Invasive Species Program 2007

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.

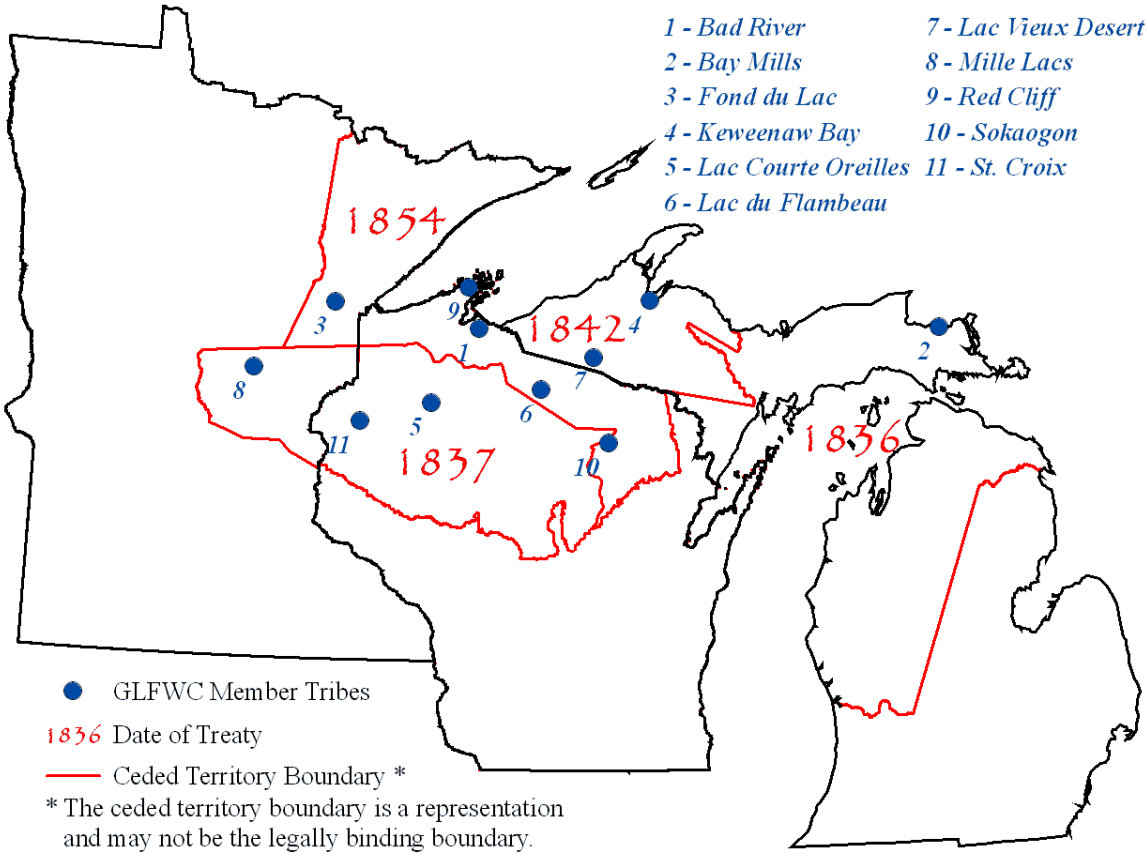

Figure 1. Location of GLIFWC member tribes and ceded territories.

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 2007 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 2007 with additional cooperation and funding from the Wisconsin DNR Division of Forestry (Garske and Falck 2008).

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 2007. GLIFWC worked with Discover Mediaworks to produce a special episode of Discover Wisconsin devoted to Terrestrial Invasive Species, their impacts, and how to prevent their spread.

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
  - Supplemental Funding
- National Fish and Wildlife Foundation (NFWF)
- U.S. Fish and Wildlife Service (USFWS)
  - Wisconsin AIS State Management Plan
- Wisconsin Department of Natural Resources (WDNR)
  - Division of Forestry

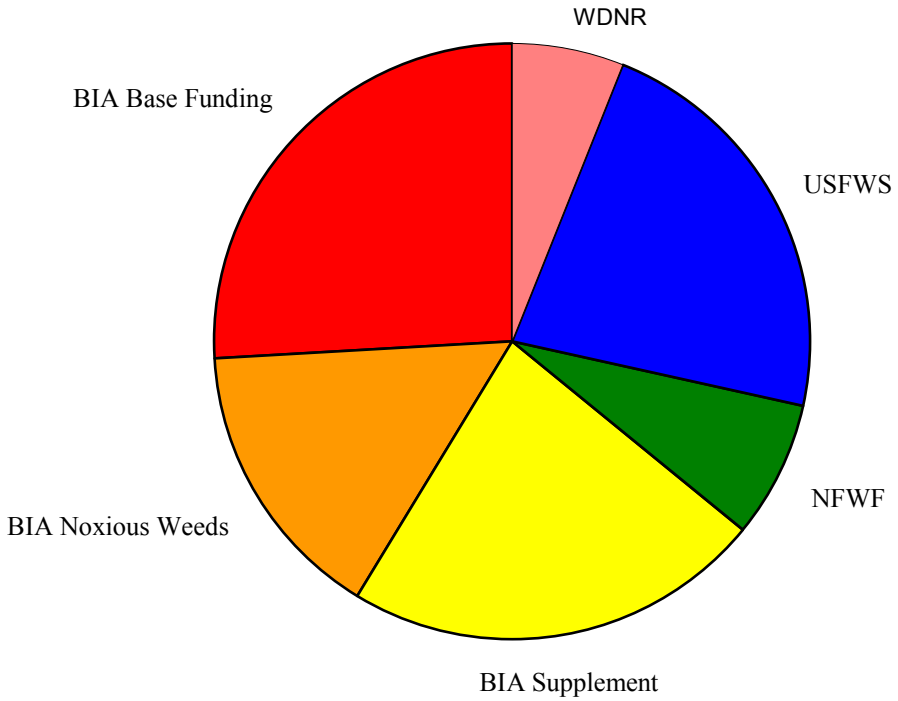

Figure 2. Funding sources for GLIFWC's Invasive Species Program in 2007.

TERRESTRIAL INVASIVE PLANT INVENTORIES IN THE CEDED TERRITORIES

The objective of the 2007 survey was to quantify the abundance and distribution of terrestrial invasive plants in northern Iron and southern Ashland 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 2007 invasive species survey began on April 23, and continued through October 3, with follow-up days on October 15 and November 2. 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. With exceptions for certain major invasives such as garlic mustard and giant hogweed, 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 handheld 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 seedheads 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 undercollected 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. Photos were provided to the WDNR along with an Excel table giving the file name, species, date, location, and additional information for each photo. Most of these photos are also available for download from the GLIFWC website.

RESULTS

A total of 1,032 invasive plant sites were detected in 2007 (Figure 3, Table 1). However, many nonnative species were very common and/or widspread 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.

Garlic Mustard - A small population of garlic mustard was found in Iron County along ATV / Snowmobile Trail 6, which runs northeast from County E and the Weber Lake area, about 6 miles through the hill country to Hoyt Fire Lane Road. Several rosettes had been found and pulled near this spot the year before (I. Shackleford, Ottawa National Forest, pers. comm.). This apparently new population was on the far side of the ditch, at the west end of a short ad-hoc loop extending from the main trail. Ongoing trail maintenance at the time of the survey facilitated burying this patch of garlic mustard with about 0.5 m of soil with a bulldozer (Figure 4).

A significant amount of time and effort was expended delineating populations of garlic mustard along the Bad River in Ashland County. This population consisted of approximately 32 patches, ranging from small and fairly compact and covering only a few meters square, to relatively large and diffuse patches of somewhat more than an acre (Figure 6). These patches seem to be scattered along the floodplain at fairly regular intervals, from Mellen north almost to the southern boundary of Copper Falls State Park. Whether due to chance, distance from upstream

