ENHANCING THE NEW INVADERS WATCH LIST PROGRAM OF THE CHICAGO AREA; RESPONDER NETWORK MODULE, NEW TARGET SPECIES, INTERACTIVE MAPPING, AND AUTOMATED REPORT MODULES-A FINAL REPORT

Final Report
Contract #s FS0603 and RC08-L22W

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By

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Preface.-This final report is for both contract #s FS0603 and RC08-L22W from the Illinois Conservation Foundation (ICF). FS0603 was originally a Chicago Wilderness grant. Because the grant program was limited to $15,000, funds were insufficient to finish all work that needed to be accomplished. Specifically, not enough funds were available for the printing of field identification cards and for some computer programming needs. Grant RC08-L22W was sought from the Wildlife Preservation Fund-Large Grant program to secure the remainder. A no-cost extension of FS0603 was sought to have it end at the same time as RC08-L22W. In this respect, it makes sense to have this report serve as final for both of them.

Introduction.-Chicago is a hub of commerce and transportation and because of this it is at risk for introduction of invasive, exotic species. Its globally imperiled natural communities have experienced decline and will continue to do so if invasive species are not controlled. The Chicago Wilderness (CW) coalition, through its Biodiversity Recovery Plan, calls for protection of habitat that supports species assemblages and the habitat that sustains them. Nationwide, invasive species are the second most important factor in the decline of imperiled species and communities. Monitoring newly arriving invaders is of the utmost importance since these are the species that society has the greatest hope of controlling.

The NewInvaders project (http://NewInvaders.org) protects biodiversity by training volunteers to recognize and report occurrences of new exotic, invasive species in the Chicago Wilderness (CW) area and by providing tools for land managers to notified of reports and to track control those species. Since 2005, we have developed training materials, data collection protocols, a web-based data reporting system and trained nearly 300 volunteers and over 75 land managers in the counties of Cook, DuPage, Kane, Lake, and McHenry in Illinois and Lake, La Porte, and Porter counties of Indiana. Funding was sought to add five new target plant species, add interactive web mapping of existing and new regional occurrence records, improve web-based rapid responder modules, build automated reporting modules, and update existing species pages to reflect current knowledge.

The funds secured for this work resulted from a renewal of funding provided by Chicago Wilderness late in 2004. This collaborative effort between the Illinois Natural History Survey (INHS), the Lake County Forest Preserve District (LCFPD), and The Nature Conservancy (TNC) has accomplished much through building the social and information infrastructure needed to find, communicate locations of, and control invasive species in the CW area.

Collaborators Karen Tharp (The Nature Conservancy, Volunteer Stewardship Network), Debbie Maurer (Lake County Forest Preserve District, LCFPD, Restoration Ecologist) have been involved in creating the social network necessary to carry out this project. Dr. Michael Jeffords and Ms. Carie Nixon (both of the Illinois Natural History Survey, INHS) designed and printed the original 3,600 copies of laminated field guides for the 15 plant and 2 insect target species. These were distributed at little or no cost to participants. Dr. DeWalt and his web and database programmers designed and built the website that provides the information infrastructure for NewInvaders. NewInvaders has been featured in local news articles and in the winter 2005 issue of the TNC Magazine. The program is now accumulating many new records for target species.

The following objectives stated in the grant agreement for contract both FS0603 and RC08-L22W were completed:

1. Addition of new target species.
2. Update the web pages.
3. Complete the responder module.

4. Build mapping module.
5. Build Reporting Modules.

In addition to these objectives, NewInvaders has met other, unfunded, objectives commensurate with its needs to recruit and train volunteers and professionals to participate in the program.

Addition of New Target Species.-NewInvaders consulted several regional botanists and land managers who provided valuable suggestions for inclusions. A short list of those who provided comments follows.

Table 1. Experts consulted for addition of new target species for NewInvaders program.

Expert	Affiliation
Patricia Charlebois	INHS, Aquatic Invasive Species Coordinator, Zion, IL
Eric Ulasek	USFWS, Midewin National Tallgrass Prairie
Noel Palovic	USPS, Indiana Dunes National Lakeshore
Ken Klick	LCFPD
Scott Kobal	DuPage County Forest Preserve District
Debra Nelson	Formerly of the Illinois Department of Natural Resources
Chris Evans	University of Southern Illinois-Carbondale
Wayne Vanderplough	Forest Preserve District of Cook County

With the help of these experts and with the considerable expertise of collaborators Maurer and Tharp, six new target species were added. No new, major insect pests have been detected within the Midwest recently, so none were added to our target species list. Table 1 provides a list of the species added.

Table 2. Plant species added to NewInvaders target list, synonyms, common names, habitats affected.

Species	Synonyms	Common Name	Habitats
Cynanchum louiseae	*C. nigrum, Vincetoxicum nigrum*	Black Swallow-wort	Uplands
Cynanchum louiseae	*Vincetoxicum rossicum*	Pale Swallow-wort	Uplands
Butomus umbellatus		Flowering Rush	Wetlands
Hydrilla verticillata		Hydrilla	Streams & lakes
Egeria densa		Brazilian Elodea	Streams & lakes
Glyceria maxima		Giant Manna Grass	Wetlands

Most new species added invade wetland and truly aquatic habitats. Until now, aquatic invasive species were not represented in the list of target species. Two of the new species have already been reported by our volunteers in the region: Brazilian Elodea in both DuPage and Lake counties and Giant Manna Grass in Lake County. Hydrilla has been found just outside of our coverage area in Indiana by another organization.

