December 11, 2015

Mr. Anthony Jernigan
US Army Corps of Engineers
250 N. Sunnyslope Road, Suite 296
Brookfield, WI 53005

Re: *Lake Belle View Restoration Project – 2015 Monitoring Summary*
MARS Project Number: 1428-011

VIA: US MAIL

Dear Mr. Jernigan:

Montgomery Associates: Resource Solutions (MARS) has prepared this letter and enclosures to summarize restoration activities to satisfy the special condition permit requirements under the USACE permit No. 2009-01035-ADJ for the Lake Belle View Restoration Project. Last month, we submitted a monitoring report for 2104 and half of 2015 that included descriptions of the spring burn, seeding, and tree planting activities as outlined in the *Mitigation and Restoration Plan for the Lake Belle View Restoration Project* as *Revised April 2010* prepared by MARS. This submittal includes the following items completing the 2015 reporting requirements:

- *Lake Belle View Restoration Project, 2015 Lake Water Levels – Continuous Monitoring*
- *2015 Monitoring Report for Lake Belle View Restoration Project*
- *Lake Belle View AIS Carp Removal Progress Report*

The graph shown in *Lake Belle View Restoration Project, 2015 Lake Water Levels – Continuous Monitoring* shows 2015 lake levels for Lake Belle View for the year 2015. The weir gate in the control structure was lowered 0.5 feet from 858' to 857.5' in late April 2015, to accommodate prairie burning and seeding activities. The gate was raised to 858' in August of 2015. Overall, the median level of the lake was 857.66' for the year 2015, which is within the requirement of 858' ± 0.5' and within ± 0.5' of the median stage of the Sugar River at the dam (857.59') as stipulated in Special Condition #5 in the permit. Pending no foreseen issues related to vegetation burns or seeding activities, the lake level will be held at 858' through 2016.

Enclosed with this submittal is the *2015 Monitoring Report for Lake Belle View Restoration Project* prepared by Eco-Resource Consulting, LLC (ERC). The report details the status of the native plant community restoration in the vicinity of the lake. No unvegetated areas larger than 10 square feet were observed. Native plant species were observed to have established to a degree of 40% or greater in all habitat areas in accordance with requirements listed in the USACE permit and defined in the *Mitigation and Restoration Plan for the Lake Belle View Restoration Project* as *Revised April 2010* prepared by MARS.

Additionally, we have included the *Lake Belle View AIS Carp Removal Progress Report* prepared by Dave Marshall and Richard Wedepohl to document the 2015 efforts to meet the requirements in Special

Condition #6 of the permit. Although establishment/enhancement of submerged, floating-leaved, and emergent aquatic communities was setback initially due to a lake drawdown in an attempt to decrease the carp population, several aquatic plant species and fish species were collected and observed. We will continue to monitor the aquatic species in the lake in the coming year.

Please feel free to contact me at 608-839-4422 should you have any questions or comments.

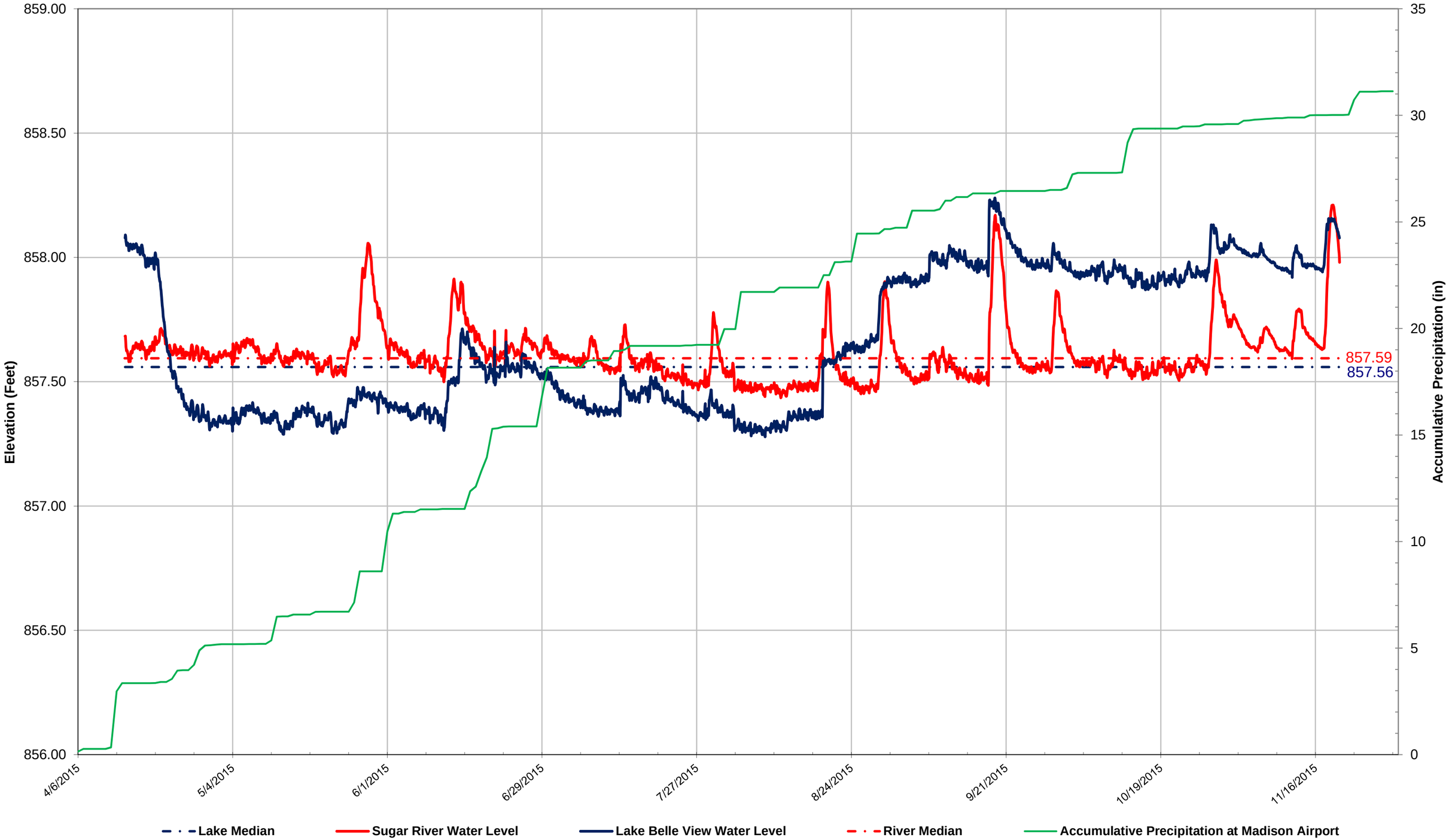
Sincerely,

Christian Burnson
Water Resources Engineer
Montgomery Associates: Resource Solutions, LLC

Enclosures: 2015 Lake Water Levels – Continuous Monitoring
2015 Monitoring Report for Lake Belle View Restoration Project
Lake Belle View AIS Carp Removal Progress Report

Cc: Roger Hillebrand, Village of Belleville

Lake Belle View Restoration Project
2015 Lake Water Levels - Continuous Monitoring



2015 MONITORING REPORT

FOR

LAKE BELLE VIEW RESTORATION PROJECT

Prepared for:
The Village of Belleville
24 West Main Street
Belleville, Wisconsin

Prepared by:
Eco-Resource Consulting, LLC
2554 County Road N
Stoughton, WI 53589

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Introduction

Eco-Resource Consulting, LLC (ERC), conducted a field investigation of the native plant community restoration around Lake Belle View on July 9, 2015. The areas surveyed included the emergent aquatic bed, an area from two feet below water level to the shoreline (-2 to 0 feet elevation), the wet meadow area from the shoreline to two feet of elevation above the shoreline (0 to + 2 feet elevation), the wet mesic prairie area from two feet to five feet elevation above the shoreline (+2 to + 5 feet elevation) and the mesic prairie area greater than five feet in elevation above the shoreline (> 5 feet elevation). The original plan called for the emergent aquatic bed to occupy 9.4 acres of shallow water, the wet meadow, 11.1 acres of wetland, the wet prairie, 4.1 acres, and the mesic prairie 3.9 acres of upland (Figure 1).

The restoration area is composed of dredge spoils from the construction of Lake Belle View. The area was dredged during September 2010 and March 2011, and grading activities were completed in November 2011. The emergent area was seeded in June 2011 and a dormant seeding using native plant seed appropriate to the community type was conducted in December 2011. ERC was assigned the task of evaluating the success of the restoration during the growing seasons from 2012 –2015 pursuant to State and Federal Permit conditions. This survey focuses on the plant species and communities the fourth year after seeding, and a taxa comparison was compiled for all four plant communities from 2012 through the 2015 sampling.

Methods

To assess the vegetation, a meander survey of the entire restoration area was conducted on July 9, 2015. Two field personnel traveled along the meander survey path(s) (Figure 2), and recorded all species encountered. Although the meander path was continuous, it was conducted so all habitat types are included. Each species encountered was assigned a vegetative cover class within each habitat type.

The 2009 survey (Montgomery Associates, 2009) defined vegetative cover class as an estimated percent cover of a species in a habitat zone based on visual observation over the entire habitat zone. The table below provides the ranges of percent cover and the cover class value or ranking.

Cover Class	% Cover
1	1-10%
2	11-25%
3	26-50%
4	51-75%
5	76-90%
6	91-100%

The percent cover assigns every species observed a cover class rating of 1 to 6. A cover class rating of 6 indicates a species was found and was dominant or co-dominant in the habitat zone. A cover rating of 1 indicates the species was found in low density throughout the habitat zone. Our estimates of cover class are included in Table 1 describing the plant communities in the four habitat types and two loop surveys.

Performance Standards

As a condition of the USACE permit, after one growing season, areas seeded with the native cover crop shall have 70% total plant cover with no bare areas larger than 10 square feet. After two full growing seasons, seeded areas shall have 80% total plant cover and 20% cover by native species. After three full growing seasons, seeded areas shall have 40% total cover by native species, at least 30% of the installed species shall be present (Montgomery Associates, 2010).

Discussion

2015 Survey

A species list was compiled within each habitat community type to estimate plant species coverage. Table 1 lists species found and coverage in the meander survey and meander loops 1 and 2. A total of 67 species were encountered with 18 (27%) species being non-native. This compares with 53 species found in 2014 with 16 (30%) species being non-native. The reasons for the increase in species number could be many. As a restoration matures, many annual and biennial species drop out of the vegetation and are replaced by perennial species. At this point in the restoration more perennial species have likely replaced the shorter life-cycle species. Also, a prescribed burn followed by a dormant seeding was conducted in spring of 2015. These two activities could increase species richness as burns release nutrients into the soil and remove plant litter while seeding increases native seed in the seed bank. There were no bare soil areas larger than 10 square feet.

