Invasive Species Program 2010

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 life ways they sustain.

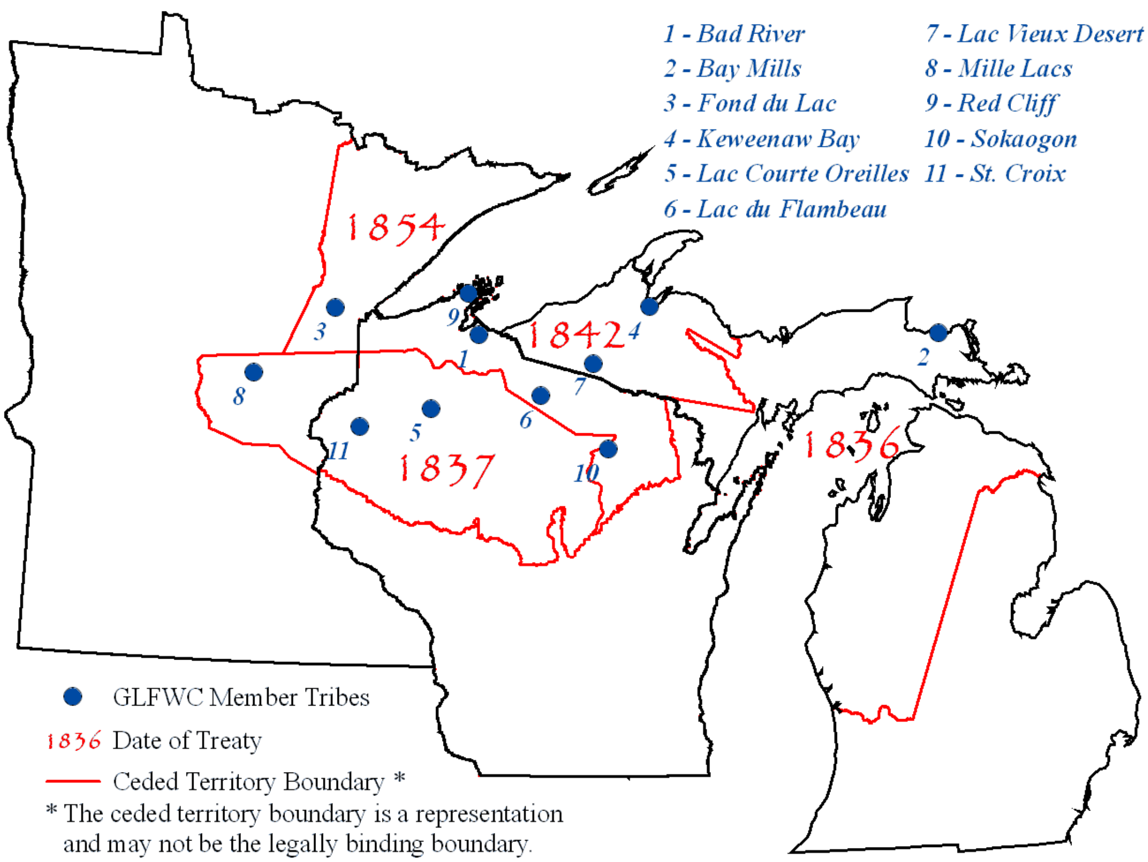

Figure 1. Location of GLIFWC member tribes and ceded territories.

This report summarizes the activities undertaken by GLIFWC staff during 2010 to address the spread of invasive species in the ceded territories. GLIFWC's invasive species program consists of 1) education outreach, 2) inventory and monitoring, 3) control, and 4) evaluation. Each of these components is coordinated with local cooperators to maximize the efficient use of limited resources.

ACKNOWLEDGMENTS

The Great Lakes Indian Fish and Wildlife Commission acknowledges the following 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

- U.S. Fish and Wildlife Service (USFWS)
  - St. Croix Interstate Management Plan
  - Wisconsin AIS State Management Plan

- Wisconsin Department of Natural Resources (WDNR)
  - Aquatic Invasive Species Control Grants

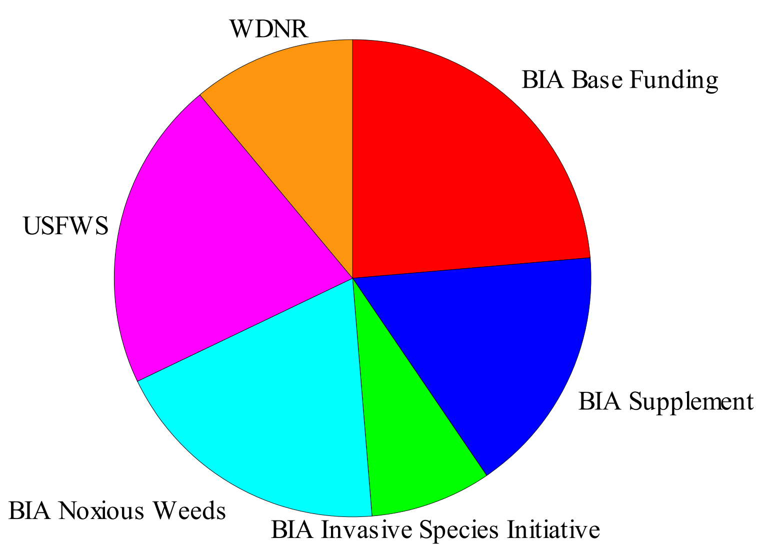

Figure 2. Funding sources for GLIFWC's invasive species program in 2010.

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 2010 to 1) assess and document the scope of the problem in the region, 2) detect small populations of the worst invasives before they become large, environmentally damaging populations, and 3) prioritize education and management efforts.

METHODS

In 2010, 51 lakes were chosen for survey in coordination with the Wisconsin Department of Natural Resources (WDNR) and County AIS coordinators. Surveys targeted lakes important to the tribes for *ogaa* (walleye) and *manoomin* (wild rice) harvest, as well as larger lakes with several boat landings which are thought to provide more opportunites for introductions (Table 1, Figure 3). 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 phenologies. Lakes within the St. Croix watershed were only visited once in midsummer.

Shorelines were surveyed from the outer edge of the littoral zone from a slow moving boat. The entire shoreline was surveyed for most of the smaller lakes (~ 500 acres and less). On large lakes (~ 500 acres and greater), surveys targeted the most likely areas for introductions. Likely areas for introductions included boat landings, inlets, outlets, shallow or protected bays, wetland areas, disturbed areas, developed shorelines and shorelines in close proximity to roads.

Dense beds of vegetation, and patches of unfamiliar vegetation were inspected intensively. 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 species informational signs at the landings was also recorded.

The most ecologically destructive aquatic invasive species threatening ceded territory waters were categorized as “priority” species (Table 2) 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 3). Wherever purple loosestrife was encountered, the presence or absence of biological control beetles (*Galerucella* spp.) was also recorded. Voucher specimens

Table 1. Lakes surveyed for aquatic invasive species in 2010.