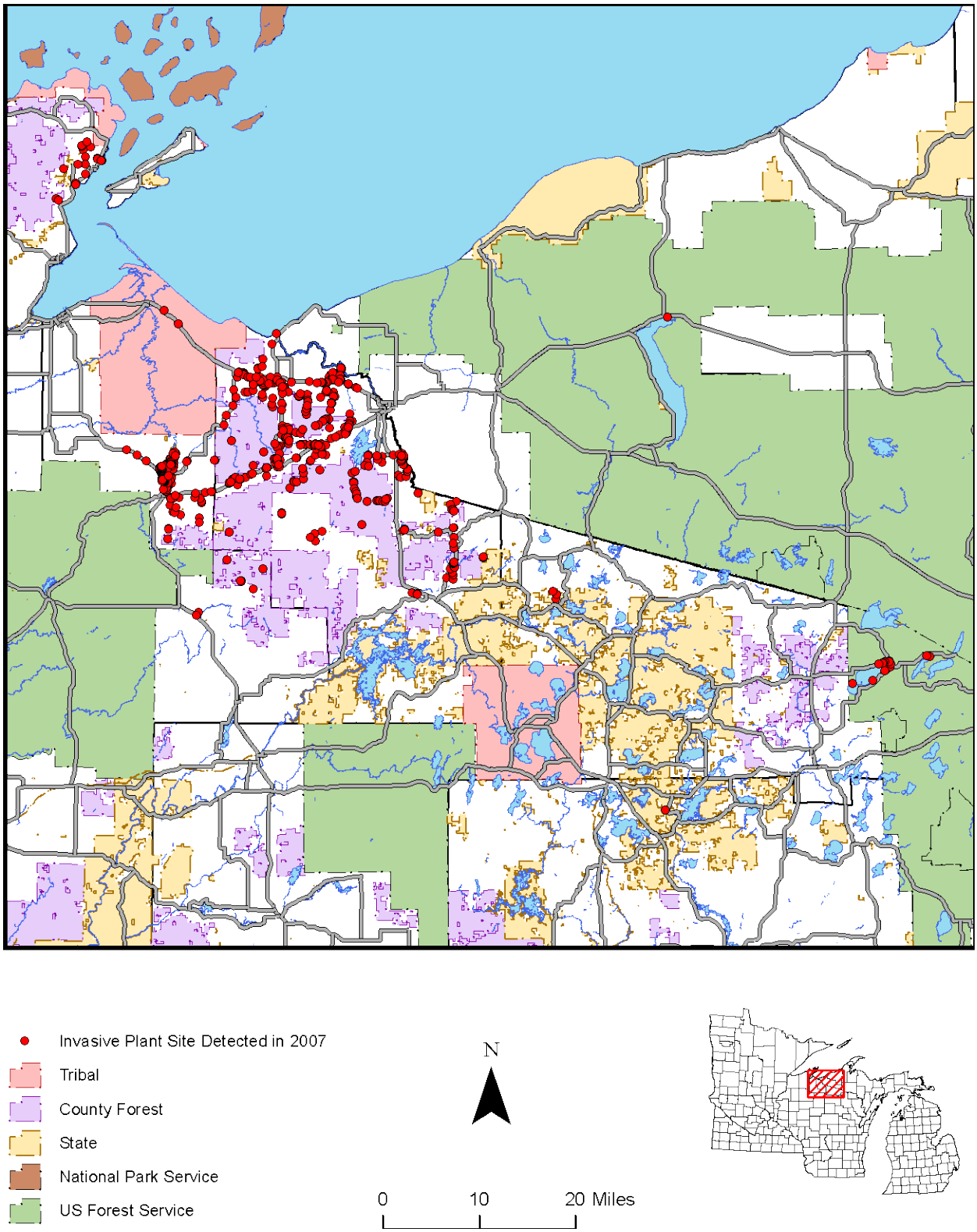

Figure 3. Invasive plant sites detected in 2007.

Table 1. Frequency of invasive plant species detected in 2007.

Scientific Name	Common Name	Frequency
Lonicera X *bella*	Bell's honeysuckle	162
Salix fragilis	crack willow	68
Phalaris arundinacea	reed canary grass	61
Salix X *rubens*	hybrid crack willow	51
Centaurea biebersteinii	spotted knapweed	46
Saponaria officinalis	bouncing bet	39
Myosotis scorpioides	common forget me not	38
Lupinus polyphyllus	bigleaf lupine	37
Rhamnus cathartica	common buckthorn	35
Alliaria petiolata	garlic mustard	33
Tanacetum vulgare	common tansy	33
Lonicera morrowii	Morrow's honeysuckle	31
Myosotis sylvatica	woodland forget-me-not	24
Lythrum salicaria	purple loosestrife	22
Hemerocallis fulva	orange daylily	21
Lapsana communis	nipplewort	20
Aegopodium podagraria	bishop's goutweed	17
Linaria vulgaris	butter and eggs	17
Solanum dulcamara	nightshade	15
Hylotelephium telephium	witch's moneybags	14
Convallaria majalis	European lily of the valley	13
Campanula rapunculoides	European bellflower	13
Dianthus barbatus	sweet William	12
Vinca minor	periwinkle	9
Campanula trachelium	throatwort	9
Lysimachia nummularia	creeping Jenny	8
Achillea ptarmica	sneezeweed	7
Linaria dalmatica	dalmatian toadflax	7
Typha X *glauca*	hybrid cattail	7
Bromus inermis	smooth brome	7
Picea abies	Norway spruce	7
Pinus sylvestris	Scotch pine	7
Poa nemoralis	forest blue grass	6
Myosoton aquaticum	giant chickweed	6
Coronilla varia	crown vetch	6
Draba verna	spring whitlowgrass	5
Typha angustifolia	narrowleaf cattail	5
Iris pseudacorus	yellow iris	5
Euphorbia esula	leafy spurge	5
Berberis thunbergii	Japanese barberry	5
Valeriana officinalis	garden valerian	5
Phlox paniculata	garden phlox	4
Lathyrus sylvestris	everlasting pea	4

Table 1. Frequency of invasive plant species detected in 2007 (continued).

Scientific Name	Common Name	Frequency
Euphorbia cyparissias	cypress spurge	4
Glechoma hederacea	creeping Charlie	4
Salix alba	white willow	4
Polygonum X *bohemicum*	Bohemian knotweed	3
Robinia pseudoacacia	black locust	3
Viburnum opulus	European cranberrybush	3
Malva moschata	musk mallow	3
Frangula alnus	glossy buckthorn	3
Hesperis matronalis	dame's rocket	3
Pastinaca sativa	wild parsnip	3
Populus alba	white poplar	2
Campanula carpatica	tussock bellflower	2
Mentha X *gracilis*	gingermint	2
Rorippa sylvestris	creeping yellowcress	2
Salix pentandra	laurel willow	2
Sorbus aucuparia	European mountain ash	2
Molinia caerulea	purple moorgrass	2
Caragana arborescens	Siberian peashrub	2
Rosa majalis	double cinnamon rose	2
Polygonum cuspidatum	Japanese knotweed	2
Hedera helix	English ivy	2
Veronica chamaedrys	germander speedwell	2
Miscanthus sacchariflorus	Amur silvergrass	1
Vitis	grape	1
Lonicera tatarica	Tartarian honeysuckle	1
Malus sieboldii	Japanese crab	1
Hemerocallis lilioasphodelus	yellow daylily	1
Silene	campion	1
Sorbaria sorbifolia	false spiraea	1
Leonurus cardiaca	motherwort	1
Kolkwitzia amabilis	beautybush	1
Veronica longifolia	longleaf speedwell	1
Mentha	mint	1
Mentha suaveolens	apple mint	1
Lathyrus latifolius	everlasting pea	1
Ornithogalum umbellatum	Star-of-Bethlehem	1
Pachysandra terminalis	Japanese spurge	1
Centaurea debeauxii	meadow knapweed	1
Alchemilla monticola	hairy lady's mantle	1
Glyceria maxima	reed mannagrass	1
Ranunculus repens	creeping buttercup	1
Calluna vulgaris	heather	1
Euonymus alatus	burning bush	1

Table 1. Frequency of invasive plant species detected in 2007 (continued).

Scientific Name	Common Name	Frequency
Centaurea montana	mountain bluet	1
Rorippa microphylla	onerow yellowcress	1
Potentilla argentea	silvery cinquefoil	1
Viburnum dentatum	arrow-wood viburnum	1
Viburnum lantana	wayfaring tree	1
Sambucus nigra	European black elder	1
Petasites japonicus	Japanese sweet coltsfoot	1
Polygonum sachalinense	giant knotweed	1
Total		946

Table 2. Nonnative plant species that were too common and/or widespread to map in 2007.