Overall Trend

The overall trend for species richness at Lake Belle View is relatively constant across years and vegetation zones. The total species number was 74 in the July sampling of 2012, 67 in June of 2013, 53 in July of 2014, and 67 in July of 2015 (Table 2). The main difference was the increase in native species that went from 59% in 2012 to 73% in 2015. More details are given in the next section.

Community Details

To keep comparisons consistent, the community coverage compares information from early season sampling as only one sampling, as was done in July of 2014 and 2015 (Tables 3-6). In previous years, two samplings were done, one in June/July and one in September. This caused some differences in vegetation as late-season plants were more predominant in the September sampling as compared to the earlier sampling.

<u>Emergent Zone</u>

Some species found in the 2012 survey returned in the 2015 survey (Table 3). During the mid-years, carp and drawdowns for carp control impacted this zone so that some of the truly aquatic plants disappeared and emergent plants ended up in the wet-meadow zone. Curly pondweed, sago pondweed, and floating leaf pondweed are all indicators of turbid water conditions, which match conditions seen on site. Many of the true emergent species can survive in shallow water or in wet-meadow conditions and their predominance varied between the two community types depending on water level fluctuation.

Wet-Meadow Zone

The wet-meadow is a "transition" habitat between the emergent and wet-mesic prairie so it supports species from both wetter and drier habitats. This habitat expanded under drawdown conditions and apparent erosion along the north shore of the lake. The "newly" opened habitat allowed for invasion of both native and non-native plants. This habitat zone continually had the highest percentage of native plants of all the terrestrial habitats (Table 2). Rice cut grass was always a predominant member of this community (Table 4), and there is a broad strip of broad-leaved cattail along the northern edge of this habitat type. Native species, like jewelweed, black-eyed susan, black bulrush, and goldenrods are replacing annual or biennial "weeds" such as pigweed and common ragweed.

Wet-Mesic Prairie Zone

Species number dropped in the last two years in the wet-mesic prairie (Table 2). The reason for this appears to be a dramatic drop in short-lived species, many of them "weedy." Much more prominent in the 2015 survey were aster (New England in particular), smartweeds, black-eyed susan, and vervain (Table 5). Switch grass is also becoming more prominent and that is a good sign for a prairie restoration.

Mesic Prairie Zone

Species number in the mesic prairie zone increased dramatically in 2015 compared to 2014 and was similar to the 2013 survey (Table 2). New England aster, smartweed, black-eyed susan, goldenrods, and blue vervain were the most dominant species, again replacing many shorter-lived species (Table 6). Switch grass was the only prairie grass of significance in the area. Other prairie grasses may become more important later in the growing season. Tree seedlings of green ash, black walnut, and what appeared to be swamp white oak are starting to invade the upland areas and red osier dogwood is starting to invade along the edges.

Meeting the Performance Standard

By the third year after planting, based on species number, all habitat areas exceeded the performance standard of having 40% native species. The emergent habitat had the highest native species percentage with 89% and the mesic prairie had the lowest with 68%. The total restoration contained 70% native species in the 2014 survey and 73% in the 2015 survey (Table 2). Based on the species observed in the 2015 survey, 37% of the installed species were present. Twenty-two tree and shrub species (10 of which were on the original installation list) were planted in the spring of 2015 but their protective coverings did not allow for positive identification of species. There were virtually no unvegetated areas except where herbicides were used to control non-native species, and those bare soil areas were not larger than 10 square feet.

Species of Concern

Since 2012, there have been a number of non-native species in the restoration, reaching a high of 68% in the early 2013 sampling of the wet-mesic prairie. Many of these species are of little concern as habitat areas become stabilized and native perennial species dominate. Two species, purple loosestrife and reed canary grass, presently found at low levels, are of concern because they are very aggressive and can quickly become problem species for continued management.

Wildlife and other notes

Vegetation was the primary purpose of this survey but bluegill spawning beds, Canada geese, a garter snake, robin, great blue heron, an immature eagle, red winged black bird, frogs, turtles, and deer tracks were noted.

References

Montgomery Associates – Resource Solutions. 2009. Wetland and aquatic plant assessment for the Lake Belle View/Sugar River Restoration Project. Cottage Grove, WI. 8 pg.

Montgomery Associates-Resource Solutions. 2010. Mitigation and Restoration Plan for the Lake Belle View Restoration Project (revised). Cottage Grove, WI. 46 pg.

Wetter, M.A., T.S. Cochrane, M.R. Black, H.H. Iltis, and P.E. Berry. 2001. Checklist of the Vascular Plants of Wisconsin. Technical Bulletin No. 192. Wisconsin Department of Natural Resources, Madison, Wisconsin. 258 pg.

TABLES

Table 1. Lake Belle View Species Coverage, July, 2015[1,2]							
Latin Name	**Common Name**	**Emergent Zone**	**Wet-Meadow Zone**	**Wet-Mesic Prairie Zone**	**Mesic Prairie Zone**	**Loop 1**	**Loop 2**
Alisma subcordatum	water-plantain	1					
Ambrosia artemisiifolia	common ragweed		1	1			
Andropogon gerardii	big blue-stem				1		
Asclepias incarnata	swamp milkweed		3		1		
Asclepias syriaca	common milkweed				1		
Aster novae-angliae	New England aster		5	5	5	4	3
Carex lacustris	lake sedge				1		
Carex sp.	sedge				1		
Ceratophyllum demersum	coon's-tail	2					
Chenopodium album	**lamb's-quarters**				1	1	
Chenopodium ambrosioides	**Mexican tea**				1		
Cirsium arvense	**Canada thistle**		1				
Cirsium vulgare	**bull thistle**				1		
Conyza canadensis	horseweed				2	1	
Cornus stolonifera	red osier dogwood				1		
Cyperus esculentus	field nut sedge		1				
Echinacea pallida	purple coneflower		1		1		
Echinochloa crusgalli	**barnyard grass**				1		
Echinocystis lobata	wild-cucumber				1		
Eleocharis acicularis	needle spike-rush	2	1				
Erigeron annuus	daisy fleabane		1	2	2		
Eupatorium maculatum	joe-pye-weed		1		1		
Eupatorium perfoliatum	boneset		2	2	2	1	1
Fraxinus pennsylvanica	green ash		1	2	2		1
Helenium autumnale.	common sneezeweed			3	3		
Impatiens capensis	jewel weed		5	1	1		
Juglans nigra	black walnut				2		
Leersia oryzoides	rice cut grass		5	1		2	4
Lemna minor	small duckweed	3					
Lycopus americanus	American water horehound		1				
Lythrum salicaria	**purple loosestrife**			1			
Medicago sativa	**alfalfa**				1		
Mentha arvensis	field mint				2		
Monarda fistulosa	bee balm		3	2	3		
Nepeta cataria	**catnip**				1		
Nymphaea odorata	white water-lily	2					
Panicum virgatum	switch grass		2	3	4		1
Pedicularis canadensis	lousewort				1		
Phalaris arundinacea	**Reed canary grass**	1	2	1	2	3	3
Poa palustris	marsh bluegrass		2		1		
Polygonum lapathifolia	dock-leaved smartweed	1					
Polygonum pensylvanicum	Pennsylvania smartweed		3	5	5	3	
Polygonum punctatum	dotted smartweed		2				
Portulaca oleracea	**purslane**		3				
Potamogeton crispus	**curly pondweed**	2					
Potamogeton natans	floatingleaf pondweed	2					
Quercus bicolor	swamp white oak				1		
Rudbeckia hirta	black-eyed susan		4	4	5	2	2
Rumex crispus	**curly dock**		2	1	2		
Salix nigra	willow		1	1			1
Schoenoplectus tabernaemontani	soft-stem bulrush		1				
Scirpus atrovirens	black bulrush		4	2			3
Scirpus cyperinus	wool grass		1				
Scirpus fluviatilis	river bulrush	1					
Silphium perfoliatum	cup-plant		1	1	1		
Solanum dulcamara	**deadly nightshade**						1
Solidago canadensis	common goldenrod		3	3	5	4	4
Solidago gigantea	giant goldenrod		4	2	2	2	2
Sonchus arvensis	**sow-thistle**				1		
Stuckenia pectinata	sago pondweed	2					
Trifolium pratense	**red clover**				1		
Trifolium repens	**white clover**				1		
Typha angustifolia	**narrow-leaved cattail**		1				
Typha latifolia	broad-leaved cattail		5				
Urtica dioica	Stinging nettle		2	2	2	2	1
Verbascum thapsus	**mullein**		1		1		
Verbena hastata	blue vervain		3	5	5	1	2
Total species	67	11	35	22	42	12	14
Native species percent	73%	82%	86%	82%	74%	84%	86%

1. Naming follows Wetter et al. 2001
2. Species in bold are non-native

Table 2. Lake Belleview Comparison of Species Number and Percentage of Native Species between 2012, 2013, 2014, and 2015												
Plant Community	**Jul 2012**		**Sep 2012**		**Jun 2013**		**Sep 2013**		**Jul 2014**		**Jul 2015**	
	Total Species Number	**% Native**	**Total Species Number**	**% Native**	**Total Species Number**	**% Native**	**Total Species Number**	**% Native**	**Total Species Number**	**% Native**	**Total Species Number**	**% Native**
Emergent	14	86%	11	82%	12	92%	5	92%	9	89%	11	82%
Wet Meadow	41	66%	40	75%	19	63%	20	70%	33	85%	35	86%
Wet-Mesic Prairie	36	39%	40	43%	31	32%	20	55%	20	70%	22	82%
Mesic Prairie	29	48%	30	57%	43	44%	29	72%	31	68%	42	74%
Total Area	74	59%	125*	66%*	67	48%	75	60%	53	70%	67	73%
* Total for 2012, not just '9/12 values												

Table 3. Emergent Zone Coverage Comparison 2012-2015 [1,2]					
Latin Name	**Common Name**	**2012**	**2013**	**2014**	**2015**
Alisma subcordatum	water-plantain	3			1
Ceratophyllum demersum	coon's-tail	3	3		2
Eleocharis acicularis	needle spike-rush				2
Eleocharis obtusa	blunt spike-rush	1			
Elodea canadensis	common waterweed	2			
Epilobium coloratum	willow-herb		3		
Eupatorium perfoliatum	boneset		1	2	
Lemna minor	small duckweed	5	2	2	3
Leersia oryzoides	rice cut grass	2	4	4	
Nymphaea odorata	white water-lily	1	1		2
Phalaris arundinacea	**Reed canary grass**	1			1
Polygonum lapathifolia	dock-leaved smartweed			4	1
Potamogeton crispus	**curly pondweed**				2
Potamogeton natans	floatingleaf pondweed	2	2	1	2
Sagittarria latifolia	common arrowhead	3			
Schoenoplectus tabernaemontani	soft-stem blurush	1	1	2	
Scirpus atrovirens	black blurush			2	
Scirpus cyperinus	wool grass		1		
Scirpus fluviatilis	river bulrush			1	1
Stuckenia pectinata	sago pondweed	1	1		2
Typha angustifolia	**narrow-leaved cattail**	5	3	1	
Typha latifolia	broad-leaved cattail	5	2		