State	County	Lake Name	WBIC	Acres	Dates Surveyed	Samples*	
						ZM	WF
MI	Iron	Camp	18660	101.0	7/21, 9/1	4	1
		Ottawa	17891	541.0	7/22, 7/28	3	3
		Stanley	18261	310.0	7/21, 8/31	4	1
WI	Bayfield	Bony	2742500	190.2	07/29/11	1	1
		Middle Eau Claire	2742100	902.2	7/27, 7/29	2	1
		Totagatic	2705000	537.0	06/21/11	0	0
		Upper Eau Claire	2742700	995.9	7/27, 7/28	2	1
	Burnett	Bashaw	2662400	171.4	08/05/11	1	0
		Big McKenzie	2706800	1184.6	07/13/11	3	2
		Devils	2461100	1000.6	07/19/11	2	1
		Eagle	2672100	71.3	7/21, 7/22	1	0
		Gull	2671100	182.3	7/22, 8/3	1	1
		Lipsett	2678100	392.5	7/14, 7/15	1	1
		Little Yellow	2674800	348.1	07/21/11	1	0
		Middle McKenzie	2706500	529.7	07/12/11	3	1
		Mudhen	2649500	562.5	08/03/11	3	2
		Yellow	2675200	2267.0	7/20, 7/21	3	2
	Douglas	Radigan Flowage	2687500	61.6	07/26/11	1	0
		St. Croix Flowage	2740300	1912.7	7/26, 7/28	2	0
		Upper St. Croix	2747300	855.4	7/27, 7/28	3	1
	Forest	Julia	1614300	391.8	7/5, 8/16	4	1
	Oneida	Big	1613000	865.3	08/17/11	2	1
		Fourmile	1610800	218.0	7/6, 7/28	2	1
		Gilmore	1589300	320.0	6/29, 8/11	2	1
		Island	1610500	284.7	7/6, 8/17	4	1
		Kawaguesaga	1542300	670.0	6/28, 8/10	6	2
		Little Fork	1610600	354.0	7/6, 8/17	4	1
		Little Tomahawk	1543900	160.3	6/29, 8/10	4	1
		Lone Stone	1605600	174.4	6/16, 7/26	4	2
		Madeline	1544700	159.1	6/30, 8/9	2	0
		Spirit	1612000	368.2	7/8, 8/18	4	1
		Whitefish	1613500	204.6	7/7, 8/18	6	2
	Polk	Little Butternut	2640700	189.3	08/02/11	1	1
	Sawyer	Pacwawong	2728700	159.6	06/21/11	0	0
		Smith	2726100	323.1	6/22, 8/5	6	3
		Windigo	2046600	522.2	6/24, 8/3	6	3
	Vilas	Big Sand	1602600	1418.0	7/22, 9/1	6	2
		Crab	2953500	248.6	7/15, 8/25	6	3
		Cranberry	1603800	955.5	6/14, 7/27	6	2
		Little Star	2334300	245.1	7/12, 8/23	4	2
		Manitowish	2329400	495.5	7/13, 8/23-24	6	2
		Oxbow	2954800	510.6	7/14, 8/26	4	1
		Pickerel	1619700	293.0	6/17, 7/29	6	2
		Shishebogama	1539600	715.7	7/1, 8/11	6	3
		Snipe	1018500	239.3	6/16, 7/27	2	1
		Sparkling	1881900	203.2	6/30, 8/12	4	2
		Spider	2329300	272.3	7/13, 8/24	6	2
	Washburn	Bass	2457900	187.5	6/22, 8/2	6	3
		(Little) Bass	2451300	144.1	07/14/11	1	1
		Dunn	2709800	192.6	08/04/11	3	3
		Slim	2109300	223.5	6/23, 8/3	6	2
Total						**170**	**71**

*ZM = Zebra Mussel Veliger Sample; WF = Water Flea Sample

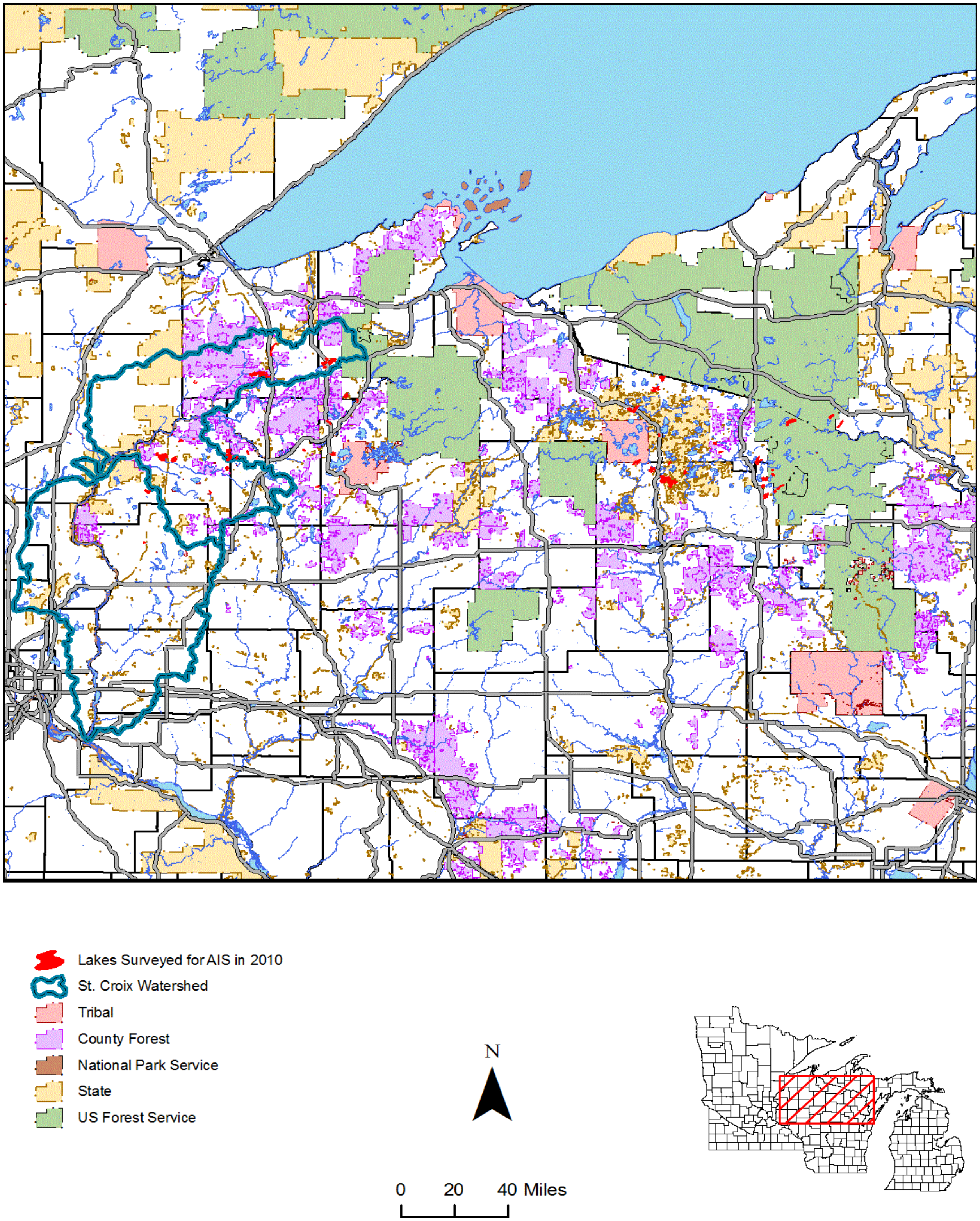

Figure 3. Lakes surveyed for aquatic invasive species in 2010.