Carie Nixon of the INHS designed the laminated field cards sets with the help of Ms. Maurer who provide information, photos, and suggestions for the layout. A pdf document of the cards is attached as Appendix 1. A total of 3,600 cards sets were produced, equal to the printing of the original set of target species. All sets are laminated, drilled in one corner, and a ring provided for keeping the set together provided. These cards are now in the possession of Ms. Maurer.

Update the Web Pages.-Information used to build the new field cards set was also used to populate databases that inform the NewInvaders.org target species web pages (Fig. 1).

Information updated includes new synonymies, new distribution descriptions, and new maps of distribution and of species traits. Currently, there are 22 plant and two insect pages.

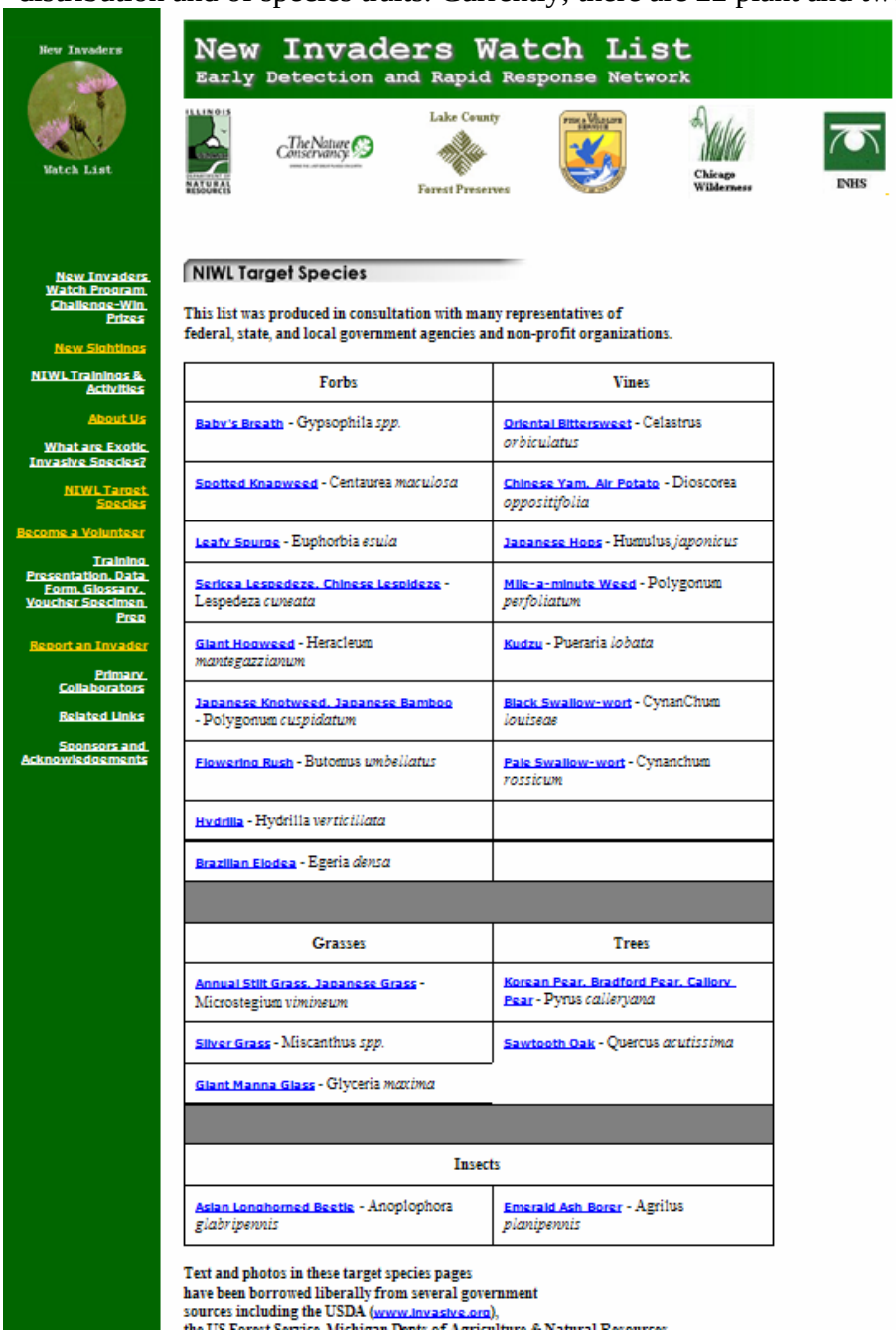


Fig. 1. Target species page on NewInvaders.org website.

