DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AQUATIC NUISANCE CONTROL AND REMEDIAL ACTION UNIT

LAKE MANAGEMENT PLAN

Pursuant to Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and Part 33, Aquatic Nuisance Control, of the NREPA, and the administrative rules promulgated thereunder, a lake management plan is required as part of the application for a whole-lake chemical treatment to the waters described below for the control of nuisance aquatic vegetation.

WATERBODY NAME	COUNTY(IES)	TOWN(S)	RANGE(S)	SECTION(S)
LANGFORD LAKE	GOGEBIC	45N	41W 42W	19,20,29,30 & 25

I. PHYSICAL CHARACTERISTICS OF THE WATERBODY:

LAKE SIZE (ACRES): 481 ACRES

MAXIMUM DEPTH (FEET): 22 FEET

MEAN DEPTH (FEET): 8.75 FEET

LAKE VOLUME (ACRE-FEET) – Include volume calculations as an attachment:

WHOLE LAKE = 4210.85 ACRE-FT

BASED ON 0-10 FEET DEPTH = 3579.25 ACRE-FT

SIZE OF LITTORAL ZONE (ACRES): 264.9 ACRES

SHORELINE LENGTH (FEET): 28042.38 FT

SHORELINE DEVELOPMENT FACTOR: 1.7286

RETENTION TIME (DAYS): 124.88 DAYS

OUTLET FLOW RATE (CFS): 17 CFS SOURCE: DEQ-HYDROLOGIC STUDIES UNIT

(retention time and flow rate based on April mean value. See Attachment A)

☒ Location Map – include a map showing the location of the waterbody within the county(ies). (See Attachment B)

☒ Bathymetric Map – include a map of the waterbody indicating the depth contours at five foot intervals. The following attributes must be identified on the map: tributaries, outlets, inlets, public and private access sites, public land, critical fish spawning areas, wetlands, special habitats, parks, and water control structures. See guidance for instructions. (See Attachment C)

☒ Land Use Map – include a map of the waterbody indicating the land use of the surrounding area. The following categories shall be used to describe the land use on the map: high density residential, low density residential, commercial/industry, agricultural, parks, and undeveloped areas. (See Attachment D)

II. WATER QUALITY INFORMATION:

Provide the water quality parameter measurements on the data sheet provided (Appendix). These parameters are required, at a minimum. If there are additional data available or additional space is required, please attach additional pages. See guidance for specific collection requirements.

☒ Water Quality Sampling Map – include a map of the waterbody indicating the sampling sites used to collect the water quality parameters.
(See Attachment E)

III. BIOLOGICAL CHARACTERISTICS OF THE WATERBODY:

Total higher aquatic plant surface coverage (%) = 45%

☒ Aquatic Vegetation Map(s) and Data Analysis – include the results of an aquatic vegetation survey of the waterbody performed in August or September of the year prior to the proposed treatment. The survey and data analysis shall be performed according to DEQ's "Procedures for Aquatic Vegetation Surveys." (See Attachment F, parts 1 and 2)

☒ Description of the Fish Community – include the source of the information and copies of any correspondence with fisheries biologists, anglers, natural resource groups, etc. Please attach the original comments as a separate sheet of paper. (See attachment G)

☒ Description of the Wildlife Community - include the source of the information and copies of any correspondence with wildlife or habitat biologists. Please attach the original comments as a separate sheet of paper. (See Attachment H)

☒ Description of the Plant Community - include copies of any correspondence with the appropriate agencies. Please attach the original comments as a separate sheet of paper. (See Attachment I)

☒ Description of Special Concern, Threatened, or Endangered Species - include copies of any correspondence with Michigan Natural Features Inventory. Please attach as a separate sheet of paper. (See Attachment J)

IV. NUISANCE CONDITIONS:

List the current aquatic nuisance condition(s) occurring in the waterbody:

Eurasian watermilfoil has grown dense throughout much of the lake and is outcompeting natives and impeding the recreational activities on the lake.

Indicate the activities that are being impaired by the nuisance conditions:

☒ Swimming

☒ Boating

☒ Fishing

☐ Hunting

☐ Other: _____

☒ Target Species Map – include a map of the waterbody indicating the current location(s) of each targeted nuisance species. (See Attachment K)

V. MANAGEMENT GOALS:

Indicate the appropriate management goals that are the desired outcome(s) of this program.

- ☒ Create/Maintain Swimming Areas
- ☒ Create/Protect Fish/Wildlife Habitat
- ☒ Improve Native Plant Diversity
- ☐ Protect Endangered/Threatened Species
- ☐ Create Areas for Recreational Use (boating, water skiing, fishing, etc.)
- ☒ Remove Exotic Plant Species
- ☐ Other: _____

☒ Management Goal Maps – include map(s) indicating locations where each of the goals may be achieved through the proposed management activities. (See Attachment L)

VI. HISTORY OF WATERBODY MANAGEMENT:

☒ Provide a written description of the management activities performed on the waterbody within the past ten years. Include mechanical, chemical, or biological control efforts, lake level manipulation, dredging, and fish stocking activities (including species stocked and stocking schedule). (See Attachment M)

VII. MANAGEMENT OPTIONS:

List all management options considered to achieve the goals established for this waterbody:

To meet the goals established for this water body, the management options considered by PLM, Lake Association, ISCCW, and the US Forest Service are as follows, 1) reduction in external nutrient loading, 2) The use of herbicide applications, 3) The use of Mechanical/ Manual harvesting, 4) Biological control methods, and (5) Any new treatment products or treatment strategies that become available.

Why was the proposed management option chosen over other options?

A whole-lake Fluridone option was chosen because it is the most feasible considering the wide spread and dense growth of Eurasian watermilfoil. We can expect lake wide, long-term control using this option.

VIII. VEGETATION MANAGEMENT PLAN:

Propose a three-year aquatic vegetation management plan that will be used to attain the management goals for this project by checking the appropriate box(es) below. Include a brief summary for each year of the plan that prioritizes and describes the management strategy. For example:

Year 2: 2014

1. Eurasian watermilfoil control – control any offshore reoccurrences of EWM using granular 2,4-D, reoccurrences within well isolation distances will be controlled using Renovate 3 (if budget allows) or Reward…

Year 1: 2013

	Fluridone	Algaecides	Harvesting	Biological Control	Other
Exotic Submerged Species	☒	☐	☐	☐	☐
Algae	☐	☐	☐	☐	☐

Prioritize and provide a detailed description of your proposed treatment strategy:

Fluridone will be applied on a whole-lake basis for the control of Eurasian watermilfoil using the 6 bump 6 method with the initial treatment in late April to Early May.

Year 2: 2014

	Systemic herbicides	Contact herbicides	Algaecides	Harvesting	Biological Control	Other
Exotic Submerged Species	☒	☒	☐	☐	☐	☐
Native Submerged Species	☐	☐	☐	☐	☐	☐
Emergent Species	☐	☐	☐	☐	☐	☐
Algae	☐	☐	☐	☐	☐	☐

Prioritize and provide a detailed description of your proposed treatment strategy:

The treatment strategy for year two will be to promote the growth of native vegetation while deterring the growth of exotic species. To achieve this goal we will use systemic and/or contact herbicides for EWM control. As new technologies are developed we may request to use additional tools as they become available.

VEGETATION MANAGEMENT PLAN (CONTINUED)

Year 3: 2015

	Systemic herbicides	Contact herbicides	Algaecides	Harvesting	Biological Control	Other
Exotic Submerged Species	☒	☒	☐	☐	☐	☐
Native Submerged Species	☐	☐	☐	☐	☐	☐
Emergent Species	☐	☐	☐	☐	☐	☐
Algae	☐	☐	☐	☐	☐	☐

Prioritize and provide a detailed description of your proposed treatment strategy:

The treatment strategy for year three will be to promote the growth of native vegetation while deterring the growth of exotic species. To achieve this goal we will use systemic and/or contact herbicides for EWM control. As new technologies are developed we may request to use additional tools as they become available. If the DEQ determines that the fluridone treatment was a failure the year of treatment in 2013, then we may also ask for the use of Fluridone during this period if Eurasian watermilfoil reaches high densities.

☒ Annual Vegetation Management Maps – include maps showing areas of management for each year. Be sure to compare the Management Goal Maps with the Annual Vegetation Management Maps to ensure that the proposed treatments are consistent with the management goals. (See Attachment N)

☒ Fluridone Distribution Map – include a map of the waterbody indicating the proposed path of fluridone distribution in the lake. (See Attachment O)

☒ Fluridone Calculations – include any calculations used to determine the amount of fluridone requested for use. (See Attachment P)

IX. MONITORING AND EVALUATION:

List the proposed monitoring activities to be performed on the waterbody during the 3 years of the management plan, include proposed date(s) of each activity. Be as specific as possible.

Proposed Activity:	Proposed Date(s)
☒ Aquatic vegetation survey	August or September 2013, 2014 and 2015
☒ Fluridone residue sampling	48hrs,14 days, 30 days, & 60 days after initial treatment
☒ EffecTEST™	If EWM is present @ 60 day post-treatment Fastest
☒ PlanTEST™	2012 season
☒ Water quality sampling	2012, 2013, 2014, 2015 seasons
☐ Fish surveys	
☐ Other:	

Describe how the monitoring results will be used to evaluate the success of this program in achieving the stated management goals:

Management Goals (from Section V.)	How will you evaluate your success of this goal using the monitoring results?
Create/maintain Swimming areas	Use AVAS/grid point survey to record dense areas of exotic plant growth for treatment
Create/protect Fish/wildlife habitat	Use AVAS survey to record dense nuisance areas of plant growth and rid those areas of them
Improve Native Plant density	Monitoring the success of the Fluridone treatment through the use of FasTest during the 2013 season. Closely monitoring/controlling exotic plant growth in future years, therefore promoting native plant growth.
Remove exotic plant species	Use AVAS survey to record dense nuisance Areas of plant growth and rid those areas of them

☒ Fluridone Residue Sampling Map – include a map of the waterbody showing locations where residue samples will be collected. Number each sample site. (See Attachment Q)

X. LAKE MANAGEMENT PLAN DEVELOPMENT:

Who has participated in developing the lake management plan for this project?

- ☐ Commercial Applicator
- ☒ Lake Consultant
- ☐ Lake Board
- ☒ Lake Association
- ☐ Township(s)/County(ies)
- ☐ State Agency(ies) (specify) _____
- ☐ Park Administrator/Board
- ☐ Group of Individual Riparians
- ☐ Back Lot Owner(s)
- ☒ Other (specify) US Forest Service – Ottawa National Forest, US Army Corp of Engineers, Invasive Species Control Coalition of Watersmeet

☒ Documentation of Lake Management Plan Development – provide documentation of participation in development of this Lake Management Plan by stakeholders and agencies responsible for managing public trust resources. Attach meeting minutes and other correspondence separately. (See Attachment R)

Lake Management Plan prepared by: _____ (signature)

Jason Broekstra (print name)

Date: 1-14-2013

DEQ

DEPARTMENT OF ENVIRONMENTAL QUALITY
INLAND LAKES AND REMEDIAL ACTION UNIT

LAKE MANAGEMENT PLAN APPENDIX

WATER QUALITY DATA

Waterbody Name: Langford Lake **County:** Gogebic

Temperature and Dissolved Oxygen: Date measured: 8/16/12

Depth Measurement (Meters)	Temperature (C)	Dissolved Oxygen (mg/L)
S	21.18	7.71
1	21.18	7.7
2	21.18	7.69
3	21.17	7.66
4	21.15	7.61
5	20.69	5.63
6	20.61	3.42
7 (BTM)	20.57	.35

Transparency:

Date Measured	Secchi Disk Transparency (feet)
** See Attachment **	
S	

Total Phosphorus and Total Alkalinity:

	Date measured	Total phosphorus (µg/L)	Total alkalinity (mg $CaCO_3$/L)
Surface sample at spring turnover	4/3/2012	Not Detected	34
Deep sample	8/16/2012	21	

EQP5885 (Rev.10/05)

This reply is being sent via email only.

We have estimated the low flow discharges requested in your email of July 23, 2012 (Process No.7996), as follows:

Langford Creek At Langford Lake Outlet, SW ¼ of the SW ¼ of Section 20, T45N, R41W, Watersmeet Township, Gogebic County, has a drainage area of 4.5 square miles. The 50% and 95% exceedance and mean monthly flows in cubic feet per second (cfs) are:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
50%	4.1	4.4	4.2	12	7.3	5.8	4.5	3.9	4.2	4.1	4.8	4.2
95%	2.3	2.9	2.7	3.5	2.4	2.5	1.8	1.4	1.5	2	2.1	2.3
Mean	4.2	4.5	5.9	17	9.7	8.1	5.6	4.2	4.7	5	5.4	4.4

If you have any questions, please contact Mr. Marlio Lesmez, Water Resources Division, Hydrologic Studies Unit, at 517-335-3173, or by e-mail at: lesmezm@michigan.gov.

Sincerely,

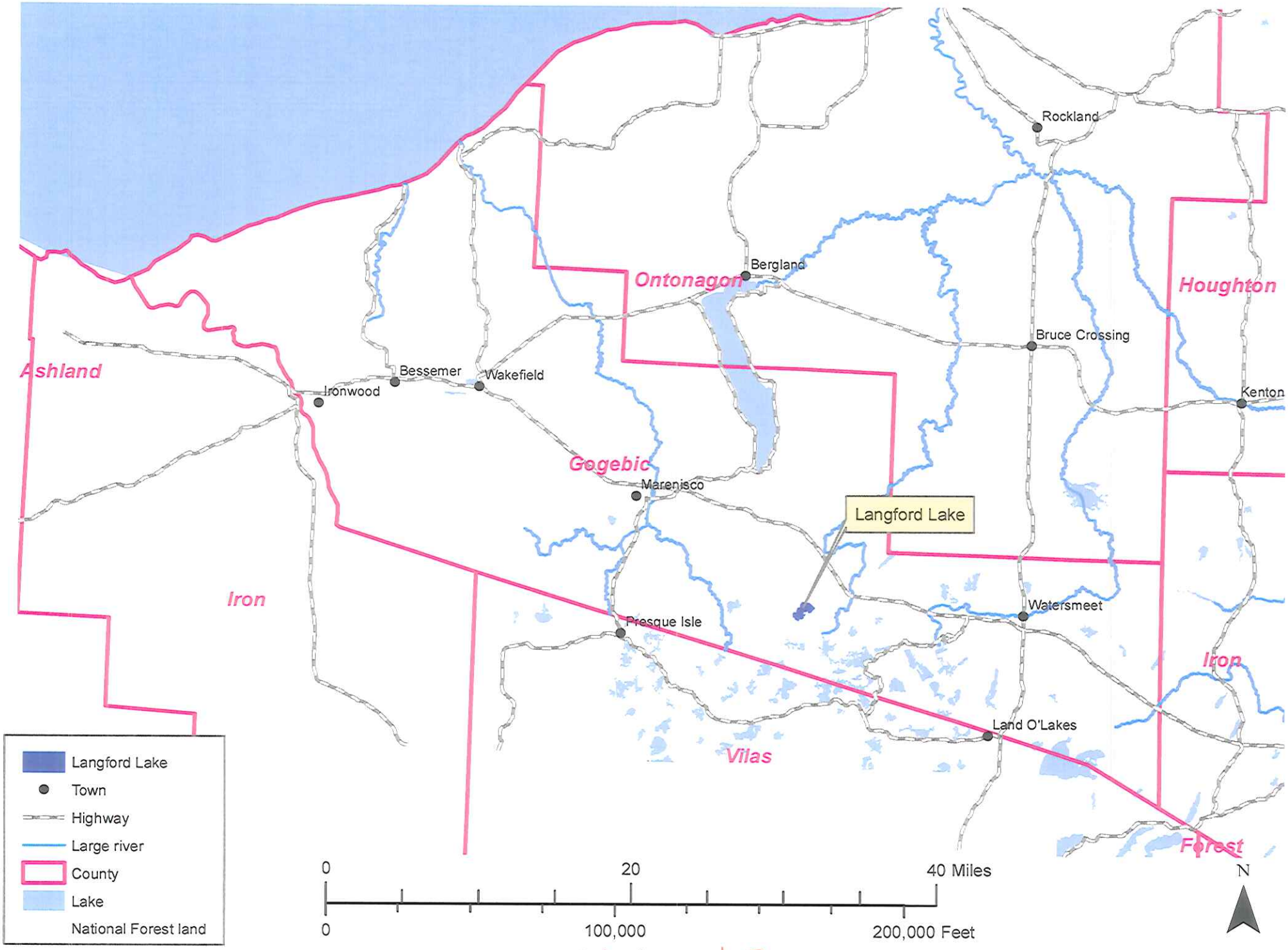
Byron P. Lane, P.E., Chief
Hydrologic Studies Unit
Water Resources Division
517-241-9862

