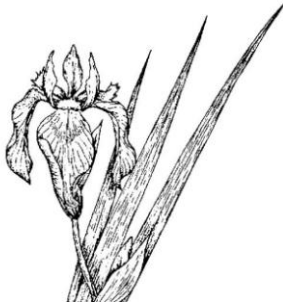
Spread Eagle Chain of Lakes (Florence County, Wisconsin)

Yellow Iris (*Iris pseudacoris*) Monitoring Report



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WHITE WATER ASSOCIATES, INC.

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INTRODUCTION

The yellow iris (*Iris pseudacoris*) is a perennial aquatic plant native to Europe, western Asia and North Africa. It was first introduced to North America in the 1800s as an ornamental plant. Over time, the plant has spread to many wetlands and proliferated to the detriment of native plants and animals. Yellow iris is present on numerous Wisconsin lake margins and the Wisconsin Department of Natural Resources (WDNR) has listed this species as "Restricted" which prevents its sale, transfer, transportation and intentional cultivation. Yellow iris can reduce habitat needed by fish and waterfowl (Thomas 1980).

During a June 16, 2014 survey for Eurasian watermilfoil in the Spread Eagle Chain of Lakes, White Water Associates staff documented yellow iris at three locations. One location (45.89908, -88.13768) was on Middle Lake. The other locations (45.90497, -88.13528 and 45.904846, -88.143467) were on North Lake. An early detection and rapid response grant awarded to the Spread Eagle Chain of Lakes Association specified that zebra mussels, Eurasian watermilfoil, and yellow iris populations be monitored. This report documents the yellow iris population in the Spread Eagle Chain of Lakes as measured in June of 2016.

We organize this report in six sections (including the Introduction). In the next section (Yellow Iris Biology), we summarize the species' biology. The Methods section details our approach to monitoring yellow iris in the Spread Eagle Chain of Lakes. Findings are reported in the Results section and the Discussion section describes impacts, mitigation, and containment of the yellow iris population. A Literature Cited section cites supporting literature.

YELLOW IRIS BIOLOGY

Iris pseudacorus is a perennial plant found in nutrient rich environments such as wetlands, swamps, floodplain forests, and wet shores of rivers and lakes (Forest Health Staff 2006, Kim et al. 2009, Vymazal and Kröpfelová 2008). Plants are very tolerant of anoxic conditions and grow vigorously in water/wet soil with a wide range of pH values (Blokhina et al. 2003, Forest Health Staff 2006). The species can tolerate salt, but is more robust in lower salinity environments (Sutherland and Walton 1990). A variety of substrates are suitable to the yellow iris. Initial colonization may be favored in silty areas, but colonies can also establish in pebbly/rocky substrate (Jacono 2001).

Yellow iris plants require three years of growth before they reach maturity and are able to flower (Tyron 2006 in Noxious Weed Control Program 2009). The seeds are buoyant and spread by wind or flowing water and germinate along shore edges (Noxious Weed Control Program 2009). Germination from seed is moderately successful. Sutherland (1990) reported a germination rate of 48% from freshly collected seed in the British Isles, yet in the field found seedlings to be rare in most habitats. In contrast, yellow iris seedlings were quite numerous in parts of Montana (Preece 1964).Yellow iris form thick rhizomes that spread out and produce large clonal populations (sometimes numbering in the hundreds). These populations form dense mats of vegetation (ISCBC 2012). The rhizomes can split to produce up to 10 plants per year (Je´han et al. 1994 in Kim et al. 2009) and are an important form of reproduction and dispersal (Sutherland 1990).

Yellow iris is a poisonous species. Insects and other animals tend not to feed on this plant in its native range (Forest Health Staff 2006). Contact with the plant can cause dermatitis in humans.

It can be difficult to distinguish yellow iris from native irises when not in bloom (Lui et al. 2010, Sarver et al. 2008). Native blue flag irises are typically smaller and more delicate. Yellow iris grows much taller and displays large, beautiful, bright yellow flowers. It can be distinguished from Northern blue flag iris, which has a three-angled seed capsule (yellow iris has a six-angled capsule) (Campbell et al. 2010). When in bloom, it is easy to distinguish yellow iris because it is the only iris that grows completely yellow in natural environments (Goodridge et al. 2011). Exhibit 1 contains photos of the yellow iris and the two native iris that can occur in Wisconsin.