Table 2. "Priority" species surveyed for in 2010.

Scientific Name	Common Name	Detected
Invertebrates		
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	Yes
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

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.

Locations were mapped using a TDS® Recon 400 hand-held computer with a GlobalSat® BC-337 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 (Table 1). 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

Table 3. "Lower priority" invasive species detected in 2010.

Scientific Name	Common Name
Invertebrates	
Cipangopaludina chinensis	Chinese mysterysnail
Viviparus georgianus	banded mysterysnail
Plants	
Berberis thunbergii	Japanese Barberry
Cirsium palustre	Eurasian marsh thistle
Euphorbia cyparissias	cypress spurge
Lonicera tatarica, *L. morrowii*, *L.* 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
Polygonum cuspidatum	Japanese knotweed
Rhamnus cathartica	common buckthorn
Robinia hispida	bristly locust
Robinia psuedocacia	black locust
Salix fragilis, S. alba, *S.* X *rubens*	white, crack and hybrid willow
Sedum spp.	stonecrop
Solanum dulcamara	bittersweet nightshade
Typha angustifolia, T. X *glauca*	narrow-leaf and hybrid cattail

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.

RESULTS

A total of 445 invasive species sites comprising 25 taxa were mapped in 2010 (occurrence records are available at gisin.glifwc.org). "Priority" species accounted for 170 of the sites, Table 4 provides a summary of invasive species detected by lake. Forty-nine boat landings also were surveyed for invasive species, and AIS signage was documented at each landing. A total of 170 zebra mussel veliger and 71 water flea plankton samples were collected during 2010 (Table 1). No water fleas or zebra mussel veligers were detected in any of the samples. Invasive species were detected in all 51 lakes surveyed in 2010. The most frequent invasive species detected were reed canary grass (66%), narrow-leaf cattail (45%), crack willow (43%), and purple loosestrife (33%).

DISCUSSION

Because only one trip was made to lakes in the St. Croix watershed, it is possible that some species were missed due to early or late phenologies. This was accounted for by timing the surveys in midsummer. The most likely species to be missed would be flowering rush which blooms early and dies back in late July or Eurasian milfoil in deeper water which may not reach the surface until late summer.

The number of invasive species detected per lake varied from 1 to 12 for lakes surveyed in 2010. Future work should look at the potential to correlate the number of invasive species per lake with possible explanatory variables such as acreage, perimeter, number of boat landings, distance to improved roads, distance to population centers, etc... This information could be used to help determine which lakes are at greatest risk and should be prioritized for surveys in the future. Additional work should look for correlations between aquatic invasive species occurrence/abundance and tribal harvest of walleye and wild rice.

Table 4. Summary of invasive species detected in 2010.

		High Priority					Lower Priority																				
County	**Lake**	***Butomus umbellatus***	***Iris pseudacorus***	***Lythrum salicaria***	***Myriophyllum spicatum***	***Potamogeton crispus***	***Berberis thunbergii***	***Cipangopaludina chinensis***	***Cirsium palustre***	***Euphorbia cyparissias***	***Lonicera spp.***	***Mentha spp.***	***Myosotis scorpioides***	***Phalaris arundinacea***	***Phragmites australis***	***Polygonum cuspidatum***	***Rhamnus catharica***	***Robinia hispida***	***Robinia pseudoacacia***	***Salix alba***	***Salix fragilis***	***Sedum spp.***	***Solanum dulcamara***	***Typha X glauca***	***Typha angustifolia***	***Viviparus georgianus***	**Total**
Iron	Camp								✓			✓	✓	✓							✓				✓		6
	Ottawa								✓																		1
	Stanley									✓	✓	✓	✓	✓							✓		✓		✓		8
Bayfield	Bony												✓														1
	Middle Eau Claire													✓											✓		2
	Totagatic										✓			✓							✓						3
Burnett	Bashaw			✓										✓											✓		3
	Devils							✓																			1
	Gull																								✓		1
	Lipsett													✓						✓			✓				3
	Little Yellow			✓				✓						✓							✓				✓		5
	Mud Hen			✓										✓						✓					✓		4
	Yellow			✓							✓					✓	✓		✓		✓						6
Douglas	Radigan Flowage													✓											✓		2
	Saint Croix Flowage			✓																					✓		2
	Upper Saint Croix			✓		✓		✓			✓		✓	✓			✓				✓		✓			✓	10
Forest	Julia								✓					✓													2
Oneida	Big							✓						✓							✓			✓			4
	Cranberry		✓						✓			✓	✓	✓													5
	Gilmore							✓																✓			2
	Island			✓			✓	✓						✓					✓					✓			6
	Julia								✓												✓						2
	Kawaguesaga	✓	✓	✓	✓			✓	✓		✓		✓	✓							✓	✓			✓		12
	Little Fork						✓							✓							✓						3
	Little Tomahawk																	✓							✓		2
	Lone Stone								✓			✓															2
	Madeline			✓																							1
	Shishebogama							✓																			1
	Spirit			✓				✓	✓				✓	✓											✓		6
	Tomahawk			✓																	✓						2
	Whitefish							✓	✓																		2
Polk	Little Butternut										✓			✓			✓				✓				✓		5
Sawyer	Pacwawong											✓	✓	✓											✓		4
	Smith			✓				✓			✓		✓	✓	✓					✓	✓		✓		✓		10
	Windigo													✓							✓						2
Vilas	Big Sand						✓	✓	✓			✓	✓	✓							✓		✓		✓		9
	Crab									✓	✓			✓	✓					✓	✓		✓		✓		8
	Cranberry		✓						✓				✓	✓						✓	✓						6
	Little Star			✓								✓		✓											✓		4
	Manitowish			✓										✓						✓					✓		4
	Oxbow						✓				✓			✓							✓						4
	Pickerel							✓				✓	✓							✓							4
	Shishebogama													✓						✓					✓		3
	Snipe							✓	✓					✓													3
	Sparkling			✓							✓			✓													3
	Spider			✓				✓	✓		✓	✓		✓						✓	✓				✓	✓	10
Washburn	Bass										✓			✓							✓					✓	4
	Dunn			✓				✓			✓	✓	✓	✓						✓	✓				✓		9
	Slim													✓		✓					✓				✓		4
Total		1	3	17	1	1	4	16	13	2	13	10	13	34	2	2	3	1	2	10	22	1	6	3	23	3	

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 root crown 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 in northern Wisconsin. Treated sites were mapped using a TDS® Recon 400 hand-held computer with a GlobalSat® BC-337 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. Control crews 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 is dicot-specific, allowing grasses and sedges to persist and re-colonize sites in a shorter time period. Chemical control efforts focused primarily on road rights-of-way between Mellen and Bayfield, Wisconsin. Private properties were also treated after consent forms were signed by the landowner.

Large sites (> 1 acre) and sites with poor access are a 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 2010, beetles were collected from locally established populations in 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 2010, GLIFWC staff treated 399 sites with herbicide. Figure 4 illustrates the distribution of chemical control efforts for purple loosestrife in 2010. Biological control efforts since 2000 have established over 60 *Galerucella* populations throughout the Bad River – Chequamegon Bay watershed and site visits continue to document their impacts (Figures 5-7). Because the largest sites within Bad River-Chequamegon Bay watershed already have established populations of *Galerucella* beetles (Figure 8), no beetles were released within the watershed in 2010. However, two days of field collections for *Galerucella* beetles were sponsored by GLIFWC. Staff from the U.S. Forest Service, Wisconsin DNR, Iron County, and citizens from several lake associations were led by GLIFWC staff to previously established biocontrol sites to collect beetles for loosestrife control efforts throughout northern Wisconsin.