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

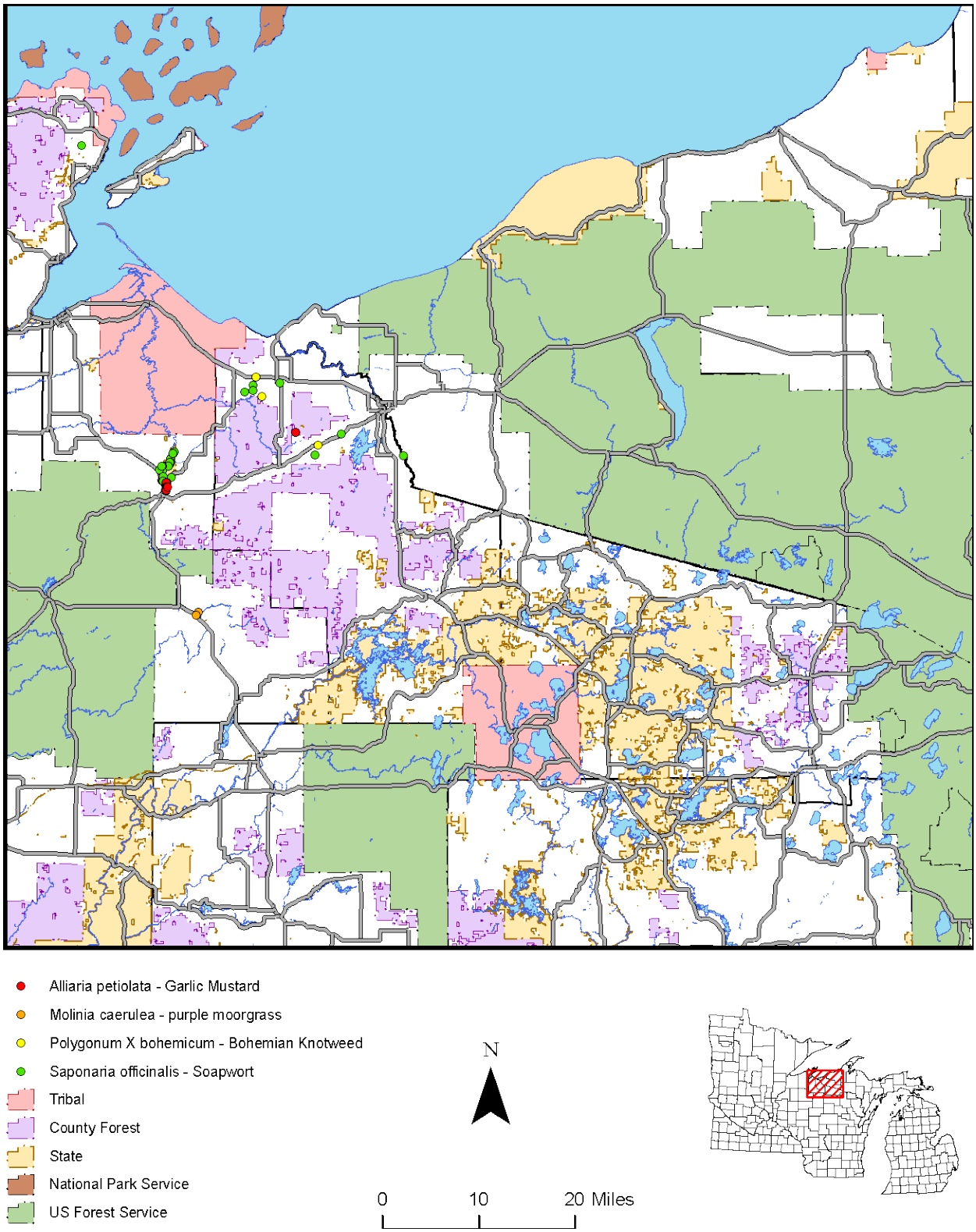

Figure 4. Species of concern detected in 2007.

Figure 5. Garlic mustard patch on ATV trail in Iron County before and after being covered with 0.5 m of soil.

Figure 6. Typical patch of garlic mustard (lower middle of photo) on the Bad River floddplain.

patches, or difficulty in getting established, garlic mustard was absent from sections of the river with steep banks. Unlike the large area of lowland forest surrounding the river south of the park, the banks within the park are increasingly steep and high, with only pockets of low wooded floodplain.

Bohemian Knotweed - A dense patch of Bohemian knotweed [*Fallopia* x *bohemicum* (Chrtek & Chrtková) J. P. Bailey, formerly *Polygonum* x *bohemicum* (Chrtek & Chrtková) Zika & Jacobson] was found along Clement Road south of Hwy 2, on both sides of a small bridge crossing Lawrence Creek (Figure 7). [Bohemian knotweed is a hybrid between Japanese knotweed, *Fallopia japonica* Houttuyn (or *Polygonum cuspidatum*), and Giant knotweed, *Fallopia sachalinensis* (F. Schmidt) Ronse Decraene, or *Polygonum sachalinense*] This knotweed colony occupies the shoulders of the road, and extend to the edge of the floodplain. Several clumps occupy the floodplain just east of the road also. Another large, vigorous patch of Bohemian knotweed was found on the south side of Iron Belt. Large clumps of knotweed occupy a disturbed area alongside and behind a large garage, and into an adjacent disturbed woods opening (with a satellite clump being cultivated in a yard). Although presumably originally planted at the site, the numerous small to large patches of knotweed occupying more than 0.25 acre of land suggest that the plant is spreading on its own as well.

Figure 7. Bohemian knotweed patch in northeastern Iron County.

Purple Moorgrass - A large population of purple moorgrass (*Molinia caerulea*) occurs just north of Glidden (Figure 8). First documented in 1996 (Judziewicz 12134, WIS), this grass thoroughly dominates a field west of Hwy 13, where it was probably once planted. From there it extends down at least two side roads, and also north for several miles along Hwy 13. This is the only population of purple moorgrass known from Wisconsin (UWSP 2008).

Figure 8. Purple moorgrass carpets a field of regenerating aspen north of Glidden.

Soapwort - Perhaps the most surprising find of the summer survey was the large amount of soapwort (*Saponaria officinalis*) along the Bad River. Soapwort was common on exposed sand and gravel bars and exposed riverbanks, and abundant on the wooded floodplain near the river. It was one of the first colonizers of the bare soil created by the frequent slumping banks. In open or semi-open, well-drained areas it was sometimes co-dominant with spotted knapweed (Figure 9).

Rare Plants - One or more populations of 6 state-listed plants were documented during the survey. These include populations of Smith's melic grass (*Melica smithii*, "endangered"), Braun's holly fern (*Polystichum braunii*, "threatened"), tea-leaved willow (*Salix planifolia*, "threatened") and three "special concern" plants: one-flowered broomrape (*Orobanche uniflora*), pallid sedge (*Carex pallescens*), and tufted hairgrass (*Deschampsia cespitosa*).

Figure 9. With its white clusters of flowers, soapwort is an obvious and significant presence on the Bad River floodplain.

AQUATIC INVASIVE SPECIES INVENTORIES IN THE CEDED TERRITORIES

Since the early 1800s, at least 183 (GLERL 2006) species of fish, plants, invertebrates, algae, and pathogens have been introduced into the riparian and aquatic habitats of the Great Lakes. 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 $100 million since its introduction (Pimentel *et al.* 2000).

GLIFWC staff surveyed select ceded territory waters in 2007 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 2007, 32 lakes were chosen for survey in coordination with the Wisconsin Department of Natural Resources (WDNR), the Western Upper Peninsula Cooperative Weed Management Area and the Watersmeet Aquatic Nuisance Species Coalition. Survey lakes targeted tribally important lakes with regards to *ogaa* (walleye) and *manoomin* (wild rice) harvest as well as lakes with high visitation rates (Table 3, Figure 10).

Four of the chosen lakes were added during the field season. Amnicon Lake in Douglas County was added after a GLIFWC fisheries biologist observed curly pondweed there. Duck Lake and Lac Vieux Desert were added after Watersmeet boat landing educators documented many boats traveling between these waters and Lake Gogebic, which is infested with spiny water fleas. Water flea plankton tows were conducted on Duck Lake. Water flea and zebra mussel veliger plankton tows were conducted on Lac Vieux Desert. Smoky Lake was added after concern was raised about its high boat traffic, proximity to Eurasian water-milfoil infested lakes and susceptibility to water flea invasion.

An effort was made to visit each lake twice during the summer to increase the chances of detecting zebra mussel veligers and plants with varying phenology. Due to time constraints, Pickerel Lake, Teal Lake, Lac Vieux Desert and Duck Lake were only visited once.

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. At each landing, shorelines, shallow water areas, pier supports, rocks, floating fragments and beach debris were inspected for invasive plants and animals.

Table 3. Lakes suveyed for aquatic invasive species in 2007.