Yellow iris is a very aggressive invasive species and capable of quickly overtaking native vegetation and altering shoreline/wetland habitat depended on by wildlife. Because it is poisonous, it generally does not provide a food source for wildlife.

Exhibit 1. Photographs of Yellow Iris (*Iris pseudacoris*), Northern Blue Flag (I*ris versicolor*), and Southern Blue Flag (*Iris virginica*).

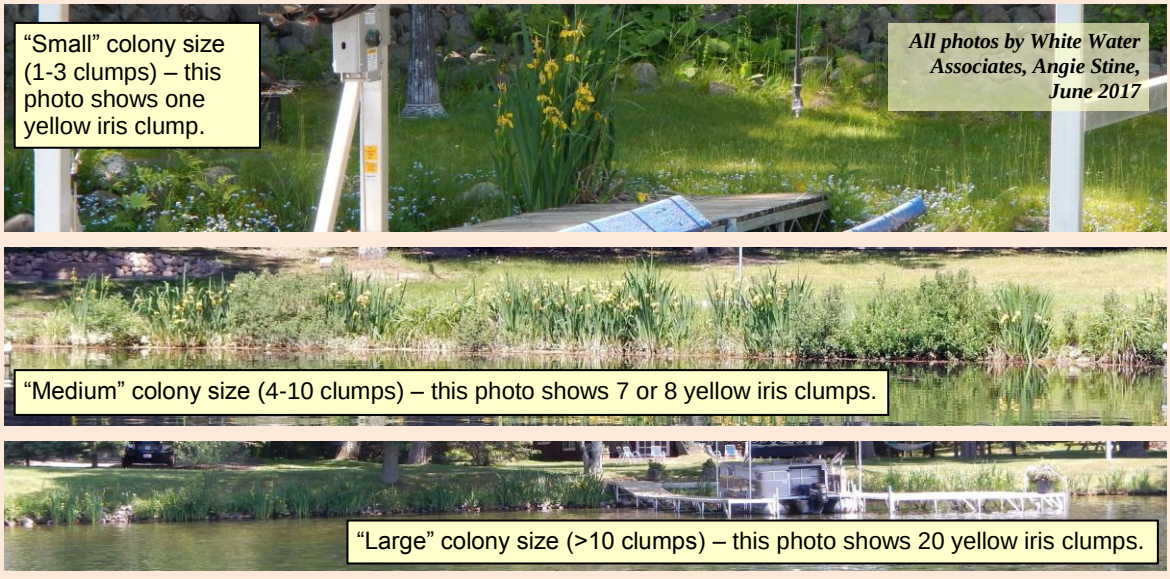
Photos from Online Virtual Flora of Wisconsin. 2017. http//:wisflora.herbarium.wisc.edu. Accessed on January 27, 2017

METHODS

White Water Associates field staff, Tracey and Angie Stine, and SECOLA volunteer, Jay Weber, circumnavigated the Spread Eagle Chain of Lakes on June 24, 2016. This date is in the flowering season for yellow iris and the two native *Iris* species. These species are easily distinguished when flowers are present. Weber's pontoon boat was used for this *informed meander search* for yellow iris along the shores of Bass, Long, Middle, North, Railroad, and West Lakes. East and South Lakes were surveyed by Weber via kayak.