DISCUSSION

The use of biological controls has allowed GLIFWC's control crew to place greater emphasis on treating small populations with herbicide before they become significant source populations (Figure 9). This strategy also reduces the amount of herbicide applied at each site (Figure 10). Biological control has been effective throughout the watershed, with the exception of some small upland sites where conditions are too dry and the expansive Fish Creek Sloughs west of Ashland, Wisconsin. Approximately 100,000 *Galerucella* beetles were released in Fish Creek Sloughs in 2002. Although they have persisted and their distribution within the wetland continues to expand, they have been slow to build their population to a density that reduces the abundance of purple loosestrife. A priority for 2011 will be to rear additional *Galerucella* beetles to supplement the population in Fish Creek Sloughs and distribute them to areas within this wetland where they are absent.

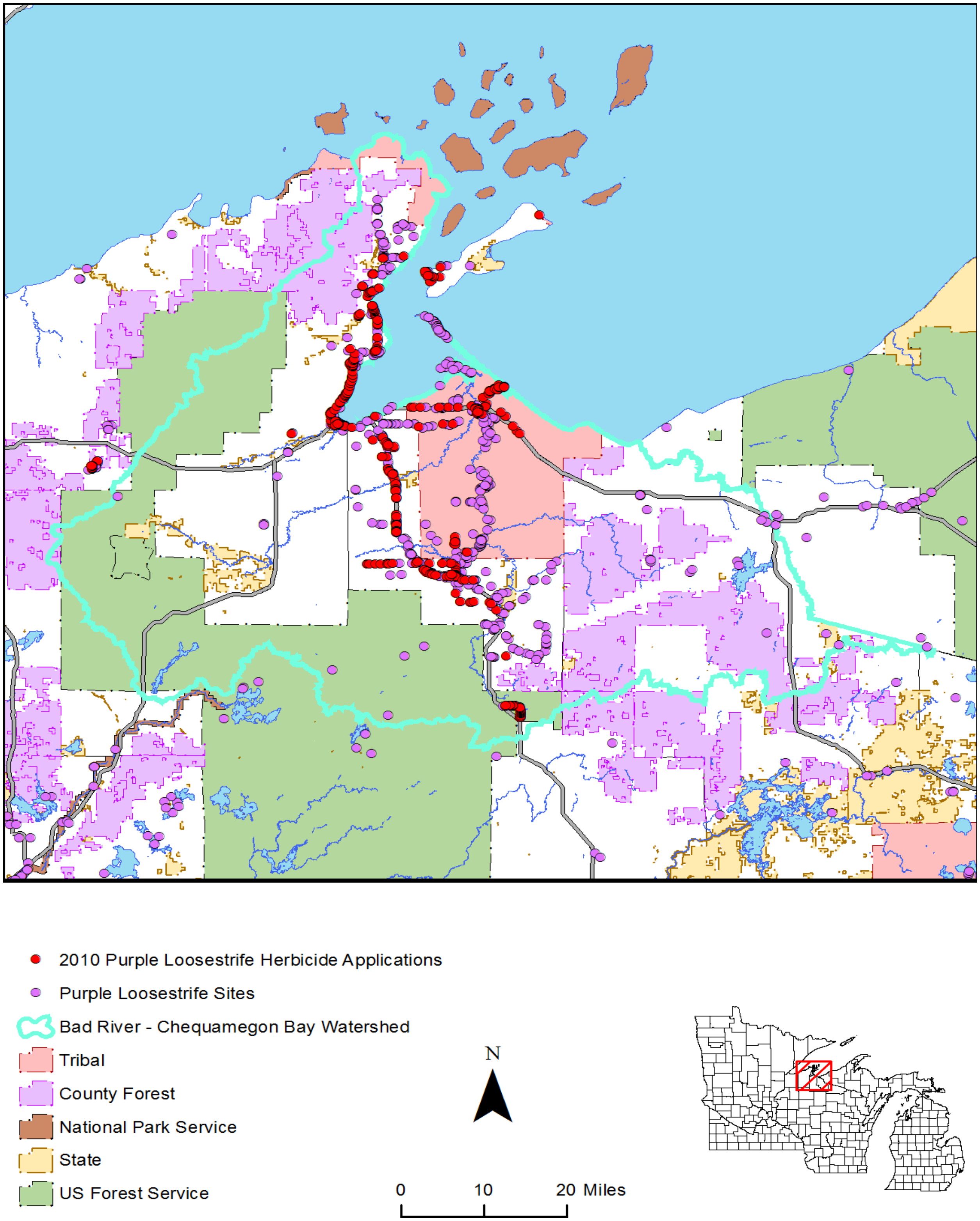

Figure 4. Distribution of purple loosestrife herbicide applications in 2010.