State	County	Lake Name	WBIC	Acres	Dates Surveyed
MI	Gogebic	Beatons		323.51	7/16, 8/27
		Duck ♦		611.77	7/18
	Iron	Emily		325.76	7/19, 8/30
		Hagerman		564.96	7/18, 8/29
		Perch		1037.49	7/17, 8/28
MI/WI	Gogebic/Vilas	Lac Vieux Desert ●	1631900	4260.00	8/29
		Smoky	1018300	572.81	8/13, 8/14
WI	Douglas	Amnicon ◊	2858100	390.22	7/9
	Forest	Jungle	377900	179.51	6/12, 7/31
		Little Rice Flowage	406400	1200.54	6/12, 8/2
	Oneida	Big Fork	1610700	662.74	7/3, 8/16
		Big Stone	1612200	606.77	7/2, 8/14
		Buckskin	2272600	641.59	6/18, 7/23
		Clear	977500	873.43	6/19, 7/25
		Crescent	1564200	616.02	6/13, 7/30
		George	1569600	442.67	6/14, 8/1
		Hasbrook	1589100	307.35	6/27, 8/7
		Katherine	1543300	524.22	6/21, 7/24
		Laurel *	1611800	248.65	8/15
		Little Fork *	1610600	336.42	8/16
		Medicine	1611700	395.86	7/3, 8/15
		Pickerel	1590400	582.89	7/26
		Rainbow Flowage	1595300	3152.99	6/25, 6/26, 8/6
		Sand	1597000	547.39	6/28, 8/9
		Squash	1019500	397.68	6/11, 7/31
	Price	Pike	2268300	740.64	6/20, 8/7
	Sawyer	Teal	2417000	1024.36	7/5
	Vilas	Big Portage	1629500	586.31	7/12, 8/22
		Long	1602300	885.83	7/10, 7/11, 8/22
		North Twin	1623800	2870.95	7/10, 8/20
		Plum	1592400	1057.46	7/11, 8/8
		South Twin	1623700	627.71	7/10, 8/21

* Plankton samples were not collected.
◊ Surveyed for curly leaf pondweed only.
● Waterflea and zebra mussel veliger tows only.
♦ Waterflea tows only.

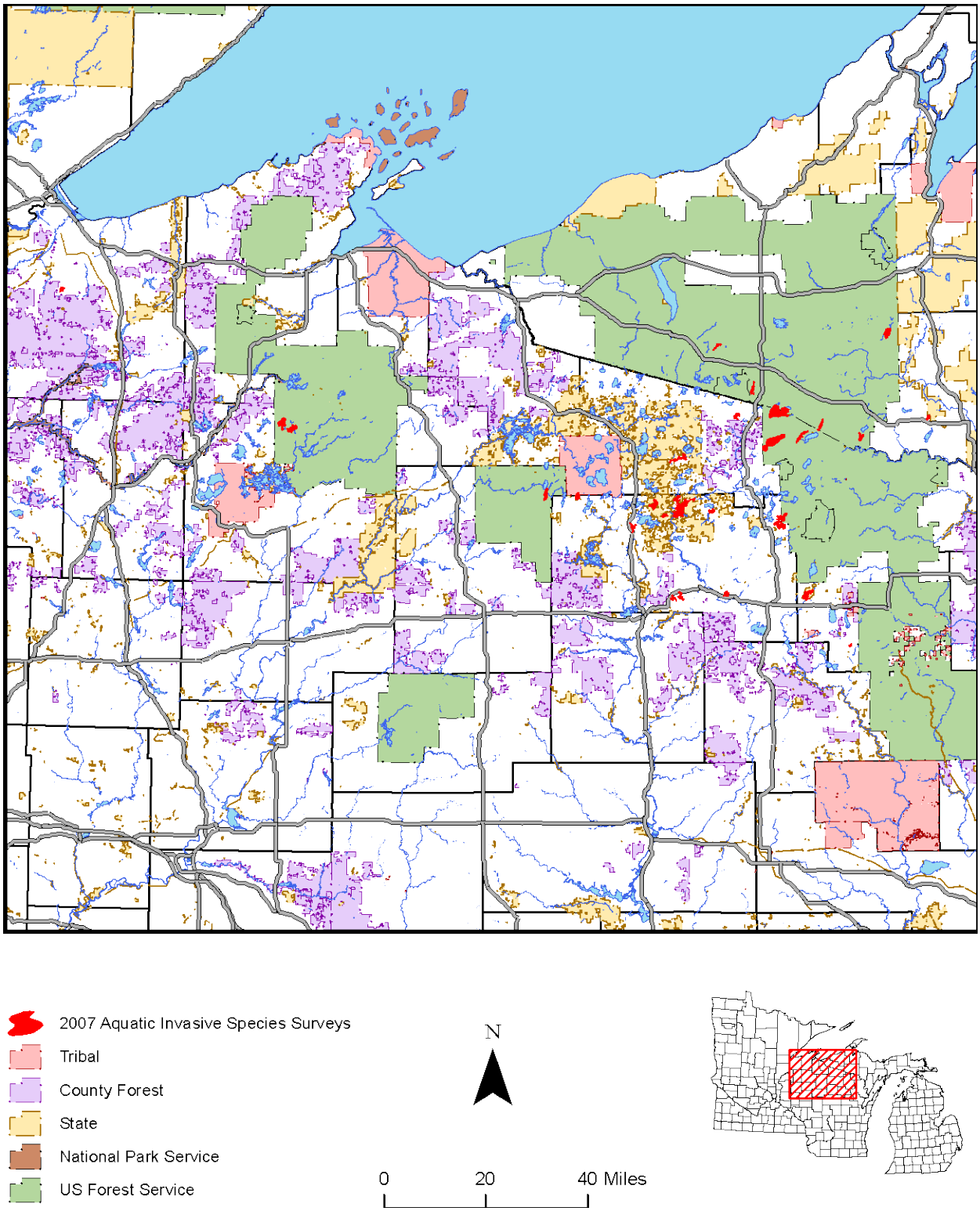

Figure 10. Lakes surveyed for aquatic invasive species in 2007.

Surveys also focused on inlets, outlets, shallow or protected bays, wetland areas, disturbed areas and developed shorelines or shorelines in close proximity to roads. Shorelines were typically surveyed from the outer edge of the littoral zone from a slow moving boat, checking any suspicious looking patches of vegetation including submerged, emergent and riparian plants. The area was also surveyed for invasive animals or evidence of these animals.

The most ecologically destructive aquatic invasive species threatening ceded territory waters were categorized as "priority" species (Table 4) and were documented at each site where 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 simply recorded as "present" or "absent" on each lake (Table 5). Wherever purple loosestrife was encountered, the surveys also searched for and documented any evidence of the biological control agent *Galerucella* spp. Voucher specimens were prepared for new invasive plant infestations and new county records. These specimens were sent to the University of Wisconsin – Stevens Point Robert W. Freckmann Herbarium or the University of Michigan Herbarium as appropriate.

The presence of aquatic invasive species informational signs at boat landings was also recorded. This information will be compiled with data collected by GLIFWC's fishery assessment crews and WDNR to identify boat landings lacking aquatic invasive species informational signs.

Location and attribute data were recorded directly into a geographic information system (GIS) spatial database using a handheld Trimble GeoXM geographic position system (GPS) receiver and data recorder running ESRI ArcPad GIS software. ArcPad provided an integrated environment to display the current GPS location overlain on GIS layers such as 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 during data entry by providing drop-down menus with standardized nomenclature and required fields.

Plankton nets were used to sample for zebra mussel veligers and for spiny and fishhook water fleas. Vertical plankton tows were used to sample for zebra mussel veligers, following WDNR-UWEX (2006). At each veliger sampling point, pH, temperature, time and conductivity were measured using an YSI 63 pH meter at a depth of one meter. These data were shared with researchers at UW-Madison Center for Limnology for use in modeling lake vulnerability to zebra mussel infestation.

Oblique plankton tows were used to sample for spiny and fishhook water fleas following Johnson (2004). A suitably deep portion of the lake was chosen to sample and the net was towed through the water for approximately 100 meters. The distance was estimated by towing the plankton net for 120 seconds at approximately 3 km per hour. The water column was surveyed

Table 4. "Priority" species surveyed for in 2007 AIS surveys.

Scientific Name	Common Name	Detected
Butomus umbellatus	Flowering Rush	No
Bythotrephes longimanus	Spiny Waterflea	No
Cercopagis pengoi	Fishhook Waterflea	No
Dreissena bugensis	Quagga Mussel	No
Dreissena polymorpha	Zebra Mussel	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)	Yes
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 2007 AIS surveys.