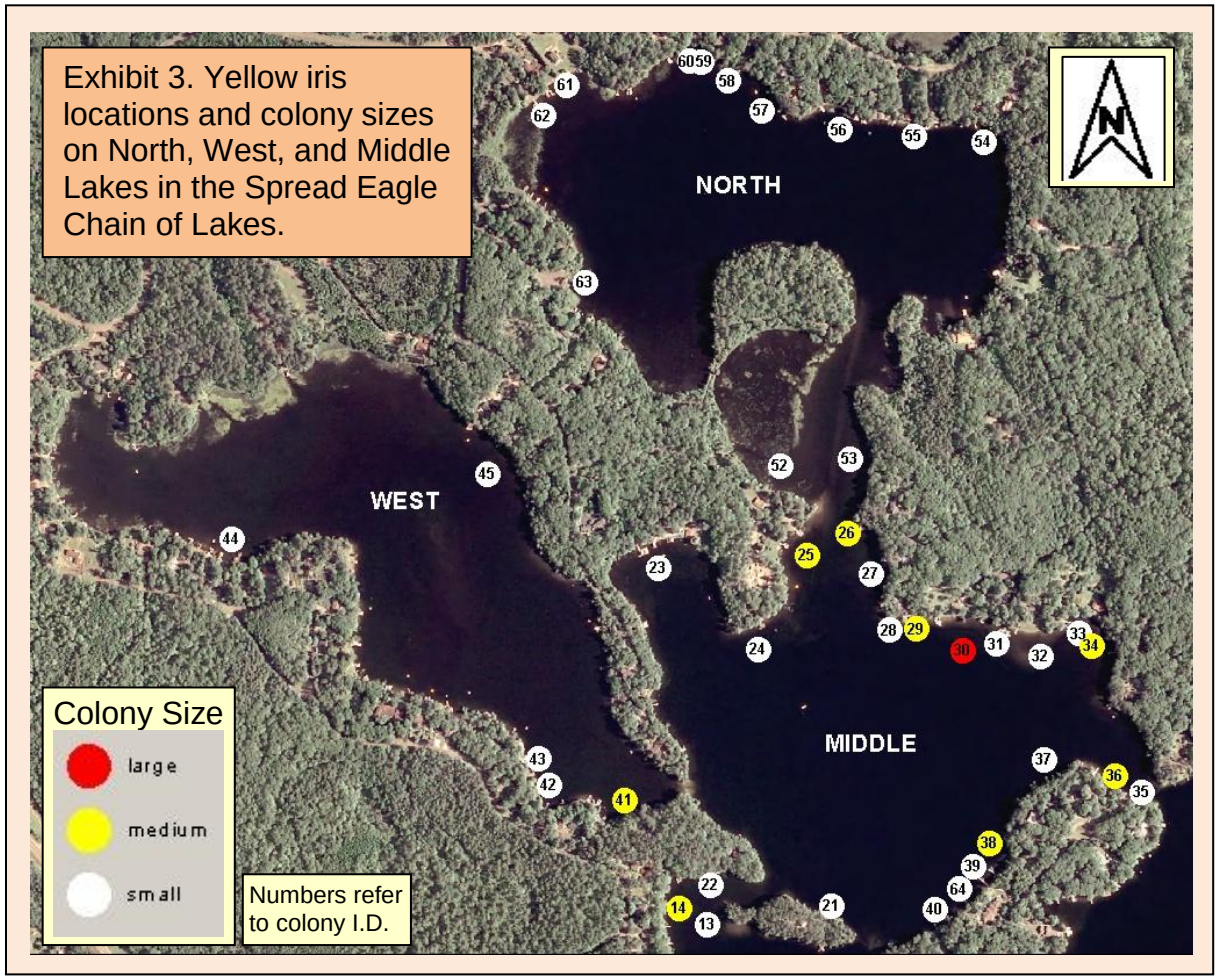
When a yellow iris individual or colony was spotted, we used a GPS unit to record latitude/longitude coordinates (recording the position of the boat near the shore). We photographed the shoreline where the yellow iris was located to document conditions. We recorded all observations on a data sheet. Recorded data included number of yellow iris clumps at the site and shoreline conditions based on four descriptors: (1) mowed (vegetation mowed to the water's edge leaving no vegetative buffer), (2) buffer strip (a narrow buffer strip of herbaceous vegetation between a mowed area and the lake), (3) developed shoreline girding (rock rip-rap or wood retaining wall), and (4) natural (a broad naturally vegetated riparian area).We condensed observations on colony size (ie., the number of clumps in a colony) into three categories: "small" (1 to 3 clumps), "medium" (4-10 clumps), and "large" (>10 clumps) (see Exhibit 2). All field data was entered in a spreadsheet for data management, analysis, and presentation.

Exhibit 2. Examples of Spread Eagle Chain of Lakes Yellow Iris colony sizes.