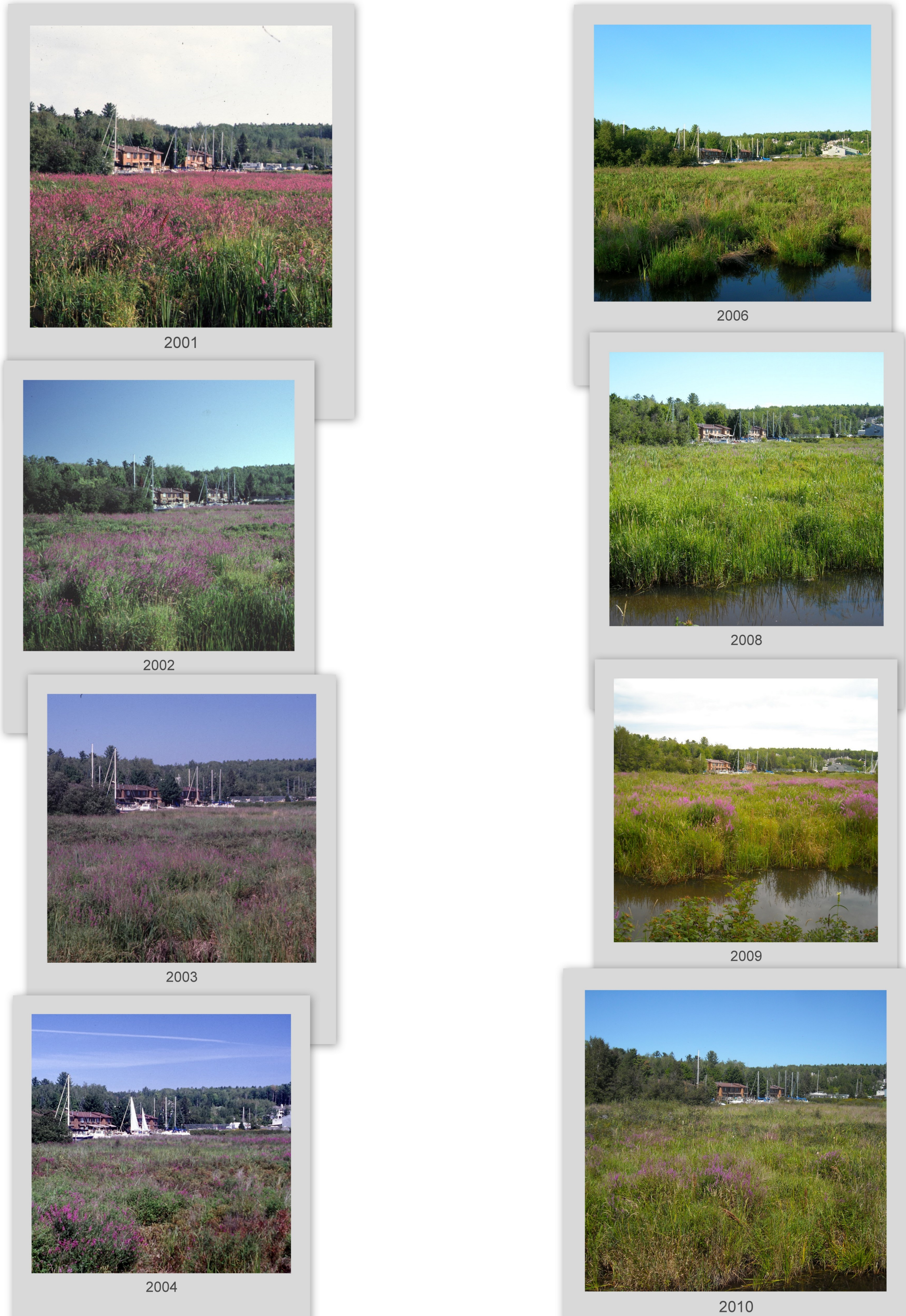

Figure 5. *Galerucella* release site north of Pike's Creek near Washburn, Wisconsin.

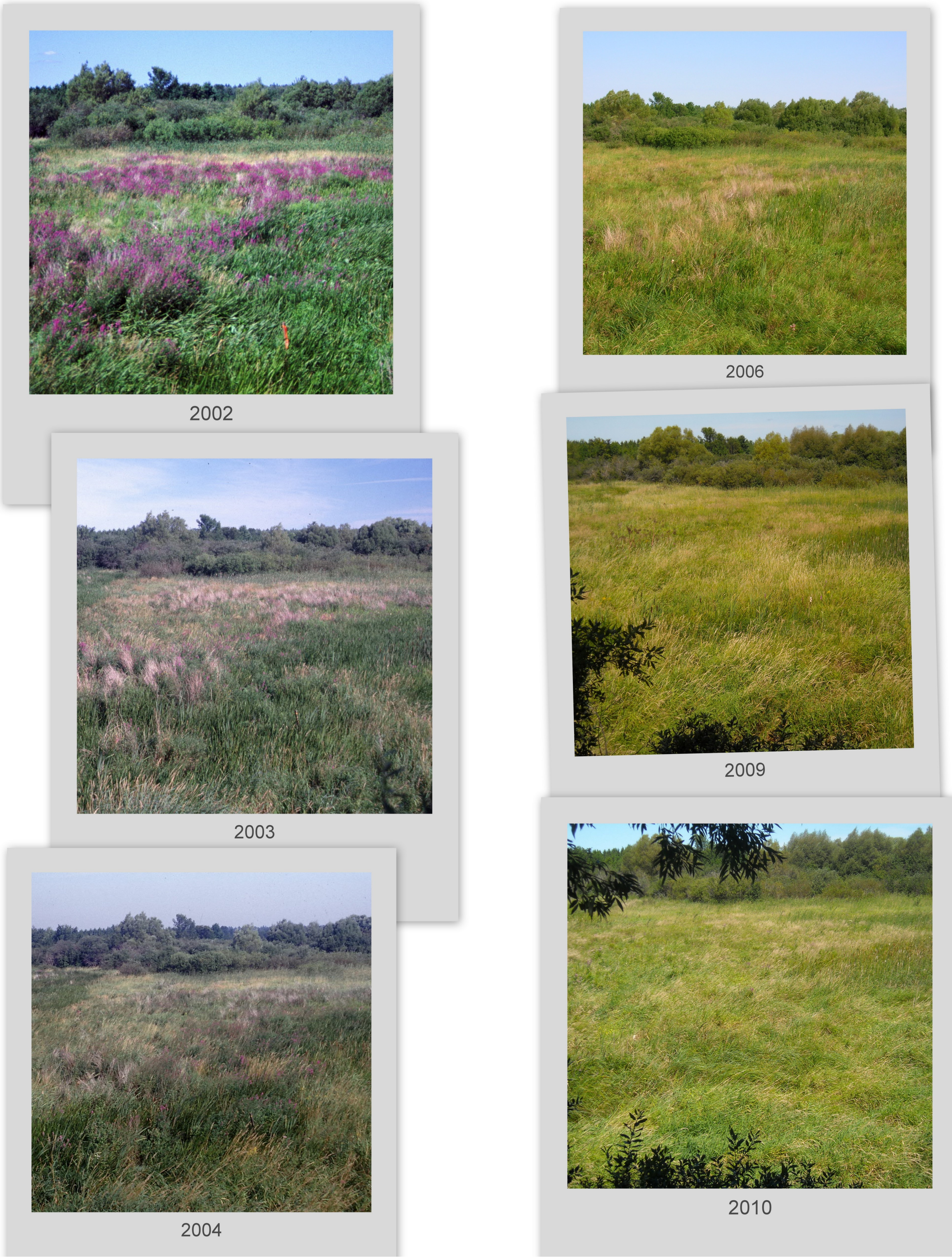

Figure 6. *Galerucella* release site south of Whittlesey Creek near Ashland, Wisconsin.