Complete the Responder Module.-This module (Fig. 2) performs two functions. First, it notifies responders of a verified target species occurrence. Second, it records information about the response. The first uses public property names as the primary keys in a database linking new target species records with land managers (responders). The list of properties and land managers is under constant update. The second function gathers comments from responders that tracks

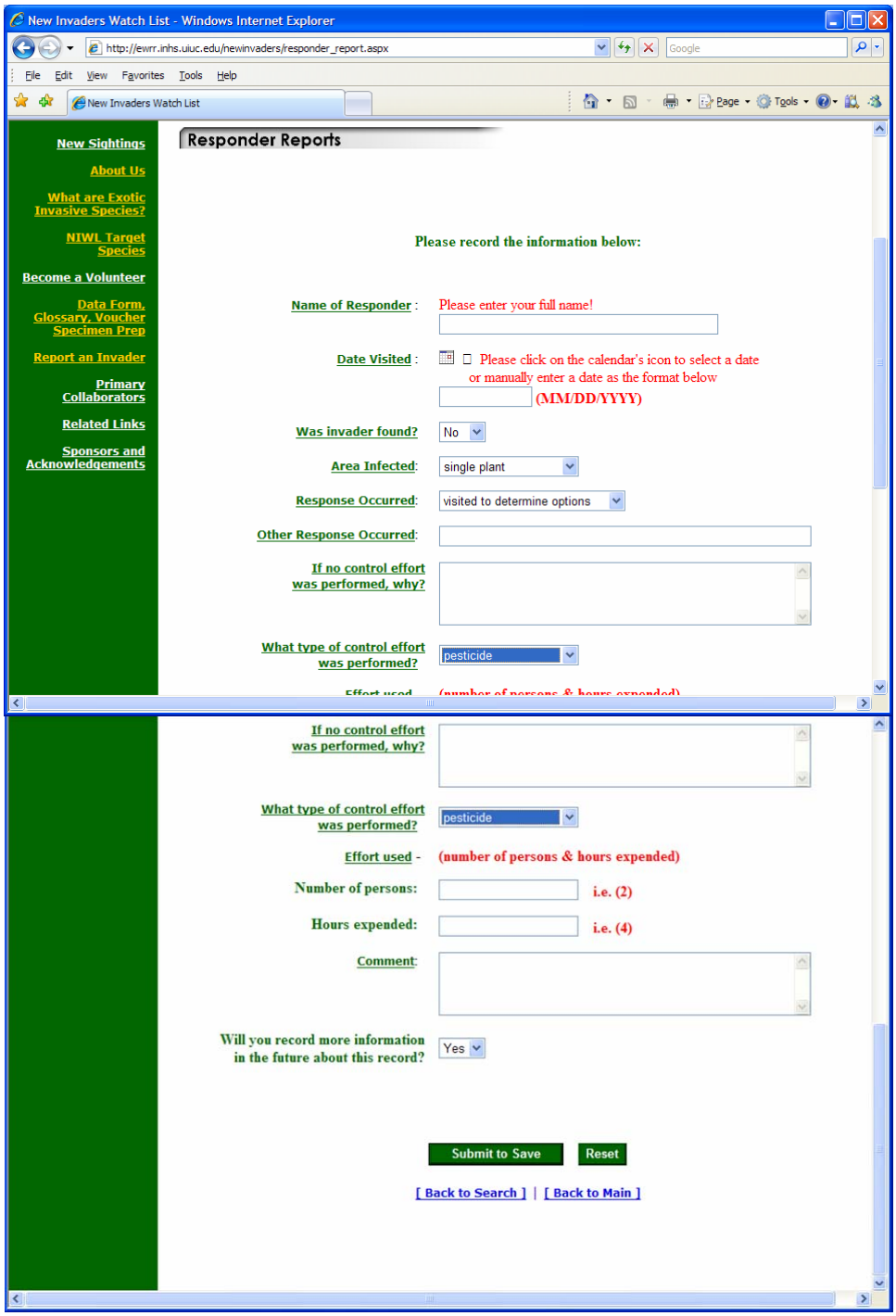


Fig. 2. Responders module.

control efforts and success of control. We have programmed this module to accept the following information:

1. Name of responder.
2. Date visited.
3. Was invader found? Answers are Yes or No, with comment field.
4. Describe area affected. Population was single plant, scattered, dense.

5. Response occurred?
6. If no control effort was performed, why? And do you have plans to control in the future?
7. Visited to determine options, control effort performed, no control, other response.
8. What type of control effort was performed? Pesticide application, mechanical removal, mowing, burning, pulling, etc.
9. Effort Use. Number of persons, hours expended.

Build Interactive Mapping and Gather Records.-Originally, we proposed to build our own mapping system using the software ASPMAP. However, through consultation with National Institute of Invasive Species Science (http://www.niiss.org, NIIS), it was decided that mapping would be dealt with through contractual services to them. NIIS stores thousands invasive species records from data providers all over the USA. Partnering with them would allow NewInvaders to share records with many organizations. Pairing our data with their's would also provide much needed context for our volunteer records.

NewInvaders has provided to NIIS a database of 280 volunteer generated records for use in mapping invasive species locations. NIIS produced a mapping module look like it came from our server and provided satellite images as a background layer. Our records are plotted as separate layers, but species, so that we have control over what is mapped at any time. Data layers consist of target species, state boundaries, and a the satellite images. Fig. 3 shows a map of Oriental Bittersweet in the context of all volunteer locations. This species appears to be distributed mostly in DuPage County at a large number of sites. The paucity of records outside of this county may be real, but more likely it is due to insufficient effort in other regions. The ability to map distributions will suggest future inventory efforts.