Scientific Name	Common Name
Berberis thunbergii	Japanese Barberry
Cipangopaludina chinensis	Chinese Mysterysnail
Cirsium palustre	Eurasian Marsh Thistle
Elaeagnus angustifolia	Russian Olive
Euphorbia cyparissias	Cypress Spurge
Hylotelephium telephium	Witch's Moneybags
Lonicera tatarica, *L. morrowii*, *L.* x *bella*	Eurasian Bush Honeysuckles
Mentha arvensis, *M.spicata*, *M. x piperita*	Eurasian Mints
Myosotis scorpioides	Water Forget-me-not
Orconectes rusticus	Rusty Crayfish
Phalaris arundinacea	Reed Canary Grass
Polygonum cuspidatum	Japanese Knotweed
Rhamnus cathartica	Common Buckthorn
Robinia hispida	Bristly Locust
Robinia pseudocacia	Black Locust
Salix fragilis, S. alba, *S.* x *rubens*	White, Crack and Hybrid Willow
Sedum kamtschaticum	Orange Stonecrop
Solanum dulcamara	Bittersweet Nightshade
Typha angustifolia, T. x *glauca*	Narrow-leafand Hybrid Cattail
Viviparus georgianus	Banded Mysterysnail

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 95% 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 by hand at the landing. 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 and D-net) were cleaned in a location that ensured the water used to disinfect would not run into storm water drains or other areas that might contaminate water. Gear, bilge and bilge pump were sprayed with a 200 ppm bleach solution for a 10 minute contact time. This procedure has been shown to kill spring viremia of carp virus (SVCv), largemouth bass virus (LMBv), viral hemorrhagic septicemia virus (VHSv), lymphosarcoma and zebra mussel zooplankton (Marcquenski and AveLallemant 2007). Lakes that were infested with Heterosporis or directly connected to a Heterosporis infested waterbody were surveyed at the end of the week and a 2200 ppm bleach solution was used for cleaning with a five minutes contact time. After sitting for the appropriate contact time, the boat, trailer and equipment were thoroughly rinsed. The boat motor was flushed using a 1:100 Virkon-S Disinfectant solution, allowed to sit for 20-30 minutes and flushed with water. At the end of the week, a steam pressure washer was used to rinse when available.

RESULTS

A total of 348 invasive plant populations comprising 25 taxa were mapped in 2007 (Table 6). “Priority” species comprised 205 of the total plant records. Two new curly pondweed-infested lakes were detected along with one new population of introduced common reed. Purple loosestrife was found on nine of the lakes surveyed. Invasive animals (rusty crayfish, Chinese mysterysnail and banded mysterysnail) were detected in 18 lakes (Table 6). Fifty-nine boat landings were surveyed with signage documented at each landing. A total of 133 zebra mussel veliger and 58 water flea samples were collected during 2007. No water fleas or zebra mussel veligers were detected in any of the samples.

Table 6. Summary of invasive species detected in 2007.

		High Priority					Lower Priority																			
County	**Lake Name**	Curly Pondweed	Eurasian Water Milfoil	Purple Loosestrife	Phragmites	Yellow Iris	Banded Mysterysnail	Bittersweet Nightshade	Black Locust	Bristly Locust	Buckthorn, common	Chinese Mysterysnails	Crack Willow	Cypress spurge	Eurasian Honeysuckles	Eurasian Marsh Thistle	Eurasian Mints	Japanese Barberry	Japanese knotweed	Narrow-leaf/hybrid Cattail	Orange Stonecrop	Reed Canary Grass	Russian Olive	Rusty Crayfish	Water forget-me-not	Witch's moneybags
Douglas	Amnicon	✓																								
Gogebic	Beatons			✓																		✓				
Gogebic/Vilas	Smoky							✓					✓		✓	✓	✓					✓			✓	
Iron	Emily	✓			✓		✓						✓		✓	✓			✓	✓		✓				
	Hagerman							✓					✓		✓	✓	✓			✓		✓			✓	
	Perch			✓												✓	✓			✓		✓		✓		
Forest	Jungle						✓																			
	Little Rice Flowage											✓	✓			✓				✓		✓				
Oneida	Big Fork					✓						✓		✓								✓				
	Big Stone			✓		✓	✓		✓			✓	✓				✓			✓	✓				✓	
	Buckskin											✓	✓				✓			✓						
	Clear			✓					✓			✓				✓						✓				
	Crescent			✓		✓		✓					✓				✓		✓	✓		✓	✓	✓	✓	
	George							✓	✓	✓		✓	✓		✓							✓			✓	
	Hasbrook			✓												✓				✓						✓
	Katherine			✓		✓		✓			✓		✓	✓	✓		✓			✓		✓			✓	
	Laurel*																	✓					✓			
	Little Fork*												✓													
	Medicine					✓									✓		✓					✓			✓	
	Pickerel						✓					✓	✓									✓			✓	
	Rainbow Flowage		✓					✓				✓	✓									✓		✓		
	Sand			✓								✓	✓		✓			✓								
	Squash						✓					✓	✓									✓			✓	
Price	Pike			✓		✓		✓				✓	✓		✓		✓					✓				
Sawyer	Teal											✓	✓	✓	✓		✓					✓				
Vilas	Big Portage								✓				✓			✓						✓			✓	
	Long		✓									✓				✓										
	North & South Twin		✓										✓		✓				✓	✓						
	Plum						✓					✓	✓		✓		✓					✓		✓	✓	

DISCUSSION

Amnicon Lake

Amnicon Lake is a 426 acre lake in Douglas County with a fair amount of development. It has one public boat landing on the northwest side of the lake. Amnicon Lake was surveyed on July 9th. Floating fragments and turions were common. The bay towards the outlet on the southwest end of the lake (southwest of Tomahawk Island) had the highest curly pondweed density. This bay supported dense mats of curly pondweed with few native plants. Curly pondweed was also common in the bay just west of Tomahawk Island mixed with native plants. A 25 m^2 patch of scattered curly pondweed plants was found in the bay to the west of Little Island. No rooted plants or fragments were observed at the boat landing. Approximately four plants were observed in the first shallow pool (about 5" - 8" deep) in Amnicon River, just southwest of County Highway A. No plants were found in a second Amnicon River pool. Wisconsin DNR was notified and is planning on visiting the lake in the spring of 2008 to assess potential treatment or containment options.

Emily Lake

Emily Lake is a 326 acre lake in Iron County, Michigan. The only public boat landing is on the east side of the lake. While no curly pondweed was found around the boat landing, floating fragments were found in the southwest bay. The Ottawa National Forest and the Iron County Conservation District were notified and follow-up surveys are planned for the spring of 2008.

A large population of the introduced genotype of common reed was also documented along the shoreline of Emily Lake. This common reed population is located on the northwest side of the southwest bay. Shoots reached up to eleven feet tall and in as much as two feet of water. Non-native common reed has also been documented along US Highway 2 in Iron County.

Smoky Lake

Smoky Lake is a 610 acre lake on the Wisconsin and Michigan border. While the majority of the lake is in Iron County, Michigan, the boat landing is in Vilas County, Wisconsin. Several of the lakes surrounding Smoky Lake are heavily infested with Eurasian water-milfoil. Two Eurasian water-milfoil fragments were observed at the boat landing, one partially dried fragment and a fresh shoot with flowers. A thorough survey was conducted of the lake but no additional Eurasian water-milfoil was observed.

It is suspected that the fragments fell off of boats or trailers coming from one of the nearby infested lakes. The Vilas County AIS Coordinator and Lake Association were notified.

Purple loosestrife

Purple loosestrife was observed on nine of the lakes surveyed in 2008. Purple loosestrife was observed on many of the lakes surveyed in Oneida County including Crescent, Clear,

Katherine, Hasbrook, Sand and Big Stone. Purple loosestrife maps and notes describing locations and potential control options were sent to the Oneida County AIS Coordinator for distribution to the appropriate lake associations.

One population of purple loosestrife was observed in the southeast bay of Pike Lake in Price County. This population consisted of approximately 50-100 plants with no *Galerucella* beetle damage observed. Pike Lake is connected to Round Lake where *Galerucella* beetles have been released in prior years. A map with the purple loosestrife population and additional notes were forwarded to the Chequamegon-Nicolet National Forest.

Purple loosestrife populations were documented on Beatons Lake and Perch Lake in Michigan. One population of three flowering purple loosestrife plants was observed in the northwest bay of Beatons Lake. The Beatons Lake Association was contacted and provided with maps and photos of the infestations. The lake association plans to control the population either manually or chemically in 2008.

Purple loosestrife was also observed along the shoreline of Perch Lake. This population extends from the boat landing south along the campground and in front of one private residence. The Ottawa National Forest was provided with GIS shapefiles of the observed locations.

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. Control efforts are documented and mapped by GLIFWC's control crew using a hand-held GPS receiver. 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. Control crews mapped treated areas using a hand-held Trimble® GeoExplorer GPS receiver. Data on each site were also collected including an estimate of the number of plants, acreage class, herbicide used, and an estimate of the amount of herbicide applied.

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 2007, 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 2007, GLIFWC staff treated 74 sites with herbicide. Figure 11 illustrates the distribution of chemical control efforts for purple loosestrife in 2007. 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 (Figure 12). Because all of the largest sites within Bad River-Chequamegon Bay watershed already have established populations of *Galerucella* beetles (Figure 13), no beetles were released there in 2007. 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, Friends of the St. Croix Headwaters, and the Iron River Lakes Association.

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 14). This strategy also reduces the amount of herbicide applied at any one site (Figure 15). 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 2008.