1. Naming follows Wetter et al. 2001
2. Species in bold are non-native

Table 4. Wet-Meadow Zone Coverage Comparison 2012-15 [1,2]					
Latin Name	**Common Name**	**2012**	**2013**	**2014**	**2015**
Ajuga genevensis	**blue bugle**	2			
Andropogon gerardii	big bluestem			1	
Amaranthus retroblexus	pigweed	1			
Ambrosia artemisiifolia	common ragweed		1	1	1
Ambrosia trifida	giant ragweed	1			
Asclepias incarnata	swamp milkweed	1			3
Aster novae-angliae	New England aster			1	5
Aster sp.	aster	1			
Bidens frondosa	beggars tick	1			
Carex lacustris	lake sedge	1			
Carex sp.	sedge	1			
Chenopodium album	**lamb's-quarters**	2			
Cirsium arvense	**Canada thistle**		1	1	1
Convolvulus arvensis	**bindweed**	1			
Conyza canadensis	horseweed	3	3	1	
Cyperus esculentus	field nut sedge	1			1
Decodon verticillatus	**swamp loosestrife**	1			
Echinacea pallida	purple coneflower	1		1	1
Echinocochloa crusgalli	**barnyard grass**	1			
Eleocharis acicularis	needle spike-rush				1
Eleocharis obtusa	**blunt spikerush**	1			
Elymus virginicus	Virginia wild rye			2	
Epilobium coloratum	willow-herb		1	2	
Erigeron annuus	daisy fleabane	1		1	1
Eupatorium maculatum	joe-pye-weed	1		1	1
Eupatorium perfoliatum	boneset	1	1	2	
Fraxinus pennsylvanica	green ash				1
Glyceria borealis	mana grass	1			
Hackelia virginiana	stickseed			1	
Helenium autumnale	common sneezeweed			4	
Impatiens capensis	jewel weed	1	1	2	5
Iris virginica	blue flag	1			
Laportea canadensis	Canadian wood-nettle	1			
Leersia oryzoides	rice cut grass	5	5	5	5
Lycopus americanus	American water horehound				1
Lythrum salicaria	**purple loosestrife**	1	1		
Medicago sativa	**alfalfa**			1	
Melliotus alba	**white sweet-clover**			1	
Ment;ha arvensis	field mint			1	
Mullugo verticillata	**carpetweed**	1			
Monarda fistulosa	bee balm			1	3
Panicum virgatum	switch grass			1	2
Phalaris arundinacea	**Reed canary grass**	1	3	2	2
Poa palustris	marsh bluegrass			2	2
Poa pratensis	**Kentucky bluegrass**	2	1		
Polygonum hydropiper	**water-pepper**	1	1		
Polygonum lapathifolia	dock-leaved smartweed			3	
Polygonum pensylvanicum	Pennsylvania smartweed	5	1	2	3
Polygonum persicaria	**lady's thumb**	3			
Polygonum punctatum	dotted smartweed				2
Populus deltoides	**cottonwood**	1			
Portulaca oleracea	**purslane**				3
Rudbeckia hirta	black-eyed susan	3	3	1	4
Rumex crispus	**curly dock**			1	2
Salix nigra	willow		1	1	1
Schoenoplectus tabernaemontani	soft-stem bulrush	1			1
Scirpus atrovirens	black bulrush	1		3	4
Scirpus cyperinus	wool grass	1	1	1	1
Silphium perfoliatum	cup-plant				1
Solanum dulcamara	**black nightshade**	1			
Solidago canadensis	common goldenrod			1	3
Solidago gigantea	giant goldenrod				4
Taraxacum officinale	**dandelion**	1			
Thlaspi arvense	**penny cress**	1			
Trifolium pratense	**red clofer**	1			
Typha angustifolia	**narrow-leaved cattail**				1
Typha latifolia	broad-leaved cattail			2	5
Urtica dioica	Stinging nettle			3	2
Verbascum thapsus	**mullein**				1
Verbena hastata	blue vervain	2	2	5	3
Vitis riparia	river bank grape	1			

1. Naming follows Wetter et al. 2001
2. Species in bold are non-native

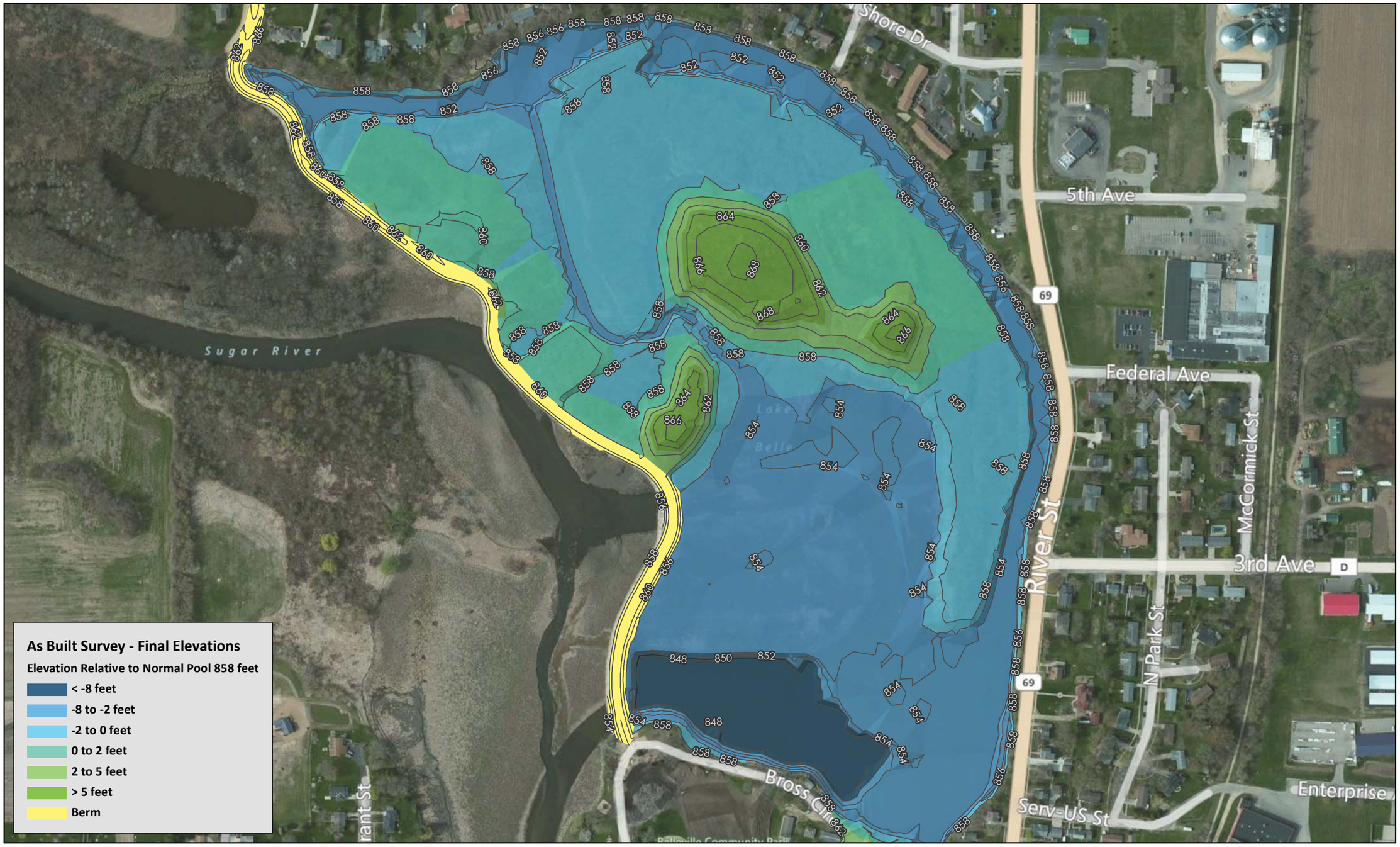
Table 5. Wet-Mesic Prairie Zone Coverage Comparison 2012-2015 [1,2]					
Latin Name	**Common Name**	**2012**	**2013**	**2014**	**2015**
Abutilon theophrasti	**velvet-leaf**	1			
Agropyron repens	**quackgrass**		2		
Alopercurus carolinianus	**foxtail**	1			
Ambrosia artemisiifolia	common ragweed				1
Arctium minus	**burdock**	1	1		
Asclepias incarnata	swamp milkweed			1	
Aster novae-angliae	New England aster			1	5
Barbarea vulgaris	**yellow rocket**	1	1		
Bidens frondosa	beggars tick	1			
Carex sp.	sedge	1			
Chenopodium album	**lamb's-quarters**	4			
Cirsium arvense	**Canada thistle**		2	2	
Cirsium vulgare	**bull thistle**	2	1	1	
Convolvulus arvensis	**bindweed**	1	1		
Conyza canadensis	horseweed	1	3		
Dactylis glomerata	**orchard grass**	1			
Daucus carota	**Queen Anne's-lace**	1	1		
Echinacea pallida	purple coneflower	1	1	1	
Echinochloa crusgalli	**barnyard grass**	1			
Elymus canadensis	Canadian wild rye	1			
Elymus virginicus	Virginia wild rye			1	
Erigeron annuus	daisy fleabane				2
Epilobium coloratum	willow-herb		2		
Eupatorium perfoliatum	boneset	1	1	2	2
Festuca pratensis	**rye grass**	1			
Fraxinus pennsylvanica	green ash				2
Helenium autumnale.	common sneezeweed			5	3
Impatiens capensis	jewel weed				1
Iris virginica	blue flag	1			
Leersia oryzoides	rice cut grass	1	1	3	1
Lythrum salicaria	**purple loosestrife**				1
Medicago lupulina	**black medic**		2		
Medicago sativa	**alfalfa**		2		
Melilotus alba	**white sweet-clover**		2		
Mentha arvensis	field mint	1	1	1	
Mollugo verticillata	**carpetweed**	4			
Monarda fistulosa	bee balm				2
Panicum virgatum	switch grass			1	3
Phalaris arundinacea	**Reed canary grass**	1	3	1	1
Phleum pratense	**timothy**		1	1	
Poa palustris	marsh bluegrass			2	
Poa pratensis	**Kentucky bluegrass**	2			
Polygonum hydropiper	**water-pepper**	1			
Polygonum pensylvanicum	Pennsylvania smartweed	5			5
Polygonum persicaria	**ladys thumb**	1			
Polygonum punctatum	dotted smartweed		1		
Potentilla simplex	**common cinquefoil**	1	1		
Rudbeckia hirta	black-eyed susan	3	3	1	4
Rumex crispus	**curly dock**	2	3		1
Salix nigra	willow	2			1
Scirpus atrovirens	black bulrush				2
Silphium perfoliatum	cup-plant				1
Solidago canadensis	common goldenrod			1	3
Solidago gigantea	giant goldenrod		1	1	2
Sonchus arvensis	**sow-thistle**	1	1	1	
Taraxacum officinale	**dandelion**	1	1		
Thlaspi arvense	**penny cress**	3			
Trifolium pratense	**red clover**	1	1		
Trifolium repens	**white clover**	1	1		
Urtica dioica	Stinging nettle				2
Verbascum thapsus	**mullein**	1	1	1	
Verbena hastata	blue vervain	3	2	5	5