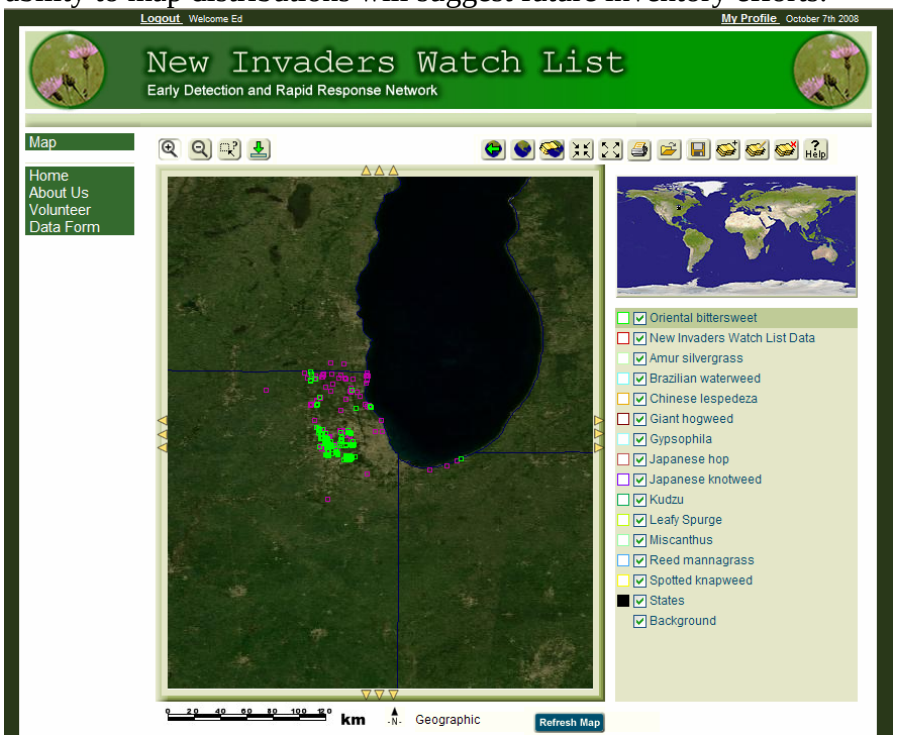


Fig. 3. NIIS map product for NewInvaders. All points volunteer generated point with Leafy Spurge points in green.

NIIS provides tools to select and zoom in and out of an area. The more one zooms in, the more detail is revealed. One can see in Fig. 4 a mapped location for Leafy Spurge that clearly provides detailed landmarks such as road intersections and stream crossings. Mapping of locations will help responders locate a NewInvader record so that they perform control related activities.

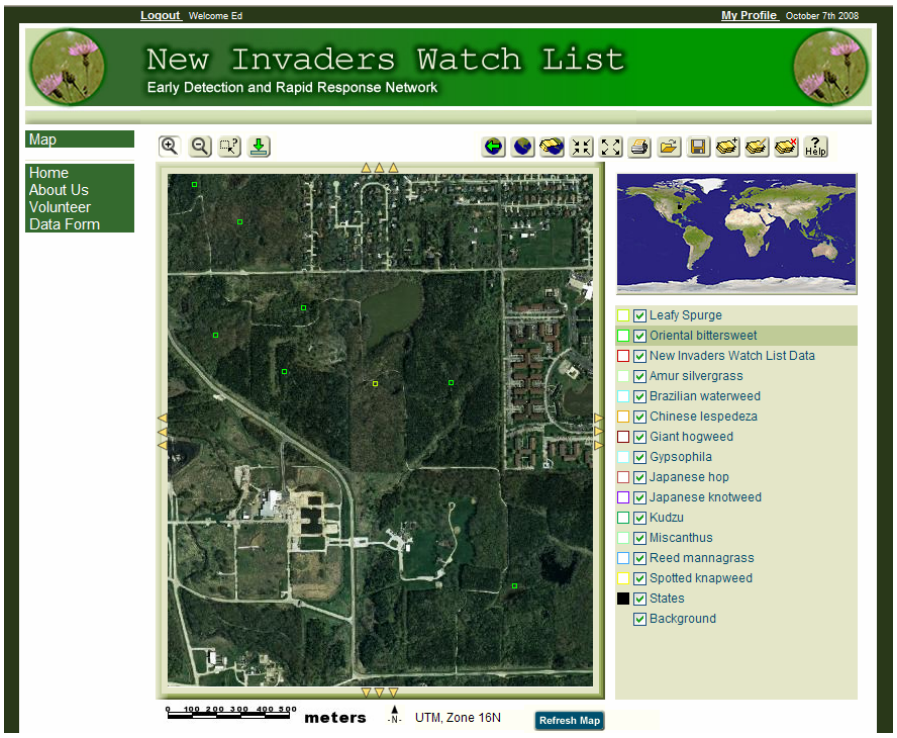


Fig. 4. Closeup of Leafy Spurge location.

One may also use the Query Tool to obtain information about a point or several points. Stretching a Query Tool box over records results in the formation of a table. Each entry in the table is a record about a map point. Clicking on one of the hyperlinks for a record sends you to a text string with information about the record.

NewInvaders has created a database of museum and literature records of target species to provide context for volunteer collected data. Some 1,500 records were gathered from the following institutions: Wisconsin State Herbarium, Vplants (a virtual museum of records from the Morten Arboretum, Chicago Botanic Garden, Field Museum of Natural History), INHS Herbarium, Butler University Herbarium, Notre Dame's Nieuland Herbarium. All specimens and location data were compiled for each record. These records have been sent to NIIS for inclusion in their database. Soon, these records will be available for viewing from NewInvaders.org. NewInvaders has helped to close an information gap for NIIS in the Midwest.

Build Report Module.-NewInvaders has built modules that greatly increase the functionality of the website for administrators such as Ms. Maurer and Dr. DeWalt. One allows for the creating of new events, such as trainings and seminars for volunteers. Events may be deleted as needed.