MWL
cc: , MDEQ (E0-05-SW)

Attachment A

Location Map: Langford Lake

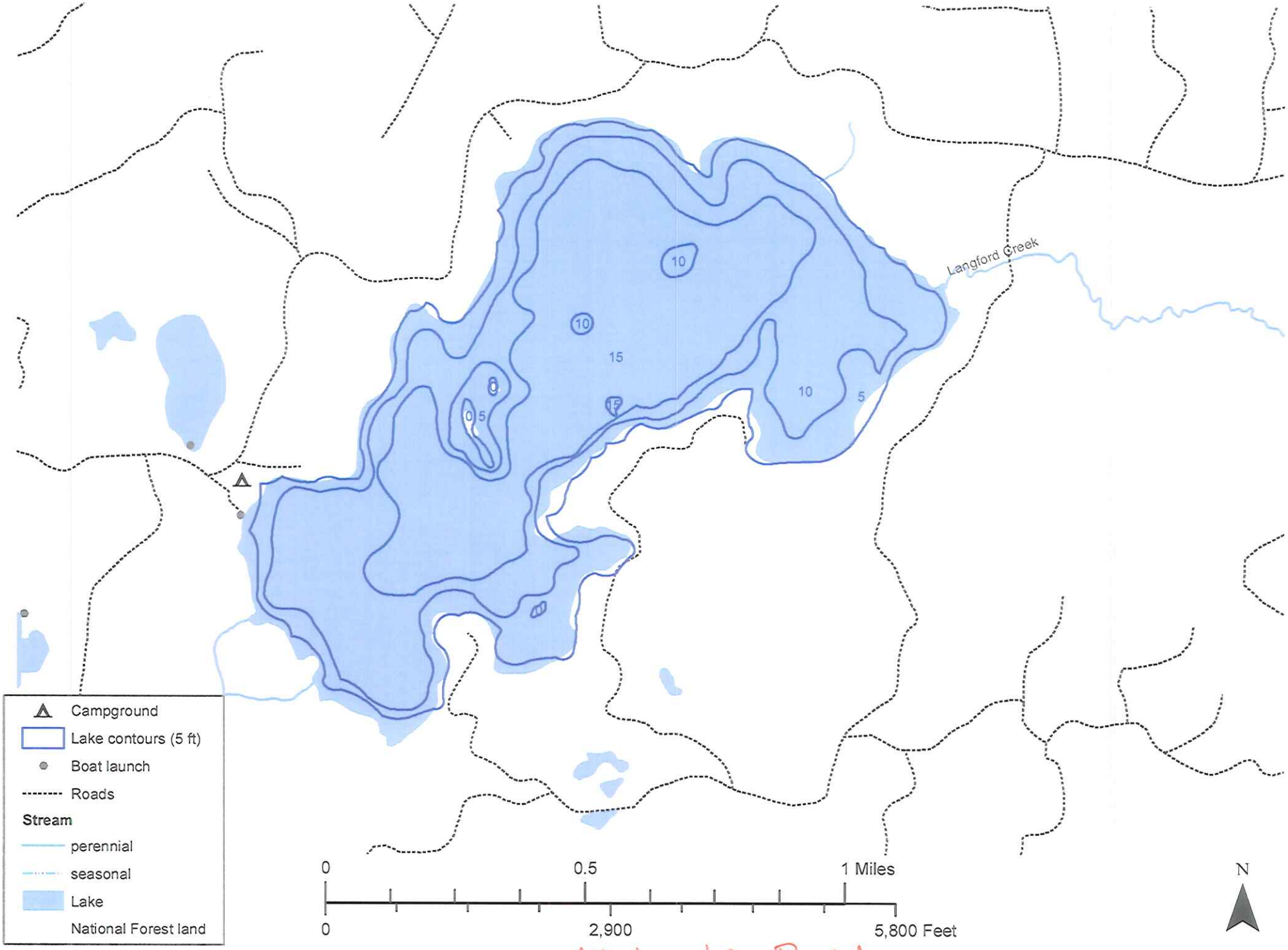
1 June 2012



Attachment B

Langford Lake: Bathymetric map, 5-foot contours

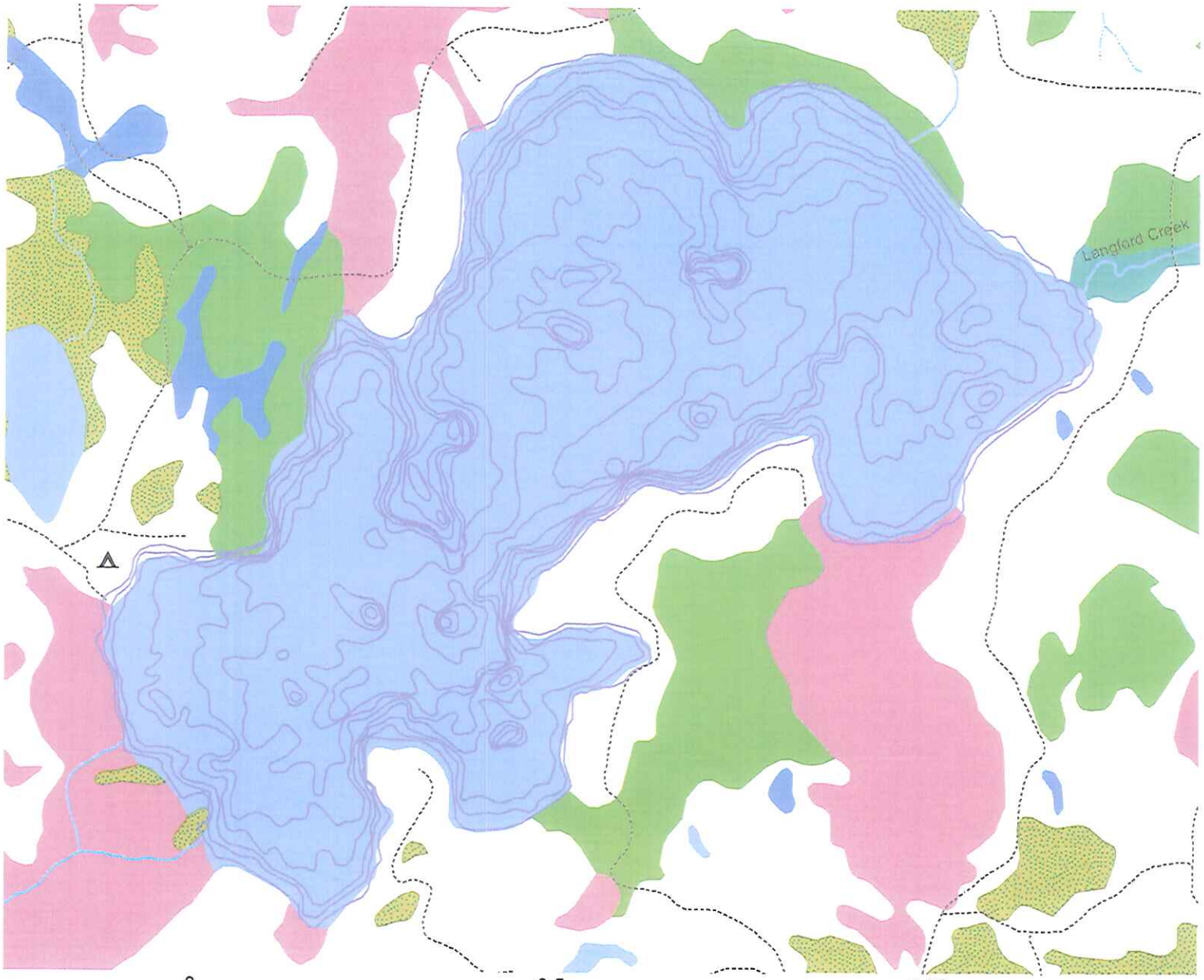
1 June 2012



Attachment C - Part 1

Langford Lake wetlands

22 February 2007



Roads

Lake contours (interval = 2 ft)

Stream

perennial

seasonal

Wetlands (ELTP data)

Swamp types(treed)

Ash potential, drainway types

Bog types (shrubs); Marsh

Floodplains

Transitionally wet:hardwood/ hemlock potential

Water

0 0.5 1 Miles

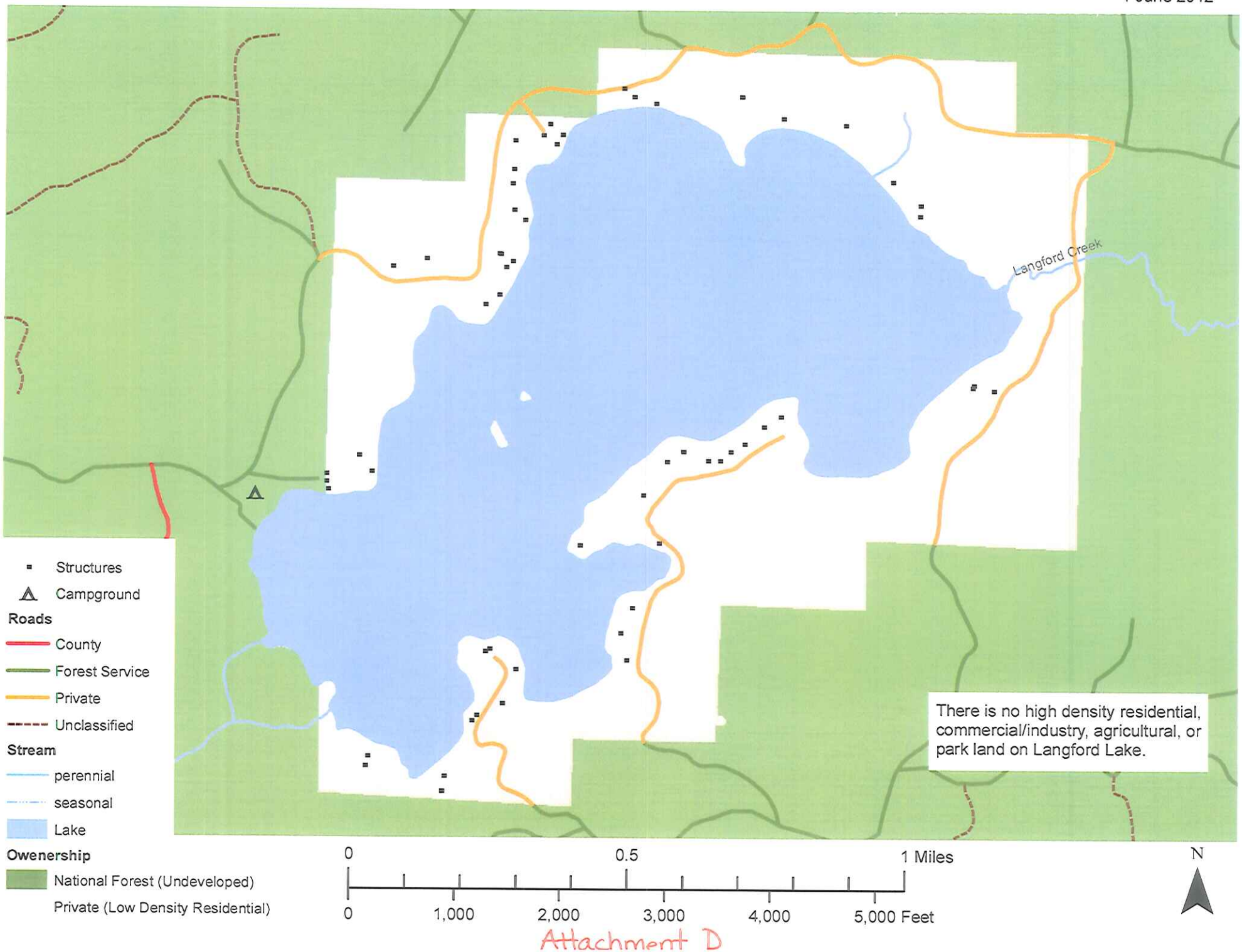
0 2,500 5,000 Feet

N

Attachment C-Part 2

Langford Lake: Land Use Information

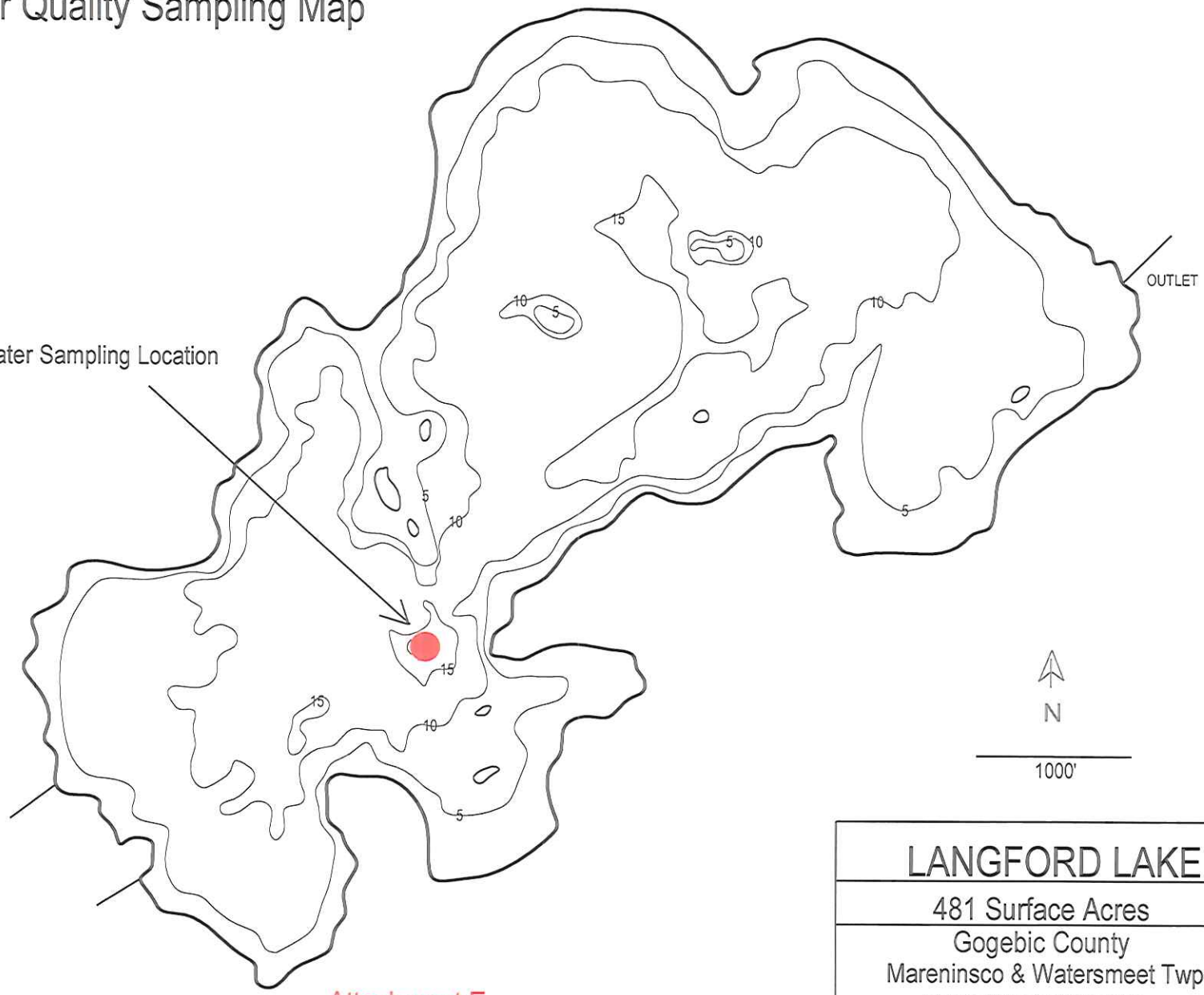
1 June 2012



There is no high density residential, commercial/industry, agricultural, or park land on Langford Lake.