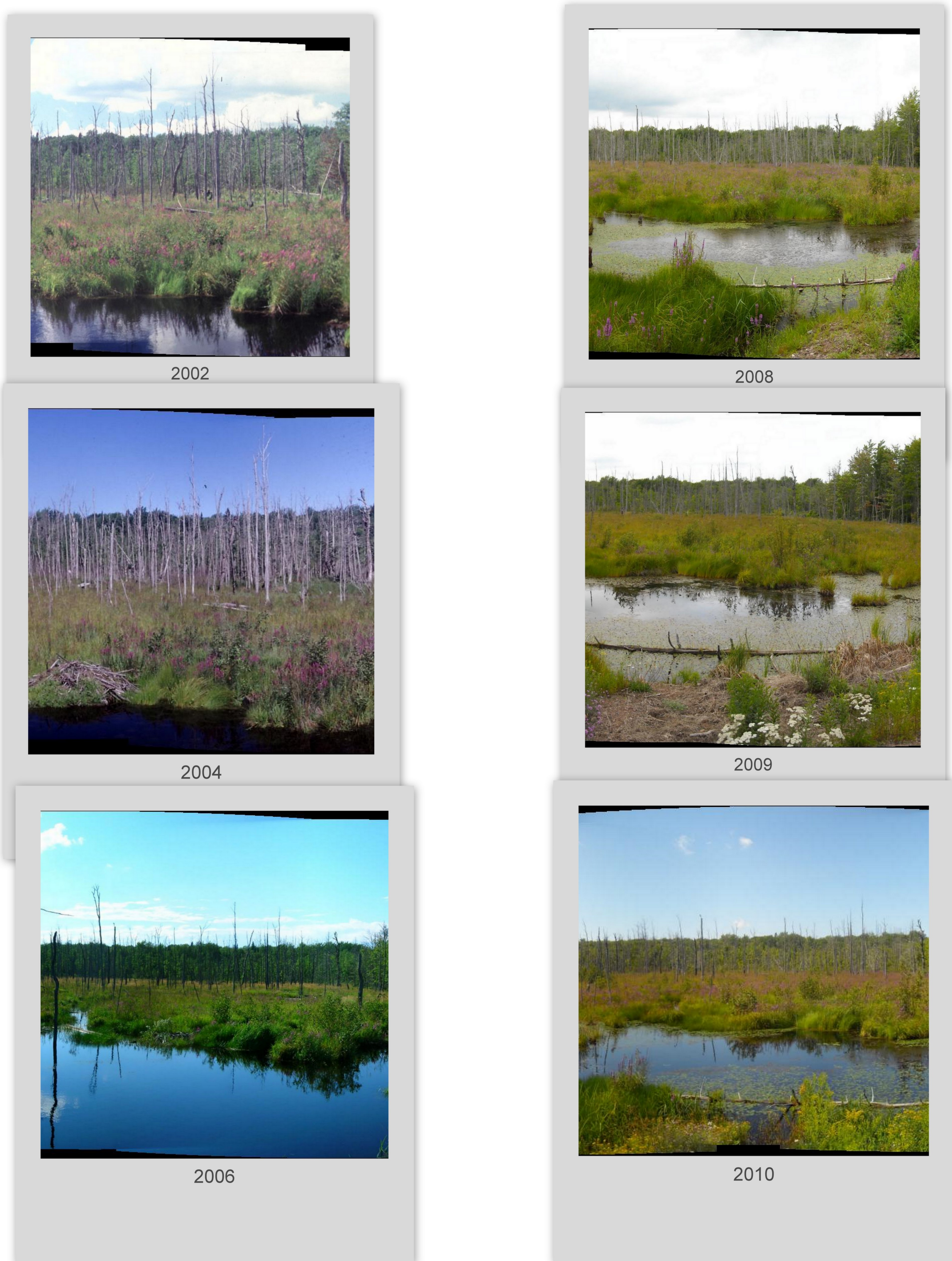

Figure 7. *Galerucella* release site at Underwood State Wildlife Area, Iron County, Wisconsin.

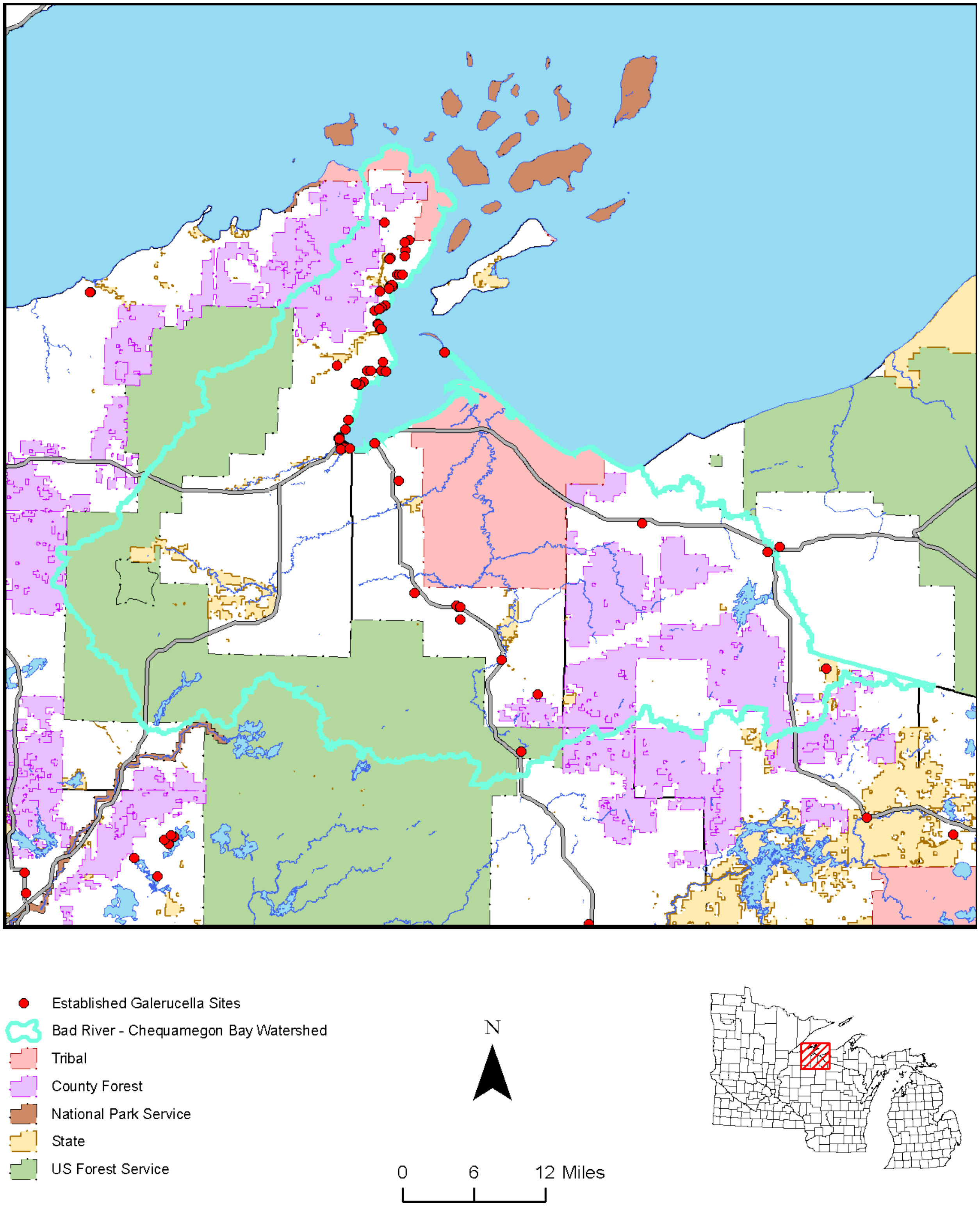

Figure 8. *Galerucella* release sites within the Bad River – Chequamegon Bay watershed.

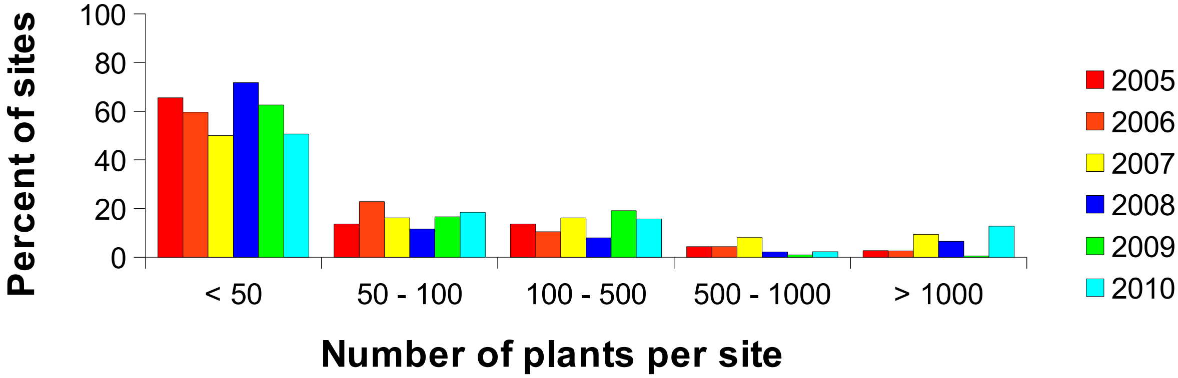

Figure 9. Abundance of purple loosestrife at sites treated in 2005-2010.

