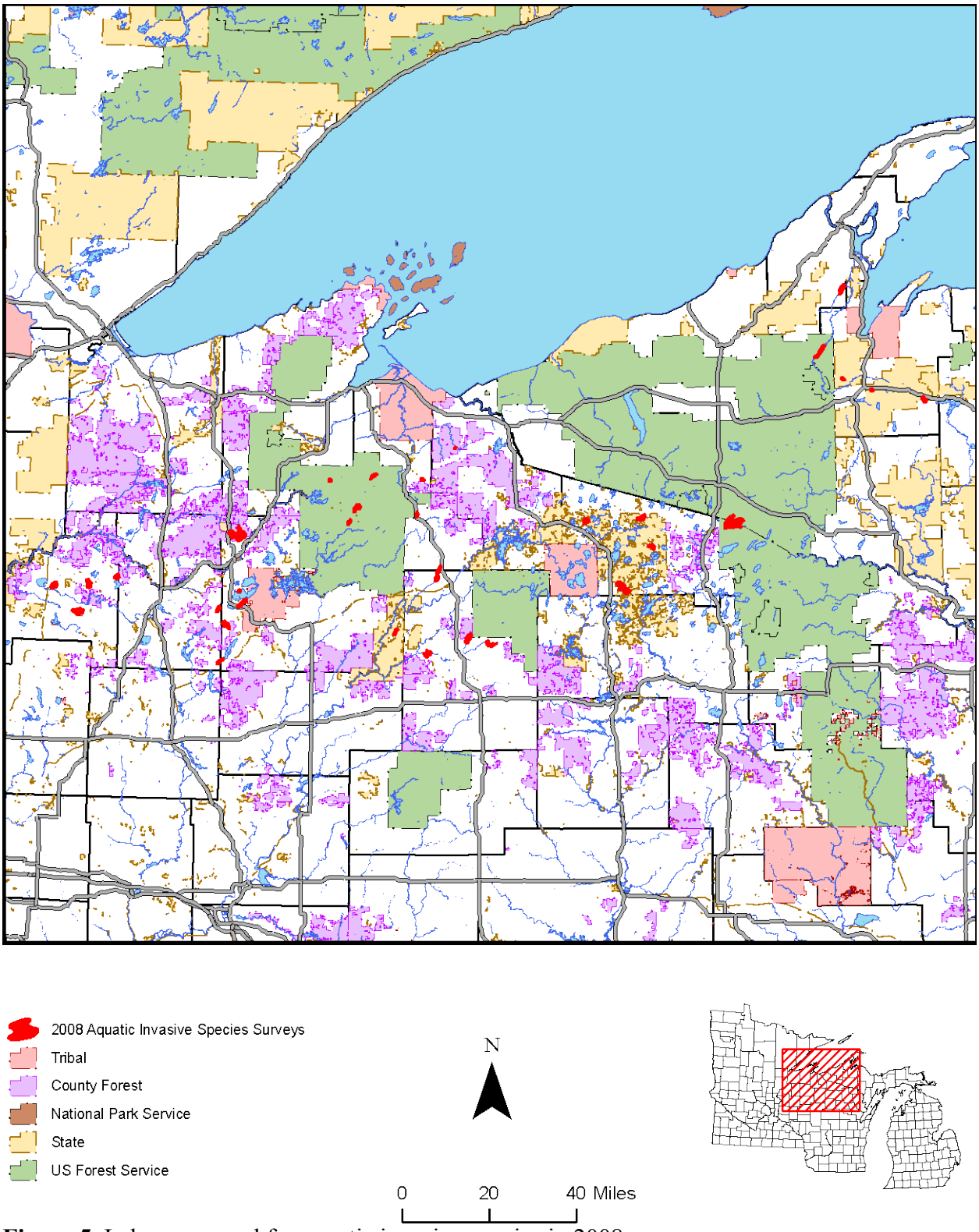

Figure 5. Lakes surveyed for aquatic invasive species in 2008.

species informational signs at the landings was also recorded. This information will be compiled with data collected by GLIFWC's inland fishery assessment crews and the WDNR to identify landings lacking signs.

Surveys also focused on inlets, outlets, shallow or protected bays, wetland areas, disturbed areas, developed shorelines and shorelines in close proximity to roads. Shorelines were typically surveyed from the outer edge of the littoral zone from a slow moving boat. Dense beds of vegetation, and patches of unfamiliar vegetation were inspected intensively. The area was also surveyed for invasive animals or evidence of their presence. As much of the shoreline as possible was surveyed.

The most ecologically destructive aquatic invasive species threatening ceded territory waters were categorized as "priority" species (Table 4) and were recorded at each site they were detected. Other aquatic invasive species considered less invasive, or so common as to be impractical to delineate, along with some terrestrial invasive species were recorded as "present" or "absent" on each lake (Table 5). Wherever purple loosestrife was encountered, the presence or absence of biological control beetles (*Galerucella* spp.) was also recorded. Voucher specimens were prepared for new invasive plant infestations and new county records. These specimens were sent to the Robert W. Freckmann Herbarium at the University of Wisconsin – Stevens Point. Observations of *manoomin* and the native type of common reed were also documented.

Table 4. "Priority" species surveyed for in 2008 AIS surveys.

Scientific Name	Common Name	Detected
Animals		
Bythotrephes longimanus	spiny waterflea	No
Cercopagis pengoi	fishhook waterflea	No
Dreissena bugensis	quagga mussel	No
Dreissena polymorpha	zebra mussel	No
Plants		
Butomus umbellatus	flowering rush	No
Eichhornia crassipes	water hyacinth	No
Hydrilla verticillata	hydrilla	No
Hydrocharis morsus-ranae	European frog-bit	No
Iris pseudacorus	yellow iris	Yes
Lythrum salicaria	purple loosestrife	Yes
Myriophyllum spicatum	Eurasian water-milfoil	Yes
Najas minor	brittle naiad	No
Nymphoides peltata	yellow floating-heart	No
Phragmites australis ssp. *australis*	common reed (Eurasian)	No
Pistia stratiotes	water lettuce	No
Potamogeton crispus	curly pondweed	Yes
Trapa natans	water chestnut	No

Table 5. Lower priority aquatic and terrestrial invasive species detected during 2008 AIS surveys.

Scientific Name	Common Name
Animals	
Cipangopaludina chinensis	Chinese mysterysnail
Orconectes rusticus	rusty crayfish
Viviparus georgianus	banded mysterysnail
Plants	
Aegopodium podagraria	bishop's goutweed
Cirsium palustre	Eurasian marsh thistle
Convallaria majalis	European lily of the valley
Euphorbia cyparissias	cypress spurge
Euphorbia esula	leafy spurge
Hesperis matronalis	dame's rocket
Hylotelephium telephium	witch's moneybags
Lonicera morrowii, L. tatarica, T. X *bella*	Eurasian bush honeysuckles
Mentha piperita, M. spicata, M. X *gentilis*	Eurasian mints
Myosotis scorpioides	water forget-me-not
Phalaris arundinacea	reed canary grass
Rhamnus cathartica	common buckthorn
Robinia hispida	bristly locust
Robinia psuedocacia	black locust
Salix alba, S. fragilis, S. X *rubens*	white, crack and hybrid willow
Sedum kamtschaticum	orange stonecrop
Solanum dulcamara	bittersweet nightshade
Typha angustifolia, T. X *glauca*	narrow-leaf and hybrid cattail

Locations were mapped using a TDS® Recon 400 hand-held computer with a Holux® GM-270 compact flash GPS card. Site locations and attribute data for each site were entered directly into a GIS database using ESRI's® ArcPad software. ArcPad provided an integrated environment to display the current GPS location overlain on GIS layers including lakes, local roads and pre-existing invasive species data. Custom data entry forms were developed using ESRI® ArcPad Application Builder. The forms speeded data entry in the field and reduced the potential for error by providing drop-down menus with standardized nomenclature and required fields.