Attachment D

Water Quality Sampling Map



Attachment E

LANGFORD LAKE

481 Surface Acres

Gogebic County

Mareninsco & Watersmeet Twps

T45N R42W & T45N R41W

PLM Lake & Land Mgmt, P.O. Box 132, Caledonia, MI 49316 Phone (800) 382-4434

LAKE NAME- Langford COUNTY- Gogebic SURVEY DATE 6-8 Sep 12

Standard Aquatic Vegetation Summary Sheet SURVEY BY: John Skogerboe

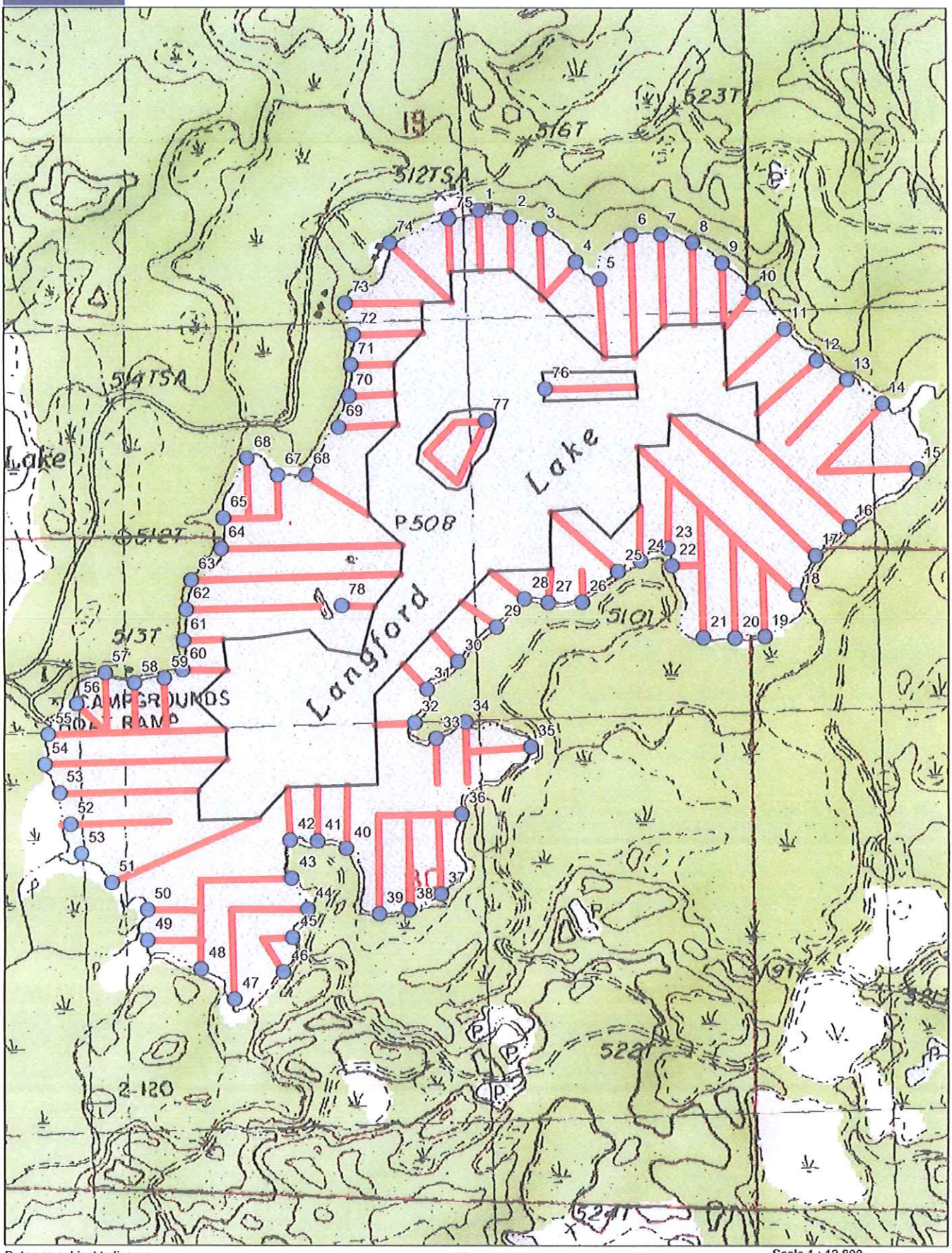
		Total number of AVAS's for each Density Catagory					Calculations				Sum of Previous Four Columns	Total Number of AVAS's	Quotient of Column 9 divided by Column 10		
		A	B	C	D		Catagory A x 1	Catagory B x10	Catagory C x 40	Catagory D x 80					
Code No	Plant Name	1	2	3	4		5	6	7	8	9	10	11	Code No	Plant Name
1	Myriphyllum spicatum	10	18	20	21		10	180	800	1680	2670	78	34.2	1	Myriphyllum spicatum
2	Chara	3					3	0	0	0	3	78	0.0	2	Chara
3	Potamogeton foliosus	3					3	0	0	0	3	78	0.0	3	Potamogeton foliosus
4	Potamogeton zosteriformis	13	15	18			13	150	720	0	883	78	11.3	4	Potamogeton zosteriformis
5	Potamogeton robbinsii	1	2	5	22		1	20	200	1760	1981	78	25.4	5	Potamogeton robbinsii
6	Potamogeton gramineus	19	10	1			19	100	40	0	159	78	2.0	6	Potamogeton gramineus
7	Potamogeton praelongus	9	6	4			9	60	160	0	229	78	2.9	7	Potamogeton praelongus
8	Potamogeton richardsonii	6	11	31			6	110	1240	0	1356	78	17.4	8	Potamogeton richardsonii
9	Potamogeton amplifolius	5	15	25			5	150	1000	0	1155	78	14.8	9	Potamogeton amplifolius
10	Bidens Beckii	6	4				6	40	0	0	46	78	0.6	10	Bidens Beckii
11	Zosterella dubia	2					2	0	0	0	2	78	0.0	11	Zosterella dubia
12	Valisneria americana	13	9	5			13	90	200	0	303	78	3.9	12	Valisneria americana
13	Myriphyllum farwelli	2					2	0	0	0	2	78	0.0	13	Myriphyllum farwelli
14	Myriophyllum tenellum	5					5	0	0	0	5	78	0.1	14	Myriophyllum tenellum
15	Ceratophyllum demersum	1	1	2			1	10	80	0	91	78	1.2	15	Ceratophyllum demersum
16	Elodea canadensis	12	5		1		12	50	0	80	142	78	1.8	16	Elodea canadensis
17	Utricularia spp.	10	2				10	20	0	0	30	78	0.4	17	Utricularia spp.
18	Bladderwort-mini	9	2				9	20	0	0	29	78	0.4	18	Bladderwort-mini
19	Ranunculus flammula	3					3	0	0	0	3	78	0.0	19	Ranunculus flammula
20	Isoetes spp	9					9	0	0	0	9	78	0.1	20	Isoetes spp
21	Lobelia dortmana	6	2				6	20	0	0	26	78	0.3	21	Lobelia dortmana
22	Juncus pelocarpus	2					2	0	0	0	2	78	0.0	22	Juncus pelocarpus
23	Nymphaea	15	19	3			15	190	120	0	325	78	4.2	23	Nymphaea
24	Nuphar	8	4	1			8	40	40	0	88	78	1.1	24	Nuphar
25	Brasenia schreberi	7	14	4			7	140	160	0	307	78	3.9	25	Brasenia schreberi
26	Polygonum amphibium	3	1	1			3	10	40	0	53	78	0.7	26	Polygonum amphibium
27	Sagiteria latifoia	6	2				6	20	0	0	26	78	0.3	27	Sagiteria latifoia
28	Pontedera cordata	7	4				7	40	0	0	47	78	0.6	28	Pontedera cordata
29	Dulichium arundinaceum	4					4	0	0	0	4	78	0.1	29	Dulichium arundinaceum
30	Typa spp	1					1	0	0	0	1	78	0.0	30	Typa spp
31	Scirpus validus	15	18	2			15	180	80	0	275	78	3.5	31	Scirpus validus
32	Sparganum spp	5					5	0	0	0	5	78	0.1	32	Sparganum spp
33	Juncus spp	6					6	0	0	0	6	78	0.1	33	Juncus spp
34	Littorella uniflora	2					2	0	0	0	2	78	0.0	34	Littorella uniflora
							0	0	0	0	0	78	0.0		

Total = 131.4% cummulative cover

C:\Users\John\Documents\Projects (work)\Michigan\Langford\2012\MI plant asssesment

Attachment F, pt. 1

DeLorme Topo USA® 7.0



Data use subject to license.

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www.delorme.com

TN

MN (3.6°W)

Scale 1 : 12,800

1" = 1,066.7 ft

Data Zoom 14-0

Attachment F, pt 2

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
FISHERIES DIVISION
FISH COLLECTION

Water:_Langford Lake_____ County:__Gogebic_____ T.___R.___ Sec._____ Date:_6/1-4/2009

I.D._____ Sheet:_____

Summary of: () All sites ( )Coll. Site #_____ ( ) Index site # _____ (x) All Gear ( ) Gear ____

Sample site(s): Number of 11 Depth Range 0-5' Temperature Range

Location(s) (Describe or map below)

Cover (Type and Abundance) Survey was conducted pre emergent vegetation growth, but lily, and milfoil dominate the fauna

Fish foods :

Water Clarity, Level, Color, etc Cond. Electro. Eff.

Weather: Present Clear winds from SW Preceding:

Temperature: Air 60's Water Surface upper 50's Time of day

Gear Description : ½" Bar

Effort: Net lifts 33 Net Nights 32 Area Covered Hours Shocked

Purpose of Collection: Follow up to chemical milfoil treatment. Relative abundance and species composition.

Data collected (X): (x) Catch Summary (x) Length-Frequency ( ) Length-Biomass ( ) Length-Weight Regression
( ) Growth ( ) Mark & Recapture Estimates ( ) Age-Frequency & Survival

Analysis, Map, Remarks, Fishing Reports

This survey repeated efforts from 2007 to monitor fish assemblages post milfoil treatment. Survey results revealed no distinct changes between surveys.
-Black Crappie was captured in spawning condition with, higher concentrations captured on the northeast end of the lake.
-Fishing pressure was present each day during the survey. One – Three boats on average.
-Five painted turtles captured in the nets and released live
-Net #1 rolled on 6/2 yielding no fish.

Analysis by__Pagel____ _____ Sec._USFS____ _____
Collection by ___ USFS_____Sec.__ _____ Identification by same_____Sec.__same_____

Attachment G

Langford Lake Fish Survey
June 1-4, 2009

US Forest Service

SPECIES	ROB	CWS	BRB	BCR	PKS	BLG	GOS	NOP	BLB	YEP	SMB
GEAR	Fyke	Fyke	Fyke	Fyke	Fyke	Fyke	Fyke	Fyke	Fyke	Fyke	Fyke
Total inches	127	1728	755	1342	562	655	97	439	249	40	74
AVG LENGTH	**7.9375**	**16.941176**	**9.3209877**	**9.3846154**	**6.0430108**	**5.3252033**	**5.1052632**	**24.388889**	**10.375**	**4.4444444**	**10.571429**
AVG WEIGHT	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
TOTAL WEIGHT											
Total Catch	16	111	137	152	148	242					
CPE											
% L -A											
% Total biomass											
INCHES	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency
1											
2											
3						7	1			1	
4					4	14	3			5	
5					14	35	8			1	
6				1	51	66	7		1	2	
7	7	1	1	2	22	1					
8	6		18	22	2				1		
9	2		26	60					1		3
10			26	37					13		
11			10	17					3		2
12	1			3					2		1
13				1					3		1
14											
15		7									
16		24									
17		36									
18		26									
19		8						1			
20											
21											
22								3			
23								4			
24											
25								3			
26								3			
27								3			
28								1			
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											
SAMPLE TOTAL	16	102	81	143	93	123	19	18	24	9	7

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
FISHERIES DIVISION
FISH COLLECTION

Water: Langford Lake
County: Gogebic_____ T._45__R._41__ Sec._19,20,29,30_____ Date: June 13-15 2007

I.D._____ Sheet:_____

Summary of: (x) All sites ( )Coll. Site #_____ ( ) Index site # _____ (x) All Gear ( ) Gear ____

Sample site(s): Number of 12 Depth Range 0-6' Temperature Range71-74F

Location(s) (Describe or map below) 12 locations that were identical to the 2004 survey performed by MI DNR

Cover (Type and Abundance) Submergent vegetation abundant, Wood debris uncommon

Fish foods : Golden Shiner, white sucker, other observed minnow species

Water Clarity, Level, Color, etc Stained Cond. Electro. Eff.

Weather: Present Sunny and Warm Preceding: Same

Temperature: Air 80's Water Surface 74F Time of day 0800

Gear Description : 6-1/2" Bar Fyke nets

Effort: Net lifts 36 Net Nights 36 Area Covered Hours Shocked

Purpose of Collection: Pretreatment survey for a chemical application to reduce Eur. Water milfoil

Data collected (X): (x) Catch Summary (x) Length-Frequency ( ) Length-Biomass ( ) Length-Weight Regression
( ) Growth ( ) Mark & Recapture Estimates ( ) Age-Frequency & Survival

Analysis, Map, Remarks, Fishing Reports

Species composition and abundance is very similar to what was captured in 2004. Water temperatures were very warm for mid June which may have had some effect on the capture rates of the panfish species.
This survey will be followed up in 2008 and or 2009 as a post milfoil treatment look at the fish community.

Analysis by_____ _____ Sec._____ _____
Collection by __USFS_ _____Sec.__ _____ Identification by same_____Sec.__same_____

Langford Lake Fish Survey 2007

SPECIES	BLG	PSF	BLC	SMB	CWS	ROB	GOS	BRB	NOP	LMB	YEP
GEAR											
Total inches	621	512	609	337	566	315	33	1758	373	3	3
AVG LENGTH	**3.764**	**4.971**	**8.826**	**10.531**	**17.152**	**7.683**	**4.714**	**8.879**	**21.941**	**3.000**	**3.000**
AVG WEIGHT	0	0	0	0	0	0	0	0	0	0	0
TOTAL WEIGHT											
Total Catch	923	247	69	32	33	41	7	258	17	1	1
CPE											
% L -A											
% Total biomass											
INCHES	**Frequenc**	**Frequenc**	**Frequenc**	**Frequenc**	**Frequenc**	**Frequenc**	**Frequenc**	**Frequenc**	**Frequenc**	**Frequenc**	**Frequenc**
1											
2	23										
3	25	10	1					2		1	1
4	93	36	2				2				
5	20	25		3		2	5	1			
6	1	15		1		6		2			
7	2	13	5	5		10		29			
8	1	4	16	2		8		41			
9			22	2		15		56			
10			16	6				44			
11			7	2				18			
12				3				3			
13								2			
14					1						
15				2	3						
16				4	5						
17				1	10						
18				1	9				1		
19					5				2		
20									3		
21									2		
22											
23									4		
24									2		
25									3		
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											
SAMPLE TOTAL	165	103	69	32	33	41	7	198	17	1	1

Fish Growth Analysis

All efforts combined
Produced: May 9, 2005

Water: LANGFORD LAKE
Survey begin: 06/07/2004 end: 06/10/2004
Survey type: Inland Lake
Primary purpose: Status & Trends

Discharge county: Gogebic
T/R/S: 45N 41W 20
Status: Field Work Completed

Gear:

No. used	Gear	Common name
1	Boom Shocker	Boom Shocker
1	EGill Net BAR-01	EGN BAR-01
1	EGill Net BAR-02	EGN BAR-02
1	Fyke Net BAR-16	Fyke Net BAR-16
1	Fyke Net BAR-20	Fyke Net BAR-20
1	Fyke Net BAR-30	Fyke Net BAR-30
1	Fyke Net BAR-34	Fyke Net BAR-34
	Limnology	
1	MiniFyke BAR-01	Mini fyke BAR-01
1	MiniFyke BAR-02	Mini fyke BAR-02
1	MSeine BAR-02	M Seine BAR-02
		M Seine BAR-02
	Other	

Species	Age group	Number of fish	Length range (in.)	Mean length (in.)	State average length (in.)	Growth index	Mean growth index for species*
Black crappie							-1.1
	II	3	4.1-4.5	4.3	6.5	--	
	IV	5	6.9-7.6	7.3	8.9	-1.6	
	V	13	7-9.1	8.1	9.7	-1.6	
	VI	18	8.4-10.4	9.3	10.4	-1.1	
	VII	4	10.3-10.8	10.6	11.1	--	
	VIII	9	10.6-12	11.4	11.6	-0.2	
	IX	3	11.2-11.4	11.3		--	
	X	1	11.8-11.8	11.8		--	
	XI	2	11.4-11.6	11.5		--	
Bluegill							-1.5
	I	8	1.5-1.9	1.8	2.4	-0.6	
	II	12	2.5-3.6	2.8	4.2	-1.4	
	III	6	3.4-3.8	3.6	5.3	-1.7	
	IV	5	3.5-4.8	4.1	6.2	-2.1	
	V	11	3.8-5.1	4.5	6.9	-2.4	
	VI	15	5-6.7	5.9	7.4	-1.5	
	VII	3	6.5-7.1	6.8	8.0	--	
	VIII	6	6.8-7.6	7.3	8.4	-1.1	