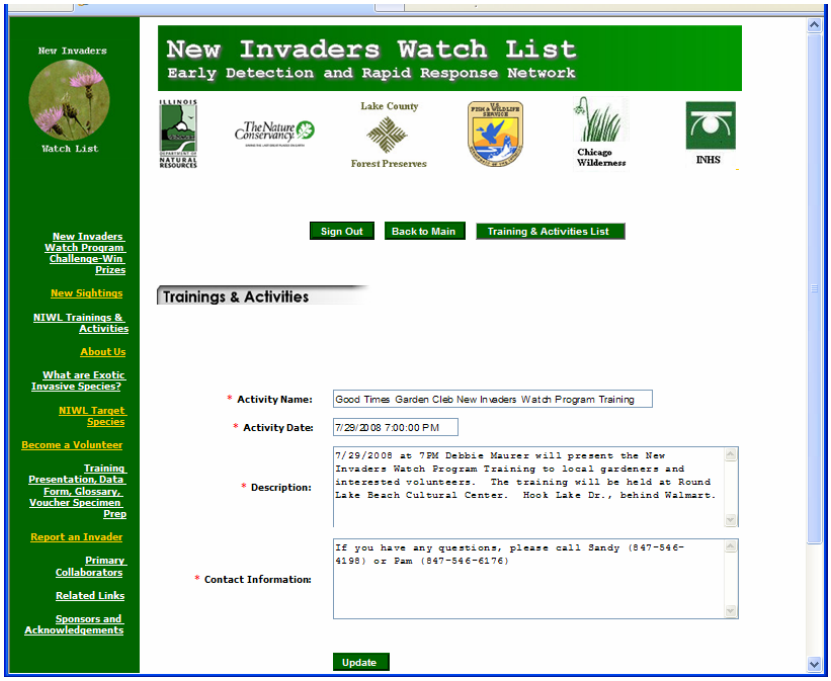


Fig. 4. Trainings & Activities recording module.

A second module allows for administrators to search for a Response record to see what has been done about a volunteer reported record. Another module has been produced to download entire datasets so that analyses can be conducted on them.

Brief Analyses of Volunteer Records.-Thirteen target plant species, representing 280 records, were reported by volunteers since the inception of this program (Fig. 5). The most frequently

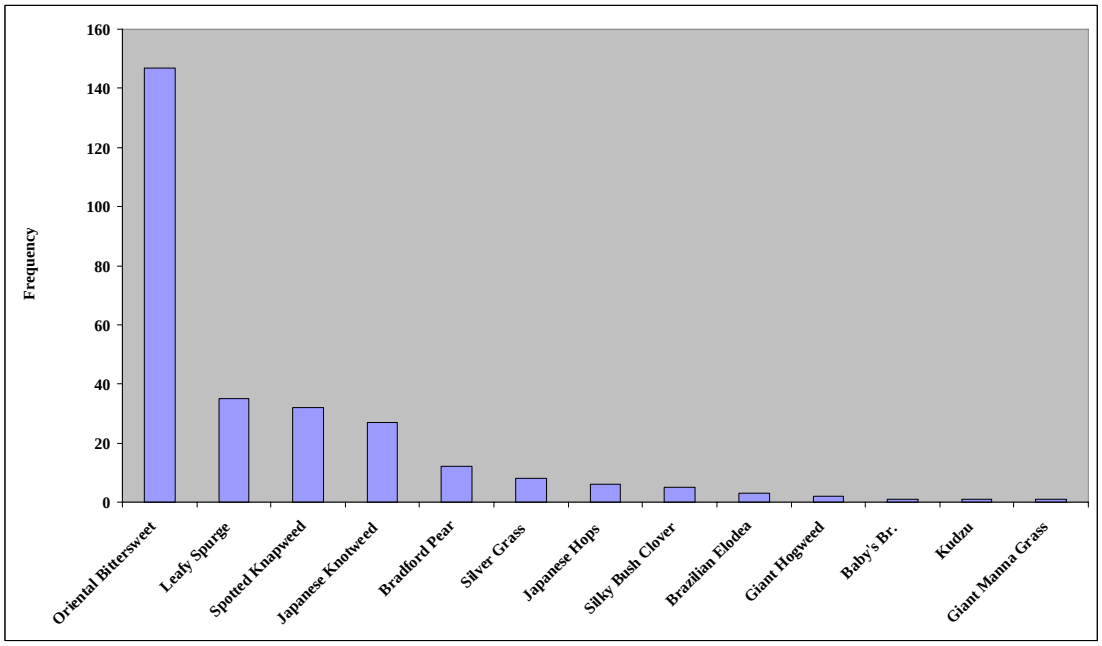


Fig. 5. Frequency distribution of NewInvaders volunteer records across 13 or 22 target plant species.

reported species was that of Oriental Bittersweet. Three other species, Leafy Spurge, Spotted Knapweed, and Japanese Knotweed also seem to be taking hold in the Chicago region, although at much reduced frequencies. Some areas have been poorly inventoried relative to others (Fig. 6). DuPage County is the best inventoried for target species, with nearly 180 records. It is this county that accounts for the majority of Oriental Bittersweet records in Fig. 5. Much social networking and training efforts will be directed in the southern part of the Chicago area and into northwest Indiana next spring to improve coverage there.