Plankton nets were used to sample for zebra mussel veligers, spiny water fleas and fishhook water fleas. Vertical plankton tows were used to sample for zebra mussel veligers following WDNR-UWEX (2006). Oblique plankton tows were used to sample for spiny and fishhook water fleas following Johnson (2004). When sampling for water fleas, a suitably deep portion of the lake was chosen and the net was towed through the water for approximately 100

meters. This distance was estimated by towing the plankton net for 120 seconds at approximately 3 km per hour. The water column was surveyed by allowing the net to sink as close to the bottom as possible and then slowly pulling the net back up.

The number of veliger and water flea samples taken on each lake was based on lake size and available time. Three samples were taken on larger lakes or lakes with multiple bays. Typically at least one sample was taken near a busy boat landing and one or two additional samples in other bays or basins. On smaller or shallow lakes, only one or two samples were taken. Both veliger and water flea samples were condensed, transferred to sample bottles, labeled and preserved with 190 proof ethyl alcohol, at a ratio of four parts alcohol to one part plankton sample. Zebra mussel veliger samples were sent to the WDNR Service Center in Plymouth, Wisconsin for analysis. Water flea plankton samples were examined at the GLIFWC lab.

After leaving each lake, the boat and all equipment were thoroughly disinfected. Plant fragments and other debris were removed at the landing by hand. The drain plug was pulled away from the landing to ensure water would not run into the lake. Lakes with known infestations were surveyed at the end of each week. The boat, trailer and all equipment that came into contact with the water (plankton nets, ropes, weights, anchor, paddles, bilge, bilge pump and D-net) were sprayed with a 2200 ppm bleach solution for a 5 minute contact time. This procedure has been shown to kill *Heterosporis* spp., viral hemorrhagic septicemia virus (VHSv), spring viremia of carp virus (SVCv), largemouth bass virus (LMBv), lymphosarcoma and zebra mussel zooplankton (Marcquenski and AveLallemant 2007). After the appropriate contact time, the boat, trailer and all equipment were thoroughly rinsed. The boat motor was flushed using a 1:100 Virkon-S disinfectant solution, allowed to sit for 20 minutes and then flushed with water. The washing location was chosen to ensure that the water used to disinfect would not run into storm water drains or other areas that might contaminate water.

RESULTS

A total of 238 invasive plant populations comprising 34 taxa were mapped in 2008 (Table 6). “Priority” species comprised 126 of the total plant records, with curly pondweed accounting for 46% of these (58 sites). One new Eurasian water-milfoil infested lake and three new curly pondweed-infested lakes were detected. Purple loosestrife and yellow iris infestations were found on seven of the lakes. Invasive animals (rusty crayfish, Chinese mysterysnail or banded mysterysnail) were detected in 21 lakes. Eighty-one boat landings were surveyed for aquatic and terrestrial invasive species with signage documented at each landing. A total of 152 zebra mussel veliger and 51 water flea plankton samples were collected during 2008. No water fleas or zebra mussel veligers were detected in any of the samples.

Table 6. Summary of invasive species detected in 2008 (p=previously reported).

		High Priority				Lower Priority																			
County	**Lake Name**	curly pondweed	Eurasian water-milfoil	purple loosestrife	yellow iris	banded mysterysnail	bittersweet nightshade	black locust	bristly locust	Chinese mysterysnail	common buckthorn	cypress spurge	dame's rocket	Eurasian bush honeysuckles	Eurasian marsh thistle	Eurasian mints	leafy spurge	narrow-leaf and hybrid cattail	orange stonecrop	reed canary grass	rusty crayfish	water forget-me-not	white, crack and hybrid willow	witch's moneybags	Total
Baraga	Beaufort				✓					✓					✓			✓				✓			5
	Big																								0
	Parent														✓										1
Houghton	Otter															✓		✓				✓			3
Houghton/Baraga	Prickett		p												✓					✓					3
Gogebic/Vilas	Lac Vieux Desert		✓	✓																					2
Ashland	Day									✓						✓		✓		✓					4
	Galilee					x														✓					2
	Gordon									✓							✓			✓		✓	✓		5
	Mineral																	✓		✓					2
Bayfield	Atkins				✓																		✓		2
Burnett	Big Sand			✓						✓		✓				✓		✓		✓			✓		7
	Devils							✓		✓			✓	✓			✓								5
	Sand							✓		✓								✓		✓			✓		5
Burnett/Washburn	Middle McKenzie	✓		✓				✓		✓								✓		✓					6
Iron	Upson																			✓					1
Price	Lac Sault Dore		p		✓	p				p				✓						✓	p	✓	✓	✓	10
	Musser Flowage	p					✓			✓								✓		✓		✓	✓	✓	8
	Solberg	p		✓	✓		✓			✓		✓						✓	✓	✓		✓	✓	✓	12
Price/Ashland	Butternut				✓	✓	✓		✓	✓				✓		✓		✓		✓	p	✓	✓		12
Sawyer	Durphee								✓											✓			✓		3
	Lake of the Pines			✓		✓				✓								✓		✓	p		✓		7
	Lower Clam															✓				✓		✓			3
	Nelson					p				p				✓		✓				✓	p		✓		7
	Sissabagama					✓				✓								✓		✓					4
	Whitefish		✓		✓		✓			✓	✓			✓		✓		✓		✓		✓	✓		11
Vilas	Ballard					p	✓			p												✓			4
	Big Arbor Vitae	✓												✓		✓							✓		4
	Clear					p	✓											✓		✓	p		✓		6
	High				✓	p				p						✓					p	✓			6
	Little Arbor Vitae					p				p										✓	p	✓	✓		6
Washburn	Stone			✓				✓			✓	✓		✓						✓					6
Washburn/Sawyer	Birch	✓		✓		✓	✓			✓	✓	✓		✓			✓			✓		✓	✓		12
Total		5	4	7	7	11	7	4	2	19	3	4	1	8	3	9	3	14	1	23	7	13	16	3	

DISCUSSION

Eurasian Water-milfoil:

Whitefish Lake

Whitefish Lake is an 800 acre lake in Sawyer County with scattered development. It has one public boat landing in the southwest area of the lake. Eurasian water-milfoil was observed in Schoolhouse Bay, in the northeast portion of the lake. Eurasian water-milfoil was scattered as isolate plants or patches in the bay. The largest population was located in the entrance to the bay (10-25 plants). Additional isolated plants and patches were found around the bay and around private residential docks, mainly on the north side of the bay. No other Eurasian water-milfoil was observed in the lake.

The Sawyer County AIS Coordinator, the WDNR, LCO Natural Resources Staff and LCO Ojibwe Community College Extension were notified. Sawyer County and the Whitefish Lake Association spot treated 0.01 acres with 2,4-D on 16 July 2008. In addition, SCUBA divers hand-pulled small plants in the bay. Since the initial treatment, the area has been monitored and spot-treated when needed. Follow-up monitoring and treatment (if needed) will be conducted annually.