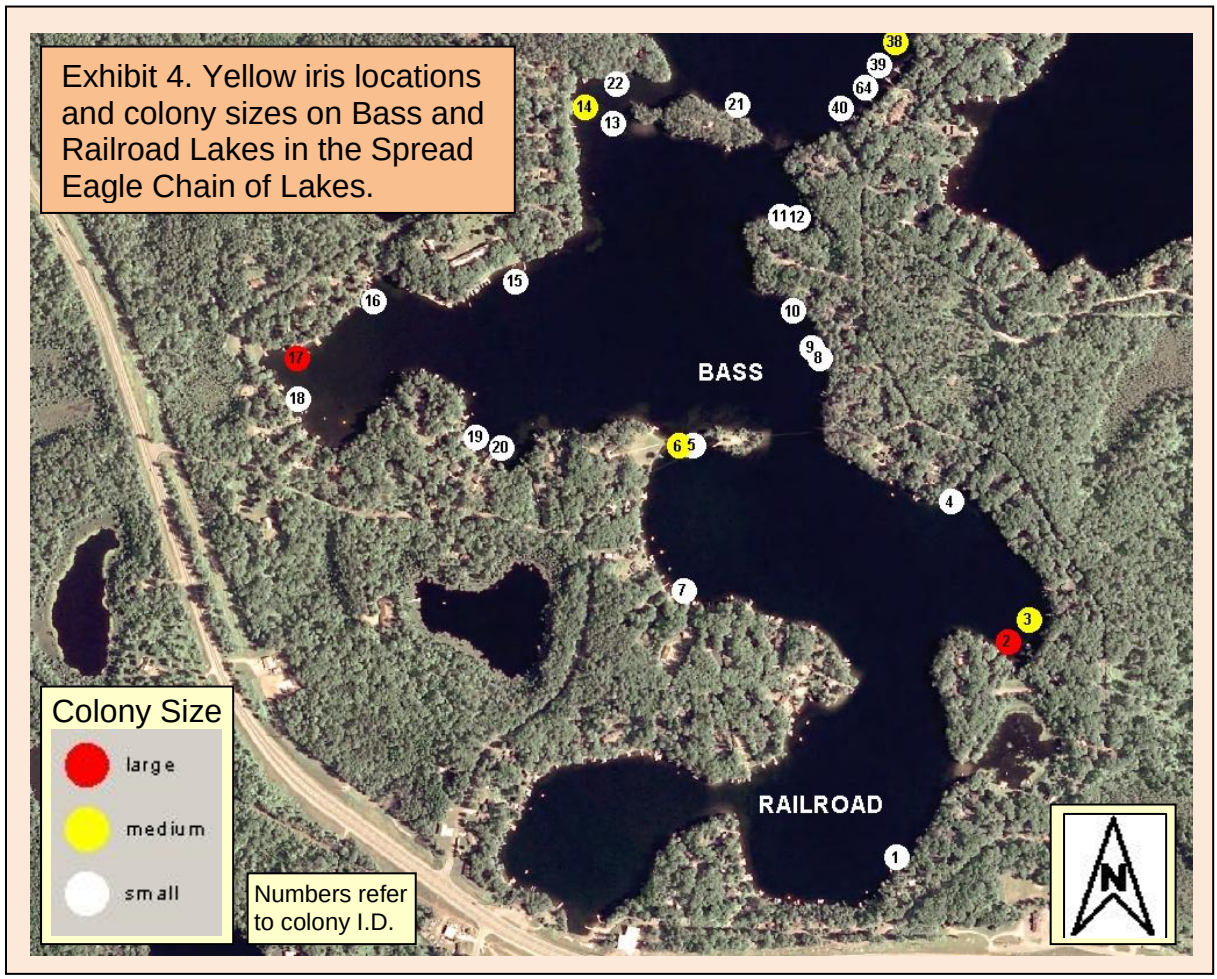
RESULTS

A total of 64 colonies of yellow iris were documented on the Spread Eagle Chain of Lakes. Exhibits 3, 4, and 5 show the location of these colonies and indicate the relative size of each colony. Table 1 (found on pages 10 and 11) provides a table of additional information about each of the 64 colonies under the headings: *Colony ID, Latitude, Longitude, Shoreline Description, Colony Size, and Photo ID.* White Water Associates photographed each colony and has archived the photos under the Photo ID number.



Middle Lake had the highest number of colonies (22), followed by Bass Lake (20), North Lake (10), Long Lake (6), West Lake (5), and Railroad Lake (1). Jay Weber observed no yellow iris in East Lake and South Lake. The highest number of clumps observed in a single "colony" was twenty. The yellow iris colonies were found along a variety of shoreline types with 21 colonies found in areas that were "mowed to the water," 18 colonies found

along "natural shorelines," 15 found along shorelines where a very narrow "buffer strip" existed, and 10 colonies in areas where the shoreline was "girded." The colonies found along natural shorelines were all "small" except for one "medium." The three "large" colonies were all located in areas where lawns had been "mowed to the water."