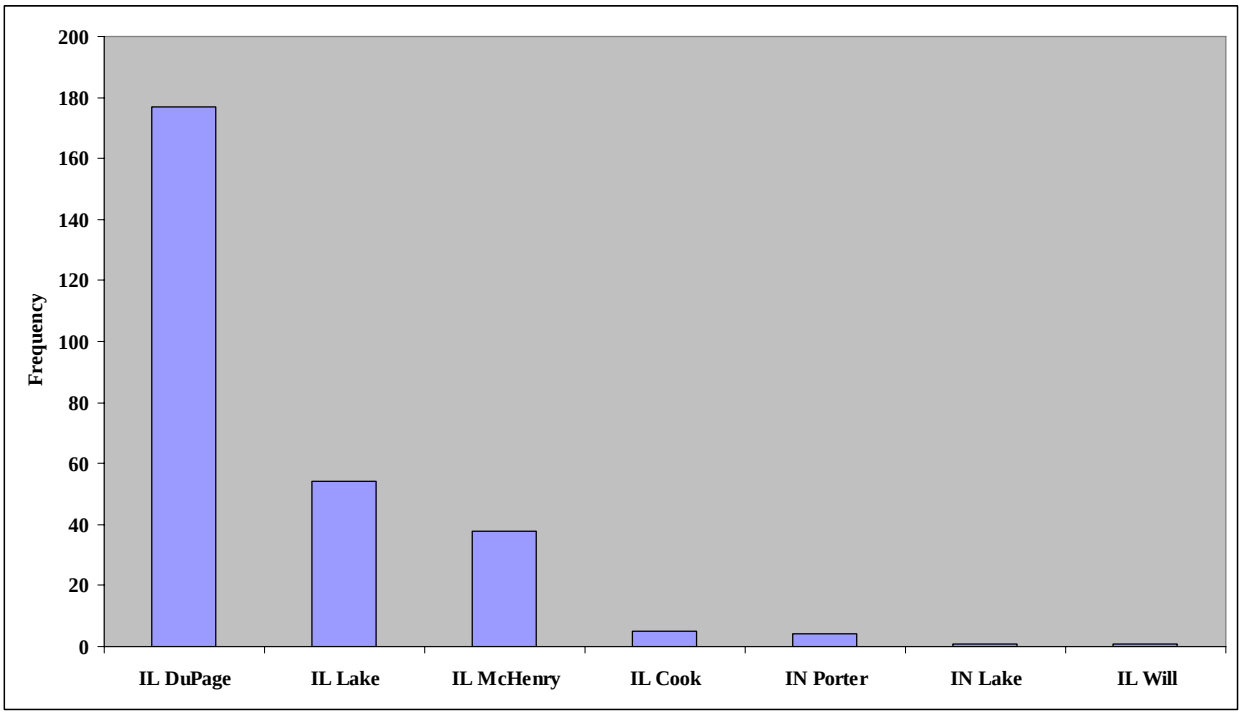


Fig. 6. Frequency distribution of NewInvaders volunteer records by state and county.

Brief Accountings of Trainings Held And Partners Involved.-Over the past two years many NewInvaders trainings have been held in the Chicago region, most given by Ms. Maurer and Ms. Tharp, but several given by partners who have graciously provided time and resources (Table 3).

Table 3. NewInvaders trainings held.

Person or Agency	**Comments**
Karen Tharp-TNC	Herbicide usage training
Noel Pavlovic-Indiana Dunes National Lakeshore	Volunteer training. 1 training
Debbie Maurer-Lake County Forest Preserves District	Volunteer training, 5 trainings
McHenry County Naturalist Certification Program	Volunteer training, at least one training
Wildones, a citizens' group	Volunteer training, two trainings
Highland Park	Volunteer training
Forest Preserves District of Cook County	Trained 50 employees

Publicity.-Ms. Maurer and Dr. DeWalt gave presentations on the NewInvaders program at several of meetings over past three years (Table 4). In addition, the NewInvaders program was

featured in the nationally recognized Nature Conservancy Magazine, in its Winter 2005 issue, for its efforts to document the location and control of new invaders.

Table 4. Professional meetings attended by Maurer and DeWalt to promote NewInvaders.

Person	Conference	Year
Maurer	National Areas Conference-Chicago	2005
Maurer	North Central Weed Science Society	2006
Maurer	National Areas Conference-Cleveland	2006
Maurer	National Areas Conference-Nashville, TN	2008
Maurer	National Institute for Invasive Species Science-Data Sharing	2008
Maurer	Chicago Wilderness Congress	2007
DeWalt	National Institute for Invasive Species Science-Data Sharing	2008

Conclusion.-The NewInvaders program has been documenting new invasive species for the Chicago Wilderness area since 2005. It has had significant challenges in doing so, mostly due to lack of a paid coordinator to schedule activities, provide trainings, and seek out funding sources. It survives due to the dedicated Maurer, DeWalt, Tharp who keep the website running, provide trainings, and recruit new partners and volunteers.

NewInvaders is now poised to make great progress to control the spread of new invaders into the region. Having the capability to map records gives us the ability to determine where to focus efforts in the future, it gives volunteers a sense of accomplishment, and it helps those who respond to new records find them in the field. The completed responders module will also aid in tracking the effectiveness of control measures.The addition of several aquatic plant invaders will spread our influence in wetland and completely aquatic habitats, places where NewInvaders has not had a presence prior to this time.

Appendix 1. Laminated field cards sets for newly added species.