All efforts combined
Produced: May 9, 2005

Species	Age group	Number of fish	Length range (in.)	Mean length (in.)	State average length (in.)	Growth index	Mean growth index for species*
Bluegill							-1.5
	IX	3	7.3-8.1	7.7	8.7	--	
	X	1	8.1-8.1	8.1		--	
	XI	1	8.7-8.7	8.7		--	
	XII	1	9.6-9.6	9.6		--	
	XIII	1	8-8	8.0		--	
Bluegill-pumpkinseed hyb Hybrid							
	II	2	2.4-3.2	2.8		--	
	VI	5	5-6.7	5.7			
Largemouth bass							-3.2
	II	5	5.3-5.8	5.5	8.7	-3.2	
	III	3	7.1-9.4	8.5	10.6	--	
	V	4	10.5-13	11.4	13.7	--	
	VI	2	12.7-15.3	14.0	15.0	--	
	VII	1	16-16	16.0	16.7	--	
	VIII	1	16.3-16.3	16.3	17.6	--	
Northern pike							-0.4
	II	17	17.9-21.5	19.8	19.0	0.8	
	III	18	19.5-22.9	21.5	21.8	-0.3	
	IV	7	21.9-24.9	23.4	24.2	-0.8	
	V	9	21.9-28	24.7	26.1	-1.4	
	VI	3	21.9-29.5	25.5	27.8	--	
	VII	2	28.2-29.2	28.7	30.0	--	
Pumpkinseed							-1.3
	II	13	2.5-3	2.7	4.2	-1.5	
	III	9	3.3-3.8	3.5	5.2	-1.7	
	IV	1	4.4-4.4	4.4	5.8	--	
	V	2	4.4-5.7	5.1	6.3	--	
	VI	20	4.5-6.7	5.3	6.8	-1.5	
	VII	5	6.2-7.8	6.7	7.2	-0.5	
	VIII	8	6.7-8.1	7.5			
	IX	6	7-8.4	7.6			
	X	5	8.2-8.5	8.3			
	XII	2	7.7-8.6	8.2		--	
Rock bass							-0.9
	VI	5	6.9-7.7	7.3	8.1	-0.8	
	VII	8	7.1-8.4	7.8	8.8	-1	
Smallmouth bass							-3.7
	III	1	7.5-7.5	7.5	11.1	--	

All efforts combined
Produced: May 9, 2005

Species	Age group	Number of fish	Length range (in.)	Mean length (in.)	State average length (in.)	Growth index	Mean growth index for species*
Smallmouth bass							-3.7
	IV	1	9-9	9.0	13.0	--	
	V	6	9.6-11	10.3	14.7	-4.4	
	VI	10	9.8-15.2	12.5	15.5	-3	
	VII	4	12-15.8	14.0	16.6	--	
	VIII	2	13.8-17	15.4	17.4	--	
Walleye							
	IX	1	24.3-24.3	24.3	22.6	--	
	X	1	21.3-21.3	21.3	23.1	--	
	XVI	2	24.6-29	26.8		--	
Yellow Perch							-1.4
	I	20	2.4-3.3	3.0	4.0	-1.1	
	II	10	3.5-4.5	4.1	5.7	-1.6	
	III	1	4.6-4.6	4.6	6.8	--	
	V	4	5.6-7.2	6.2	8.7	--	
	VI	3	5.9-6.6	6.2	9.7	--	

* Mean growth index is the average deviation from the state average length at age.

Water	LANGFORD LAKE, Dis. Gogebic County T45N R41W S20 470.00 acres.
Survey	06/07/2004-06/10/2004 Coll. site: all
Gear	Boom Shocker, Fyke Net, EGN, Mini Fyke Net, Minnow Seine
Effort meas.	Various Meas. total: 1855

Species	Black bullhead		Black crappie		Bluegill		Bluegill-pumpkinseed hyb H	
Legal size (in)	>=7.00		>=7.00		>=6.00		>=	
Avg. length (in)	12.5		9.0		5.0		4.9	
Avg. weight (lb)		0.91		0.43		0.10		0.00
	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.
Total	7	6.34	174	74.25	456	47.51	7	0.00
No. legal	7		170		123		0	
% Legal size	100.00%		97.70%		27.77%			
% Total catch	0.47%	0.72%	11.78%	8.43%	30.87%	5.40%	0.47%	0.00%
CPE	0.00	0.00	0.09	0.04	0.25	0.03	0.00	
Inch group								
0								
1					14	0.03		
2					49	0.45	1	
3					57	1.52	1	
4			3	0.13	78	4.61		
5					122	13.56	4	
6			1	0.14	97	18.33	1	
7			12	2.68	21	6.24		
8			77	25.66	4	1.76		
9			58	27.52	1	0.63		
10			10	6.53				
11	1	0.71	12	10.45				
12	5	4.5	1	1.14				
13	1	1.13						
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
Sample total:	7	6.34	174	74.25	443	47.13	7	0.00

Effort date(s): 6/7/2004 - 6/8/2004, 6/8/2004 - 6/9/2004, 6/9/2004 - 6/10/2004, 7/8/2004

All species total: Number: 1,477 Pounds: 880.36

fyke nets:

N46.28122, W089.48211; northeast of lake

N46.26811, W089.48244; south of island

N46.27457, W089.48409; island set, east side of west island.

N46.27609, W089.46707; far east end along undeveloped shoreline

N46.28141, W089.47559; shallow reed area on east shore

N46.27242, W089.48780; northeast of access 0.4 miles.

N46.27559, W089.47300; off of point down east shore of lake

N46.27118, W089.47903; south bay off island, east side of bay

N46.27401, W089.47833

Water	LANGFORD LAKE, Dis. Gogebic County T45N R41W S20 470.00 acres.
Survey	06/07/2004-06/10/2004
Gear	Boom Shocker, Fyke Net, EGN, Mini Fyke Net, Minnow Seine
Effort meas.	Various

Species	Brown bullhead		Common shiner		Golden shiner		Largemouth bass	
Legal size (in)	>=7.00		>=		>=		>=14.00	
Avg. length (in)	10.2		5.0		5.0		10.0	
Avg. weight (lb)		0.53		0.06		0.04		0.74
	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.
Total	267	140.24	4	0.22	11	0.47	16	11.91
No. legal	267		0		0		3	
% Legal size	100.00%						18.75%	
% Total catch	18.08%	15.93%	0.27%	0.02%	0.74%	0.05%	1.08%	1.35%
CPE	0.14	0.08	0.00	0.00	0.01	0.00	0.01	0.01
Inch group								
0								
1								
2								
3					2	0.03		
4			2	0.08	4	0.11		
5			2	0.14	4	0.2	5	0.39
6								
7	6	1.24			1	0.13	1	0.2
8	33	9.81						
9	72	29.44					2	0.84
10	88	48.01					2	1.16
11	51	36.2					1	0.77
12	16	14.41					1	1
13	1	1.13					1	1.27
14								
15							2	3.9
16							1	2.38
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
Sample total:	267	140.24	4	0.22	11	0.47	16	11.91

Effort date(s): fyke nets:

All species total: N46.26831, W089.49156; lily pad area just south of access 200 yards.
N46.27818, W089.46527; far east end; marshy area
N46.28027, W089.46928; shallow reed area east side of lake
EGN:
Shallow end = N46.26982, W089.48161; Deep end = N46.26943, W089.48202; shallow end is actually more towards center of lake, but shallower due to submerged island.
Start = N46.27526, W089.48248; End = N46.27510, W089.48196; off of east side of island
Shallow end = N46.27253, W089.48855; Deep end = N46.27198, W089.48873; northeast of boat launch 200 yards
Start = N46.27723, W089.47997; End = N46.27680, W089.47984; east of island 200 yards

Water	LANGFORD LAKE, Dis. Gogebic County T45N R41W S20 470.00 acres.
Survey	06/07/2004-06/10/2004
Gear	Boom Shocker, Fyke Net, EGN, Mini Fyke Net, Minnow Seine
Effort meas.	Various

Species	Northern pike		Pumpkinseed		Rock bass		Smallmouth bass	
Legal size (in)	>=24.00		>=6.00		>=6.00		>=14.00	
Avg. length (in)	22.1		5.1		7.5		12.2	
Avg. weight (lb)		2.49		0.16		0.32		1.05
	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.
Total	57	141.94	224	35.22	8	2.53	27	28.40
No. legal	11		83		8		8	
% Legal size	19.30%		37.05%		100.00%		29.63%	
% Total catch	3.86%	16.12%	15.17%	4.00%	0.54%	0.29%	1.83%	3.23%
CPE	0.03	0.08	0.12	0.02	0.00	0.00	0.01	0.02
Inch group								
0								
1								
2			46	0.48				
3			33	1.03				
4			25	1.74				
5			37	4.86				
6			34	7.71	1	0.2		
7			38	13.54	6	1.87	1	0.21
8			11	5.86	1	0.46		
9							3	1.31
10							8	4.72
11							2	1.56
12							2	2
13							3	3.79
14							4	6.28
15							3	5.76
16								
17	1	1.13					1	2.77
18	3	4.02						
19	8	12.67						
20	8	14.83						
21	13	27.96						
22	10	24.82						
23	3	8.55						
24	3	9.73						
25	2	7.36						
26	1	4.15						
27	1	4.66						
28	2	10.44						
29	2	11.62						
30								
Sample total:	57	141.94	224	35.22	8	2.53	27	28.40

Effort date(s):

All species total. **Mini Fyke:**

N46.26789, Q089.48497

N46.27420, W089.47219; east end of lake, shallow bay with Nuphar abundant

N46.27749, W089.48616; shallow woody bay northeast of access.

N46.27918, W089.48299; northeast end of lake

Minnow Seine:

Start = N46.27134, W089.49281; End = N46.27153, W089.49260; from access down 25'

Start = N46.28112, W089.46995; End = N46.28102, W089.46980

Start = N46.27383, W089.48405; End = N46.27396, W089.48414; west side of island

Start = N46.26556, W089.48572; End = N46.26564, W089.48556; west side of lake at old boat landing

Water	LANGFORD LAKE, Dis. Gogebic County T45N R41W S20 470.00 acres.
Survey	06/07/2004-06/10/2004
Gear	Boom Shocker, Fyke Net, EGN, Mini Fyke Net, Minnow Seine
Effort meas.	Various

Species	Walleye		White sucker		Yellow Perch			
Legal size (in)	>=15.00		>=		>=7.00		>=	
Avg. length (in)	25.0		18.1		3.9		0.0	
Avg. weight (lb)		5.36		2.37		0.03		0.00
	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.
Total	4	21.44	155	368.11	60	1.78	0	0.00
No. legal	4		0		1		0	
% Legal size	100.00%				1.67%			
% Total catch	0.27%	2.44%	10.49%	41.81%	4.06%	0.20%	0.00%	0.00%
CPE	0.00	0.01	0.08	0.20	0.03	0.00		
Inch group								
0								
1					1			
2					10	0.05		
3					23	0.37		
4					19	0.65		
5					3	0.21		
6					3	0.33		
7			1	0.17	1	0.17		
8								
9								
10								
11								
12			1	0.77				
13								
14			3	3.6				
15			9	13.14				
16			17	29.93				
17			30	63.01				
18			46	114.16				
19			41	119.15				
20			6	20.28				
21	1	3.26	1	3.9				
22								
23								
24	2	9.68						
25								
26								
27								
28								
29	1	8.5						
30								
Sample total:	4	21.44	155	368.11	60	1.78	0	0.00

Effort date(s):

All species total: Boomshocker:

Start = N46.28054, W089.47462; End = N46.28206, W089.47468

Start = N46.27607, W089.46748; End = N46.27483, W089.46864

Start = N46.27235, W089.48850; End = N46.27150, W089.49239

Water: LANGFORD LAKE
Primary county: Gogebic
Dis. county: Gogebic
Special regs: No
Purpose: Status & Trends

T/R/S: 45N 41W 20
Surface acres: 470.00
Survey begin: 06/07/2004

Status: Completed
end: 06/10/2004

Gear: Fyke Net BAR-20
Fyke Net BAR-34
Fyke Net BAR-16
Fyke Net BAR-30
Mini fyke BAR-01
Mini fyke BAR-02
EGN BAR-02
EGN BAR-01
M Seine BAR-02
Fyke Net BAR-20
Fyke Net BAR-16
Fyke Net BAR-34
Fyke Net BAR-30
Mini fyke BAR-01
Mini fyke BAR-02
EGN BAR-01
EGN BAR-02
Fyke Net BAR-20
Fyke Net BAR-30
Fyke Net BAR-16
Fyke Net BAR-34
M Seine BAR-02

Boom Shocker

1.5 amps

Air temperatures

Reading Datetime	Temperature	Collection/index site no.
07/08/2004 00:00:00	55F	Coll. site 1

Water temperature/oxygen readings

Date/time	Reading depth	Temperature	Oxygen	Collection/index site no.
08/03/2004 00:00:00	0	75.4	9.52	
08/03/2004 00:00:00	1	76.68	10.68	
08/03/2004 00:00:00	3	74.8	10.69	
08/03/2004 00:00:00	12	70.84	8.41	
08/03/2004 00:00:00	2.01	75.02	10.78	
08/03/2004 00:00:00	4.01	74.44	10.68	
08/03/2004 00:00:00	4.99	74.32	10.58	
08/03/2004 00:00:00	6.03	73.56	10.33	
08/03/2004 00:00:00	7.03	72.48	9.96	
08/03/2004 00:00:00	7.99	72.1	9.93	
08/03/2004 00:00:00	9.03	71.65	9.65	

Attachment G

Water temperature/oxygen readings

Date/time	Reading depth	Temperature	Oxygen	Collection/index site no.
08/03/2004 00:00:00	9.98	71.31	9.25	
08/03/2004 00:00:00	11.04	70.99	8.61	
08/03/2004 00:00:00	13.05	70.48	7.57	
08/03/2004 00:00:00	14.03	70.32	7.29	
08/03/2004 00:00:00	15.01	70.14	6.55	
08/03/2004 00:00:00	15.99	69.96	6.2	
08/03/2004 00:00:00	16.98	69.73	3.92	
08/03/2004 00:00:00	17.21	69.51	0.69	
07/08/2004 00:00:00	surface	66F		Coll. site 1

Field notes: Black Bullhead were brought back to shop and postively identified.
Status & Trends water 2004 protocol observed. GOS 5" = 3 caught in fyke leads. Other GOS sighted but none caught with gear. Lake has incredible abundance of cover! Macrophytes galore!

Analysis: Langford Lake was last surveyed in 2000. At that time, the lake was found to have healthy populations of bluegill, pumpkinseeds, and black crappie, but predatory gamefish (walleye, northern pike, smallmouth bass, and largemouth bass) were relatively scarce.

Panfish continue to be abundant in Langford Lake, but growth of these species is considerably below state average (growth index = -1.5 to -0.9). Harvestable-sized fish comprised only 28%, 37%, and 2% of the bluegill, pumpkinseeds, and yellow perch collected, respectively. These percentages are much lower than those observed in 2000, when 54% of the bluegill, 69% of the pumpkinseeds, and 11% of the yellow perch were of harvestable size. Relative abundance of black crappies has increased slightly, and over 97% of these fish were larger than seven inches.

Although walleye were planted in Langford Lake in 2000 and 2003, the population still has not rebounded, and no walleyes (N = 4) smaller than 20 inches were captured. Northern pike (N = 57) appear to be present in sufficient numbers and sizes to provide a modest fishery. Smallmouth bass (N = 27) and largemouth bass (N = 16) also were collected, but growth for both bass species is very slow (growth index = -3.7 to -3.2). Cumulatively, the four piscivorous species comprised 23% of the total biomass in the catch.

Relative abundance of bullheads and suckers appears to be increasing. These two species accounted for 58% of the biomass in 2003, compared to 23% in 2000.

Management Summary: Piscivores continue to be scarce in Langford Lake. Since crappies were introduced into this lake in the mid-1980s, walleye recruitment has been minimal despite repeated stocking efforts. Bullheads and suckers have reached nuisance levels, and the panfish appear to be stunted.

Management Recommendations: Spring fingerling walleye plants should be discontinued. Conduct a manual removal of bullheads, suckers, and panfish smaller than six inches. Once the removal has been completed, begin biennial plants of fall fingerling walleye (25/acre).