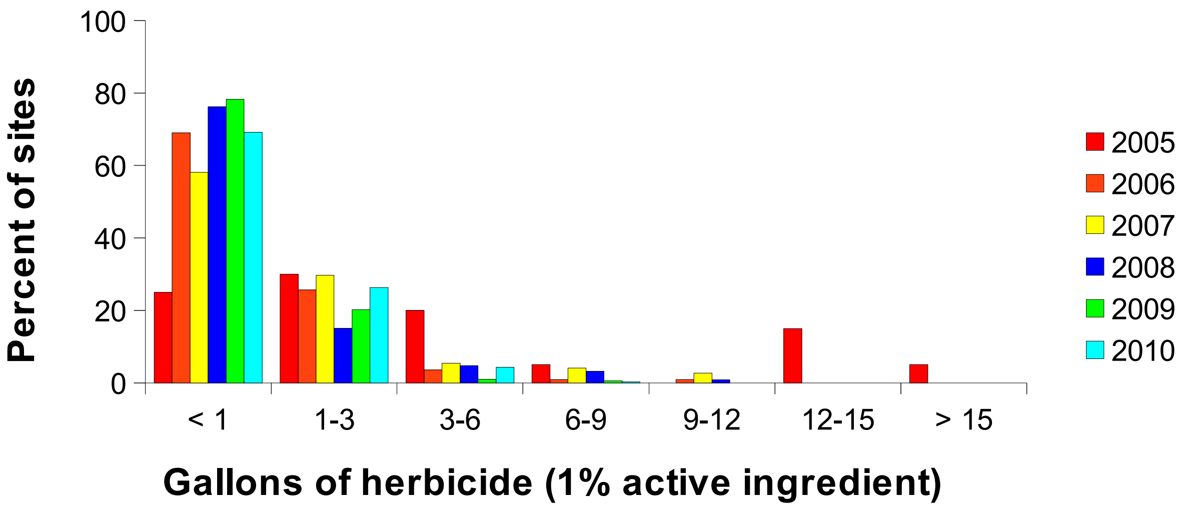

Figure 10. Amount of herbicide applied to purple loosestrife infestations in 2005-2010.

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's integrated control efforts for leafy spurge are focused in the town of Washburn in Bayfield County, Wisconsin. GLIFWC crews applied imazapic (Plateau®) herbicide to leafy spurge 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. An assortment of biological control organisms have been approved by USDA-APHIS for controlling leafy spurge. Three of these have been released at leafy spurge sites in Bayfield County – *Aphthona lacertosa*, *A. nigriscutus* and *Oberea erythrocephala*.

Treated sites were mapped using a TDS® Recon 400 hand-held computer with a GlobalSat® BC-337 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 2010, GLIFWC staff treated 42 sites with herbicide. Figure 11 illustrates the distribution of chemical control efforts for leafy spurge in 2010. Road rights-of-way on the eastern edge of the Moquah Barrens near Washburn, Wisconsin 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. GLIFWC also contributed herbicide and back-pack sprayers to the annual leafy spurge work day efforts coordinated by the Northwoods Cooperative Weed Management Area (NCWMA) to treat leafy spurge on private lands.

DISCUSSION

Annual control efforts have substantially reduced the abundance of leafy spurge. Over 50% of sites treated in 2010 consisted of less than 100 plants (Figure 12). Consequently, the amount of herbicide applied has also declined over time (Figure 13). Integrated measures employing both herbicide and biological controls have shown great success on private lands west of Washburn, Wisconsin. GLIFWC staff obtained several thousand *Aphthona* beetles from WDNR and released them at two sites in northern Bayfield County in 2009 (Figure 13). Additional *Aphthona* beetles were requested in 2010 but they perished in transit due to a delay in shipping. Unfortunately it was too late to collect more beetles, so no releases were conducted in 2010.

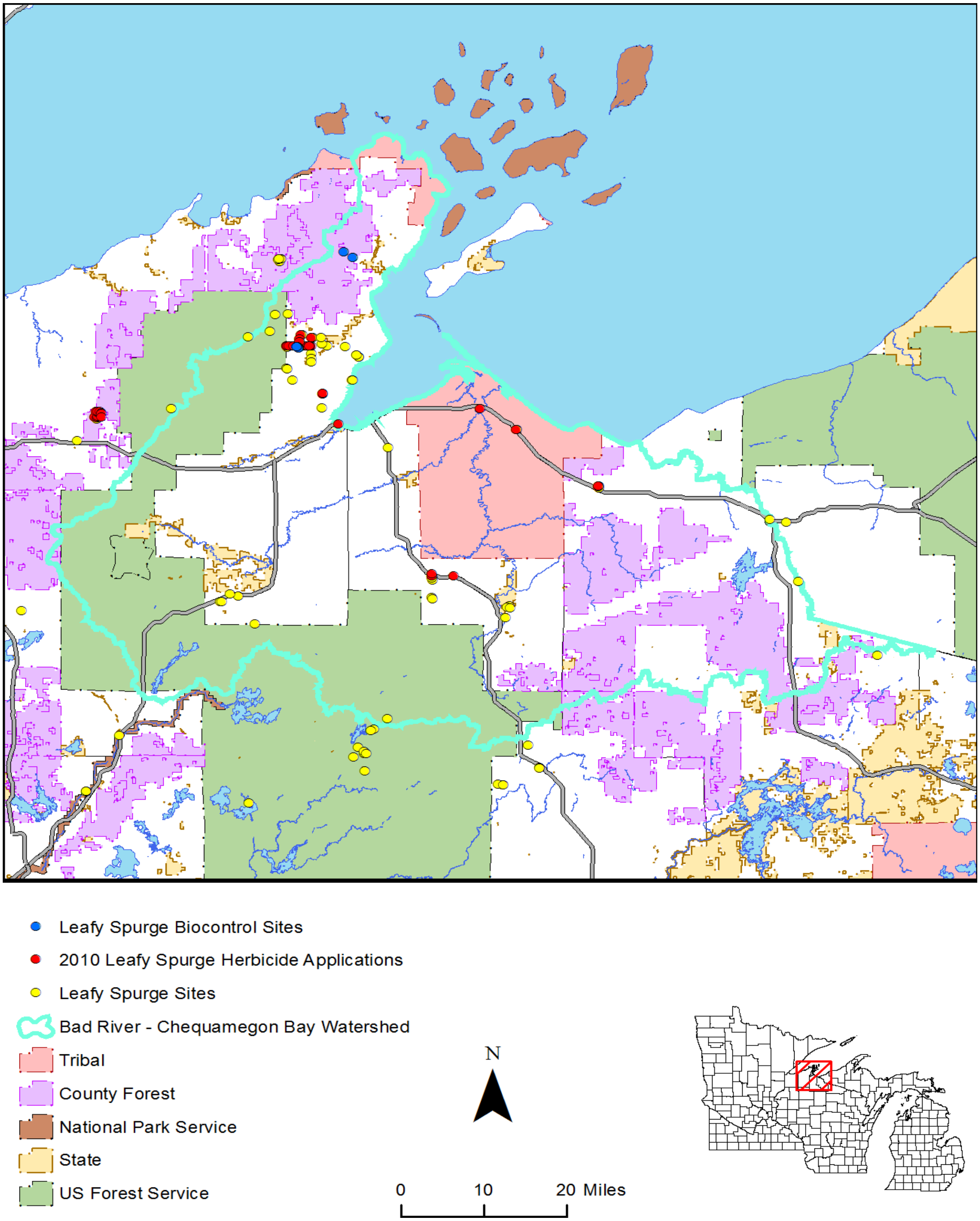

Figure 11. Distribution of leafy spurge, biological control sites, and 2010 herbicide applications.