1. Naming follows Wetter et al. 2001
2. Species in bold are non-native

Table 6. Mesic Prairie Zone Coverage Comparison 2012-2015 [1,2]					
Latin Name	**Common Name**	**2012**	**2013**	**2014**	**2015**
Amaranthus retroflexus	**pigweed**	1	1		
Ambrosia artemisiifolia	common ragweed	1	1		
Andropogon gerardii	big blue-stem				1
Asclepias incarnata	swamp milkweed			1	1
Asclepias syriaca	common milkweed				1
Asparagus officinalis	**asparagus**	1			
Aster novae-angliae	New England aster		1	1	5
Barbarea vlugaris	**yellow rockets**		1		
Bromus inermis	**smooth brome grass**	1			
Carex sp.	sedge				1
Cerastium fontanum	**mouse-ear chickweed**		1		
Chenopodium album	**lamb's-quarters**	4	2		1
Chenopodium ambrosioides	**Mexican tea**				1
Cirsium arvense	**Canada thistle**			1	
Cirsium vulgare	**bull thistle**			1	1
Convolvulus arvensis	**bindweed**		1	1	
Conyza canadensis	horseweed	3	3	2	2
Cornus stolonifera	red osier dogwood				1
Cuscuta gronovii	dodder	1			
Daucus carota	**Queen Anne's lace**		1		
Echinacea pallida	purple coneflower	1	1		1
Echinochloa crusgalli	**barnyard grass**			1	1
Echinocystis lobata	wild-cucumber		1		1
Elymus canadensis	Canadian wild rye			1	
Elymus virginicus	Virginia wild rye			2	
Epilobiium coloratum	cinnamon willow-herb		1		
Erigeron annuus	daisy fleabane		1	1	2
Eupatorium maculatum	joe-pye-weed				1
Eupatorium perfoliatum	boneset	1	1	2	2
Fraxinus pennsylvanica	green ash			1	2
Hackelia virginiana	stickseed			1	
Helenium autumnale.	common sneezeweed			5	3
Hordeum jubatum	**squirrel tail**		1		
Impatiens capensis	jewel weed				1
Juglans nigra	black walnut				2
Leersia oryzoides	rice cut grass	3	1	3	
Lythrum salicaria	**purple loosestrife**	1			
Matricaria discoidea	**pineapple-weed**		1		
Mullugo verticillata	**carpetweed**	2	1		
Medicago lupulina	**black medic**		2		
Medicago sativa	**alfalfa**		2		1
Melilotus alba	**white sweet-clover**		1		
Menispermum canadense	**moonseed**		1		
Mentha arvensis	field mint		1	1	2
Monarda fistulosa	bee balm		1	3	3
Nepeta cataria	**catnip**				1
Oenothera biennis	evening-primrose	1			
Panicum virgatum	switch grass			1	4
Pedicularis canadensis	lousewort				1
Phalaris arundinacea	**Reed canary grass**	1	3	1	2
Plantago lanceolata	**English plantain**		1		
Plantago major	**common plantain**		1	1	
Poa palustris	marsh bluegrass			1	1
Poa pratensis	**Kentucky bluegrass**	3	3		
Polygonum hydropiper	**water-pepper**	2			
Polygonum persicaria	**lady's thumb**	1	1		
Polygonum pensylvanicum	Pennsylvania smartweed	5		1	5

Table 6. Mesic Prairie Zone Coverage Comparison 2012-2015 [1,2]					
Latin Name	**Common Name**	**2012**	**2013**	**2014**	**2015**
Potentilla simplex	common cinquefoil		1		
Quercus bicolor	swamp white oak				1
Rudbeckia hirta	black-eyed susan	3	3	1	5
Rumex crispus	**curly dock**	2	2	1	2
Salix nigra	willow	1			
Silphium perfoliatum	cup-plant			1	1
Silene latifolia	**white campion**	1			
Solanum dulcamara	**deadly nightshade**		1		
Solidago canadensis	common goldenrod				5
Solidago gigantea	giant goldenrod		1	2	2
Sonchus arvensis	**sow-thistle**	1	1		1
Taraxacum officinale	dandelion		1		
Thlaspi arvense	**penny cress**	3	1		
Tragopogon pratensis	**goats-beard**		1		
Trifolium pratense	**red clover**		1	1	1
Trifolium repens	**white clover**		1	1	1
Typha angustifolia	**narrow-leaved cattail**	1			
Urtica dioica	Stinging nettle	1	1	2	2
Verbascum thapsus	**mullein**	1	1	2	1
Verbena hastata	blue vervain	3	3	5	5
1. Naming follows Wetter et al. 2001 2. Species in bold are non-native					

FIGURES



Main Map Projection: Dane County Coordinate System | Locator Map Not to Scale

DRAWN BY	CHECKED BY
DYL	SJH

MONTGOMERY ASSOCIATES:
RESOURCE SOLUTIONS, LLC
119 South Main Street | Cottage Grove, WI 53527
(608) 839-4422 | www.ma-rs.org

AS BUILT ELEVATIONS
HABITAT ZONES

Lake Belle View Lake Restoration
Village of Belleville
Dane County, WI

N
W E
S

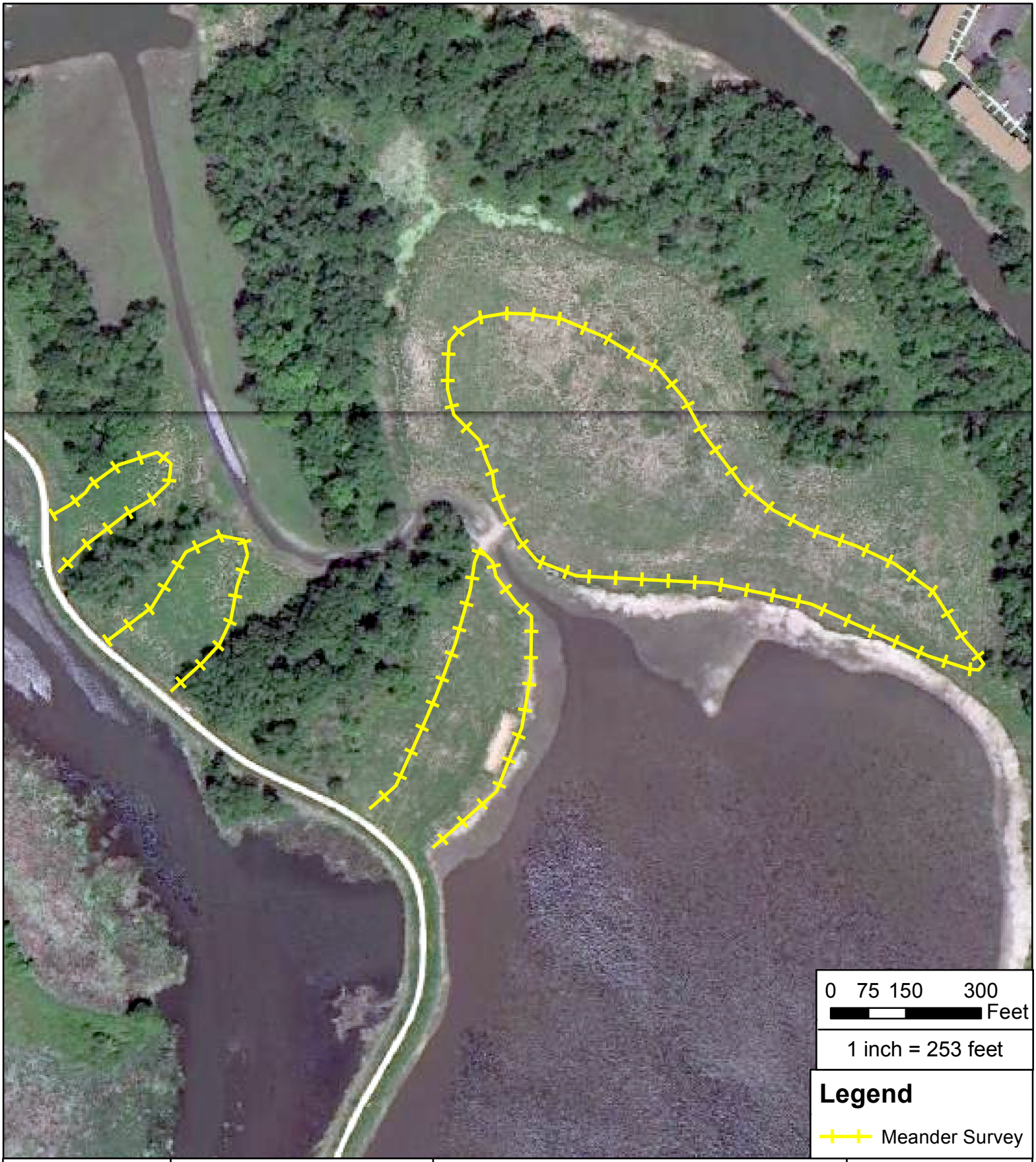
0 150 300 Feet

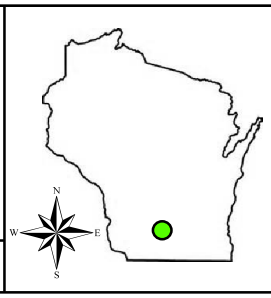
SCALE
1 inch = 300 feet

PROJECT NO.	DATE
1428-011	Sept 4, 2012

SHEET NO.

Figure 1



Drawn By: Daniel Fuhs	ERC ECO-RESOURCE CONSULTING, LLC	2015 Meander Survey Lake Belle View Lake Restoration Village of Belleville Dane County, Wisconsin	
Date: 7/16/2015	2554 County Rd N Stoughton, WI 53589 www.eco-resource.net		
Project Number: 11006			
Figure 2		Image Source: Google Earth 06122014	

Lake Belle View AIS Carp Removal Progress Report

2014 Lake Drawdown and Commercial Seining Operation

Prepared by David W. Marshall and Richard Wedepohl

For

Village of Belle View AIS Grant

December 2015

Common carp (*Cyprinus carpio*) remains one of the most widespread and destructive exotic species in North America. It is tolerant of environmental degradation and its aggressive benthic feeding behavior can further degrade water quality and habitat for native fish populations. Controlling the destructive effects of common carp is a significant challenge due to a combination of factors including fast growth, large body size, prolific egg production and long lifespan. As part of a Wisconsin Department of Natural Resources (WDNR) Aquatic Invasive Early Detection and Response grant, the Village of Belle View, through a cooperative agreement with WDNR, hired a commercial fisherman to remove nuisance common carp in Lake Belle View. The carp removal effort was established for eradication and disposal and not for commercial sale. To improve seining catch rates, the lake was drawn down in the spring. Over a three day harvest/channel herding effort, 2,200 lbs of carp were removed from the lake. Consultants Richard Wedepohl and Dave Marshall participated in the commercial harvest and conducted water quality/fish shocking as monitoring efforts to assess the effectiveness of the eradication. While water quality monitoring continued, no commercial carp removal was conducted in 2015.