Analysis by: B. Gunderman
Collection by: W.Wellenkamp, C.Menghini
Id. by: W.Wellenkamp

Wildlife communities

From the 2006 Ottawa National Forest Environmental Impact Statement:

The Ottawa has a rich diversity of wildlife with more than 300 wildlife species believed to be resident on the Ottawa. These include Regional Forester's Sensitive Species (RFSS), threatened Affected Environment and or endangered species, hunted species, species of management concern, and non-game species. Some of the commonly hunted wildlife species on the Ottawa include white-tailed deer, ruffed grouse, and black bear. The number of wildlife species found on the Ottawa and their population levels are determined to a large degree by the amount, quality, and variety of habitats available. Other factors affecting species populations are prey availability, human and natural predation, weather, diseases, and natural population cycles. Many animal habitats are associated with vegetative communities that can be described by forest composition and age classes.

Lakes and streams on the Ottawa that produce a wide variety of fishing opportunities as well as habitat for numerous aquatic animal and plant species. Important sport species sought by anglers include walleye, muskellunge, panfish, trout, and salmon. Management of fish and fish habitat is jointly planned and carried out in cooperation with the Michigan DNR Fisheries Division, with emphasis given to the management of lakes with existing recreation access. Limiting factors for coldwater fish in the western Upper Peninsula normally include overly warm water temperatures, spawning habitat, rearing habitat, and adult over-wintering habitat. Factors that can affect these habitat elements include beaver flooding, sediment delivery to streams, loss of shade, and lower than desired levels of both small and large woody debris, that is important to the stability and productivity of lake and stream environments.

The Ottawa is primarily a second-growth forest, with the vast majority of stands, regardless of forest type, being regenerated after the early logging era (Cleland et al. 2004a). After this intensive logging, sites regenerated to early seral forest types instead of hemlock, white pine or northern hardwoods that originally occupied those sites. As the amount of early-seral forest decline (i.e., aspen), these forest types begin to succeed to mid- to late-seral forest species. In many instances, aspen areas are succeeding to northern hardwoods. In a minority of stands, aspen is converting to a spruce/fir forest type. Very seldom does aspen naturally regenerate into more young aspen on the Ottawa.

The Ottawa is part of the largest contiguous block of northern hardwood forest in the Midwest, according to Cleland, et al. (2004a). In an unpublished report developed internally to suppor Forest Plan revision, entitled "Historical and Ecological Context of the Ottawa National Forest", the authors reviewed past practices that resulted in today's landscape of the Ottawa (USDA Forest Service 2005c). This report concluded that, "Relative to most of the upper Midwest, however, the western Upper Peninsula has escaped the massive clearing for agriculture, broadscale forest type changes, or other dramatic landcover changes. Clearly, the western Upper
Peninsula represents one of the least altered landscapes in the eastern US." The Historical and Ecological Context document contains an extensive analysis of fragmentation and discussion of size of forest "patches" relative to ecological concepts such as connectivity and dispersal (USDA Forest Service 2005c).

US Forest Service submitted a request to Robert Doepker on 6/1/2012.

Attachment I

(Section III. Biological Characteristics of the Waterbody)

Description of the Plant Community

11 December 2012

The following map shows all the plant habitat types around Langford Lake identified by the ONF Ecological Classification System (ECS). The Ottawa National Forest uses habitat types described by Coffman et al. (1984). Seven different habitat types were identified:

- ATD (Acer-Tsuga-Dryopteris). Sugar maple, hemlock, basswood, beech, yellow birch, red maple, american elm. Podzolized or well developed sand to loam textured soils. Generally morainic in origin, but may be covered by eolian deposit, or may occur on deep eolian deposits over outwash sands.
- AVO (Acer-Viola-Osmorhiza). Sugar maple, basswood, white ash, yellow birch, ironwood, hemlock, american elm. Loam to silt loam soils. Landform is usually moranic in origin, rolling, and often loess capped.
- TMC (Tsuga-Maianthemum-Coptis). Hemlock, red maple, sugar maple, yellow birch, balsam fir, white spruce, white cedar. On soils of various textures with impeded soil drainage, on any landform. The Vaccinium phase occurs on lacustrine sands, usually with QAE, AQV, or TMV. The Dryopteris phase occurs on loamy soils with ATD habitat type.
- TTS (Tsuga-Thuja-Sphagnum). Hemlock, white cedar, balsam fir, black spruce, red maple. On soils with excessive soil moisture. Usually the soil is organic (> 6") over mineral, but the sphagnum may rarely occur directly on mineral soil. Can occur within any landform.
- FMC (Fraxinus-Mentha-Carex). Black ash, american elm, red maple, balsam fir. Occurs on soils with excessive soil moisture of various textures. The Carex phase occurs on organic over mineral soils deposited in active floodplains.
- FI (Fraxinus-Impatiens). White ash, red maple, sugar maple, black ash, balsam fir. Occurs on loam to clay texture soils with excessive soil moisture. Usually found in upland drainways within morainic landforms.
- PCS (Picea-Chamadaphne-Sphagnum). Black spruce, tamarack, white cedar. Occurs on deep organic soils. Lower pH than TTS.

The plant habitat types, as well as field visits by Forest Service staff, can also help identify the plant community types (MNFI 2007). The ATD, AVO, and TMC habitats together fall within mesic northern forest. TTS corresponds to rich conifer swamp. FMC and FI are northern hardwood swamp. PCS is poor conifer swamp. From past aquatic plant surveys, we also know Langford Lake includes submergent marsh and emergent marsh. The riparian areas along the lake also include some northern shrub thicket. Please see MNFI (2007) for descriptions of these plant communities.

Online MNFI data were also checked and no plant communities of local concern were documented near Langford Lake.

Ian Shackleford emailed this information to Robert Doepker (Michigan DNR) and George Madison (Michigan DNR) on July 23, 2012. Mr. Madison replied on July 25, 2012, saying the DNR Fisheries Division does not have any record of any plant communities of special concern in the Langford Lake watershed. Email correspondence follows.

John Skogerboe (Army Corp of Engineers) has conducted aquatic plant grid surveys in Langford Lake since 2002. His 2012 AVAS survey is given in Attachment F. A list of the species he encountered is available in Skogerboe (2012) and included here in Attachment I.

References

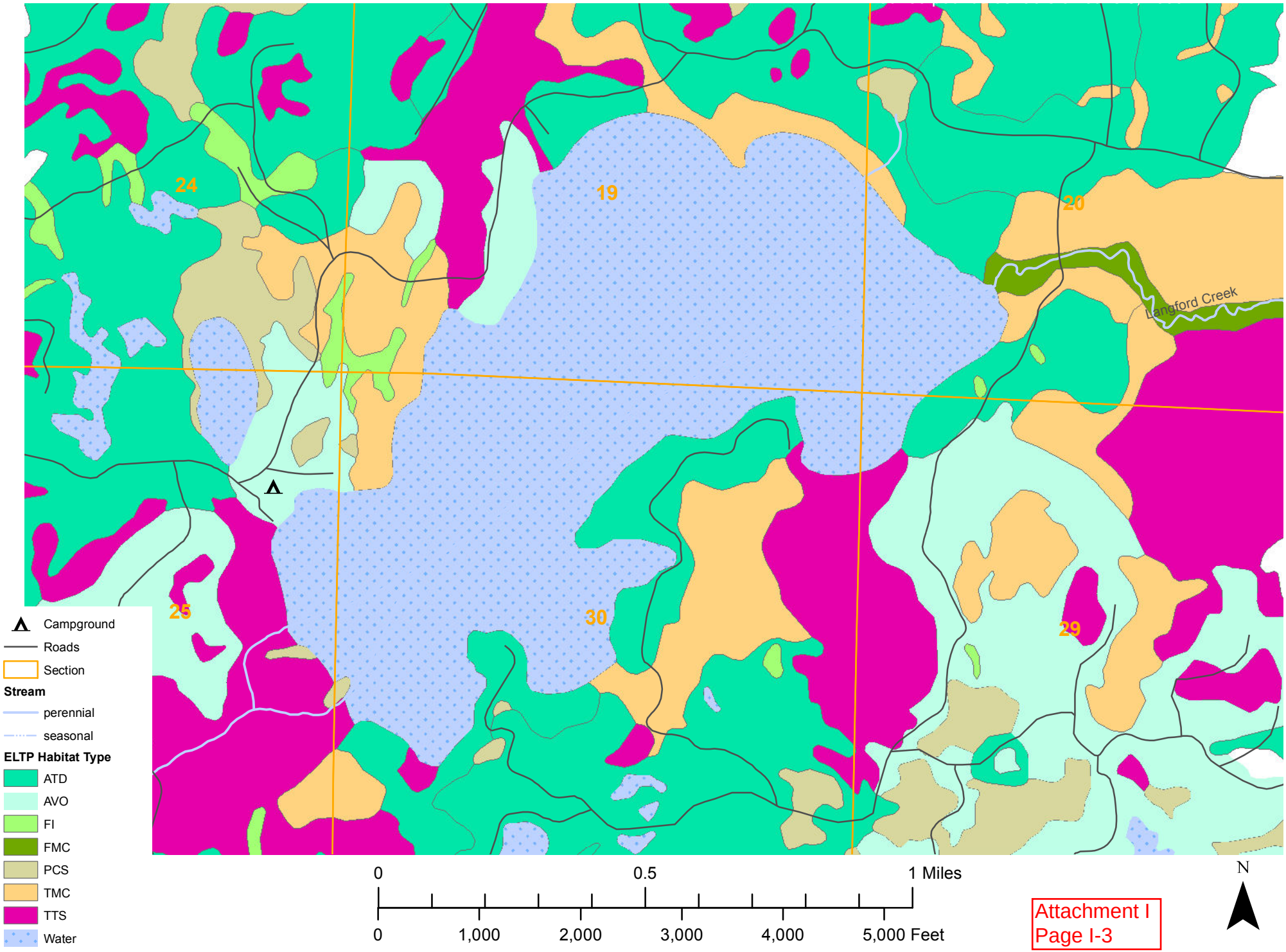
Coffman, M. S., E. Alyanak, J. Kotar, and J. E. Ferris. 1984. Habitat classification system field guide for Upper Peninsula of Michigan and northeast Wisconsin. Cooperative Research on Forest Soils, School of Forestry and Wood Products, Michigan Technological University.

Michigan Natural Features Inventory. 2007. Natural Communities of Michigan: Classification and Description. Report Number 2007-21. Lansing, Michigan.

Skogerboe, John. 2012. Selective Control of Eurasian Watermilfoil on Langford Lake, MI Using Early Spring Applications of 2,4-D. Unpublished. US Army Engineer Research and Development Center.

Langford Lake

23 July 2012



Attachment I
Page I-3

Summary of Aquatic Plant Percent Occurrence (2002-2012)

Data provided by John Skogerboe (2012), US Army Engineer Research and Development Center

Plant Species	2002	2006	2007	2008	2009	2010	2011	2012
Bidens beckii	3	1	0	0	2	3	3	3
Brasenia schreberi	9	7	6	6	9	7	6	8
Carex sp	NP	NP	NP	NP	0	NP	NP	NP
Ceratophyllum demersum	3	4	1	1	3	2	1	1
Ceratophyllum echinatum	NP	NP	NP	NP	0	NP	NP	NP
Dulichium arundinaceum	NP	NP	1	1	1	1	1	1
Eleocaris acicularis	1	NP	1	1	2	1	0	1
Eleocaris palustris	2	NP	NP	NP	NP	NP	NP	NP
Elodea canadensis	13	22	27	27	16	14	10	6
Equisetum fluviatile	NP	NP	0	0	2	1	1	1
Eriocaulon aquaticum	NP	NP	1	1	1	1	1	NP
Iris versicolor	NP	NP	0	0	NP	NP	NP	NP
Isoetes sp	NP	NP	2	2	3	3	2	3
Juncas pelocarpus	NP	NP	1	1	1	1	1	0
Juncas sp	NP	NP	1	1	1	1	NP	0
Littorella uniflora	NP	NP	1	1	NP	1	1	0
Lobelia dortmanna	3	NP	1	1	3	3	3	3
Myriophyllum farwellii	2	NP	1	0	1	1	1	1
Myriophyllum sibiricum	1	1	NP	NP	NP	NP	NP	NP
Myriophyllum spicatum	1	21	2	2	9	9	9	40
Myriophyllum tenellum	1	1	1	1	1	1	1	1
Najas flexilis	2	1	0	0	4	3	3	1
Nymphaea odorata	13	4	11	11	12	11	10	12
Nuphar lutea	8	0	6	6	8	5	4	5
Polyganum amphibium	2	0	0	1	1	1	1	1
Pontederia cordata	2	3	3	3	3	3	3	6
Potamogeton amplifolius	34	18	25	25	22	25	27	24
Potamogeton epihydrus	1	1	NP	NP	1	1	1	NP
Potamogeton foliosus	NP	NP	0	0	NP	NP	NP	1
Potamogeton gramineus	20	5	8	8	9	12	17	12
Potamogeton praelongus	NP	4	20	20	8	22	24	5
Potamogeton pusillus	NP	NP	NP	NP	1	NP	NP	NP
Potamogeton richardsonii	34	12	19	19	14	24	25	28
Potamogeton robbinsii	17	18	27	27	18	19	19	16
Potamogeton zosteriformis	21	10	13	13	4	5	6	13
Ranunculus flammula	NP	NP	NP	NP	1	1	0	1
Sagittaria cuneata	NP	NP	NP	NP	1	1	1	1
Sagittaria graminea	NP	NP	3	3	3	3	1	2
Scirpus acutus	12	3	5	5	6	5	5	8
Sparganium chlorocarpum	1	NP	NP	NP	NP	NP	NP	NP
Sparganium eurycarpum	1	1	1	1	1	1	1	2
Stukenia pectinatta	NP	NP	1	1	NP	1	1	NP
Utricularia gibba	NP	NP	2	NP	4	1	1	4
Utricularia intermedia	1	NP	NP	NP	4	1	1	4

Utricularia purpurea	NP	NP	1	NP	3	1	1	4
Utricularia vulgaris	1	6	3	3	4	4	2	4
Vallisneria americana	1	11	6	6	10	14	15	15
Zosterella dubia	NP	1	NP	NP	1	1	0	0
Chara	4	3	3	3	7	5	5	2
No plants	ND	54	53	53	54	52	52	42
Number Species	30	26	39	37	43	42	41	39

0-Plants were present at less than 1 % occurrence
NP- No plants were found in the lake
ND – No data was available

From: Madison, George (DNR) <MADISONG@michigan.gov>

Sent: Wednesday, July 25, 2012 7:32 AM
To: Shackleford, Ian K -FS; Doepker, Robert (DNR)
Cc: Jaimee Conroy (jaimeec@plmcorp.net)
Subject: RE: Langford Lake Management Plan: plant community information request

Hello Ian,

Michigan DNR Fisheries Division does not have any record of any plant communities of special concern in the Langford Lake watershed.

Respectfully,

George Madison, Fisheries Manager
Michigan Department of Natural Resources
West Lake Superior Management Unit
Baraga, Michigan 49908

From: Shackleford, Ian K -FS [mailto:ishackleford@fs.fed.us]
Sent: Monday, July 23, 2012 2:27 PM
To: Doepker, Robert (DNR); Madison, George (DNR)
Cc: Jaimee Conroy (jaimeec@plmcorp.net)
Subject: Langford Lake Management Plan: plant community information request

Hello Mr. Doepker and Mr. Madison,

This is Ian Shackleford, a botanist from the Ottawa National Forest. I am currently helping prepare a lake management plan for Langford Lake, following guidance from the DEQ. We are interested in treating the Eurasian watermilfoil in Langford Lake with fluridone herbicide in 2013. The DEQ guidance for lake management plans directs me to ask you if you are aware of any plant communities of local concern associated with Langford Lake.

c. Plant communities – Contact the DNR Fisheries and DNR Wildlife to determine if there are plant communities of local concern associated with the waterbody proposed for chemical treatment. Plant community information may also be gathered from a limnologist or botanist that is familiar with the waterbody. Reviews may be obtained from:

- *the DNR Fisheries by letter or email request (see attached contact information). Allow 4-6 weeks for these reviews.*
- *the DNR Wildlife by letter or email request. Contact the District Supervisor and local wildlife biologist (see attached contact information). Allow 4-6 weeks for these reviews.*

I have drafted a Plant Community section for our Lake Management Plan. I pasted it below:

An attached map shows all the plant habitat types around Langford Lake identified by the ONF Ecological Classification System (ECS). The Ottawa National Forest uses habitat types described by Coffman et al. (1984). Seven different habitat types were identified:

- *ATD (Acer-Tsuga-Dryopteris). Sugar maple, hemlock, basswood, beech, yellow birch, red maple, american elm. Podzolized or well developed sand to loam textured soils. Generally morainic in origin, but may be covered by eolian deposit, or may occur on deep eolian deposits over outwash sands.*
- *AVO (Acer-Viola-Osmorhiza). Sugar maple, basswood, white ash, yellow birch, ironwood, hemlock, american elm. Loam to silt loam soils. Landform is usually moranic in origin, rolling, and often loess capped.*
- *TMC (Tsuga-Maianthemum-Coptis). Hemlock, red maple, sugar maple, yellow birch, balsam fir, white spruce, white cedar. On soils of various textures with impeded soil drainage, on any landform. The Vaccinium phase occurs on lacustrine sands, usually with QAE, AQV, or TMV. The Dryopteris phase occurs on loamy soils with ATD habitat type.*
- *TTS (Tsuga-Thuja-Sphagnum). Hemlock, white cedar, balsam fir, black spruce, red maple. On soils with excessive soil moisture. Usually the soil is organic (> 6") over mineral, but the sphagnum may rarely occur directly on mineral soil. Can occur within any landform.*
- *FMC (Fraxinus-Mentha-Carex). Black ash, american elm, red maple, balsam fir. Occurs on soils with excessive soil moisture of various textures. The Carex phase occurs on organic over mineral soils deposited in active floodplains.*
- *FI (Fraxinus-Impatiens). White ash, red maple, sugar maple, black ash, balsam fir. Occurs on loam to clay texture soils with excessive soil moisture. Usually found in upland drainways within morainic landforms.*
- *PCS (Picea-Chamadaphne-Sphagnum). Black spruce, tamarack, white cedar. Occurs on deep organic soils. Lower pH than TTS.*

The plant habitat types, as well as field visits by Forest Service staff, can also help identify the plant community types (MNFI 2007). The ATD, AVO, and TMC habitats together fall within mesic northern forest. TTS corresponds to rich conifer swamp. FMC and FI are northern hardwood swamp. PCS is poor conifer swamp. From past aquatic plant surveys, we also know Langford Lake includes submergent marsh and emergent marsh. The riparian areas along the lake also include some northern shrub thicket. Please see MNFI (2007) for descriptions of these plant communities.