Lac Vieux Desert

Lac Vieux Desert (LVD) is a 2780 acre flowage on the Wisconsin-Michigan border. Eurasian water-milfoil was observed by Barb Gajewski of the Watersmeet ANS Coalition in late July. Plants were observed in Thunder Bay in the southeast portion of the lake. GLIFWC conducted follow-up surveys in late August to assess the extent of the Eurasian water-milfoil. The first day was spent surveying *manoomin* beds while also looking for Eurasian water-milfoil. The next two days were spent surveying for Eurasian water-milfoil. Four additional locations of Eurasian water-milfoil were found west of the original Thunder Bay sighting. All these additional sites had five or fewer plants. No plants were found outside of Thunder Bay.

WDNR has planned a full lake point intercept plant survey for mid-summer of 2009. The Vilas County AIS Coordinator is planning a meeting to discuss potential funding, treatment options and the development of a lake management plan with all interested parties.

Curly Pondweed:

Middle McKenzie Lake

Middle McKenzie is 527 acre lake located mainly in Burnett County, with the extreme eastern side located in Washburn County. One public boat landing is located in the west bay. A total of four curly pondweed sites were observed on the lake. The largest site was located just southwest of the boat landing (approximately 50-100 plants). A single plant was observed in the northwest bay. Less than 50 plants were observed in the northeast bay and an area just southeast

of the boat landing. Fragments were scattered throughout the lake, but no rooted plants were observed near the inlet from Big McKenzie Lake. St.Croix Natural Resources Department staff, Washburn County AIS coordinator and WDNR were notified.

Big Arbor Vitae Lake

Big Arbor Vitae is a 1070 acre lake in Vilas County with three public boat landings. Two of the boat landings are located in the southeast area of the lake. The third is located on the north end, along with a public park and beach. Observed curly pondweed was isolated in the southeast bay. The main population of curly pondweed is located on the west side of the southeast bay with a few hundred plants covering about 0.5 to 1.0 acre. Plant fragments were observed in the east bay, but no rooted plants were observed. Curly pondweed was not observed near the outlet or inlet of Link Creek which connects Little Arbor Vitae Lake to Big Arbor Vitae Lake. The Vilas County AIS Coordinator and WDNR were contacted and are planning follow up management.

Birch Lake

Birch Lake is a 364 acre lake on the Washburn and Sawyer County border with two public boat landings in Washburn County. Dense mats of curly pondweed were found throughout the lake. Fragments, turions and rooted plants were common near the County Highway D boat landing and dock. Curly pondweed has already been documented upstream and downstream of Birch Lake. LCO Natural Resource staff, Washburn and Sawyer County AIS Coordinators and the WDNR were notified.

Purple Loosestrife:

On Birch Lake, one clump of purple loosestrife was observed along the southeast shoreline in front of a private residence. Two patches of purple loosestrife were found along the north shoreline on Big Sand Lake. On LVD, one clump of purple loosestrife was observed in front of a private residence on Lesleys Island. Three populations of purple loosestrife were observed along private, residential shorelines on Middle McKenzie Lake, northeast of the boat landing. On Lake of the Pines, three plants were observed around the campground swimming area. On Solberg Lake, purple loosestrife was found around the campground shoreline and by Solberg Lake Road boat landing on the northwest side of the lake. Purple loosestrife was found scattered in small isolated populations around Stone Lake. The appropriate County AIS Coordinator and the WDNR were notified of all these occurrences.

Other:

Butternut Lake

Butternut Lake is a 983 acre lake along the border of Ashland and Price Counties. There are four public boat landings on Butternut Lake, two in Ashland County and two in Price County. Along the south side of the lake, a potted, scarlet-colored water lily in a planter near native water lilies was observed. That this plant had been deliberately placed in the lake was of concern

because of the potential for other aquatic invasive species to hitch a ride with the plant. The WDNR and Upper Chippewa CWMA were notified. The WDNR removed the plant and contacted the lake shore property owners. The Upper Chippewa CWMA is planning follow-up educational outreach with the Butternut Lake Association.

PURPLE LOOSESTRIFE CONTROL ACTIVITIES IN THE BAD RIVER - CHEQUAMEGON BAY WATERSHED

INTRODUCTION

Purple loosestrife is a perennial, herbaceous wetland plant native to Europe. It arrived in eastern North America in the early 1800's via plants brought by settlers, seeds carried within livestock, and in ballast soil carried by ships (Thompson *et al*. 1987). After its introduction, purple loosestrife quickly spread westward displacing native wetland plant communities. Its current distribution includes much of the U.S. and southern Canada.

Purple loosestrife can germinate in moist, exposed soils and tolerates a wide range of pH, nutrient, and light levels. Once established, seedlings can survive shallow flooding. The plant develops a large rootcrown and dense shoots that out-compete adjacent plant life. The stalks are square and commonly attain heights up to 2m on mature plants. The leaves are opposite each other and alternate at 90 degree angles along the stem. The distinctive flowering spike of purple loosestrife blooms from mid July through early September in the upper Great Lakes region.

Purple loosestrife degrades wetland habitats by out-competing native vegetation. On exposed substrates, purple loosestrife seeds germinate at such a high density that they out-compete native vegetation. The herbivores and pathogens that keep loosestrife from dominating European wetlands are absent in North America. This lack of natural enemies combined with prolific seed production gives purple loosestrife a substantial advantage over native vegetation. Diverse wetland plant communities can quickly be displaced by monotypic stands of purple loosestrife. Reductions in native plant diversity result in a loss of food and shelter for the numerous insect, amphibian, mammal, and bird species that depend on healthy wetlands for their survival.

METHODS

GLIFWC's integrated control efforts continued to focus on purple loosestrife within the Bad River/Chequamegon Bay watershed. Treated sites were mapped using a TDS® Recon 400 hand-held computer with a Holux® GM-270 compact flash GPS card. Site locations and attribute data for each site were entered directly into a GIS database using ESRI's® ArcPad software. Custom data entry forms were created using ESRI's® ArcPad Application Builder to increase accuracy and efficiency of data entry. Attribute data for each site were also collected including an estimate of the number of plants, acreage class, type of herbicide used, and an estimate of the amount of herbicide applied. These data were used to prioritize effort and select control methods based on the areal extent of the site, number of plants, and the site's location within the watershed.

Small sites (< 0.5 acres) in upper reaches of the watershed were prioritized for chemical control. Depending on the hydrology of the site, control crews using back-pack sprayers applied either Glyphosate (Glypro®) or Triclopyr (Garlon 3A®) to purple loosestrife plants. Glyphosate was used on sites with standing water, while Triclopyr was used where standing water was absent. Triclopyr has the advantage of being dicot-specific, allowing grasses and sedges to persist and re-colonize the site in a shorter time period. Chemical control efforts focused primarily on road rights-of-way between Mellen and Bayfield. Private properties were also treated after consent forms were signed by the landowner.

Large sites (> 1 acre) in lower reaches of the watershed, sites with poor access, and sites where landowners have expressed a preference for biological control were given high priority for biological control. 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. In 2008, beetles were collected from locally established populations in late May or early June and transferred directly to new release sites. Release sites from prior years were visited in early June and again in late summer to ascertain overwinter survival, assess suitability of sites for collection of adults, and to take site photos documenting the effects of beetle herbivory.