Eutrophic conditions in Lake Belle View continued through the 2015 growing season. Trophic State Index values in Figure 1 demonstrate that a significant water quality change did not occur after the carp removal in 2014. These conditions indicated that common carp numbers in the lake remain high enough to maintain the turbid conditions. However, lake users reported that lake conditions are generally favorable since Cyanobacteria blooms have not occurred for the last two summers. In Figure 2, high turbidity measurements continued in 2014 and 2015.

A partial winterkill occurred in early 2014 and the resulting environmental stress had potential to benefit common carp at the expense of native fish populations. Deep hole dissolved oxygen profiles in Figure 3 demonstrate low dissolved oxygen levels measured during the winters of 2014 and 2015. The 2014 winterkill occurred due to very low dissolved oxygen concentrations that dropped below 1 mg/l throughout the water column. However, the loss of walleyes and some other large gamefish 2014 did not affect high numbers of panfish that may have overwintered in spring seeps elsewhere in the lake. Figures 4 displays nearshore fish shocking surveys in 2014 and 2015. In September 2014, two young of year common carp were collected and demonstrated recruitment for the first time in the lake. As part of citizen outreach and efforts to encourage carp removal from the lake, carp fishing contests were organized as part of the 2014 and 2015 Lakefest events. Results demonstrated that common carp were still abundant in the lake following commercial harvests and additional carp removal efforts should continue. Figure 5 displays the length frequency distribution from the carp fishing contests. Comparing the 2014 and 2015 data, carp recruitment occurred after the lake was constructed and some growth had occurred in 2015. In Figure 6, the catch and harvest rates did not change significantly comparing the 2014 and 2015 contests. Vertical temperature and conductivity

profiles appear in Figures 7and 8. In addition to relatively high phosphorus and chlorophyll concentrations in the lake, chloride was measured in 2015 and high concentrations were found; 55.4 mg/l (June 16, 2015), 50.4 mg/l (July 15, 2015) and 67.3 mg/l (August 11, 2015). These high concentrations reflect the urbanized watershed and impervious surfaces where road salt is applied

Figure 1: Lake Belle View Trophic State Index 2011 – 2015

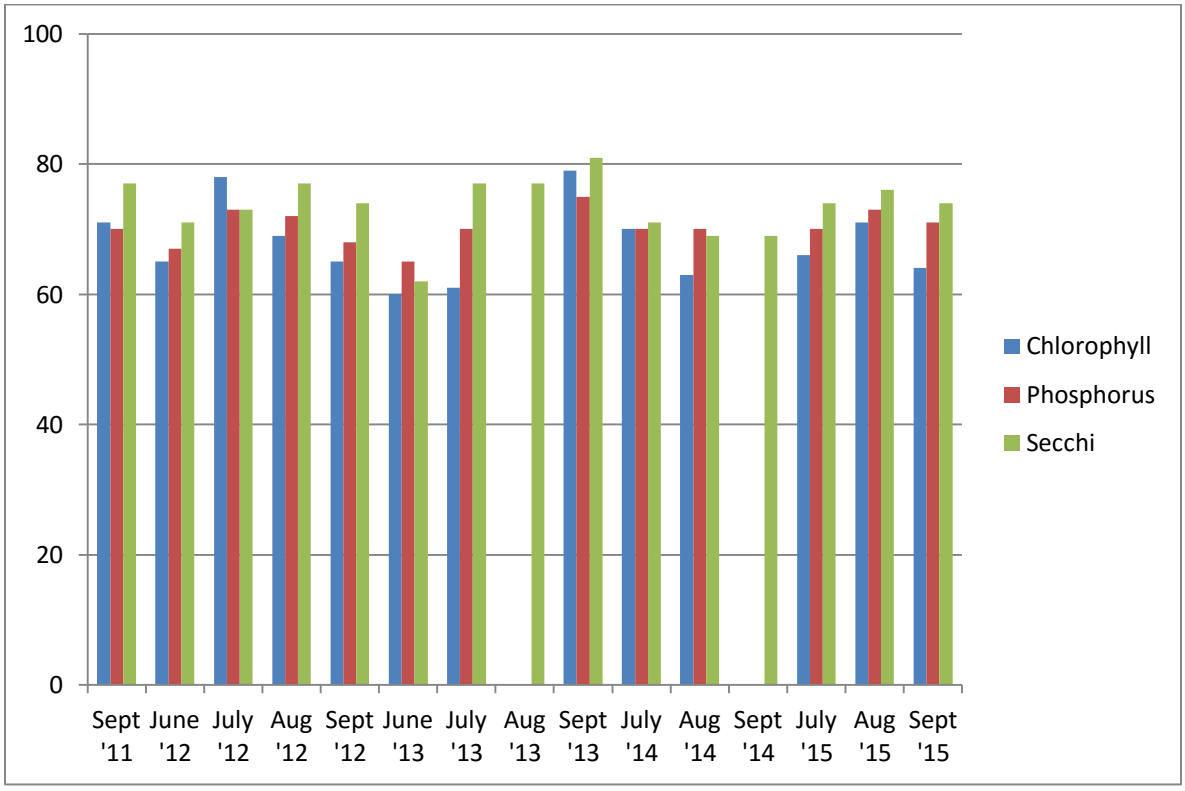


Figure 2: Lake Belle View Turbidity Levels 2011 – 15

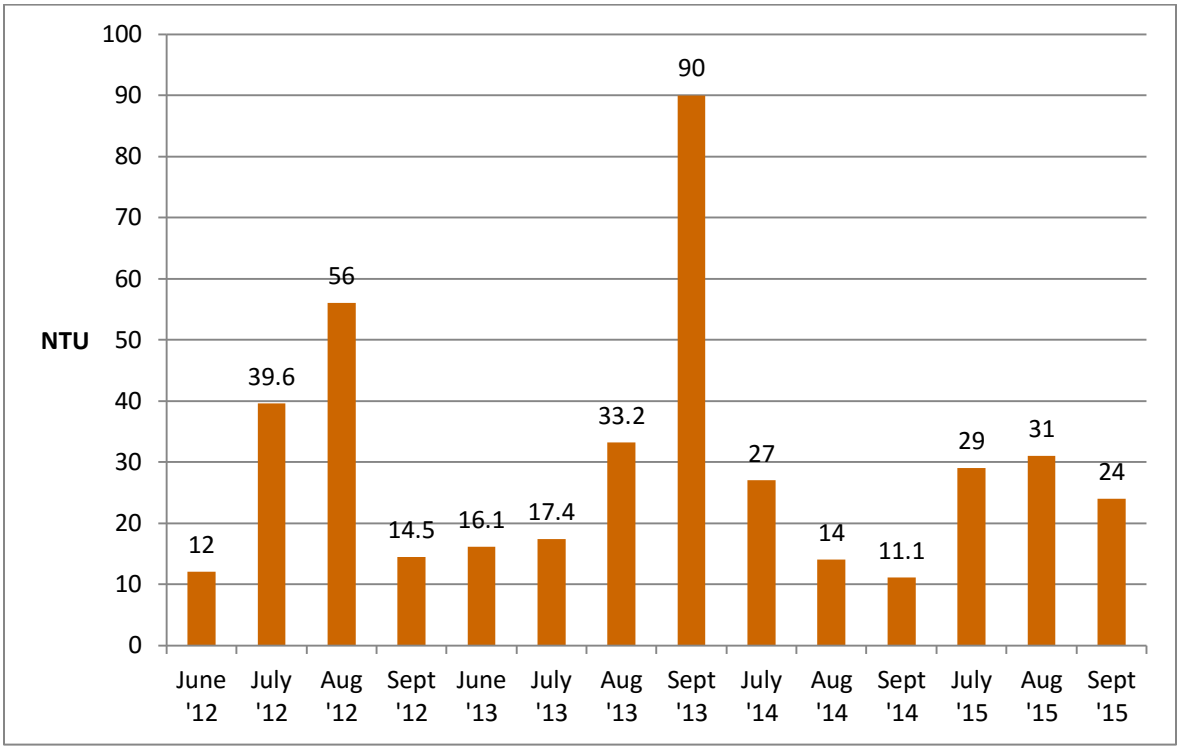
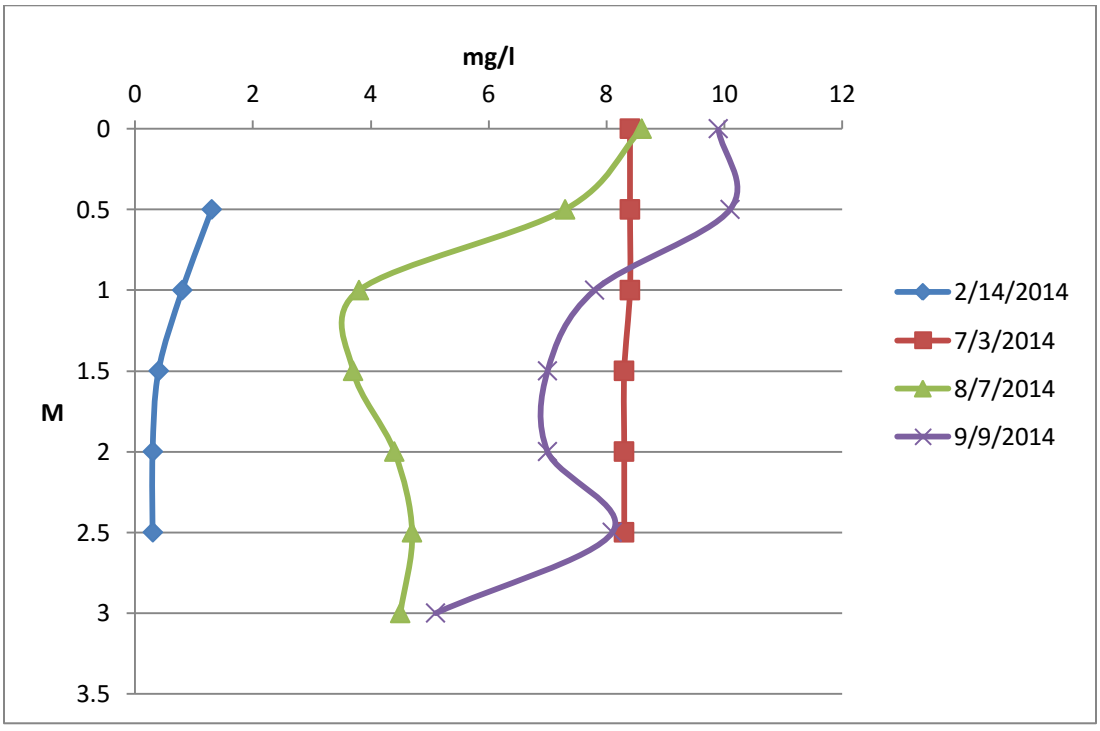