Online MNFI data were also checked and no plant communities of local concern were documented near Langford Lake.

If you have any other information about plant communities of local concern near Langford Lake, please let me know!

Ian

Ian Shackleford, Botanist
US Forest Service, Ottawa National Forest
E6248 US 2, Ironwood, MI 49938
(906)932-1330 x331, cell (906) 285-4329
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Attachment J

(Section III. Biological Characteristics of the Waterbody)

Description of Special Concern, Threatened, or Endangered Species

10 December 2012

On 6/2/2012 and 12/10/2012 Ian Shackleford (US Forest Service) queried the online Michigan National Features Inventory Web Database (http://mnfi.anr.msu.edu/search/query.cfm). The query submitted was for all data within the five sections that include Langford Lake (T45N R41W Sections 19, 20, 29, 30; T45N R42W Section 25). All are in Gogebic County. Four records were returned: one bald eagle (State Special Concern) and three common loon (State Threatened).

Element Occurrence Code Common Name Scientific Name	Observed	EO Data	Site of Observation Managed Area Town Range Section	Best Documentation of EO
ABNKC10010*001*MI Bald eagle Haliaeetus leucocephalus	First = 1961 Last = 2003	1982: 2 yg. 1982-85: 1 yg. 1986: (a) 2 yg. 1987: 2 ad. 1988: (c) 1 yg. 1989: (c) 2 yg. 1990: (b) 1 yg. 1991: (c) 2 yg. 1992-93: (c) 2 yg banded. 1994-06-08: (c) 1 yg. 07-14: gone. 1995: (d) ad sitting. 1996: pr present obs. incubating (sitting). No yg raised (d). 1997 (d) empty. 1998: (d) Nest productive w/ 2 yg. banded. 1999: Inactive. 2000-06-03: (d) Nest productive w/ 1 yg. banded + 1 addled egg collected. 2001: (d) Nest occupied but failed; adult incubating. 2002: (d) 2 yg. 2003: (d) 1 yg.	Langford Lake Ottawa National Forest 45N 41W Sec 19,20,29,30 Mapping Precision S	
ABNBA01030*275*MI Common loon Gavia immer	First = 1988? Last = 2009	1986: 0 ad, 0 eggs, 1yg; 1988: 1 pr, 1 yg; 1989: 1 pr, 2 yg fledged; 1990: 1 pr, 1 yg fledged; 1991: 1 pr, 0 yg fledged; 1992: 1 pr, 1 yg fledged; 1993: 1 pr, 1 yg fledged; 1994: 1 pr, 1 yg fledged; 1995: 1 pr, 2 yg fledged; 1996: 1 pr, 1 yg fledged. Langford/Little Langford - 1996: 1 pair, 1 nest, 2 hatch, 1 fledgling. 1997: 1 pair, 1 nest, 1 hatch, 1 fledgling. 1998: 1 pair, 1 nest, 1 hatch, 1 fledgling. 1999: 1 pair, 1 nest, 1 hatch, 1 fledgling. 2000: 1 pair, 1 nest, 1 hatch, 1 fledgling. 2001: 1 pair, 1 nest, 0 fledglings. 2002: 1 pair, 1 nest, 1 hatch, 1 fledgling. 2003: 2 pair. 2004: 1 pair. 2005: 1 pair, 1 nest, 0 hatch. 2006: 1 pair, 1 nest, 0 hatch. 2007: 1 pair, 0 nest. 2009: 1 pair, 0 nests.	Langford Lake - Gogebic County Ottawa National Forest 45N 41W Sec 19,20,29,30 Mapping Precision M	Edde, J. 1986. Ottawa National Forest Loon Survey Data, 1983-1986.
ABNBA01030*086*MI Common loon Gavia immer	First = 1985 Last = 2001	1985: 2 eggs. 1986: 2 ad, 1 egg, 1 yg. 87-06-14: 2 ad, 2 yg. 1995: 1 nest reported. 2001: 1 pair, 1 nest. Langford/Little Langford - 1996: 1 pair, 1 nest, 2 hatch, 1 fledgling. 1997-2000: 1 pair, 1 nest, 1 hatch, 1 fledgling. 2001: 1 pair, 1 nest, 0 fledglings. 2003: 2 pair.	Little Langford Lake - Gogebic County Ottawa National Forest 45N 42W Sec 24,25 Mapping Precision M	Michigan Loon Preservation Association. 1997-2001. Michigan Loon Watch Report and map.
ABNBA01030*850*MI Common loon Gavia immer	First = 2002 Last = 2009	2002: 1 pair, 1 nest, 1 hatch, 1 fledgling. 2003: 1 pair. 2005: 0 pairs. 2008: 1 pair, 1 nest, 2 hatch, 1 fledgling. 2009: 1 pair, 1 nest, 1 hatch, 1 fledgling.	Cornelia Lake - Gogebic County 45N 42W Sec 25	Michigan Loon Preservation Association. 2002-2006. Loon Report sent by Joann Williams.

Three fields with no data omitted: general site description, directions to site, and protection comments.

John Skogerboe (US Army Corp of Engineers) has found ***Myriophyllum farwellii*** (Farwell's water-milfoil, State Threatened) during grid surveys of Langford Lake (see Attachment I). He detected it at two points in 2002, and single points in 2007, 2009, 2010, and 2011. He also found it during the AVAS survey in 2012 (Attachment F).

The US Forest Service also maintains spatial databases of rare species locations. The databases were checked December 11, 2012. In addition to the *Myriophyllum farwellii,* there is a site of a rare lichen from National Forest land on the west shore of Langford Lake (T45NR42W Section 25). Dr. Cliff Wetmore, while doing a lichen survey within the Ottawa National Forest in 2004, found the crustose lichen *Caloplaca parvula* (a firedot lichen) growing on a black ash by the lakeshore, within an ash bog. There are no State-listed lichens in Michigan, although *Caloplaca parvula* is a Regional Forester Sensitive Species on the Ottawa National Forest (USFS 2012) and was mentioned in Fryday and Wetmore (2002). As of 2005 this was one of only two known sites of this lichen in Michigan (Wetmore 2005). As the lichen occurs on land it is unaffected by aquatic plants or their management in Langford Lake.

According to USFS data, there are eleven records of *Myriophyllum farwellii* in Gogebic County:

Ottawa #	Site name	Observer name	Last observed date
260	Langford Lake	John Skogerboe	2012
261	Thousand Island Lake	John Skogerboe	2002
266	Crooked Lake	John Skogerboe	2002
269	Tamarack Lake	John Skogerboe	2002
574	Bobcat Lake	Ian Shackleford	9/7/2009
576	Elbow Lake	Susan Trull & Melanie Fullman	9/3/2009
469	McDonald Lake	Susan Trull	8/30/2011
657	Thrush Lake	Sue Trull	8/28/2012
619	Redboat Lake	Andrea Corpolongo-Smith	9/5/2012
628	Ridge Lake	Ian Shackleford	9/12/2011
New	FR 6834 pond	Ian Shackleford	7/24/2012

This data has been shared with MNFI and the University of Michigan Herbarium, but is not yet updated in the MNFI data.

References

Fryday, Alan M., and Clifford M. Wetmore. 2002. Proposed list of rare and/or endangered lichens in Michigan. Michigan Botanist 41: 89-93.

Michigan Natural Features Inventory. 2012. Michigan National Features Inventory Web Database. Lansing, Michigan. Online http://mnfi.anr.msu.edu/search/query.cfm).

U.S. Forest Service. 2012. Regional Forester Sensitive Species list 2011 Maintenance Update. USDA Forest Service, Eastern Region. Milwaukee, Wisconsin.

Skogerboe, John. 2012. Selective Control of Eurasian Watermilfoil on Langford Lake, MI Using Early Spring Applications of 2,4-D. Unpublished. US Army Engineer Research and Development Center.

Wemore, Clifford. 2005. Lichens of Ottawa National Forest. Unpublished contract with the US Forest Service. Purchase Order 43-54A7-4-0067. Ironwood, Michigan.

Target Species Map

Areas of Eurasian watermilfoil growth

Attachment K

LANGFORD LAKE

481 Surface Acres

Gogebic County

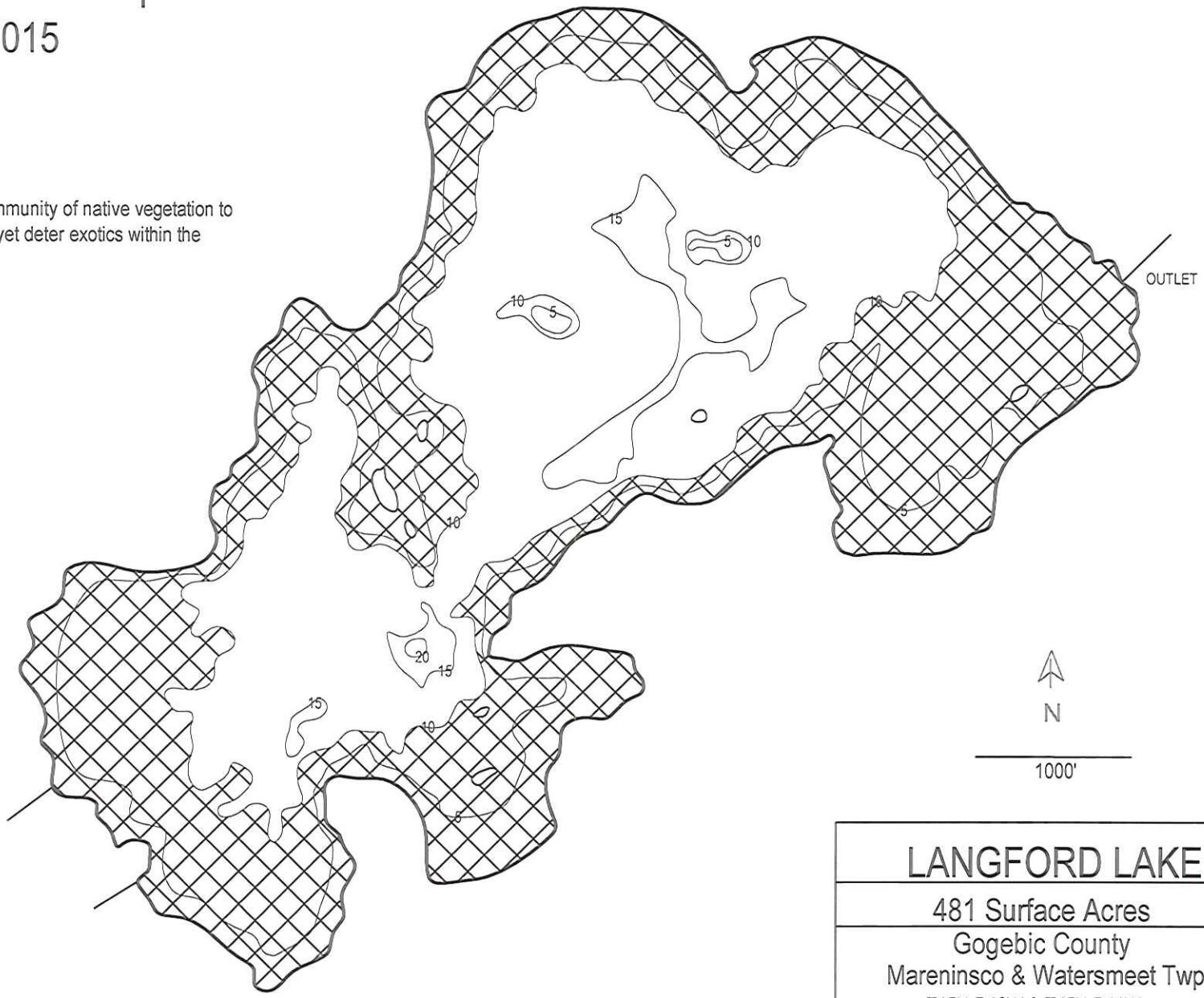
Mareninsco & Watersmeet Twps

T45N R42W & T45N R41W

PLM Lake & Land Mgmt, P.O. Box 132, Caledonia, MI 49316 Phone (800) 382-4434

Management Goal Map
2013-2015

Promote a mixed community of native vegetation to non-nuisance levels yet deter exotics within the area.



Attachment L

LANGFORD LAKE

481 Surface Acres

Gogebic County

Mareninsco & Watersmeet Twps

T45N R42W & T45N R41W

PLM Lake & Land Mgmt, P.O. Box 132, Caledonia, MI 49316 Phone (800) 382-4434

Langford Lake Eurasian watermilfoil timeline

Langford Lake is a 481-acre lake in Gogebic County, Michigan. Maximum depth 22 feet. Most of the lake is less than 16 feet deep. 10% of the lakeshore is Ottawa National Forest, including the only public boat launch and Langford Lake Campground.

2002

- July 2002. John Skogerboe (US Army Corp of Engineers) conducts a 100-meter grid survey of Langford Lake, as part of a 16-lake survey in Watersmeet Township. Langford Lake is the most diverse of sampled lakes, with 31 different aquatic plants documented. He discovers Eurasian watermilfoil (*Myriophyllum spicatum*) at boat launch, however. "The infestation at Langford Lake consisted of scattered plants along a 100-yard band on either side of the boat ramp. The infestation extended 50 feet out from the ramp."

2003

- July 2003. First EW milfoil herbicide treatment (DEQ permit # 03-98-0162-0). Langford Lake Milfoil Association treats 2.5 acres treated at boat launch with Navigate aquatic herbicide (granular 2,4-D), applied with MDEQ permit by licensed contractor. $2,150
- October 2003. More EW milfoil is found, and LLROA has another 2 acres treated in one of the south bays of the lake. $1,620.

2004

- June 2004. LLROA has scattered sites of EW milfoil treated (permit # 04-98-0070-0). 1.5 acres total. $1,185.
- September 2004. LLROA has another 4.3 acres of scattered EW milfoil treated. $2,698.

2005

- June 2005. EW milfoil found in several spots throughout lake. 4.85 acres treated (permit # 05-98-0046-0). $3,059.
- August 2005. More EW milfoil found in several locations. 4.33 acres treated. $3,470.
- September 8, 2005. Michigan DEQ employees Laura Esman & Julie Sims conduct an AVAS plant survey on Langford Lake.