RESULTS

In 2008, GLIFWC staff treated 138 sites with herbicide. Figure 6 illustrates the distribution of chemical control efforts for purple loosestrife in 2008. With respect to biological control efforts, *Galerucella* beetles have established viable populations at all sites where they have been released since 2000 and site visits continue to document their impacts (Figures 7 and 8). Because all of the largest sites within Bad River-Chequamegon Bay watershed already have established populations of *Galerucella* beetles (Figure 9), no beetles were released within the watershed in 2008. However, three days of field collections for *Galerucella* beetles were sponsored by GLIFWC and the Northwoods Cooperative Weed Management Area (NCWMA). Participants were led by GLIFWC staff to previously established biocontrol sites to collect beetles for loosestrife control efforts throughout northern Wisconsin. Participants included the U.S. Forest Service, Wisconsin DNR, Iron River Lakes Association, as well as several private landowners.

DISCUSSION

The use of biological controls has allowed GLIFWC's control crew to place greater emphasis on treating small satellite populations with herbicide before they become significant source populations (Figure 10). This strategy also reduces the amount of herbicide applied at any one site (Figure 11). The establishment of local *Galerucella* populations has eliminated the need for mass rearing, allowing beetles to be collected *en masse* from established sites and released on the same or following day at new sites. This has reduced the labor associated with this activity by approximately 70%. The field collection day sponsored by GLIFWC and NCWMA has also

extended this benefit to cooperators outside of GLIFWC's focus watershed; three more collection days are planned for 2009.

The majority of *Galerucella* sites within the Bad River – Chequamegon Bay watershed were established between 2000 and 2002. Beetle populations reached their highest densities within 1-2 years at the smallest sites (typically a roadside ditch <100 m). Several of the largest sites (typically coastal wetlands with over 1 acre of purple loosestrife) reached their highest beetle densities 3-5 years after the initial release. When *Galerucella* beetles are initially introduced at a loosestrife-infested site, their populations grow rapidly, eventually reaching a population density that substantially reduces the loosestrife population as is evident in Figures 7 and 8. As a consequence, the *Galerucella* population also crashes, and purple loosestrife plants recover somewhat the following year. However, the *Galerucella* population typically recovers within 1-2 years and prevents loosestrife from achieving its previous dominance at a site. This pattern has been observed at several small sites within the watershed, with each recovery of loosestrife a little weaker than the previous one. With the exception of Fish Creek Sloughs near Ashland, WI, *Galerucella* populations peaked at the largest sites in 2006 and 2007. These sites showed signs that *Galerucella* populations had crashed and purple loosestrife was recovering in 2008 (Figures 7 and 8 – see 2008 photos). It is unknown how fast *Galerucella* populations will recover and decrease purple loosestrife again at these large sites. GLIFWC staff will continue to monitor these sites into the future.

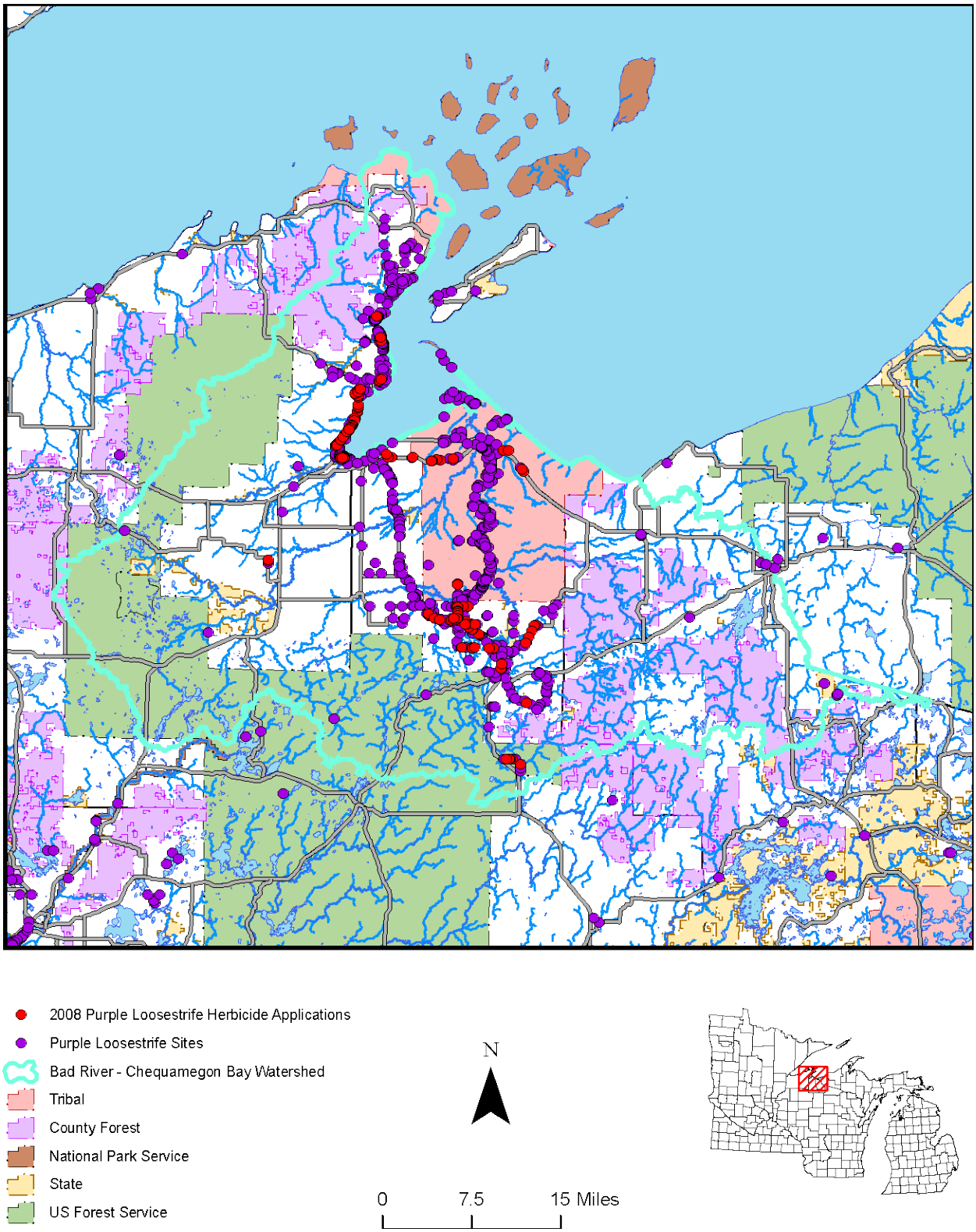

Figure 6. Purple loosestrife herbicide applications in 2008.

Figure 7. *Galerucella* release site near Washburn, WI. *Galerucella* were released in 2002 with peak impacts occurring in 2006. The *Galerucella* population subsequently crashed and loosestrife has rebounded slightly in 2008.