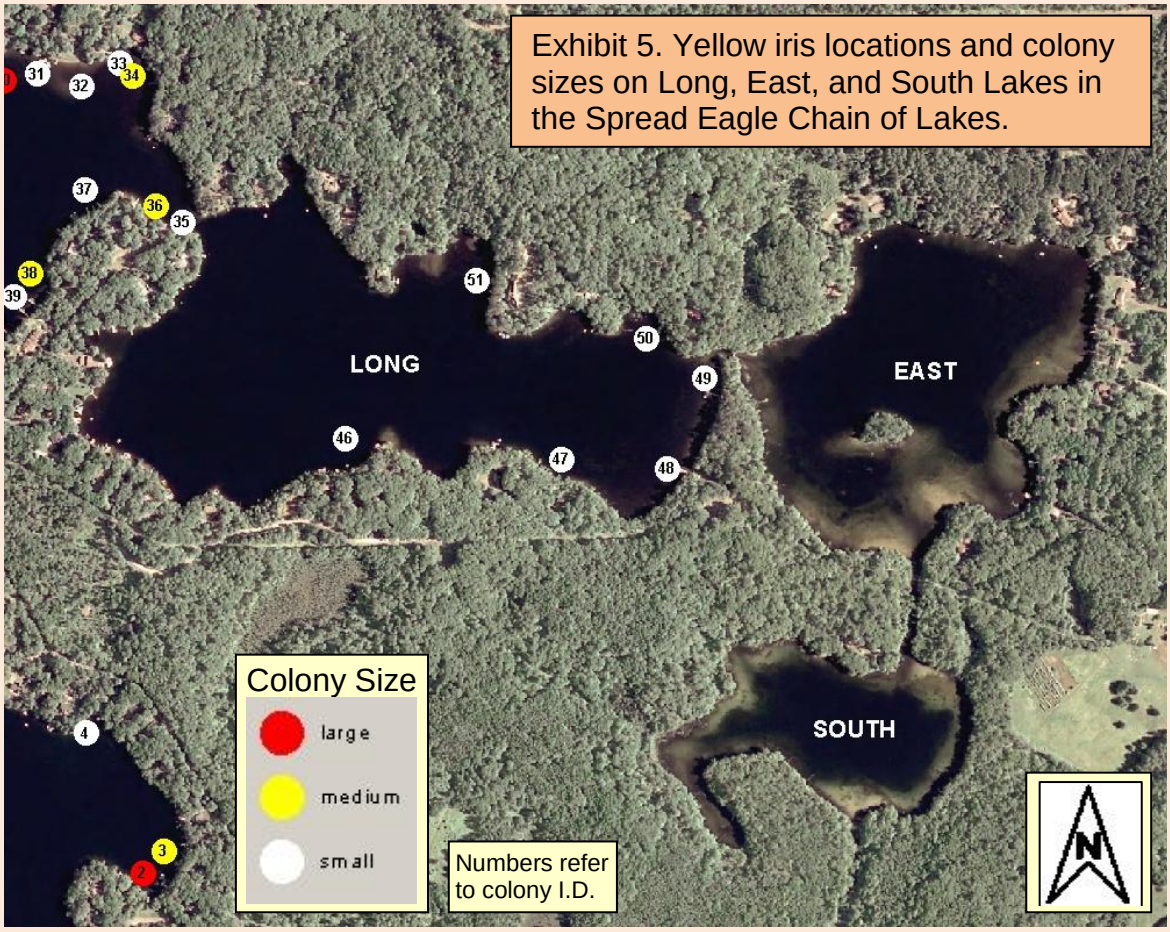


Exhibit 5. Yellow iris locations and colony sizes on Long, East, and South Lakes in the Spread Eagle Chain of Lakes.

DISCUSSION

The Spread Eagle Chain of Lakes is an ecosystem under stress from human development and recreational use and aquatic invasive species such as zebra mussels, Eurasian watermilfoil, yellow iris, banded mystery snail, and rusty crayfish. It is important for stakeholders to minimize these and other potential stressors. Riparian landowners and other stakeholders should endeavor to (1) prevent additional AIS, (2) maintain and create good shoreland buffers to provide habitat and prevent unwanted nutrients from entering the lakes, and (3) maintain good aquatic habitat in the lakes. The SECOLA can work together and with others to build interest, volunteers, and funding to make this happen. In this discussion we focus on the growing population of yellow iris in the lakes.