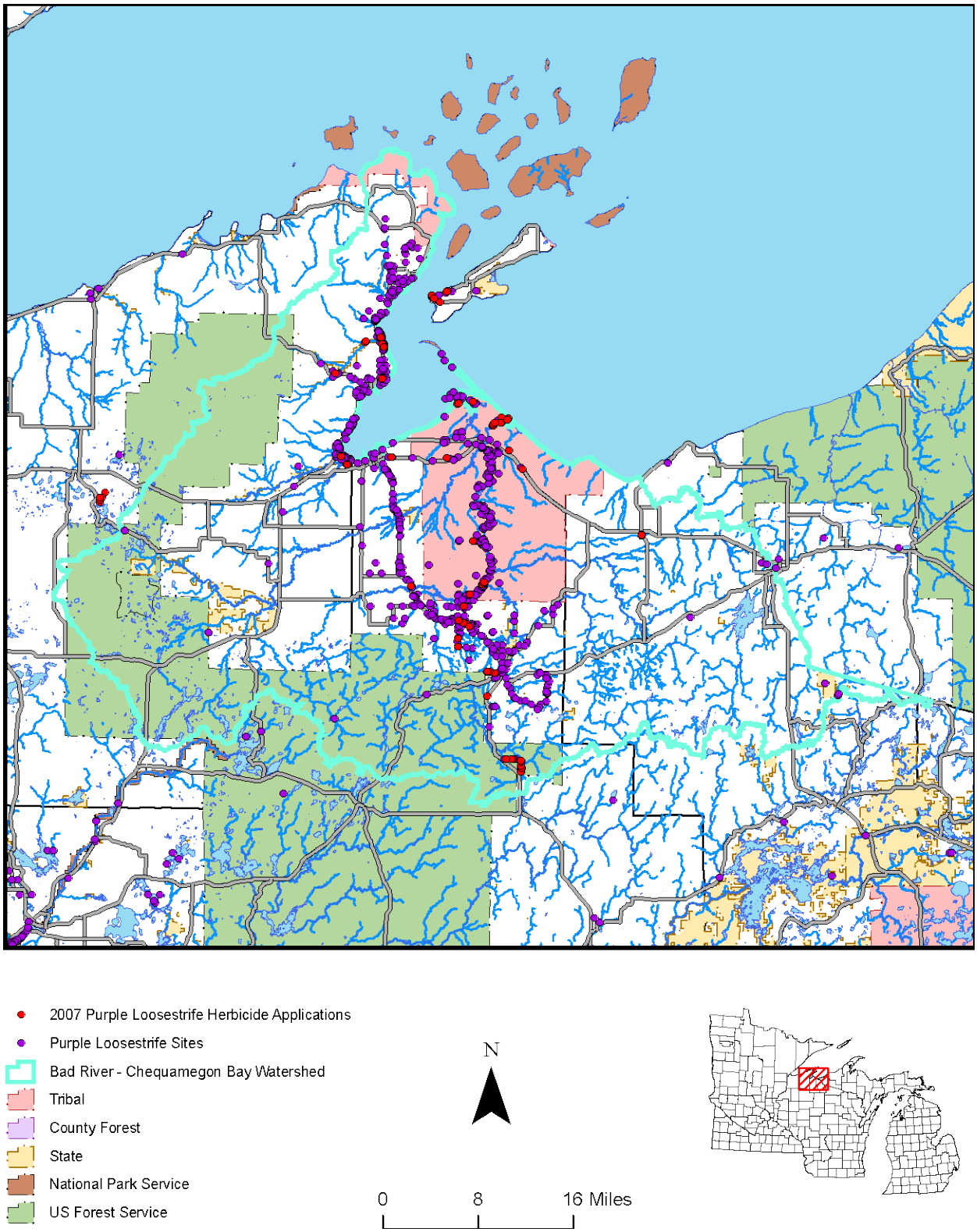

Figure 11. Purple loosestrife herbicide applications in 2007.

Figure 12. *Galerucella* release site in Ashland, WI.

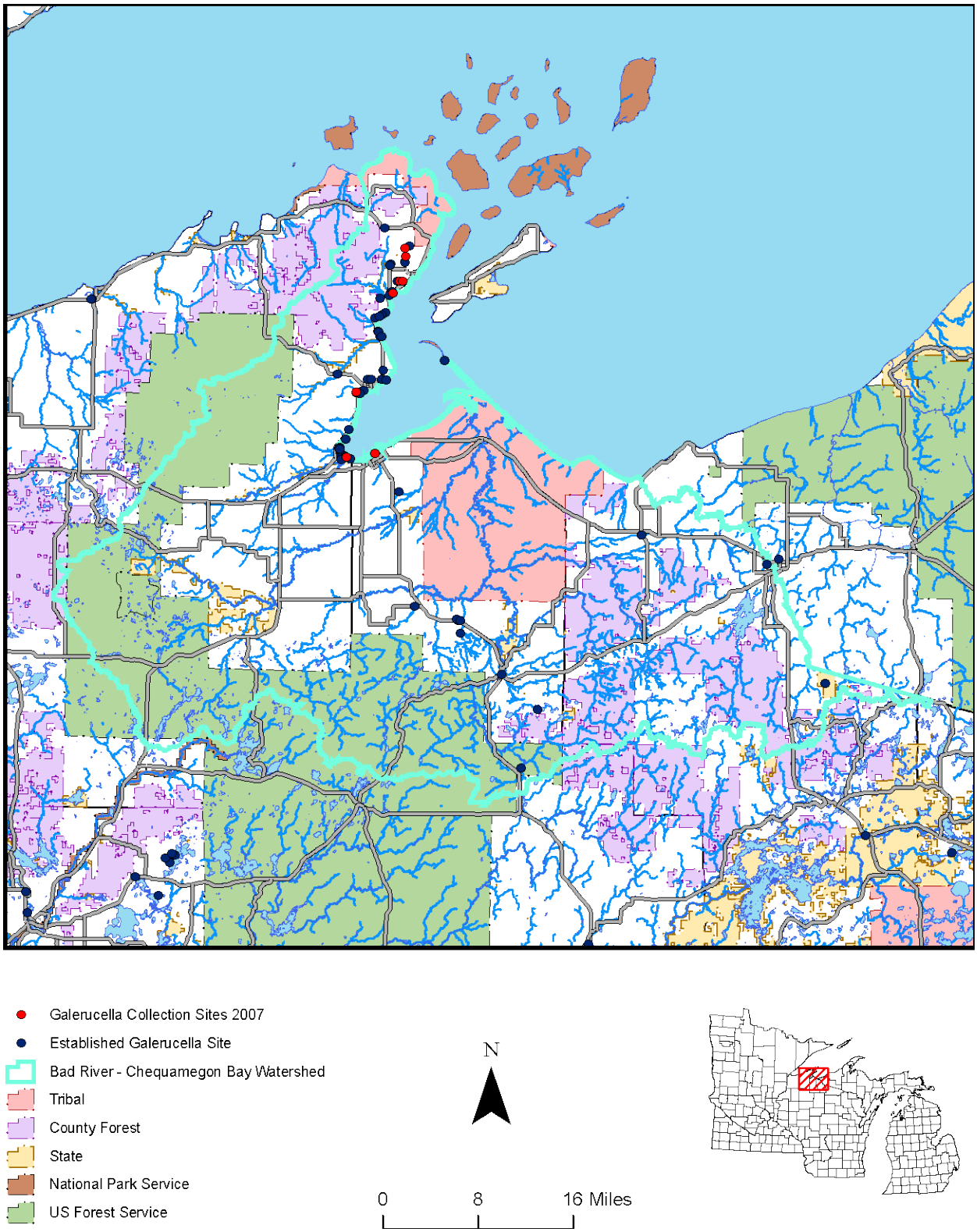

Figure 13. *Galerucella* sites within the Bad River – Chequamegon Bay watershed.