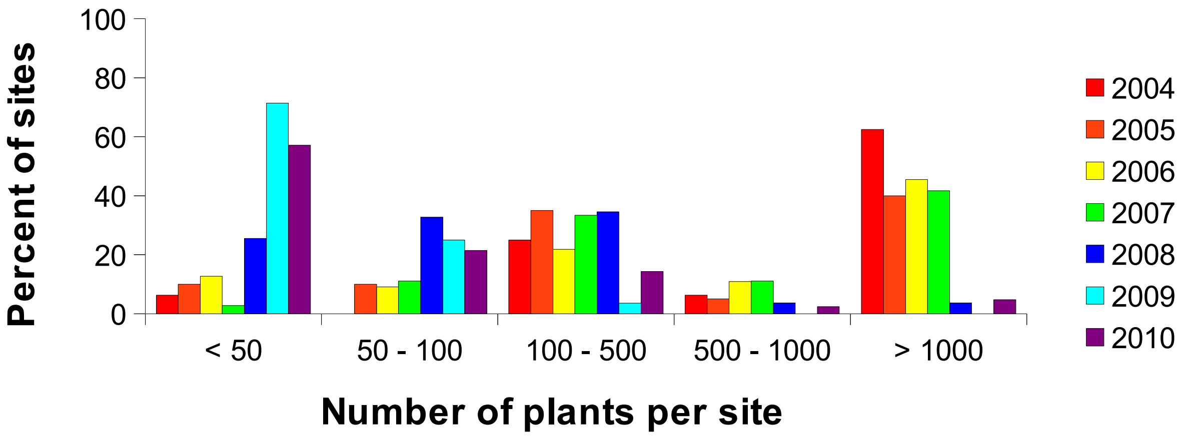

Figure 12. Abundance of leafy spurge at sites treated in 2004-2010.

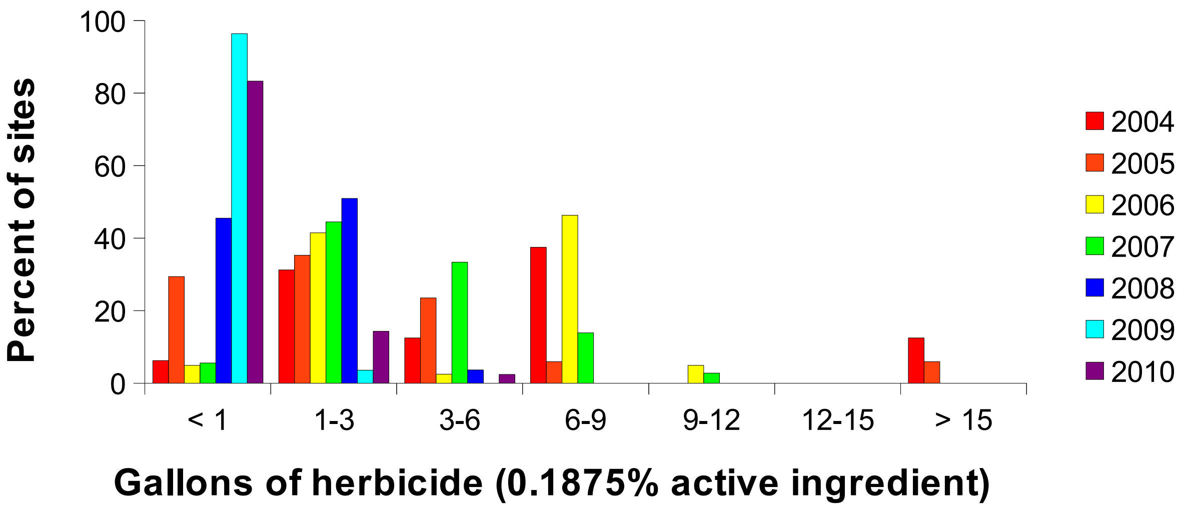

Figure 13. Amount of herbicide applied to leafy spurge infestations in 2004-2010.

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. 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

Each issue of GLIFWC's newsletter features an article on invasive species. Topics covered in 2010 included:

- Summer 2010 (http://www.glifwc.org/publications/mazinaigan/Summer2011.pdf)
  - "Sweet grass or vernal grass?" by Steve Garske
  - A discussion of native sweet grass (*Hierochloe odorata*) and the introduced sweet vernal grass (*Anthoxanthum odoratum*)
- Fall 2010 (http://www.glifwc.org/publications/mazinaigan/Fall2011.pdf)
  - "Waging war on wiley weeds" by Miles Falck
  - NCWMA buckthorn and honeysuckle control workday at Prentice Park in Ashland, Wisconsin and GLIFWC staff participation.
- Winter 2010 (http://www.glifwc.org/publications/mazinaigan/Winter2010.pdf)
  - "Thoughts about biomass, forests, and our energy future" by Steve Garske
  - A discussion of the interaction between emerging biomass to energy schemes and invasive species.

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. In 2010 the site's layout was updated to match GLIFWC's main website. The site received a total of 1,499 visits in 2010.

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 inter-agency 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 Douglas, Bayfield, Ashland, and Iron Counties in northern Wisconsin. In 2010, GLIFWC staff worked with the NCWMA to control buckthorn and honeysuckle at Prentice Park in Ashland, Wisconsin, led field trips to collect *Galerucella* beetles for the biological control of purple loosestrife and provided herbicide and spraying equipment for annual leafy spurge control efforts in the town of Washburn.

Wisconsin Headwaters Invasives Partnership (WHIP): Formally established in 2010, WHIP provides a forum to share information, collaborate on planning, and cooperate on management activities in Vilas and Oneida Counties in northern Wisconsin. GLIFWC has a history of surveying inland waters in Vilas and Oneida Counties for AIS and sharing the findings with WHIP partners.

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.

Global Invasive Species Information Network (GISIN): GLIFWC staff participated on the standards committee to develop this standardized information exchange protocol for sharing invasive species information. An early adopter of the technology, GLIFWC's node of the Global Invasive Species Information Network (gisin.glifwc.org) demonstrates how this technology can be used to query multiple databases simultaneously and browse the results via an interactive table or map.

maps.glifwc.org: Similar to GISIN, the goal of this project is to facilitate collaboration by providing a common communications infrastructure. maps.glifwc.org provides a portal for viewing invasive species distribution and management in the context of the ceded territories and other GIS layers relevant to GLIFWC's member tribes such as manoomin and ogaa waters.

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