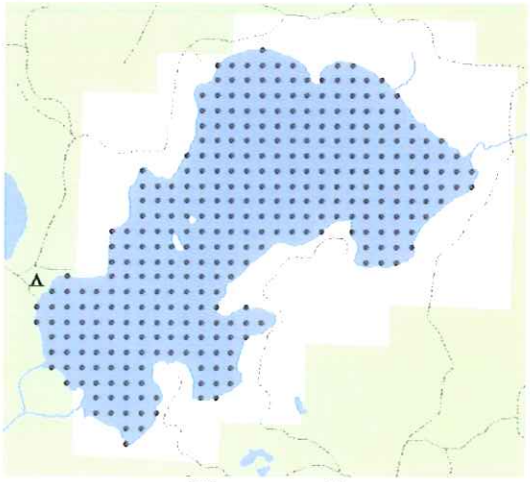
2006

- May 2006. US Forest Service agrees to start helping with control of EW milfoil.
- May 20-30, 2006. Barb Gajewski, under FS contract, maps EW milfoil in Langford Lake.
- June 8, 2006. US Forest Service contracts with Northern Environmental to treat 16.5 acres treated throughout lake (based on 2005 survey). DEQ permit # 06-98-0167-0. Much more than 16.5 acres is observed, however. $6,435.
- July 6, 2006. Barb Gajewski maps many sites of EW milfoil in a post-treatment survey.
- July 26 & 27, 2006. John Skogerboe returns to Langford Lake with Bill Ratajczyk of Applied Biochemists, master distributor of Navigate herbicide. John recommends a grid survey of Langford Lake be repeated, to map milfoil and see if any changes to aquatic plant community have occurred.
- September 13 & 14, 2006. FS pays for Northern Environmental to conduct a 75-meter grid survey of Langford Lake.

Attachment M

Langford Lake Eurasian watermilfoil timeline

- November 2006. John Skogerboe proposes a research project to use early-season treatment of EW milfoil in Langford Lake. The high aquatic diversity and the demonstrated commitment of the Lake Association made Langford a good candidate for a research project.



75-meter grid

2007

- Army Corp early spring 2,4-D experiment year 1 of 3.
- February 2007. Nufarm Inc. (manufacturer of Navigate) agrees to donate Navigate herbicide.
- March 2007. Marine Biochemists, sister company of Applied Biochemists, agrees to be applicator for Langford Lake treatment for free. LLROA arranges for MDEQ permit ($1,500).
- May 7 & 8, 2007. Marine Biochemists applies 17,000 pounds (8.5 tons) of Navigate to 111 acres of Langford Lake. Permit # 07-98-1080-0.
- May to June 2007. LLROA collects weekly water samples for measurement of herbicide residue.
- June 11-13, 2007. John Skogerboe returns to Langford Lake for post-treatment monitoring.
- June 11-14, 2007. US Forest Service conducts a fish survey of Langford Lake.
- August 2007. John Skogerboe returns for more post-treatment monitoring. Results disappointing.

2008

- Army Corp early spring 2,4-D experiment year 2 of 3.
- May 19, 2008: Marine Biochemists applies 17,050 pounds (8.5 tons) of Navigate to 112.8 acres (08-98-0775-0).
- October 21, 2008: Marine Biochemists adds a fall treatment and applies 750 pounds of Navigate to 4 acres.

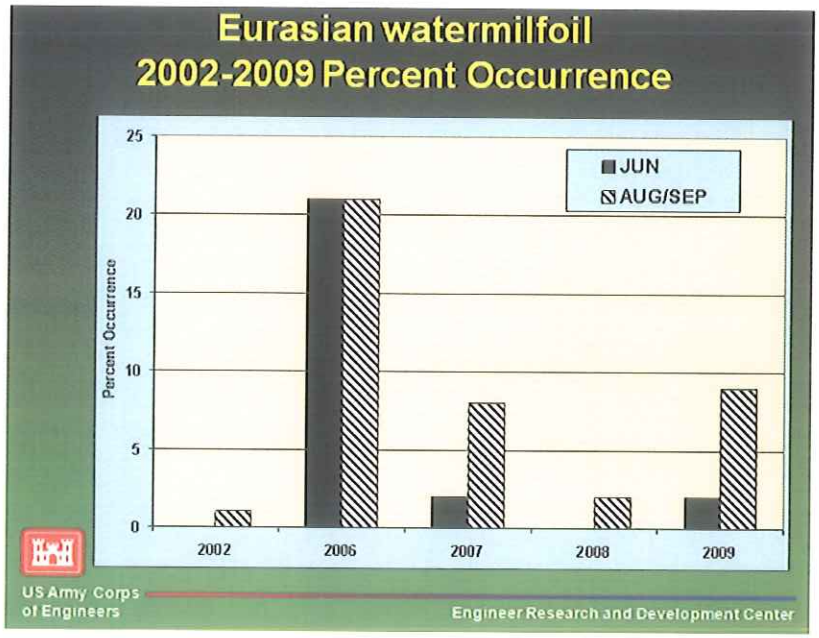
2009

- Army Corp early spring 2,4-D experiment year 3 of 3.
- May 12, 2009: Marine Biochemists applies 5,650 pounds (2.8 tons) of Navigate to 35.1 acres (09-98-1346-0).
- October 7, 2009: Marine Biochemists applies 3,195 pounds (1.6 tons) of Navigate to 18.8 acres.

Langford Lake Eurasian watermilfoil timeline

Conclusions

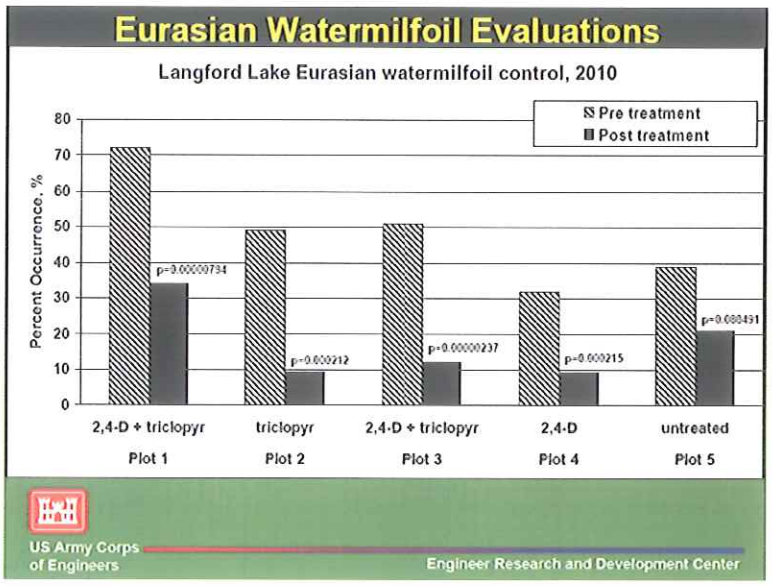
- *Eurasian watermilfoil has been reduced both in frequency and density.*
- *Yearly treatment requirements to maintain control have been reduced.*
- *The native aquatic plant community including many native dicots have not been adversely affected.*



2010

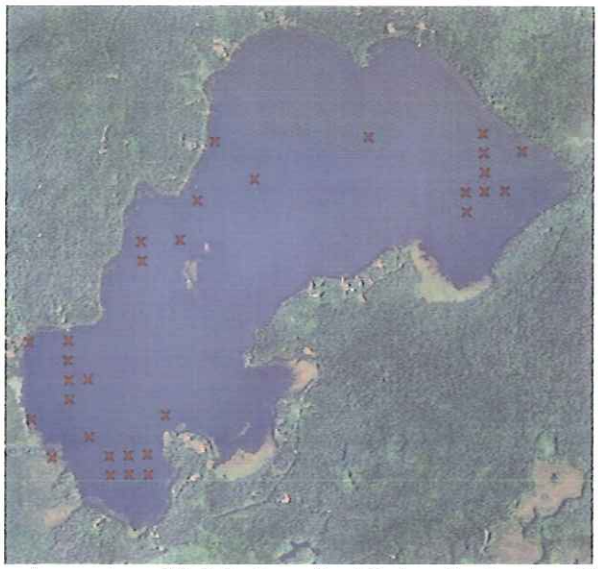
- Army Corp arranges an experimental treatment to compare the effects of Navigate (2,4-D) and Navitrol (triclopyr) aquatic herbicides. Nufarm again donates herbicide and Marine Biochemists donates application.
- June 10, 2010: Marine Biochemists applies 4,519 pounds (2.3 tons) of Navigate and 4,417 pounds of Navitrol (2.2 tons) to 40.6 acres total. Permit # 10-98-1815-0.
- Results show similar EW milfoil dieback from Navigate and Navitrol. No difference between one, the other, or both. EW milfoil remains frequent fall 2010.

Langford Lake Eurasian watermilfoil timeline



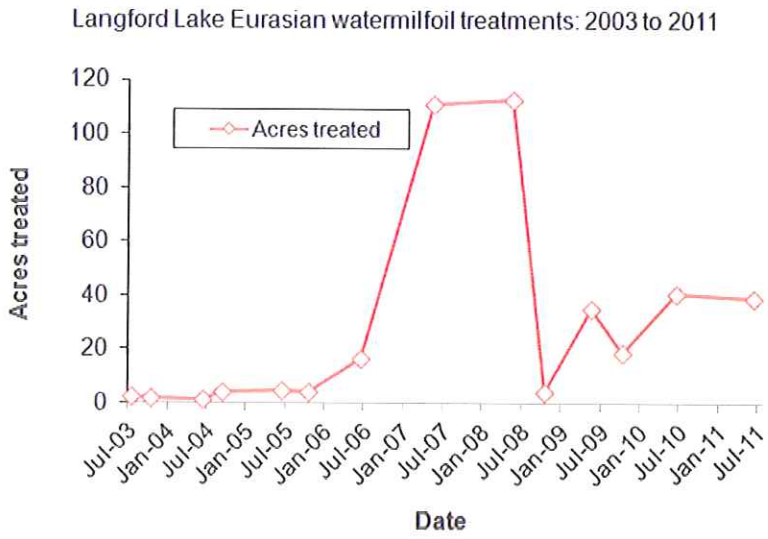
2011

- Langford Lake Milfoil Association receives a $20,000 grant from the Gogebic County Resource Advisory Committee.
- June 14, 2011: Marine Biochemists applies 7150 pounds of Navigate to ten treatment sites, 39 acres total. These are the remaining bags from the Toumey Nursery, leftover from the Army Corp herbicide studies begun in 2007. Application cost $7,500, paid for from the RAC grant. Permit # 11-98-1569-0.
- Follow-up surveys by John Skogerboe find very little long-term effect from 2,4-D treatments. Eurasian watermilfoil dies, but comes back in same locations. Ongoing use of 2,4-D has kept EW milfoil at around 40 acres.



Eurasian watermilfoil in Langford Lake, September 2011

Langford Lake Eurasian watermilfoil timeline



2012

- Langford Lake Milfoil Association, US Forest Service, Invasive Species Control Coalition of Watersmeet (ISCCW), and Army Corp of Engineers (John Skogerboe) discuss future plans for Langford Lake.
- Instead of doing another year of spot treatments with 2,4-D or triclopyr, we decide to plan for a whole-lake treatment with fluridone herbicide in 2013.
- No herbicide application in Langford Lake in 2012, the first year with no herbicide since 2002.
- US Forest Service awards a contract ($2,000) to help prepare a Lake Management Plan to **PLM Lake & Land Management** of Alto, Michigan. Website www.plmcorp.net. Ian has been working with Jason Broekstra and Jaimee Conroy.
- John Skogerboe agrees to do the special AVAS plant survey required by the DEQ.
- Jim & Judy Donlan collect required transparency (Secchi disk) data.
- ISCCW collects required spring alkalinity & phosphorus data. They are also planning an optional PlanTEST to help determine of susceptibility of EW milfoil from Langford Lake to fluridone.
- US Forest Service and Langford Lake Milfoil Association sign an agreement (12-PA-11090700-023), planning the remaining $12,500 of RAC grant for herbicide application in 2013.
- DEQ permit application and Lake Management Plan must be submitted by January 1, 2013.
- Lake Association should send a letter to all property owners on Langford Lake.

DRAFT REPORT
NOT FOR GENERAL DISTRIBUTION

5 November 2012

Selective Control of Eurasian Watermilfoil on Langford Lake, MI Using Early Spring Applications of 2,4-D

John Skogerboe[1]

[1]USAERDC, Waterways Experiment Station, Eau Galle Ecology Research Facility,
W500 Eau Galle Dam Rd, Spring Valley, (651) 325- 8181

BACKGROUND

The US Army Engineer Research and Development Center (ERDC) is currently developing cooperative research with the Minnesota Department of Natural Resources, the Wisconsin Department of Natural Resources, the US Forest Service, and the Aquatic Ecosystem Restoration Foundation to demonstrate aggressive whole lake management of invasive exotic plants to restore and protect native aquatic plant communities. One management strategy currently being evaluated is early season application of aquatic herbicides to selectively control Eurasian watermilfoil (*Myriophyllum spicatum* L.). Eurasian watermilfoil begins to actively grow in early spring soon after ice out, while many native plants are dormant. Herbicide applied in early spring can allow a window of application that minimizes exposure to native plants, and thus reduces likelihood of plant injury (Skogerboe and Getsinger 2006). Additional advantages of early spring applications include younger, smaller target plants that are more susceptible to aquatic herbicides, less biomass eliminating concerns for dissolved oxygen depletion, and slower herbicide degradation resulting in longer contact times. The herbicide 2,4-D, applied as Navigate (granular formulation), is selective for dicotyledon (dicots) plants and has been frequently used to selectively control Eurasian watermilfoil (Parsons et al. 2001) where native plant communities are dominated by

Monocotyledons (monocots). Early spring applications may improve herbicide performance and increase selectivity particularly when native dicots are present.

Langford Lake is 450 acres located in Gogebic County near Watersmeet MI, in the upper peninsula. Eurasian watermilfoil was first discovered in Langford Lake by ERDC in July 2002 (Skogerboe et al 2003) while conducting a comprehensive aquatic plant survey using the point intercept method (Madsen 1999). At the time Eurasian watermilfoil was discovered, the infestation was limited to 1 to 2 acres near the public access boat ramp. Subsequent control measures have been limited to spot treatments with granular 2,4-D applied to Eurasian watermilfoil visible at the surface and has resulted in an increase in the area infested to between 150 and 200 acres. More aggressive management measures including targeting larger areas in early spring and incorporating improved survey techniques are needed to gain control of Eurasian watermilfoil and protect the native plant population in Langford Lake.

The native aquatic plant community in Langford Lake was quantitatively evaluated in July 2002 and August 2006 using the point intercept method and the Wisconsin Floristic Quality Assessment (WFQA) system (Griffin and Bernthal 2003). Based on the survey of 16 lakes in Gogebic County in 2002, Langford Lake had the second highest WFQA rating of 37.1. Langford Lake had four species with a coefficient of conservatism (CoC) of 9 or 10, and nine species with a CoC of 7 or 8. A rating of 9 or 10 include taxa restricted to a narrow range of synecological conditions, with low tolerance to disturbance, and a rating of 7 and 8 include taxa found in a narrow range of plant communities, but can tolerate only minor disturbance. Native plants included 9 species of dicots including 3 species of native milfoil. An uncontrolled Eurasian watermilfoil infestation could have significant adverse impacts on a native plant community sensitive to disturbance and could act as a source for infestation of

numerous nearby lakes including the Sylvania Wilderness Area and Notre Dam Ecological Research Facility. During the period from 2002 to 2006 a series of small scale operational herbicide treatments were conducted by lake residents using a certified herbicide applicator. During this period Myriophyllum spicatum increased in percent occurrence from 1 to 21 percent which included 39% of sites with aquatic vegetation.

OBJECTIVES

The objective of this study is to evaluate early spring application of 2,4-D to selectively control Eurasian watermilfoil and protect a threatened, relatively undisturbed native plant community.

APPROACH

Herbicide Applications

The initial herbicide application included an early spring application of 2,4-D applied as Navigate and will target all know areas of Eurasian watermilfoil. Areas infested with Eurasian watermilfoil were determined based on a comprehensive plant survey in April 2007 including a point intercept survey combined with hydro acoustics and underwater video camera. The herbicide was applied in spring 2007 when water temperatures are approximately 12C (55°F), which generally occurs in early May. The herbicide 2,4-D was applied as Navigate to all of the infested areas at a rate of 150 to 200 lbs/acres, and additional herbicide applications were conducted in following years as needed (Table 1). Additional herbicide applications were conducted from 2008 to 2011.

Aquatic Plant Community Evaluations

Plant community assessments were conducted to quantify the effect of whole lake management strategies applied in early spring on both target (Eurasian

watermilfoil) and non target species (native species). Pretreatment plant community assessments were conducted in August of 2002 and 2006 using the point intercept method, and will provide background data to evaluate the effects of future herbicide treatments on native plant diversity. Plant evaluations in following years will be conducted in April, prior to herbicide application, and again in August or September.

Plant species percent occurrence and diversity were evaluated using the point intercept method (Madsen 1999). A sample grid (75 m x 75 m) was developed for each lake using Garmin MapSource United States topographic software and downloaded to a Garmin or Lowrance GPS. At each sample point a double rake head attached to a rope was thrown approximately 3 to 5 m from the boat and dragged along the bottom back to the boat. The species contained on the rake head will be identified and recorded. Changes in frequency of native and exotic plant species will be analyzed using Chi-squared statistic (Madsen 1999). Changes in the number of native and exotic plant species per sampling station will be analyzed using a t-test (Madsen 1999). Changes in the WFQA will also be quantified.