Figure 3: 2014 and 2015 Lake Belle View Dissolved Oxygen Profiles



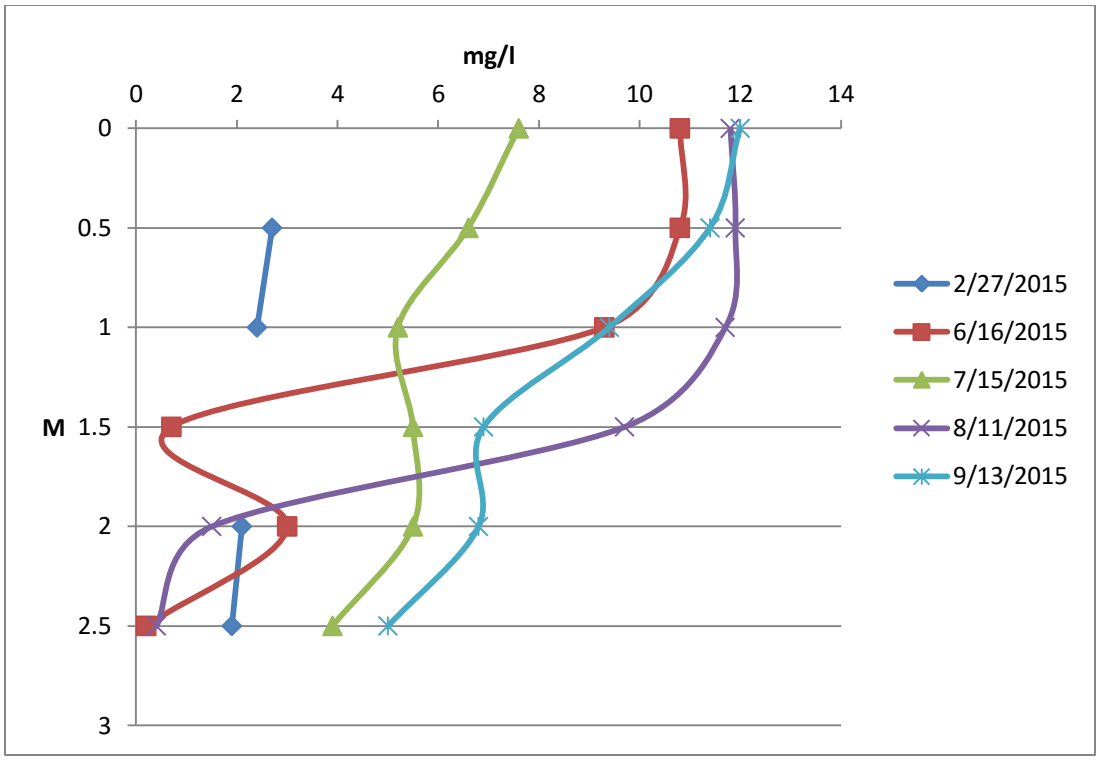


Figure 4: 2014 and 2015 Nearshore Fish Shocking Survey Results

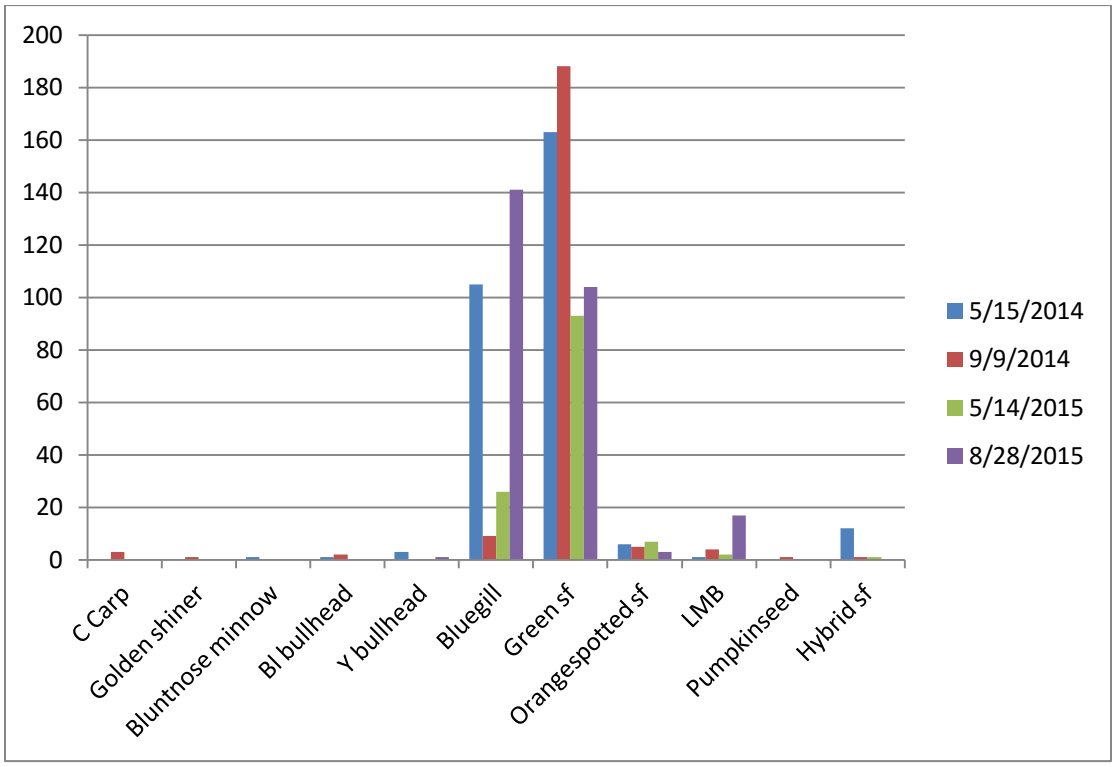


Figure 5: “Catch Me if You Can” Carp Contest Results

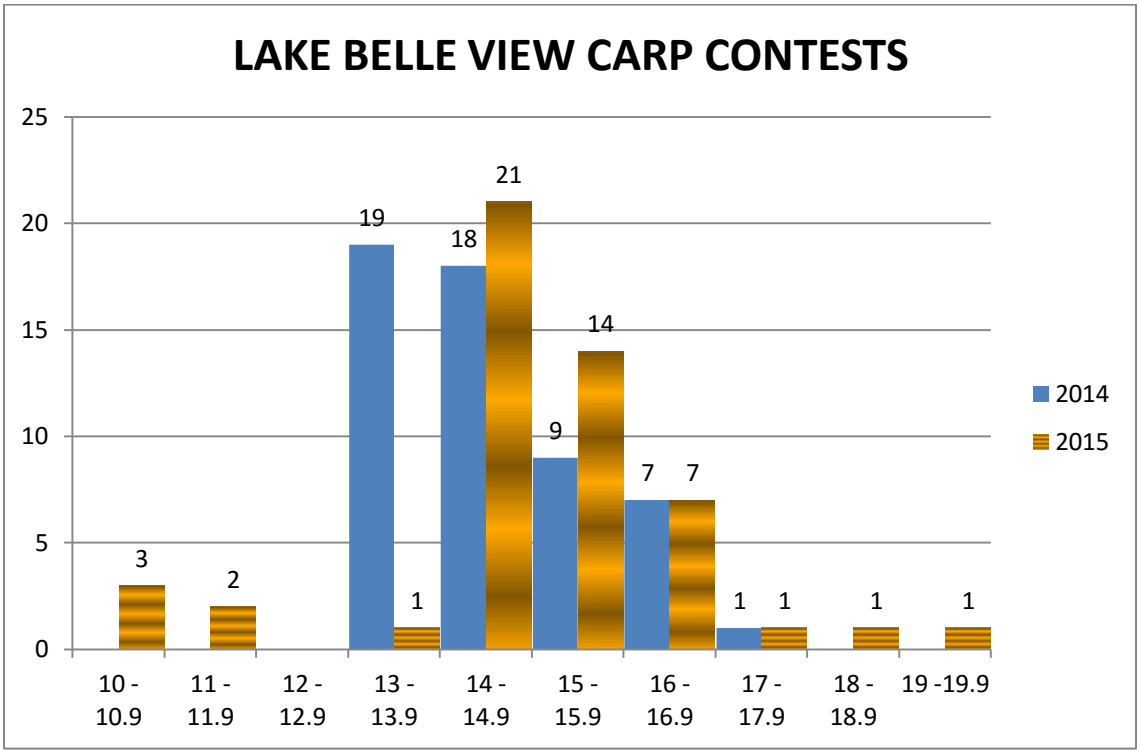
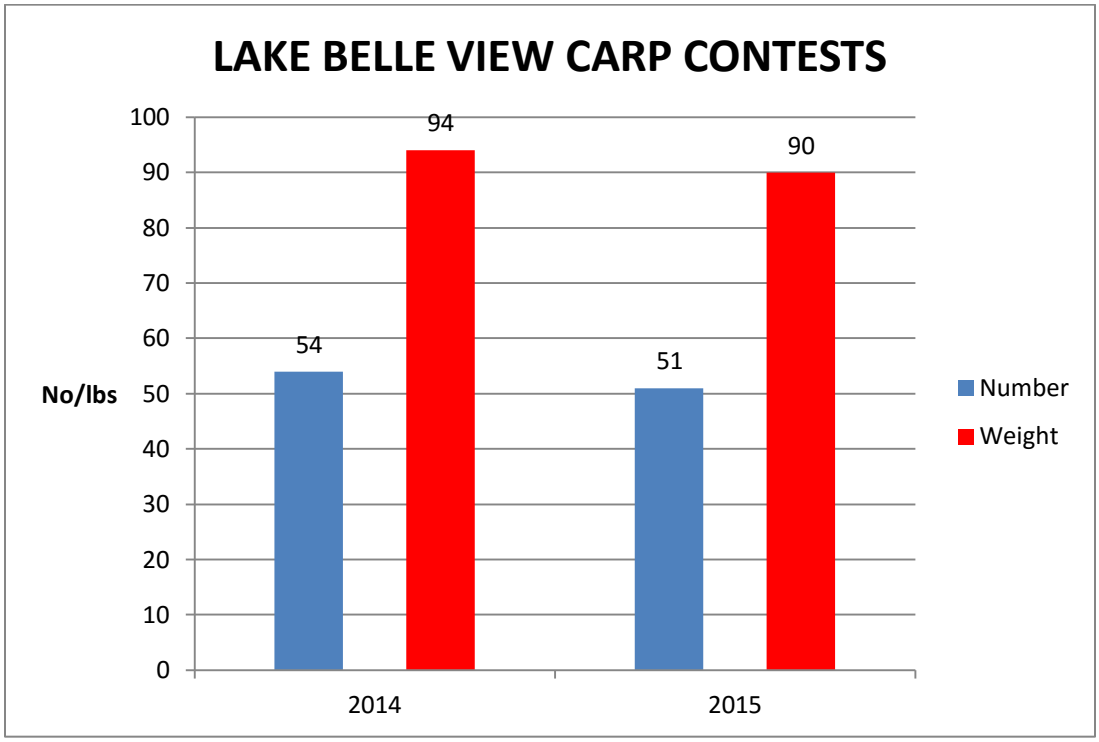
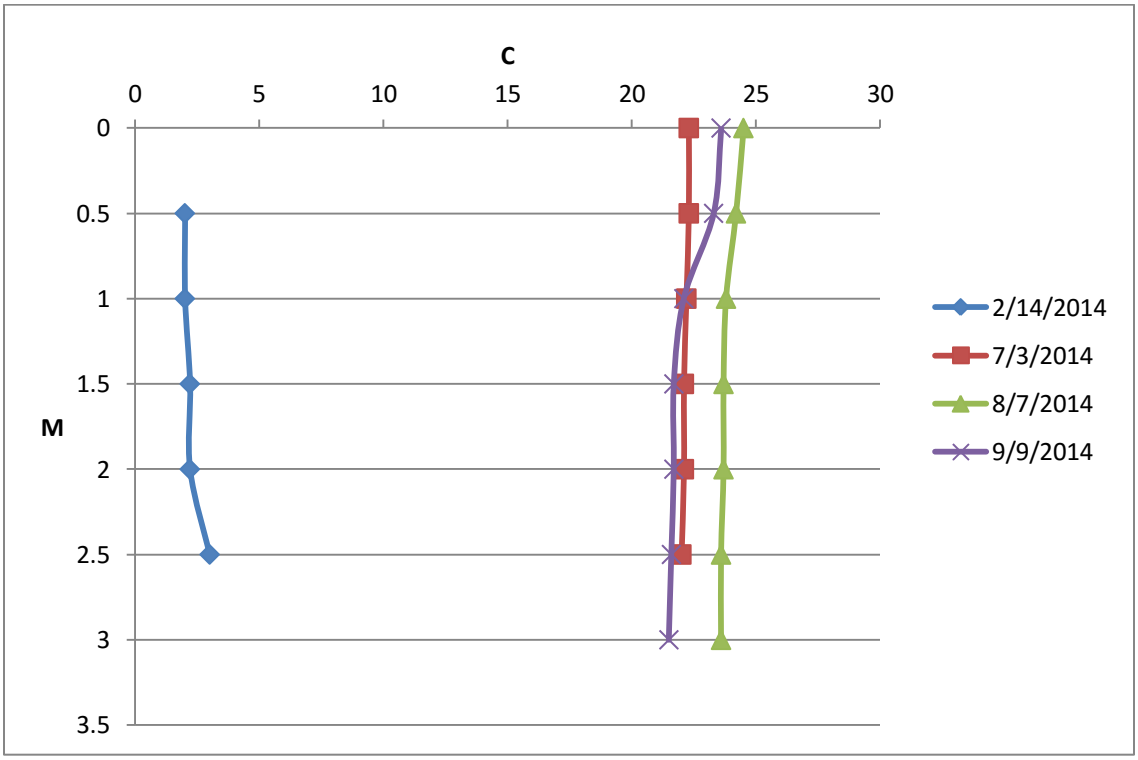