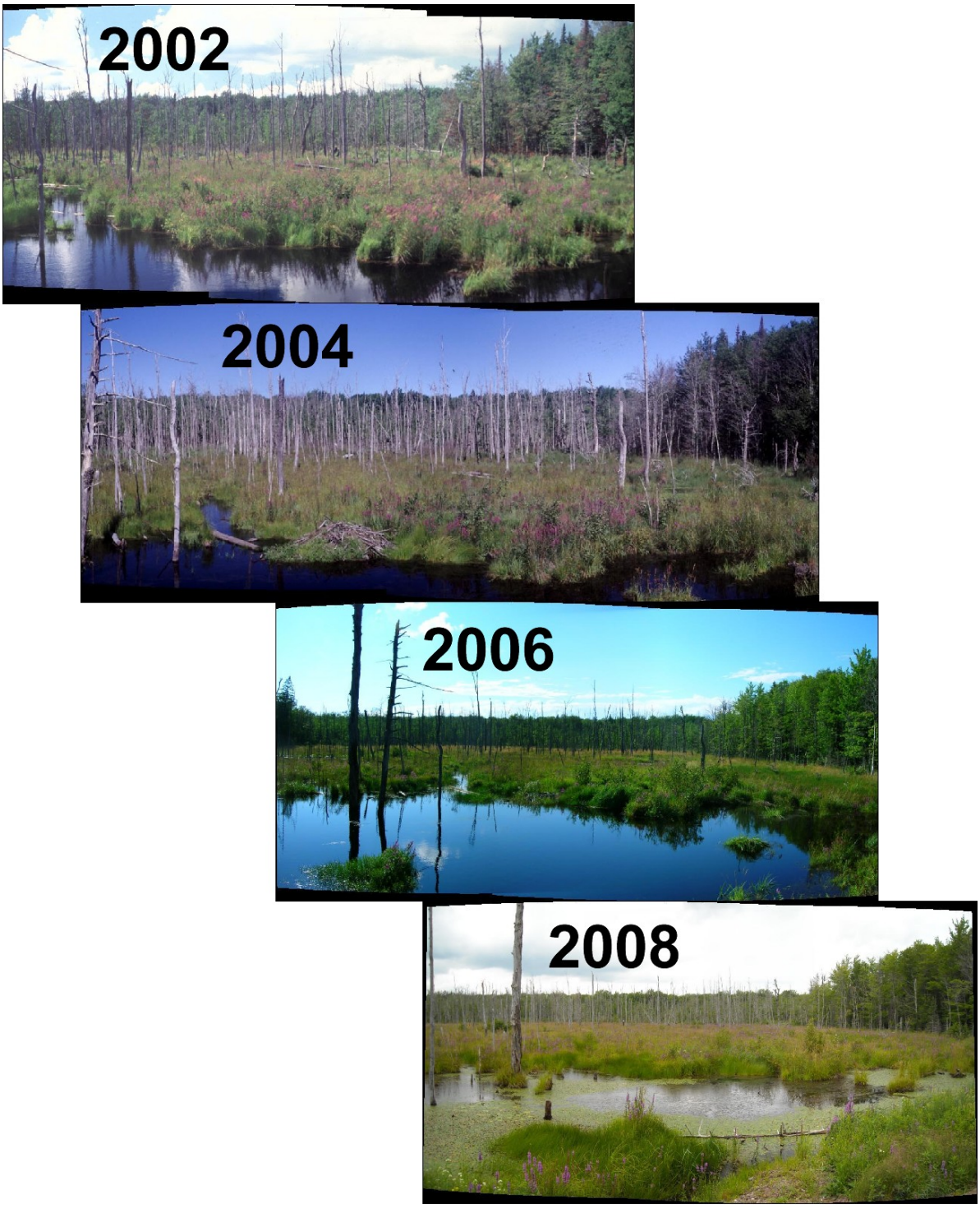

Figure 8. *Galerucella* release site near Underwood State Wildlife Area and headwaters of Black River, Iron County, WI. *Galerucella* were released in 2002 with peak impacts occurring in 2006. The *Galerucella* population subsequently crashed and loosestrife has rebounded slightly in 2008. (Panoramas created with *AutoStitch*-http://people.cs.ubc.ca/~mbrown/autostitch/autostitch.html).

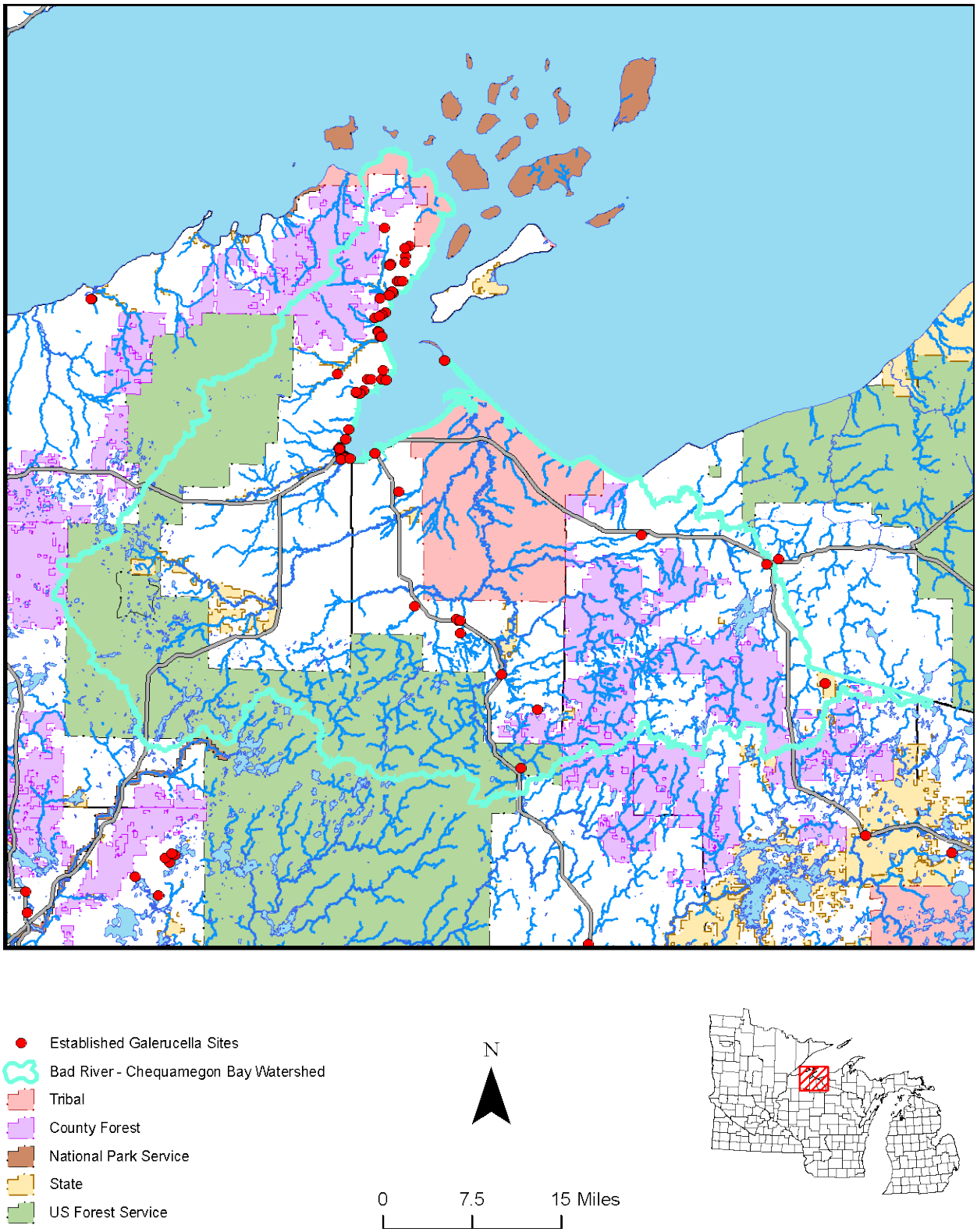

Figure 9. *Galerucella* sites within the Bad River – Chequamegon Bay watershed.