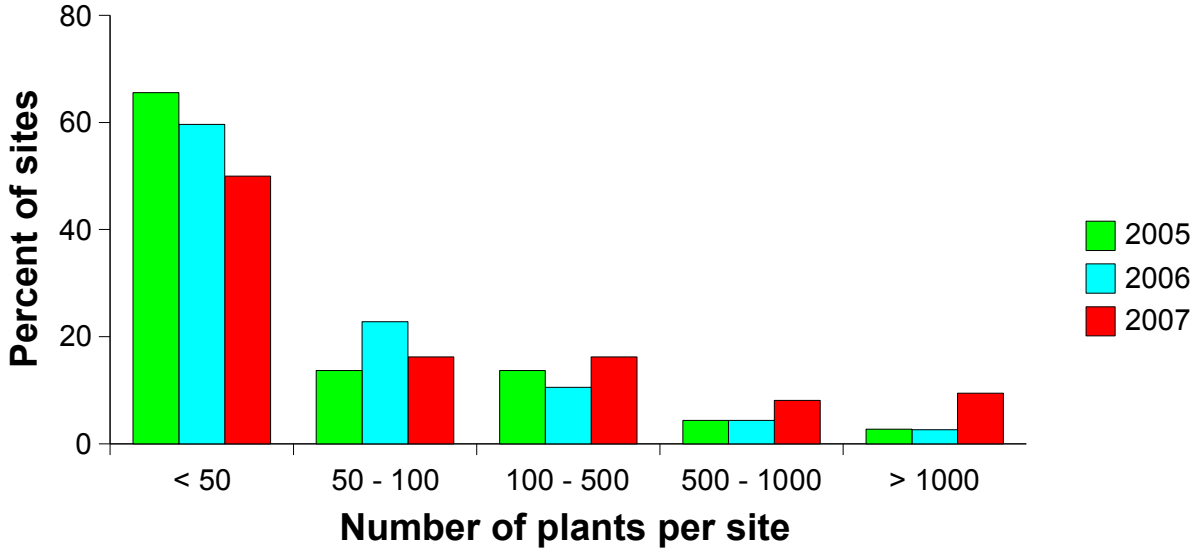

Figure 14. Abundance of purple loosestrife at sites treated in 2005-2007.

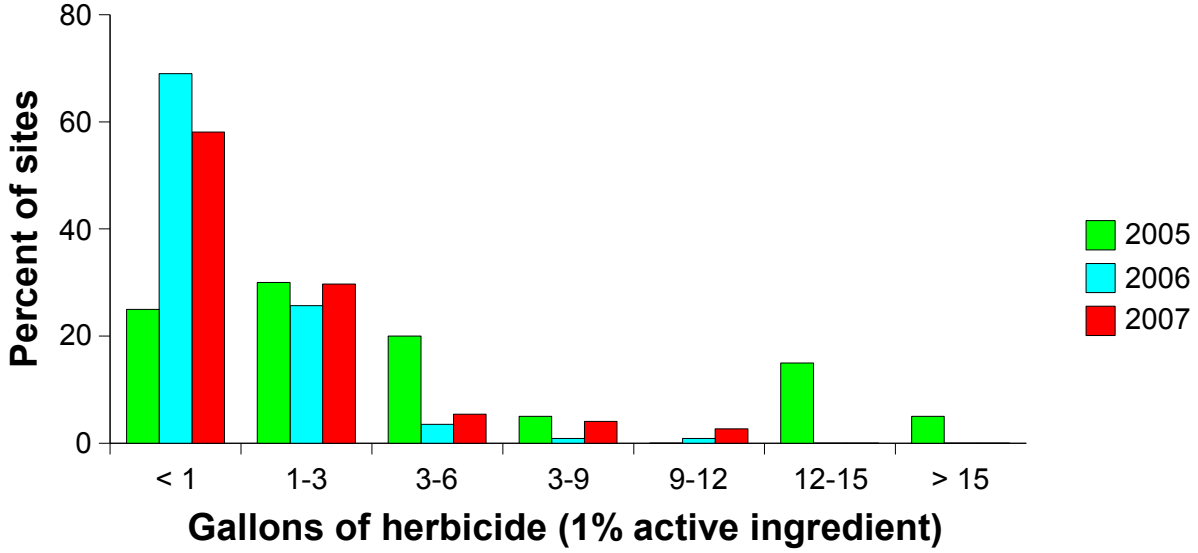

Figure 15. Amount of herbicide applied to purple loosestrife infestations in 2005 - 2007.

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.

RESULTS

In 2007, GLIFWC staff treated 36 sites with herbicide. Figure 16 illustrates the distribution of chemical control efforts for leafy spurge in 2007.

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. Control efforts in 2007 continued to expand the area treated annually and focused on smaller satellite populations to prevent them from becoming large source populations (Figure 17). GLIFWC staff also participated in two workdays 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 and US Forest Service.

DISCUSSION

Unlike purple loosestrife, 42% of the leafy spurge sites treated consisted of over 1,000 plants (Figure 18). Consequently, the amount of herbicide applied at each site was also considerably more relative to purple loosestrife control efforts (Figure 11). Although biological controls have been released in the area by private landowners, their impacts have yet to be realized.

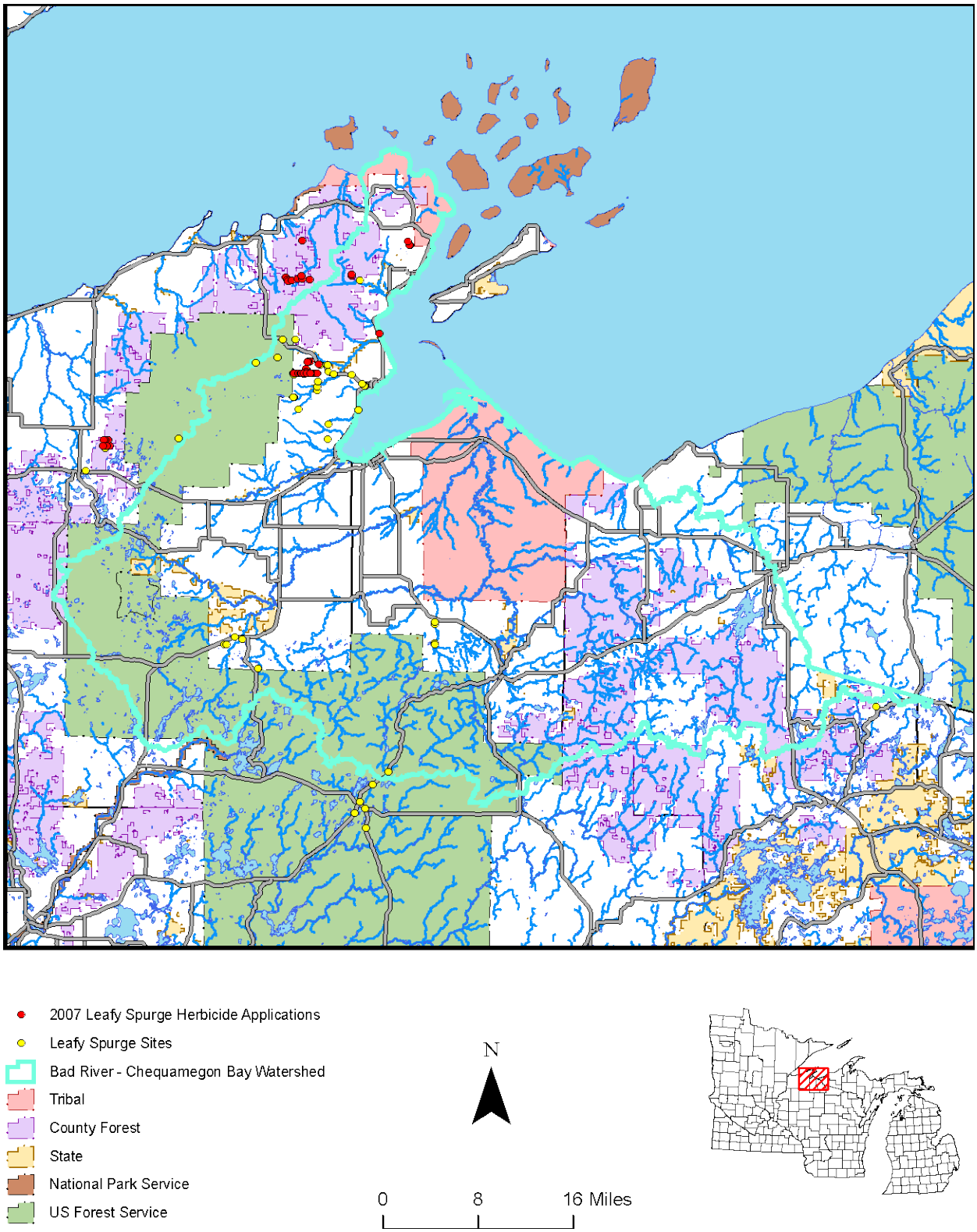

Figure 16. Leafy spurge herbicide applications in 2007.