It is the mantra of conservation biologists that the most cost-efficient and effective method of managing invasive species is to prevent their establishment and spread by maintaining "healthy" natural communities (Mack et al 2000; Sheley et al 1999). A program that strives to maintain the integrity of the native plant community also tends to make it more difficult for the invader to establish and is very likely more effective than managing solely to control the invader (Hobbs et al, 1995).

The yellow iris population in the Spread Eagle Chain of Lakes is still small, but seems to be expanding. It is fortunately restricted to the shoreline areas and has not extended into wetland areas. As such, individual plants are reasonably easy to recognize (during the flowering season) and access. We recommend that the SECOLA and its partners view this condition as an opportunity to aggressively act to remove as many individual clumps of the yellow iris as possible before the population expands and ages. It is important to control yellow iris early in its colonization before extensive rhizomes are established.

The WDNR states that small populations may be successfully removed using physical methods but care should be taken if hand-pulling as some people show skin sensitivity to plant sap and tissues (WDNR 2017). They also state cutting of the seed heads may help the plant from spreading. Aquatic formulas of herbicides may be used to control yellow flag iris, however, permits would be needed (WDNR 2017).

We believe that the population is still small enough that physical and mechanical methods may be effective in controlling the yellow iris in the Spread Eagle Chain of Lakes. Some sources suggest physical removal of the entire plant and rhizome system (King County 2007, and Weber 2003), though all rhizomes must be removed for this method to be effective. Repeated mowing or cutting of aboveground foliage may eventually kill yellow iris. A

horticultural guide suggests the removal of seed pods to prevent future establishment from seed (Taylor 1988).

Physical and mechanical control methods may be preferable in wetland settings where use of herbicides is problematic (Weatherbee et al 1998). However, mechanical removal of yellow iris in sensitive areas may cause extensive substrate disturbance, leading to the establishment of other unwanted plants (Morgan 2008). Substrate disturbance could be mitigated by native plantings of perennial herbaceous plants. For those who might miss the colorful bloom of the yellow iris, there are many native plants that can be purchased and introduced to areas where yellow iris plants have been removed or other areas of disturbed shoreline. These plants would add natural color and beauty to the shoreline and provide better habitat for native animals. Examples include "sweet flag" (*Acorus americanus*), "northern blue flag" (*Iris versicolor*), "swamp milkweed (*Asclepias incarnata*), and "spotted joe-pye-weed" (*Eupatoriadelphus maculatus*). Exhibit 6 is a summary of *Best Management Practices* for yellow iris appropriate to the current population in the Spread Eagle Chain of Lakes.

Exhibit 6. Summary of Yellow Iris Best Management Practices
Applicable to the Spread Eagle Chain of Lakes

Adapted from King County Noxious Weed Control Program Yellow-flag iris BMP; 206-296-0290 Website: www.kingcounty.gov/weeds)

Small Infestations in Native and/or Desirable Plants

- Hand digging is recommended for very young plants not yet established.
- Larger plants from isolated small populations can be dug out from moist areas. Requires persistence for several seasons.
- Replace divots created when removing the plants to lessen the amount of disturbed soil.
- Plants in standing water can be cut below the waterline.
- If manual control is not possible, consult WDNR for possible chemical approaches and necessary permit(s).

Control in Riparian Areas or Lake Shores

- Survey area and document extent of infestation.
- Focus on manual removal for small infestations.
- When large areas are removed, the cleared area needs to be replanted with native or non-invasive vegetation and stabilized against erosion.
- For areas where herbicide use may be warranted, consult WDNR for method(s) that will cause the least amount of damage to desirable vegetation and for advice on permit(s).
- Control efforts may require several years of attention to remove plants germinating from the seed bank and rhizome fragments.

Table 1. Yellow iris colony records for the Spread Eagle Chain of Lakes.
(Photo ID number refers to photos archived by White Water Associates and not included in this report).