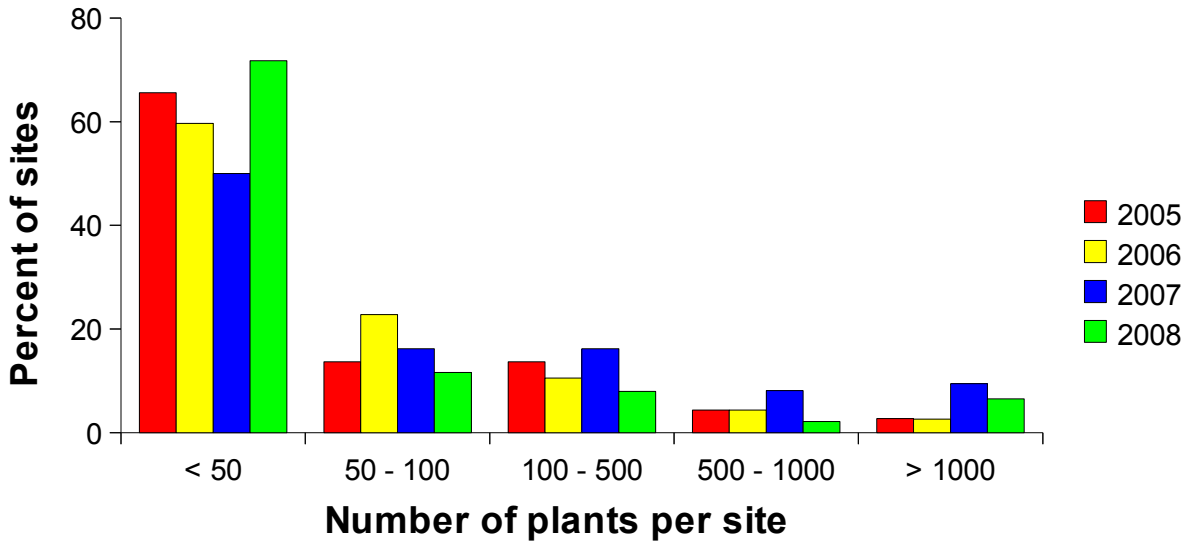

Figure 10. Abundance of purple loosestrife at sites treated in 2005-2008.

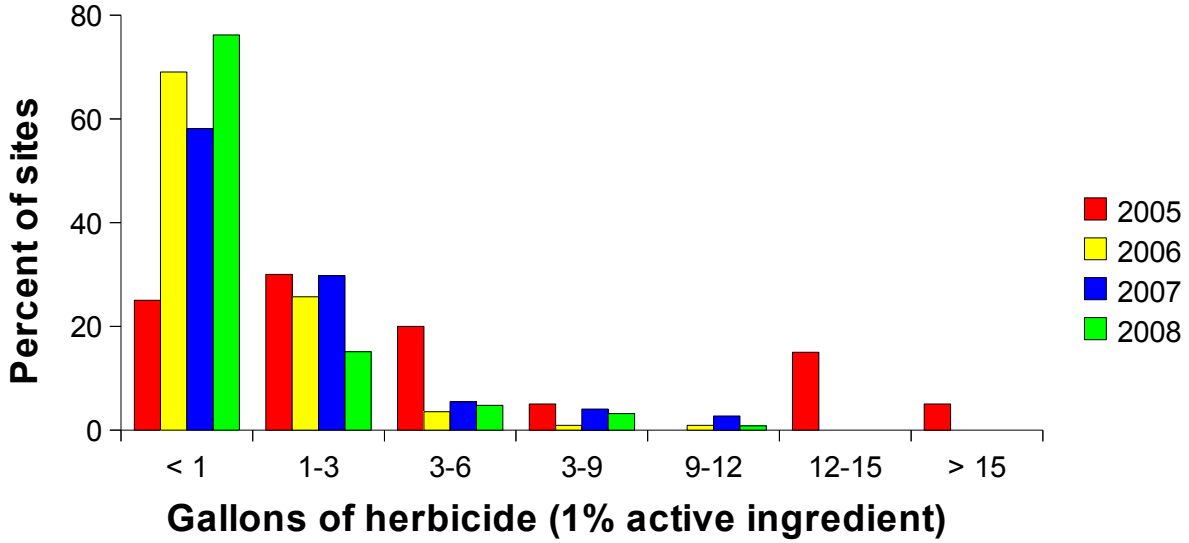

Figure 11. Amount of herbicide applied to purple loosestrife infestations in 2005-2008.

LEAFY SPURGE CONTROL ACTIVITIES IN THE BAD RIVER-CHEQUAMEGON BAY WATERSHED

INTRODUCTION

Leafy spurge is a perennial herb native to Eurasia. It was first recorded in North America from Massachusetts in 1827. It is thought to have arrived in contaminated seed. By the early 1900's, leafy spurge had spread as far west as North Dakota.

Leafy spurge thrives in open, sunny habitats. The plant reaches heights of up to 1 meter, though they are often shorter on poor sites. The plants bloom in late May and early June, producing clusters of inconspicuous flowers subtended by yellow bracts. The seed capsules of leafy spurge open explosively, dispersing seeds up to 15 feet. The seeds are often carried further by water, wildlife, and heavy equipment. Leafy spurge also spreads vegetatively, allowing the plant to dominate a site. The extensive root system of leafy spurge can penetrate as far as 15 feet underground.

Leafy spurge displaces native vegetation in open habitats including prairies, pine barrens, pastures, abandoned fields, and roadsides. It is especially dominant on dry or nutrient poor sites where its extensive root system and lack of natural enemies give it a substantial advantage over native vegetation. Because leafy spurge is unpalatable to cattle and deer, it can cause significant economic and ecological impacts.

Pine barrens habitats in northwestern Wisconsin are unique habitats that are especially vulnerable to the threats posed by leafy spurge. These areas provide habitat for a wide range of wildlife, as well as gathering and hunting opportunities for tribal members.

METHODS

GLIFWC staff evaluated the ecological threats and feasibility of control for over 300 non-native plants within Ashland and Bayfield counties in 2001 (Falck and Garske 2002, Falck and Garske 2003). Baseline distribution and abundance data were collected from the field and compiled with information on ecological impacts and control options from peer-reviewed literature and other sources. The resulting database was used to rank species into four management categories according to each plant's relative abundance, ecological impact, and feasibility for control. The results indicated that leafy spurge posed the greatest threat to local habitats, while its relatively low abundance and wide range of control options made it feasible to contain and control.

GLIFWC initiated chemical control for leafy spurge in the fall of 2003 using imazapic (Plateau®) herbicide applied with backpack sprayers. Herbicide was applied in the fall when plants were senescing and drawing energy reserves back into their roots for the winter. Herbicide

was applied until a hard freeze damaged or killed the shoots, preventing uptake by the plants. Shoot damage was monitored by checking for the presence of milky sap in broken stems.