Figure 6: Carp Contest Harvest Data



Catch Me if You Can Tournament Winners

Figure 7: 2014-15 Lake Belle View Temperature Profiles



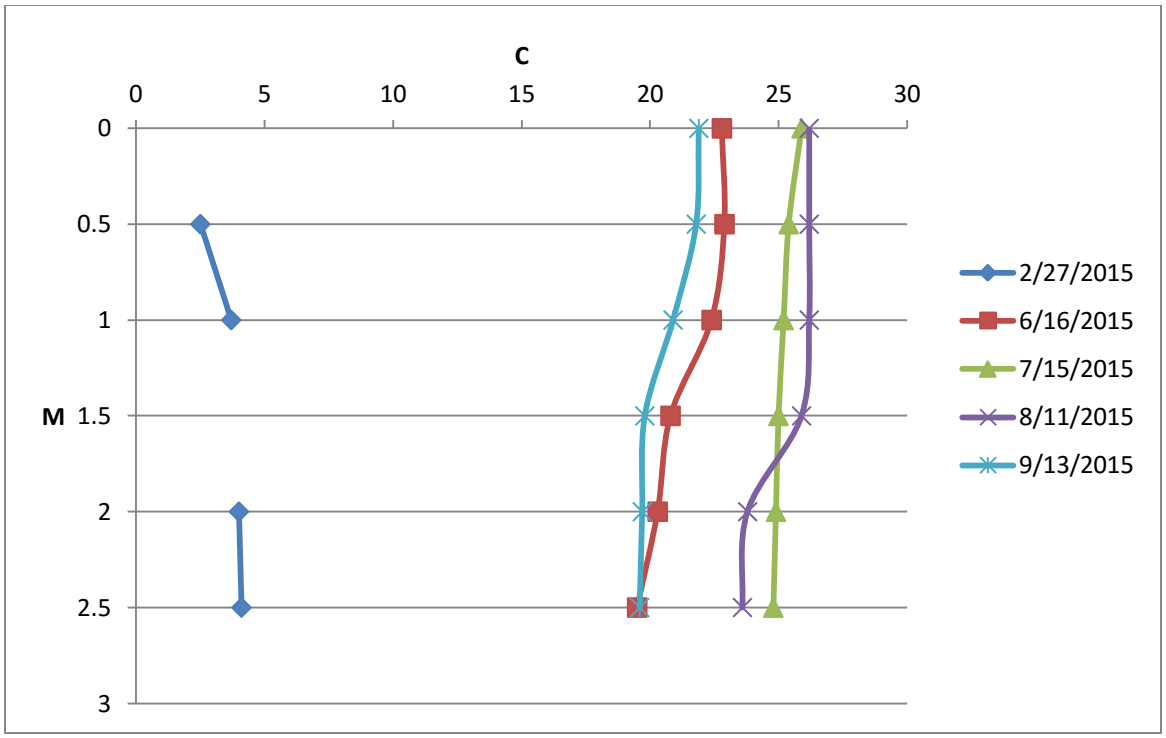
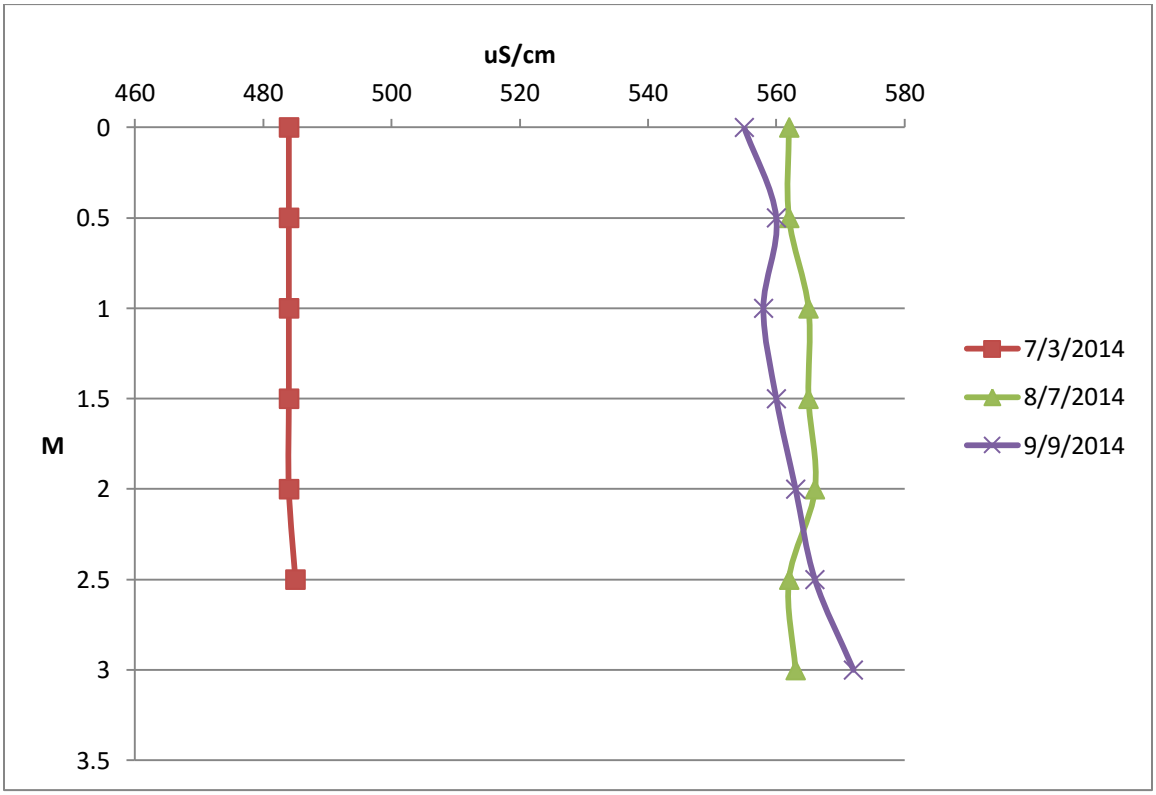
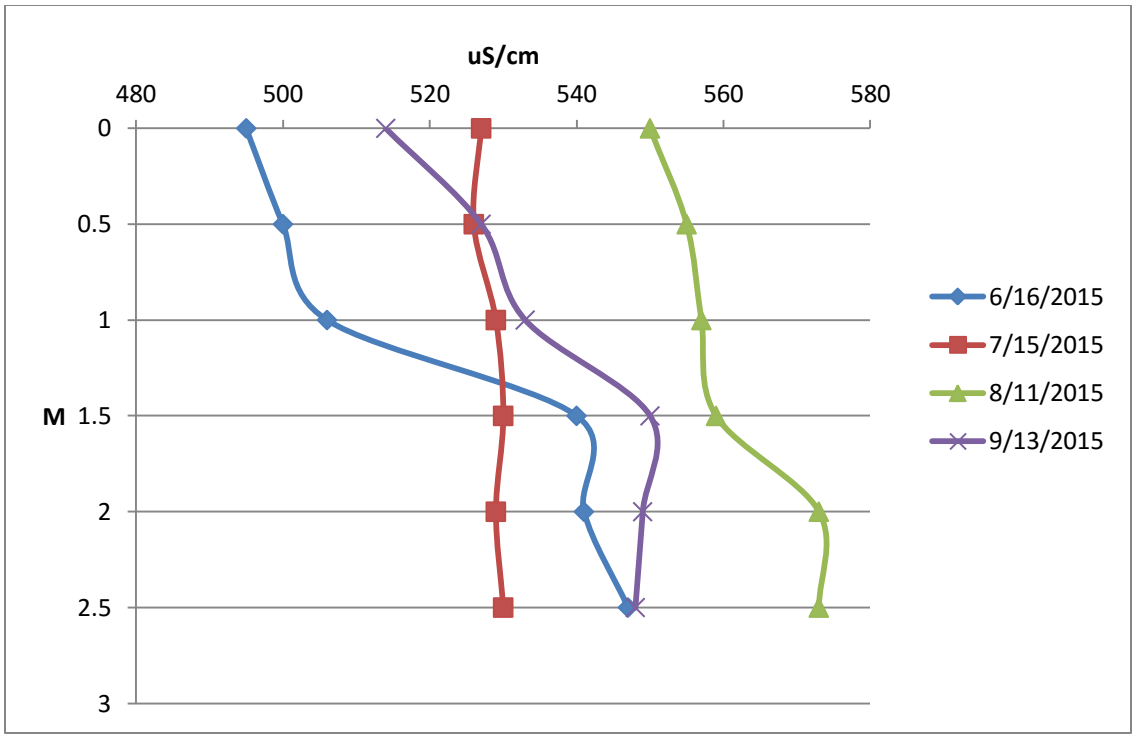