Black Swallow-wort, ***Cynanchum louiseae***
(Vincetoxicum nigrum and C. nigrum)

Pale Swallow-wort, ***Cynanchum rossicum***
(Vincetoxicum rossicum)

- **Herbaceous, perennial vines** twine 3–8 feet high.
- **Stem** single, sometimes branching.
- **Leaves** dark green, shiny, opposite, 1–4 inches long, toothless, narrowly to broadly oval-shaped with pointed tips.
- **Black Swallow-wort flowers** tiny, dark purple with 5, pointed, downy (hairy), triangular petals that are as long as wide (lower right photo).
- **Pale Swallow-wort flowers** maroon to pink with 5, pointed, hairless, triangular petals that are twice as long as wide (lower left photo).
- **Seed pods** milkweed-like, slender and tapered, 1–3 inches long, turn brown when ripe; seed on silky filaments, wind dispersed (see illlustration below).
- Threatens most upland community types including woodlands, forests, grasslands, and savannas; can persist in sun or shade.
- NATIVE LOOK-ALIKES: Milk & Honey Vine (Blue Vine) (*Cynanchum laeve* [*Ampelamus albidum*]); flowers cream or yellowish white, stems and leaves with a milky sap, base of leaf blades heart-shaped.

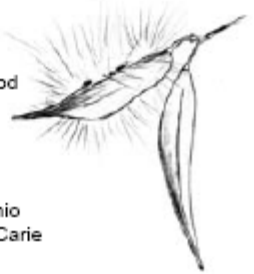


Photo Credits: Upper–David Eagan, University of WI; Lower left–Larissa L. Smith, Cornell University; Lower right– Antonio DiTommaso, Cornell University; Illustration–Carie Nixon, Illinois Natural History Survey.

Flowering Rush, *Butomus umbellatus*

- **Perennial, emergent aquatic herb** that can be submerged in deep water; in shallow water, grows 1–4 feet tall on an erect stem.
- **Stem** green and triangular in cross section.
- **Emergent leaves** grow from base of stem, 2–4 feet tall, stiff and narrow, with smooth edges, triangular in cross-section. Leaf tips may be spirally twisted. Submersed leaves are limp.
- **Flowers** 3 petals and 3 sepals, white or pink in a distinctive flat-topped spray (umbel) atop stem. Blooms mid-summer thru early fall. Plants only produce flowers in very shallow water or on dry sites.
- **Seeds**, rarely produces seeds; spreads locally by rhizomes and root pieces that break off and form new plants.
- Threatens marshes, backwaters and shorelines; prefers shallow or slow moving water.
- NATIVE LOOK-ALIKES: Bur reeds (*Sparganium* spp.); leaves keeled (V-shaped), female flower parts resemble small, spiked balls.

Butomus umbellatus

Triangular stem

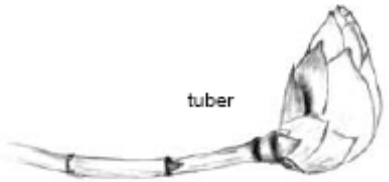
Sparganium sp.

V-shaped stem

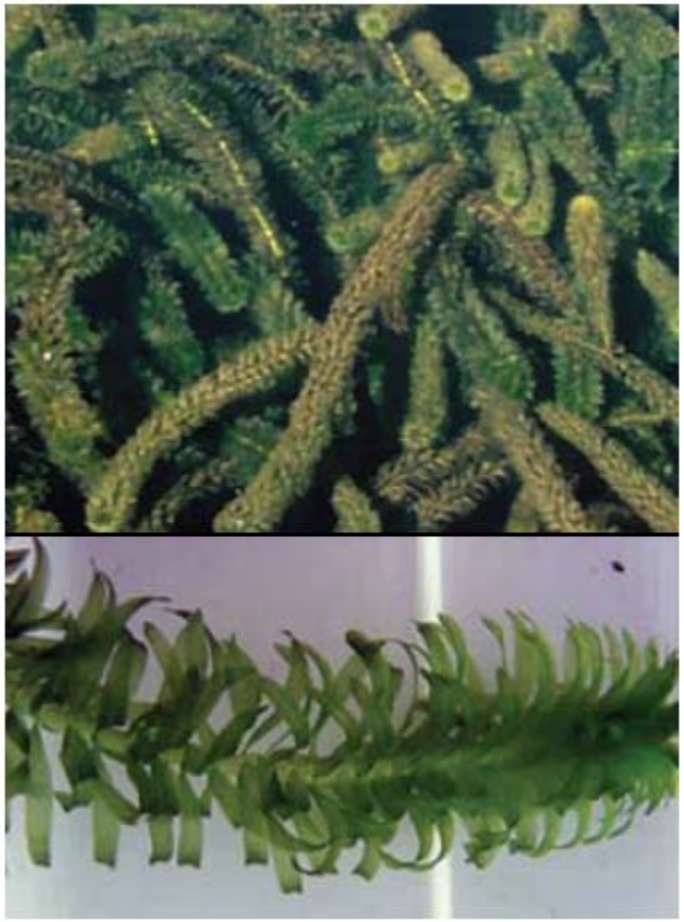
Credits: Background photo– Bill Smith, Wisconsin Department of Natural Resources; Lower left photo– Emmet Judziewicz, University of Wisconsin Stevens Point; Illustrations–Carie Nixon, Illinois Natural History Survey.