Treated sites were mapped using a TDS® Recon 400 hand-held computer with a Holux® GM-270 compact flash GPS card. Site locations and attribute data for each site were entered directly into a GIS database using ESRI's® ArcPad software. Custom data entry forms were created using ESRI's® ArcPad Application Builder to increase accuracy and efficiency of data entry. Attribute data for each site were also collected including an estimate of the number of plants, acreage class, type of herbicide used, and an estimate of the amount of herbicide applied.

RESULTS

In 2008, GLIFWC staff treated 55 sites with herbicide. Figure 12 illustrates the distribution of chemical control efforts for leafy spurge in 2008.

Road rights-of-way on the eastern edge of the Moquah Barrens near Washburn, WI comprised the core area of local leafy spurge populations and provided a massive seed source for dispersal via road maintenance activities such as mowing and grading. Private properties were also treated after consent forms were signed by the landowner. GLIFWC staff also participated in one workday sponsored by the Northwoods Cooperative Weed Management Area to treat several large infestations on private lands, providing herbicide, backpack sprayers, and assistance with herbicide application. Participants also included private landowners, the National Park Service Exotic Plant Management Team, US Forest Service, and Wisconsin DNR.

DISCUSSION

Much progress has been made on leafy spurge control efforts. Unlike previous years, the vast majority of sites treated in 2008 consisted of less than 500 plants (Figure 13). Consequently, much less herbicide was applied at each site in 2008 (Figure 14). Populations of biological control organisms, released in 2003, also appear to be expanding. In 2008, *Aphthona* spp. were found along the road right-of-way adjacent to the initial release site.

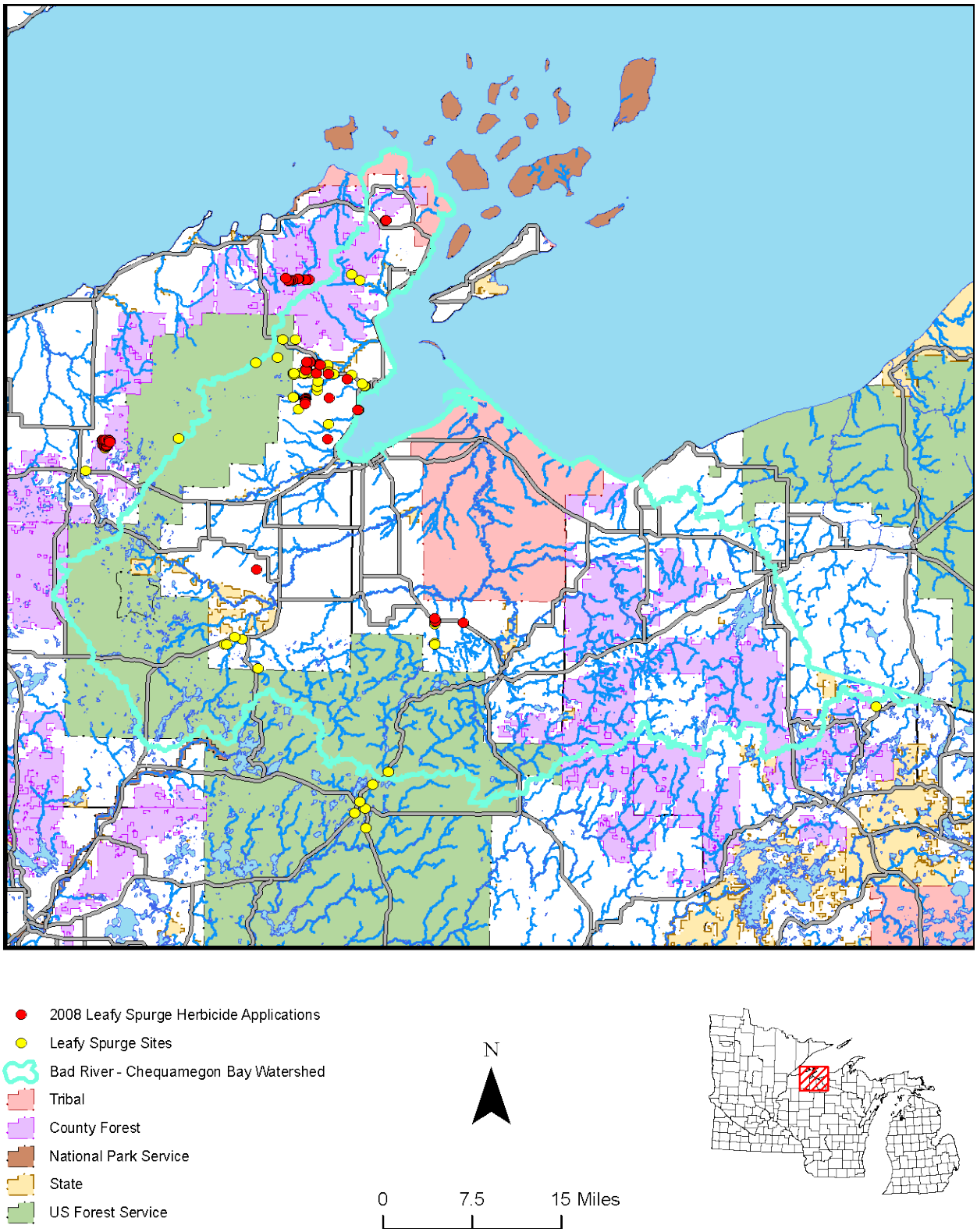

Figure 12. Leafy spurge herbicide applications in 2008.

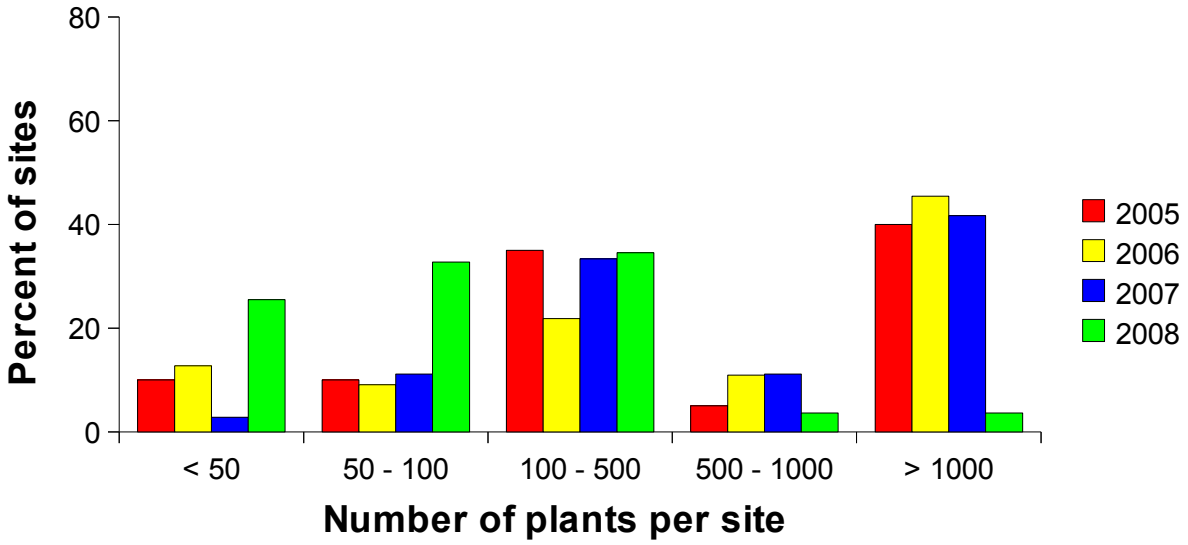

Figure 13. Abundance of leafy spurge at sites treated in 2005-2008.