Figure 8: 2014 and 2015 Lake Belle View Specific Conductance Levels





Establishing diverse submersed and floating leaf aquatic plants was identified as an important goal of the oxbow lake restoration. However, the relatively short initial drawdown and common carp refuge undermined that effort. On June 16, 2015 we conducted a modified point intercept aquatic plant survey based on an earlier map of the old millpond. We sampled a subset of survey points that lie within the new lake boundaries but many other points now occur in the much reduced millpond, separation berm and newly expanded floodplain forest (Figure 9). Our data demonstrate the scarcity of both submersed and floating leaf pondweeds even though numerous white water lily and wild celery propagules were planted in the lake. Table 1 summarizes the aquatic plant survey results. Aquatic plant species collected or observed during the survey included coontail, Sago pondweed, curly-leaf pondweed, white water lily, small duckweed, large duckweed and long-leaf pondweed.

Figure 9: Lake Belle View (former millpond) Point Intercept Map and Sampled Areas Highlighted

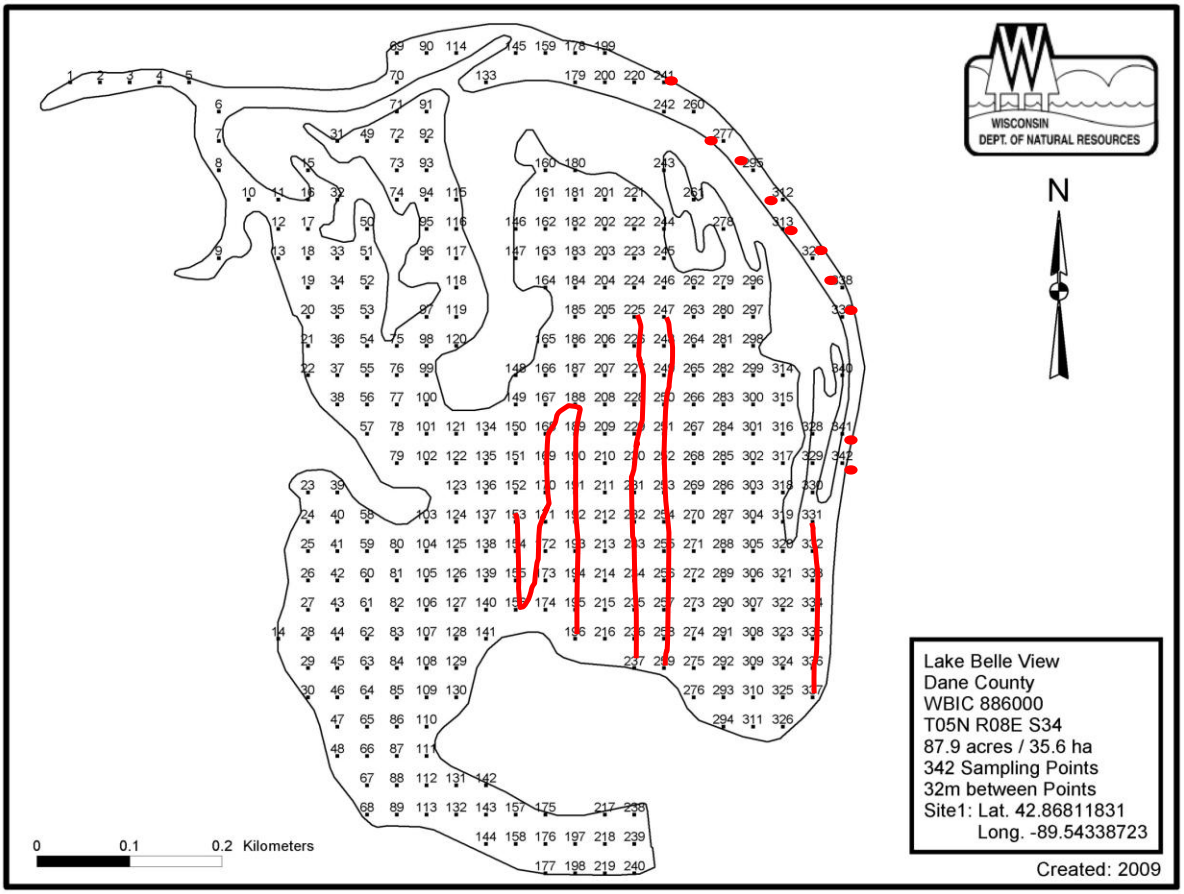


Table 1: Point Intercept Statistics

INDIVIDUAL SPECIES STATS:	Tot. Veg.
Frequency of occurrence within vegetated areas (%)	
Frequency of occurrence at sites shallower than maximum depth of plants	
Relative Frequency (%)	
Relative Frequency (squared)	0.43
Number of sites where species found	
Average Rake Fullness	
#visual sightings	
present (visual or collected)	
SUMMARY STATS:	
Total number of points sampled	**58**
Total number of sites with vegetation	**7**
Total number of sites shallower than maximum depth of plants	**50**
Frequency of occurrence at sites shallower than maximum depth of plants	**14.00**
Simpson Diversity Index	**0.57**
Maximum depth of plants (ft)	**8.50**
Number of sites sampled using rake on Rope (R)	**0**
Number of sites sampled using rake on Pole (P)	**0**
Average number of all species per site (shallower than max depth)	**0.14**
Average number of all species per site (veg. sites only)	**1.00**
Average number of native species per site (shallower than max depth)	**0.06**
Average number of native species per site (veg. sites only)	**1.00**
Species Richness	**3**
Species Richness (including visuals)	**7**

Species	Sites Found	Rake Fullness
Coontail (*Ceratophyllum demersum*)	4	1
Sago pondweed (*Struckenia pectinatus*)	3	1
Curly-leaf pondweed (*Potomogeton crispus*)	3	Visual
Long-leaf pondweed (*Potomogeton nodusus*)	1	Visual
White water lily (*Nymphaea odorata*)	1	Visual
Small duckweed (*Lemna minor*)	11	Visual
Large duckweed (*Spirodela polyrhiza*)	2	Visual
Filamentous algae	4	1

Management Needs

Given the limited commercial common carp removal and apparent strength of the population, a meeting was held on October 15, 2015 to discuss future management options. Below is a summary of the meeting between April Little, Richard Wedepohl, David Rowe, Kurt Welke (meeting notes preparer) and Dave Marshall. The AIS grant has since been amended to reflect the changes summarized below.

Notes- Meeting of Lake BelleView partners

October 15, 2015

In Attendance:

Kurt Welke, David Rowe WDNR

David Marshall, Richard Wedepohl, consultants to Village

April Little Village administrator

We discussed the proposal by The Village and the consultant to use remaining AIS grant funding (balance approximately $2000) to fund a electrofishing population estimate of carp using the Bajer-Sorenson method of Catch-per-unit-effort.

Our underlying problem is-was that contract fishing has been ineffective at reducing adult carp numbers. Efforts to attract a fisherman have been unsuccessful.

David re-visited the lake management plan and the elements therein :

- Enacting of a NR20.35 bag and size limit change on largemouth bass from 14" X 5 fish to 18" X 1 fish. This became effective in august 2015.
- Stocking of largemouth bass, Northern Pike and bluegill (in addition to field transfers) in order to provide predatory pressure on carp recruitment. Stockings have occurred in both 2014 and 2015.
- DNR intention to perform a spring (May) 2016 electrofishing survey to provide a carp CPUE metric and an idea of panfish abundance and size structure: in relation to goals established in the lake management plan.

We also discussed other tools that may be available. These were:

1. Supplemental stocking of channel catfish fingerlings at a rate of 10/acre. The Village may submit a stocking permit by on-line application: https://cida.usgs.gov/wdnr/apex/f?p=244:1:

Raw Field Data

Temp C				
	2/14/2014	7/3/2014	8/7/2014	9/9/2014
0		22.3	24.5	23.6
0.5	2	22.3	24.2	23.3
1	2	22.2	23.8	22.1
1.5	2.2	22.1	23.7	21.7
2	2.2	22.1	23.7	21.7
2.5	3	22	23.6	21.6
3			23.6	21.5

Temp C					
	2/27/2015	6/16/2015	7/15/2015	8/11/2015	9/13/2015
0		22.8	25.9	26.2	21.9
0.5	2.5	22.9	25.4	26.2	21.8
1	3.7	22.4	25.2	26.2	20.9
1.5		20.8	25	25.9	19.8
2	4	20.3	24.9	23.8	19.7
2.5	4.1	19.5	24.8	23.6	19.6

D.O. mg/l				
	2/14/2014	7/3/2014	8/7/2014	9/9/2014
0		8.4	8.6	9.9
0.5	1.3	8.4	7.3	10.1
1	0.8	8.4	3.8	7.8
1.5	0.4	8.3	3.7	7
2	0.3	8.3	4.4	7
2.5	0.3	8.3	4.7	8.1
3			4.5	5.1

D. O. mg/l					
	2/27/2015	6/16/2015	7/15/2015	8/11/2015	9/13/2015
0		10.8	7.6	11.8	12
0.5	2.7	10.8	6.6	11.9	11.4
1	2.4	9.3	5.2	11.7	9.4
1.5		0.7	5.5	9.7	6.9
2	2.1	3	5.5	1.5	6.8
2.5	1.9	0.2	3.9	0.4	5

Sp. Cond uS/cm			
	7/3/2014	8/7/2014	9/9/2014
0	484	562	555
0.5	484	562	560
1	484	565	558
1.5	484	565	560
2	484	566	563
2.5	485	562	566
3		563	572

Sp Cond uS/cm				
	6/16/2015	7/15/2015	8/11/2015	9/13/2015
0	495	527	550	514
0.5	500	526	555	527
1	506	529	557	533
1.5	540	530	559	550
2	541	529	573	549
2.5	547	530	573	548

Secchi	ft.
7/3/2014	1.5
8/7/2014	1.8
9/9/2014	1.8
6/16/2015	2
7/15/2015	1.3
8/11/2015	1.1
9/13/2015	1.2