Hydrilla, *Hydrilla verticillata*

- **Aquatic, submersed, perennial herb** rooted in saturated soil, grows in water a few inches deep to 20 feet deep.
- **Stem** submersed, slender and branching profusely across the water surface; up to 25 feet long. White adventitious roots grow from stem.
- **Leaves** green, 0.6 inches long, pointed tips, arranged in whorls of 3 to 10 joined directly to stem; whorls in long increments, ⅛–2 inches apart on stem. Leaf edges distinctly saw-toothed; plant noticeably rough when pulled through the hand.
- **Flowers** male or female: female flowers solitary, tiny, white, floating on stalk at water surface; male flowers tiny, greenish, attached to stems, until they break loose, rise to the surface and free-float.
- **Reproduces vegetatively**, mainly by regrowth of stem fragments, but also by buds at leaf nodes (turions, dark green, ¼ inch round) and from ½ inch x ½ inch potato like tubers at ends of rhizomes, below ground (see illustration below).
- Threatens any freshwater aquatic communities including springs, lakes, marshes, ditches, streams, and rivers.
- NATIVE LOOK-ALIKES: Common Waterweed (*Elodea canadensis)*; leaves occur in whorls of 3 around the stem (or opposite), without tubers. Non-native, invasive Brazilian Waterweed (*Egeria densa)*; leaves lacking teeth, and in whorls of 4–6 (sometimes 8), bushier in appearance, without tubers. See *Egeria densa* card for illlustrations.



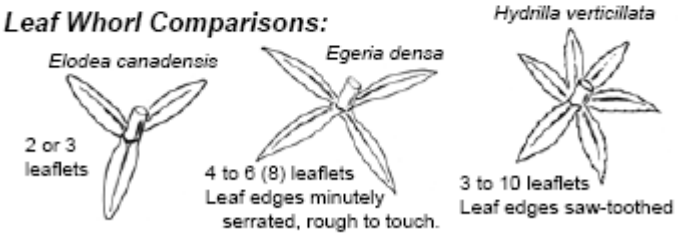
Credits: Photo–Nancy Tresser, Wisconsin Resident; Illustration–Carie Nixon, Illinois Natural History Survey.



Brazilian Elodea, *Egeria densa*

- **Aquatic submersed, perennial herb**, bushy in appearence, generally rooted in depths up to 20 feet or drifting; roots slender, white or pale, unbranched; lacks rhizomes and tubers.
- **Stem** cylindrical, single or branched; grows to water surface forming dense mats (profuse branching); roots produced from specialized areas on the stem (double nodes).
- **Leaves** bright green, 0.8–1.2 inches long, up to 0.2 inches broad, usually in whorls of 4 to 6 (sometimes 8) in short intervals along stem (gives leafy, bushy appearance), leaf edges minutely serrated.
- **Flowers** white, 0.7–1 inches across have three petals, male or female; float on or rise above the water's surface while attached to stem.
- **Reproduction from vegetative growth**; double nodes produce new plants if fragmented from stem (double nodes present every 6–12 whorls). Seeds and female flowers have never been reported from populations in the United States.
- Threatens still and flowing freshwater aquatic communities including lakes, ponds, pools, ditches, and quiet streams.

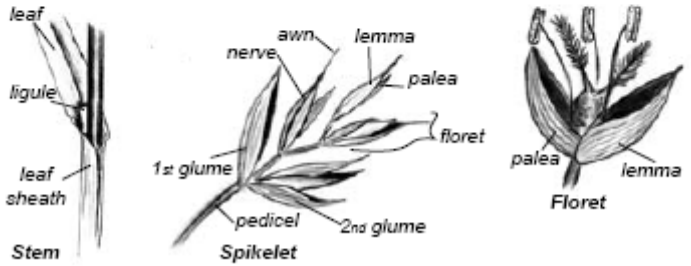
Leaf Whorl Comparisons:



Credits: Upper photo–Bill Haller, University of Florida/IFAS Center for Aquatic and Invasive Plants; Lower photo–Ann Murray, University of Florida/IFAS Center for Aquatic and Invasive Plants; Illustrations–Carie Nixon, Illinois Natural History Survey.

Giant Manna Grass, *Glyceria maxima*

- **Perennial, rhizomatous grass** grows from 1.6–8.2 feet tall.
- **Stem** unbranched, 0.3–0.5 inches thick.
- **Leaves** flat, 7 or more on stem, 8.6–11.4 inches long and 0.3–0.8 inches wide, shallowly grooved with prominent midribs. Leaf sheath closed for most of length (left illustration). Leaf edges with short, stiff hairs, rough to the touch.
- **Flowering portion of plant (inflorescence)** opens with many branches (panicle), branches with short, stiff hairs. Inflorescence strongly drooping at maturity with 50 + flattened (laterally compressed) spikelets, **spikelets** 0.2 (0.4) inches long, egg-shaped with 4–10 minute florets. (see illustrations below).
- Threatens freshwater communities, especially shallow water wetlands.
- NATIVE LOOK-ALIKES: Fowl Manna Grass (*G. striata)* shorter (1.6–4.0 feet tall). Floating Manna Grass (*G. septentrionalis* and *G. borealis*) spikelets linear, 0.4 inches or longer. Pale Manna Grass (*G. pallida)* leaf sheaths open, split to base. Rattlesnake Grass (*G. canadensis*) and Reed Manna Grass (*G. grandis*) 3–6 leaves on stem, leaf sheaths smooth.



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