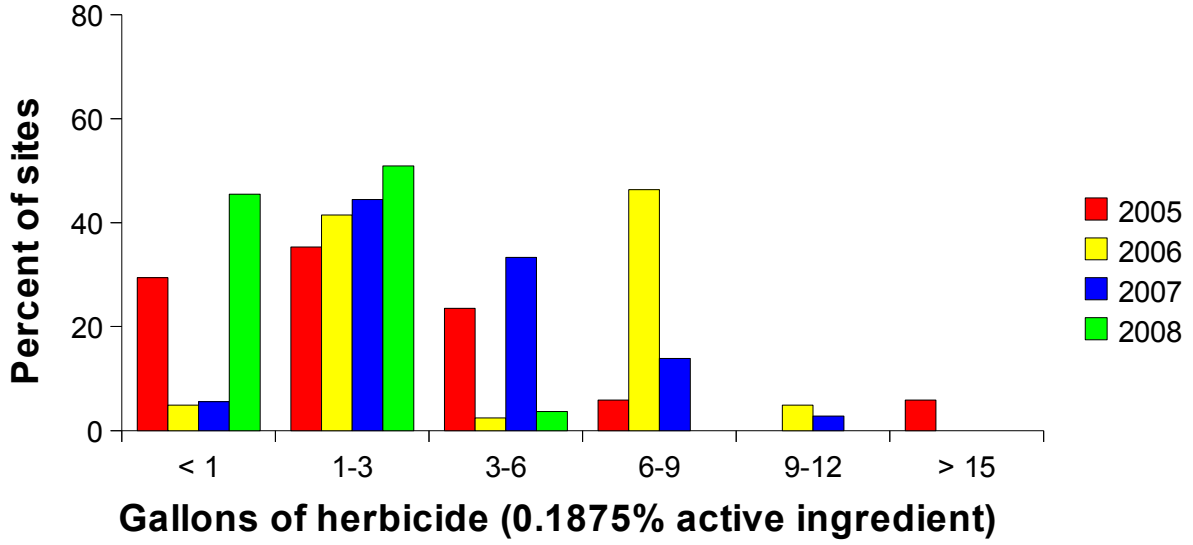

Figure 14. Amount of herbicide applied to leafy spurge infestations in 2005-2008.

EDUCATION OUTREACH ACTIVITIES

INTRODUCTION

Because the vast majority of invasive species introductions can be attributed to human activities, effective prevention and control efforts depend on an informed public. Unfortunately, awareness of the ecological and economic impacts of invasive species among the general public is generally low (Colton and Alpert 1998). To help address this situation, GLIFWC initiated an educational outreach program in 1998 to raise public awareness of this important issue.

PROGRAM OVERVIEW

A suite of educational materials have been compiled and/or developed to reach a broad range of audiences. These materials include ID cards, brochures, slide and poster presentations, and videos. GLIFWC distributes educational material with the help of cooperating state and federal agencies throughout the ceded territories. Additional outreach is provided via GLIFWC's invasive species web site (www.glifwc.org/invasives) and quarterly newsletter - *Mazina'igan*.

ACCOMPLISHMENTS

Mazina'igan Feature Articles

Starting in 2004, each issue of GLIFWC's quarterly newsletter has featured an article on at least one invasive species issue. Topics covered in 2008 included sea lamprey, biological control, AIS prevention, viral hemorrhagic septicemia (VHS), *Phragmites australis*, emerald ash borer, and an update on GLIFWC's invasive species program.

www.glifwc.org/invasives

GLIFWC's invasive species web site features species abstracts for many of the regions' invasive plants, photos that can be downloaded for educational purposes, GLIFWC reports, and links to interactive maps and other Internet resources on invasive species.

"Stopping Aquatic Hitchhikers"

In 2008, GLIFWC partnered with members of the Invasive Species Education Alliance to produce a DVD to raise public awareness about invasive species. The DVD was distributed free of charge during Invasive Species Awareness month in June. Members of the Invasive Species Education Alliance include: Discover Mediaworks, Bureau of Indian Affairs, Great Lakes Indian Fish and Wildlife Commission, Lac du Flambeau Band of Chippewa Indians, Wisconsin Department of Tourism, Wisconsin Department of Natural Resources, Wisconsin Counties Association, and the University of Wisconsin-Extension.

COORDINATION AND COOPERATION

INTRODUCTION

Because non-native invasive plants disperse widely across the landscape and administrative boundaries, it is advantageous to work cooperatively towards management and control objectives. In addition, the introduction and spread of new invasive species in the region continues to out-pace control activities, and is too much for any one agency to manage alone. GLIFWC strives to coordinate its invasive species activities with cooperating agencies, universities, non-governmental organizations, and the general public to maximize the efficient use of limited resources.

ACCOMPLISHMENTS

GLIFWC staff are actively engaged in several long-term initiatives that seek to enhance interagency cooperation and coordination of invasive species management and planning:

Northwoods Cooperative Weed Management Area (NCWMA): Formally established in 2006, NCWMA provides a forum to share information, collaborate on planning and cooperate on management activities in northern Wisconsin. GLIFWC staff were instrumental in obtaining funding for and developing a website (www.northwoodscwma.org) and brochure for the NCWMA. GLIFWC staff also worked with the NCWMA on annual leafy spurge control activities (providing labor, herbicide and other equipment) and purple loosestrife biological control activities (leading field trips to collect *Galerucella* beetles from previous release sites). In 2008, the Northwoods Cooperative Weed Management Area was selected by the Wisconsin Council on Invasive Species as a recipient of the annual "Invader Crusader" award.

St. Croix National Scenic Riverway Comprehensive Interstate Management Plan for the Prevention and Control of Aquatic Nuisance Species: Completed in March of 1998 in cooperation with the Lower St. Croix Management Commission, Minnesota Department of Natural Resources, Minnesota-Wisconsin Boundary Area Commission, National Park Service, Wisconsin Department of Natural Resources, U.S. Fish and Wildlife Service, and the Upper St. Croix Management Commission. This plan makes GLIFWC eligible for funding from the U.S. Fish and Wildlife Service to implement tasks identified in the plan and helps facilitate cooperation on AIS issues within the St. Croix watershed.

Wisconsin's Comprehensive Management Plan To Prevent Further Introductions and Control Existing Populations of Aquatic Invasive Species: Completed in cooperation with the Wisconsin Department of Natural Resources and UW-Extension in September of 2003, this plan makes GLIFWC eligible for funding from the U.S. Fish and Wildlife Service to implement tasks identified in the plan and helps facilitate cooperation with the WDNR on AIS issues.

www.glifwc-maps.org: The goal of this project is to facilitate much of the collaborative work discussed above by providing a common communications infrastructure. GLIFWC compiles and shares information on invasive species distribution and management efforts throughout Minnesota, Wisconsin, and Michigan at www.glifwc-maps.org.

Invasive Species Advisory Committee (ISAC): GLIFWC staff were appointed to this advisory committee by the Secretary of Interior to provide advice from a tribal perspective to the National Invasive Species Council (NISC) which is responsible for implementation of the National Invasive Species Management Plan.

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