Colony ID	Latitude	Longitude	Shoreline Description	Colony Size	Photo ID
Bass Lake					
2	45.88651	-88.13184	mowed to the water	large	3211
3	45.88682	-88.13142	mowed to the water	medium	3212
4	45.88849	-88.13291	mowed to the water	small	3213
5	45.88936	-88.13807	mowed to the water	small	3214
6	45.88936	-88.13835	mowed to the water	medium	3215
7	45.88734	-88.13831	mowed to the water	small	3217
8	45.89054	-88.13548	mowed to the water	small	3218
9	45.89069	-88.13564	mowed to the water	small	3219
10	45.89121	-88.13600	buffer strip	small	3220
11	45.89254	-88.13622	natural	small	3221
12	45.89252	-88.13587	buffer strip	small	3222
13	45.89390	-88.13953	developed shoreline girding	small	3223
14	45.89413	-88.14007	developed shoreline girding	medium	3224
15	45.89171	-88.14156	developed shoreline girding	small	3225
16	45.89148	-88.14441	buffer strip	small	3226
17	45.89071	-88.14598	mowed to the water	large	3227
18	45.89014	-88.14596	mowed to the water	small	3228
19	45.88955	-88.14243	buffer strip	small	3230
20	45.88940	-88.14191	mowed to the water	small	3232
22	45.89445	-88.13943	natural	small	3234
Long Lake					
Colony ID	Latitude	Longitude	Shoreline Description	Colony Size	Photo ID
46	45.89253	-88.12758	mowed to the water	small	3264
47	45.89216	-88.12327	natural	small	3265
48	45.89200	-88.12114	mowed to the water	small	3266
49	45.89325	-88.12037	natural	small	3267
50	45.89383	-88.12150	natural	small	3268
51	45.89470	-88.12487	natural	small	3270
Middle Lake					
Colony ID	Latitude	Longitude	Shoreline Description	Colony Size	Photo ID
21	45.89411	-88.13702	natural	small	3233
23	45.89891	-88.14034	developed shoreline girding	small	3235
24	45.89774	-88.13836	natural	small	3236
25	45.89904	-88.13734	buffer strip	medium	3237
26	45.89933	-88.13652	natural	medium	3240
27	45.89875	-88.13607	buffer strip	small	3243
28	45.89796	-88.13573	developed shoreline girding	small	3244

29	45.89797	-88.13519	developed shoreline girding	medium	3245
30	45.89765	-88.13428	mowed to the water	large	3246
31	45.89773	-88.13359	mowed to the water	small	3247
32	45.89754	-88.13271	natural	small	3248
33	45.89785	-88.13194	mowed to the water	small	3249
34	45.89768	-88.13168	developed shoreline girding	medium	3250
35	45.89561	-88.13074	natural	small	3251
36	45.89584	-88.13128	developed shoreline girding	medium	3252
37	45.89610	-88.13268	developed shoreline girding	small	3253
38	45.89494	-88.13383	buffer strip	medium	3254
39	45.89463	-88.13417	buffer strip	small	3256
40	45.89403	-88.13496	buffer strip	small	3258
52	45.90030	-88.13783	buffer strip	small	3271
53	45.90038	-88.13643	natural	small	3272
64	45.89431	-88.13445	buffer strip	small	3257
North Lake					
Colony ID	Latitude	Longitude	Shoreline Description	Colony Size	Photo ID
54	45.90477	-88.13362	natural	small	3273
55	45.90487	-88.13500	mowed to the water	small	3275
56	45.90499	-88.13649	developed shoreline girding	small	3276
57	45.90528	-88.13804	natural	small	3277
58	45.90571	-88.13871	natural	small	3278
59	45.90598	-88.13923	mowed to the water	small	3279
60	45.90600	-88.13947	natural	small	3280
61	45.90570	-88.14195	buffer strip	small	3281
62	45.90528	-88.14244	buffer strip	small	3282
63	45.90293	-88.14168	natural	small	3283
Railroad Lake					
Colony ID	Latitude	Longitude	Shoreline Description	Colony Size	Photo ID
1	45.88353	-88.13418	mowed to the water	small	3209
West Lake					
Colony ID	Latitude	Longitude	Shoreline Description	Colony Size	Photo ID
41	45.89567	-88.14113	buffer strip	medium	3259
42	45.89590	-88.14262	mowed to the water	small	3260
43	45.89627	-88.14282	natural	small	3261
44	45.89945	-88.14887	buffer strip	small	3262
45	45.90028	-88.14371	mowed to the water	small	3263

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