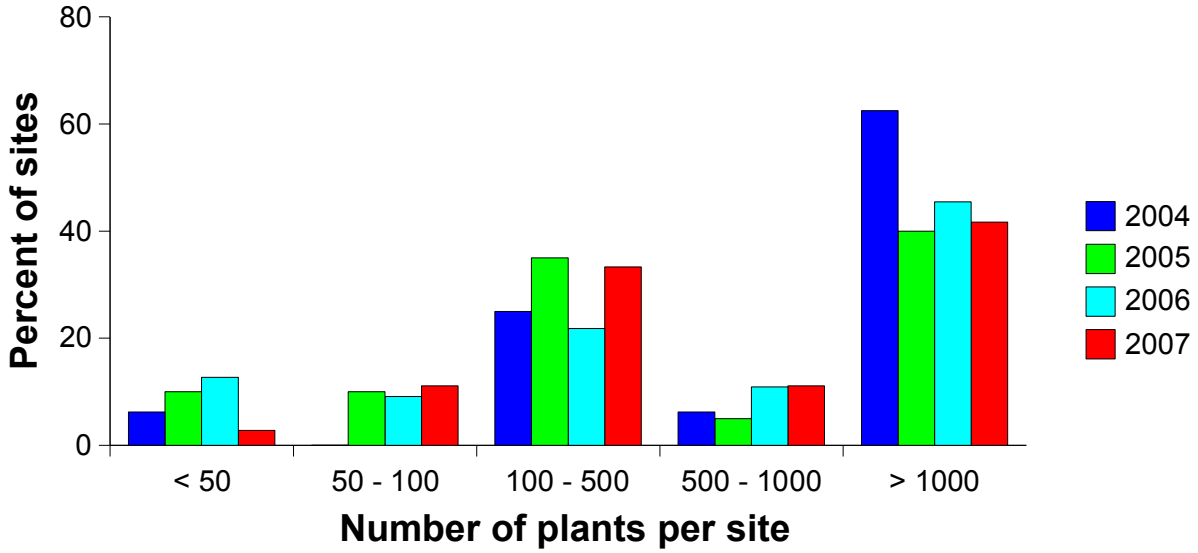

Figure 17. Abundance of leafy spurge at sites treated in 2004-2007.

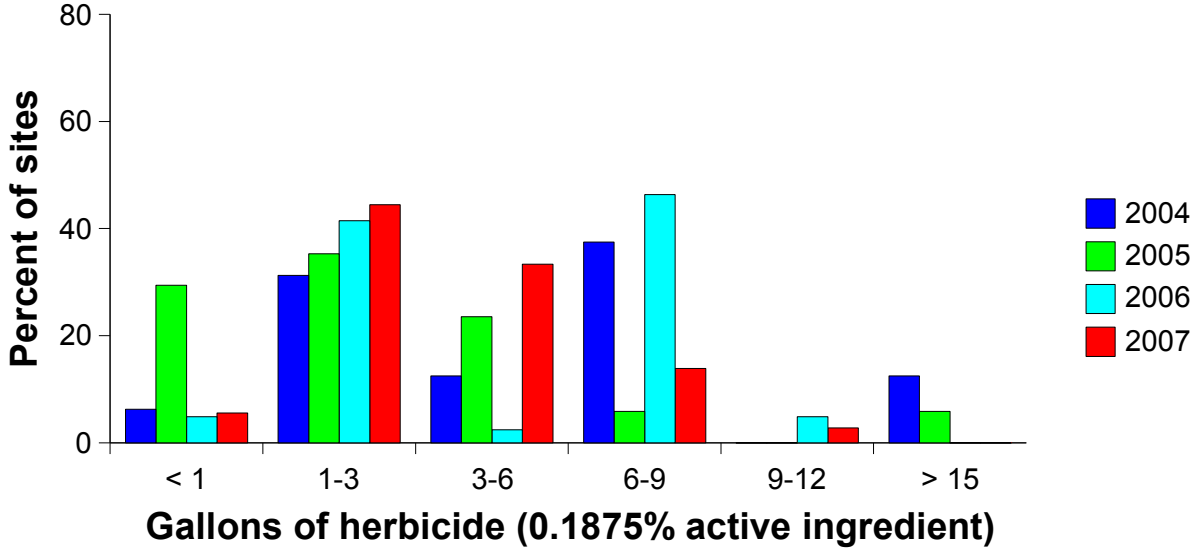

Figure 18. Amount of herbicide applied to leafy spurge infestations in 2004-2007.

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 2007 included invasive snails, forest pests, invasive thistles, the costs of invasive species, and an update on GLIFWC's control crew activities and accomplishments.

Discover Wisconsin - *Grounds For Improvement - Terrestrial Invasive Species*

A special episode of Discover Wisconsin - *Grounds For Improvement - Terrestrial Invasive Species* - was produced in 2007 with funding from the Bureau of Indian Affairs and the National Fish and Wildlife Foundation. The episode featured a variety of forest user groups including small landowners, hunters and recreationists and highlighted the fact that terrestrial invasive species affect nearly everyone, and everyone shares the responsibility to prevent their spread. The episode aired during Wisconsin's Invasive Species Awareness month in June of 2007 and will be rebroadcast twice over the next two years.

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.

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 activites (leading field trips to collect *Galerucella* beetles from previous release sites).

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.

Invasive Plant Association of Wisconsin - Science Committee: GLIFWC has contributed to invasive species prioritization, inventory and mapping, and information sharing initiatives

undertaken by this group.

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.

USGS-Invasive Species Information Node Working Group: GLIFWC staff participated in monthly conference calls with USGS-NBII-Invasive Species Information Node managers, academics, and others active in this field to share information and ideas on invasive species data management.

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.

Wisconsin Council on Invasive Species - Species Assessment Groups: GLIFWC staff participated on several Species Assessment Groups to help develop legal classifications, management guidelines, and rules to help prevent the spread of invasive species in Wisconsin.

Wisconsin Council on Forestry - Invasives Best Management Practices - Technical Advisory Committee: GLIFWC staff participate on this committee to guide the development of Best Management Practices to prevent the spread of invasive species in the course of forest management activities.

LITERATURE CITED

Colton, T. F. and P. Alpert. 1998. Lack of public awareness of biological invasions by plants. Natural Areas Journal 18:262-266.

Enserink, M. 1999. Biological invaders sweep in. Science 285:1834-1836.

Falck, M., and S. Garske. 2002. Invasive non-native plant management during 2001. Administrative Report 02-08. Great Lakes Indian Fish and Wildlife Commission, Odanah, Wisconsin, USA.

_____ and S. Garske. 2003. Invasive non-native plant management during 2002. Administrative Report 02-12. Great Lakes Indian Fish and Wildlife Commission, Odanah, Wisconsin, USA.

Garske, S. and M. Falck. 2005. Aquatic invasive species survey of selected lakes in the ceded territory during 2004. Project Report ANA Grant 90NR0204/01. Great Lakes Indian Fish and Wildlife Commission, Odanah, Wisconsin, USA.

Garske, S. and M. Falck. 2007. 2006 Invasive plant survey of the Northern Highland – American Legion State Forest. Administrative Report 07-04. Great Lakes Indian Fish and Wildlife Commission, Odanah, Wisconsin, USA.

Gilbert, J. and R. Parisien. 1989. Purple loosestrife control efforts of the Great Lakes Indian Fish and Wildlife Commission 1988-1989. Administrative Report 89-13. Great Lakes Indian Fish and Wildlife Commission, Odanah, Wisconsin, USA.

[GLERL] Great Lakes Environmental Research Laboratory. 2006. Great Lakes Aquatic Nonindigenous Species List. National Oceanic and Atmospheric Administration. http://www.glerl.noaa.gov/res/Programs/invasive/ (June 21, 2007).

Johnson, P. 2004. Sampling protocol for spiny water fleas (*Bythotrephes longimanus*) in Wisconsin Waters, version 2.0. Center for Limnology, University of Wisconsin, Madison, Wisconsin USA.

Marcquenski, S. and S. AveLallemant. 2007. Boat and Gear Disinfection Protocol for Fish Health Statewide. Wisconsin Department of Natural Resources. Madison, Wisconsin, USA.

[OTA] Office of Technology Assessment, US Congress. 1993. Harmful non-indigenous species in the United States. OTA-F-565, US Government Printing Office, Washington, DC, USA. http://www.wws.princeton.edu/~ota/disk1/1993/9325_n.html (November 2002).

Pimentel, D., L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs of nonindigenous species in the United States. Bioscience 50 (1)53-64.

Thompson, D., R. Stuckey, and E. Thompson. 1987. Spread, impact, and control of purple loosestrife (*Lythrum salicaria*) in North American wetlands. US Department of Interior, Fish and Wildlife Service, Washington, DC, USA.

Walker, L. R. and S. D. Smith. 1997. Impacts of invasive plants on community and ecosystem properties. Pages 69-86 *in* J. O. Lukin and J. W. Thieret, editors. Assessment and management of plant invasions. Springer-Verlag, New York, New York, USA.

[WDNR-UWEX] Wisconsin Department of Natural Resources and University of Wisconsin Extension. April 2006. *Dreissena* Mussel Monitoring Protocol: Zebra and Quagga Mussels. Wisconsin Department of Natural Resources. Madison, Wisconsin, USA.

Westbrooks, R. G. 1998. Invasive plants: changing the landscape of America: fact book. Federal Interagency Committee for the Management of Noxious and Exotic Weeds, Washington, DC, USA.

Wilcove, D. S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. BioScience 48:607-615.