The plant community was also evaluated using Biosonics hydro acoustic equipment to measure plant community density and structure. Both the MN and WI DNR are currently evaluating this method as a means of quantifying the effects of invasive plants and management techniques on native plant communities and fisheries habitat.

Results

Percent occurrence of Myriophyllum spicatum was reduced from 21% in 2006 to 2 in and maintained at less than 10% through 2011 (Table 2). Myriophyllum spicatum percent occurrence increased to 40% in 2012 when no herbicide applications were conducted. Native aquatic plant community percent occurrence was not adversely affected. Hydro acoustic data showed that plant density was also not negatively affected.

References

Crowell, W.J., N. Troelstrup, L. Queen, and J. Perry. 1994. Effects of harvesting on plant communities dominated by Eurasian watermilfoil Lake Minnetonka, MN. Journal of Aquatic Plant Management 32:56-60.

Green, W.R. and H.E. Westerdahl. 1990. Response of Eurasian watermilfoil to 2,4-D concentrations and exposure times. J. Aquat. Plant Manage. 28: 27-32.

Griffin, M.A., and Bernthal, T.W. 2003. "Development of a Floristic Quality Assessment Methodology for Wisconsin." Final Report to USEPA Region V, Wetland Grant #CD975115-01-0. Madison, WI.

Madsen. 1999. Point Intercept and Line Intercept Methods for Aquatic Plant Management. APCRP Technical Notes Collection (TN APCRP-MI-02). U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Skogerboe, J.G., A.G. Poovey, K.D. Getsinger, and G.K. Kudray. 2003. Invasion of Eurasian Watermilfoil in Lakes of the Western Upper Peninsula, Michigan. APCRP Technical Report (ERDC/EL TR-03-10). U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Skogerboe, J.G., and K.D. Getsinger. 2006. Selective control of Eurasian watermilfoil and curly-leaf pondweed using low doses of endothall combined with 2,4-D. APCRP Technical Notes Collection (ERDC/TN APCRP-CC-05). U.S. Army Engineer Research and Development Center, Vicksburg, MS

Table 1. Summary of Aquatic Herbicide Treatments in Langford Lake, MI (2007-2012)

Year	Area Treated acres	Herbicide	Application Rate lbs/acre	Application Rate mg/L ae	Date Treated
2007	110	2,4-D	150	1.2	8 May
	6	2,4-D	200	1.6	8 May
Total	116		17700		
2008	105	2,4-D	150	1.2	18 May
	6	2,4-D	200	1.6	18 May
Total	111		16950		
2008	5	2,4-D	150	1.2	13 October
Total			750		
2009	25	2,4-D	150	1.2	12 May
Total			3750		
2009	18	2,4-D	150	1.2	14 October
Total			2700		
2010	10	2,4-D + triclopyr	114 + 112	1.0 + 0.5	10 June
	5	triclopyr	287	1.5	10 June
	10	2,4-D + triclopyr	114 + 112	1.0 + 0.5	10 June
	13	2,4-D	171	3	10 June
Total	38		4503+3675		
2011	2.5	2,4-D	200	2.0	14 June
	4.5	2,4-D	194	1.7	14 June
	4.0	2,4-D	194	1.7	14 June
	3.5	2,4-D	194	1.7	14 June
	4.0	2,4-D	197	2.3	14 June
	3.5	2,4-D	171	1.2	14 June
	3.5	2,4-D	154	1.2	14 June
	3.5	2,4-D	197	2.3	14 June
	6.0	2,4-D	197	2.3	14 June
	4.0	2,4-D	137	1.2	14 June
Total	39.0		7173		
2012	0				

Table 2. Summary of Aquatic Plant Percent Occurrence (2002-2012)

Plant Species	2002	2006	2007	2008	2009	2010	2011	2012
Bidens beckii	3	1	0	0	2	3	3	3
Brasenia schreberi	9	7	6	6	9	7	6	8
Carex sp	NP	NP	NP	NP	0	NP	NP	NP
Ceratophyllum demersum	3	4	1	1	3	2	1	1
Ceratophyllum echinatum	NP	NP	NP	NP	0	NP	NP	NP
Dulichium arundinaceum	NP	NP	1	1	1	1	1	1
Eleocaris acicularis	1	NP	1	1	2	1	0	1
Eleocaris palustris	2	NP	NP	NP	NP	NP	NP	NP
Elodea canadensis	13	22	27	27	16	14	10	6
Equisetum fluviatile	NP	NP	0	0	2	1	1	1
Eriocaulon aquaticum	NP	NP	1	1	1	1	1	NP
Iris versicolor	NP	NP	0	0	NP	NP	NP	NP
Isoetes sp	NP	NP	2	2	3	3	2	3
Juncas pelocarpus	NP	NP	1	1	1	1	1	0
Juncas sp	NP	NP	1	1	1	1	NP	0
Littorella uniflora	NP	NP	1	1	NP	1	1	0
Lobelia dortmanna	3	NP	1	1	3	3	3	3
Myriophyllum farwellii	2	NP	1	0	1	1	1	1
Myriophyllum sibiricum	1	1	NP	NP	NP	NP	NP	NP
Myriophyllum spicatum	1	21	2	2	9	9	9	40
Myriophyllum tenellum	1	1	1	1	1	1	1	1
Najas flexilis	2	1	0	0	4	3	3	1
Nymphaea odorata	13	4	11	11	12	11	10	12
Nuphar lutea	8	0	6	6	8	5	4	5
Polyganum amphibium	2	0	0	1	1	1	1	1
Pontederia cordata	2	3	3	3	3	3	3	6
Potamogeton amplifolius	34	18	25	25	22	25	27	24
Potamogeton epihydrus	1	1	NP	NP	1	1	1	NP
Potamogeton foliosus	NP	NP	0	0	NP	NP	NP	1
Potamogeton gramineus	20	5	8	8	9	12	17	12
Potamogeton praelongus	NP	4	20	20	8	22	24	5
Potamogeton pusillus	NP	NP	NP	NP	1	NP	NP	NP
Potamogeton richardsonii	34	12	19	19	14	24	25	28
Potamogeton robbinsii	17	18	27	27	18	19	19	16
Potamogeton zosteriformis	21	10	13	13	4	5	6	13
Ranunculus flammula	NP	NP	NP	NP	1	1	0	1
Sagittaria cuneata	NP	NP	NP	NP	1	1	1	1
Sagittaria graminea	NP	NP	3	3	3	3	1	2
Scirpus acutus	12	3	5	5	6	5	5	8
Sparganium chlorocarpum	1	NP	NP	NP	NP	NP	NP	NP
Sparganium eurycarpum	1	1	1	1	1	1	1	2
Stukenia pectinatta	NP	NP	1	1	NP	1	1	NP
Utricularia gibba	NP	NP	2	NP	4	1	1	4
Utricularia intermedia	1	NP	NP	NP	4	1	1	4

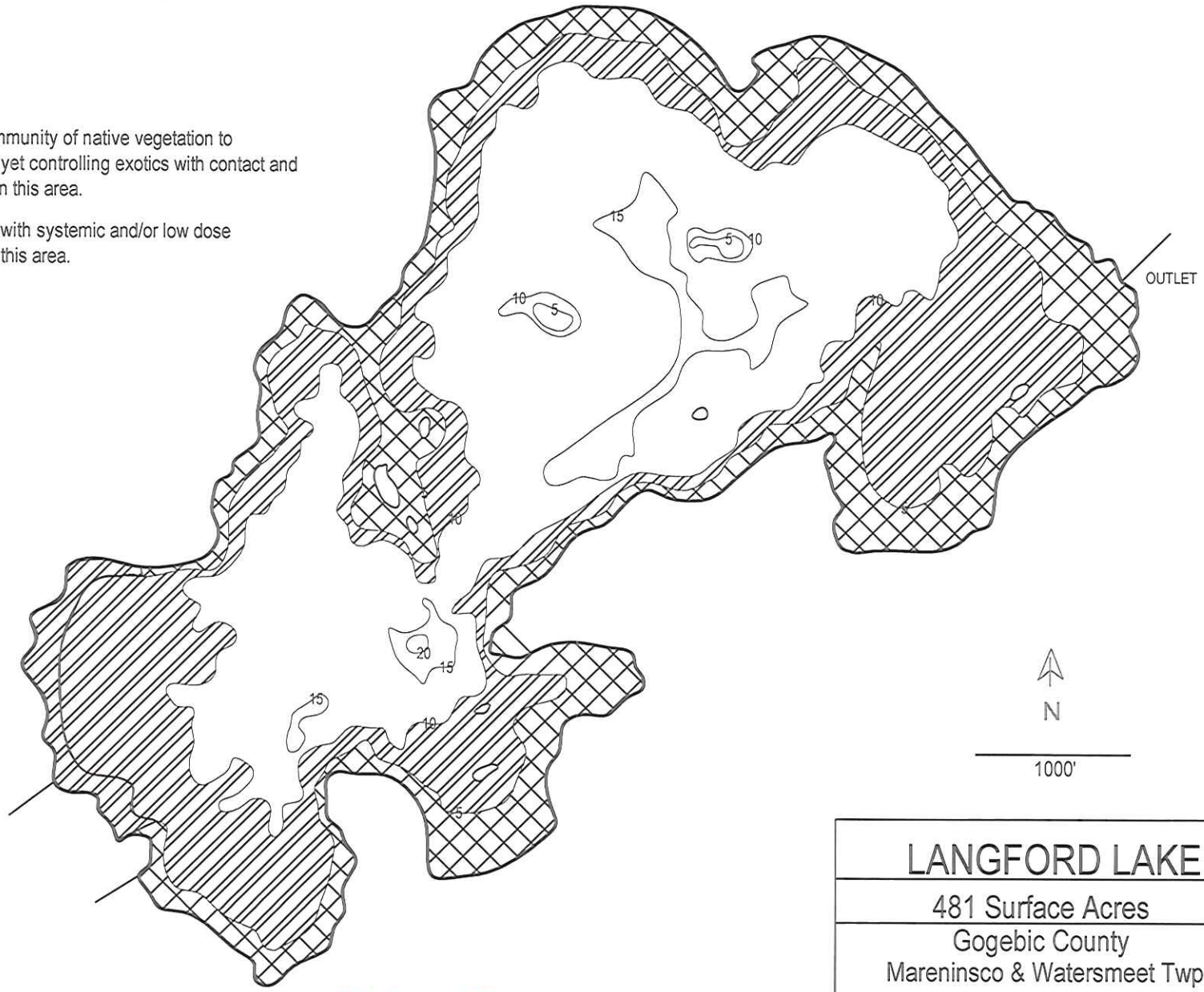
Utricularia purpurea	NP	NP	1	NP	3	1	1	4
Utricularia vulgaris	1	6	3	3	4	4	2	4
Vallisneria americana	1	11	6	6	10	14	15	15
Zosterella dubia	NP	1	NP	NP	1	1	0	0
Chara	4	3	3	3	7	5	5	2
No plants	ND	54	53	53	54	52	52	42
Number Species	30	26	39	37	43	42	41	39

0-Plants were present at less than 1 % occurrence
NP- No plants were found in the lake
ND – No data was available

Annual Vegetation Map 2013-2015

Promote a mixed community of native vegetation to non-nuisance levels, yet controlling exotics with contact and systemic herbicides in this area.

Control exotic plants with systemic and/or low dose contact herbicides in this area.



Attachment N

LANGFORD LAKE

481 Surface Acres

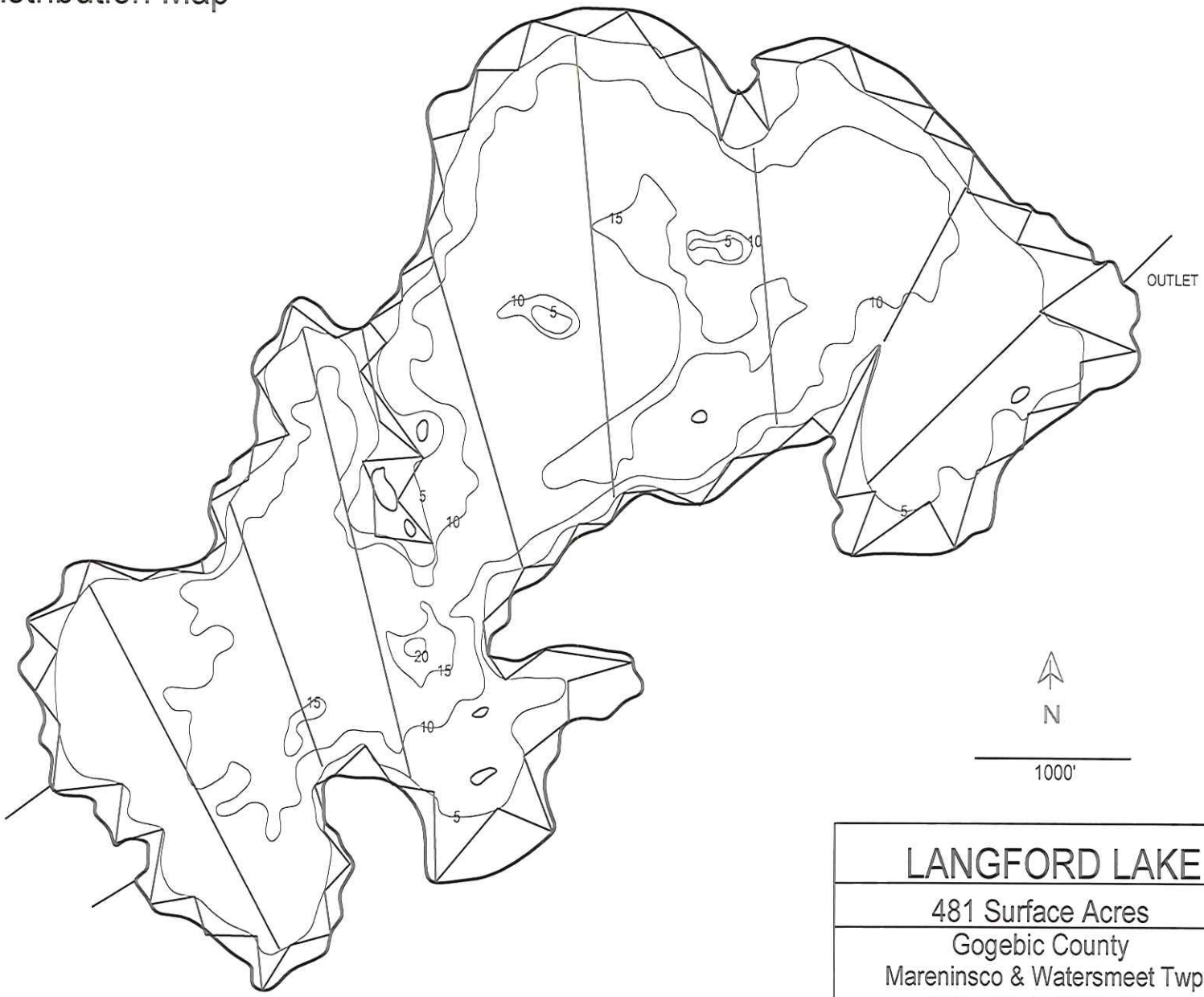
Gogebic County

Mareninsco & Watersmeet Twps

T45N R42W & T45N R41W

PLM Lake & Land Mgmt, P.O. Box 132, Caledonia, MI 49316 Phone (800) 382-4434

Fluridone Distribution Map



Attachment O

LANGFORD LAKE

481 Surface Acres

Gogebic County

Mareninsco & Watersmeet Twps

T45N R42W & T45N R41W

PLM Lake & Land Mgmt, P.O. Box 132, Caledonia, MI 49316 Phone (800) 382-4434

Lake: Langford

County: Gogebic

Lake Volume and Fluridone Calculation

Maximum Depth 22 feet

Contour	Area	Area between Contour and Next Contour	Average Depth (feet)	Volume (acre-ft)
0	481	113.7	2.5	284.25
5	367.3	151.2	7.5	1134
10	216.1	198.31	12.5	2478.875
15	17.79	17.47	17.5	305.725
20	0.32	0.32	25	8
25		0	27.5	0
30		0	45	0
35		0	37.5	0
40		0	45	0
45		0	47.5	0
50		0	55	0
60		0	65	0
70		0	72.5	0
75		0	75	0
Total				4210.85

Sonar Dose Rate Calculations

Lake Volume - (0-20') 4210.85 acre-ft

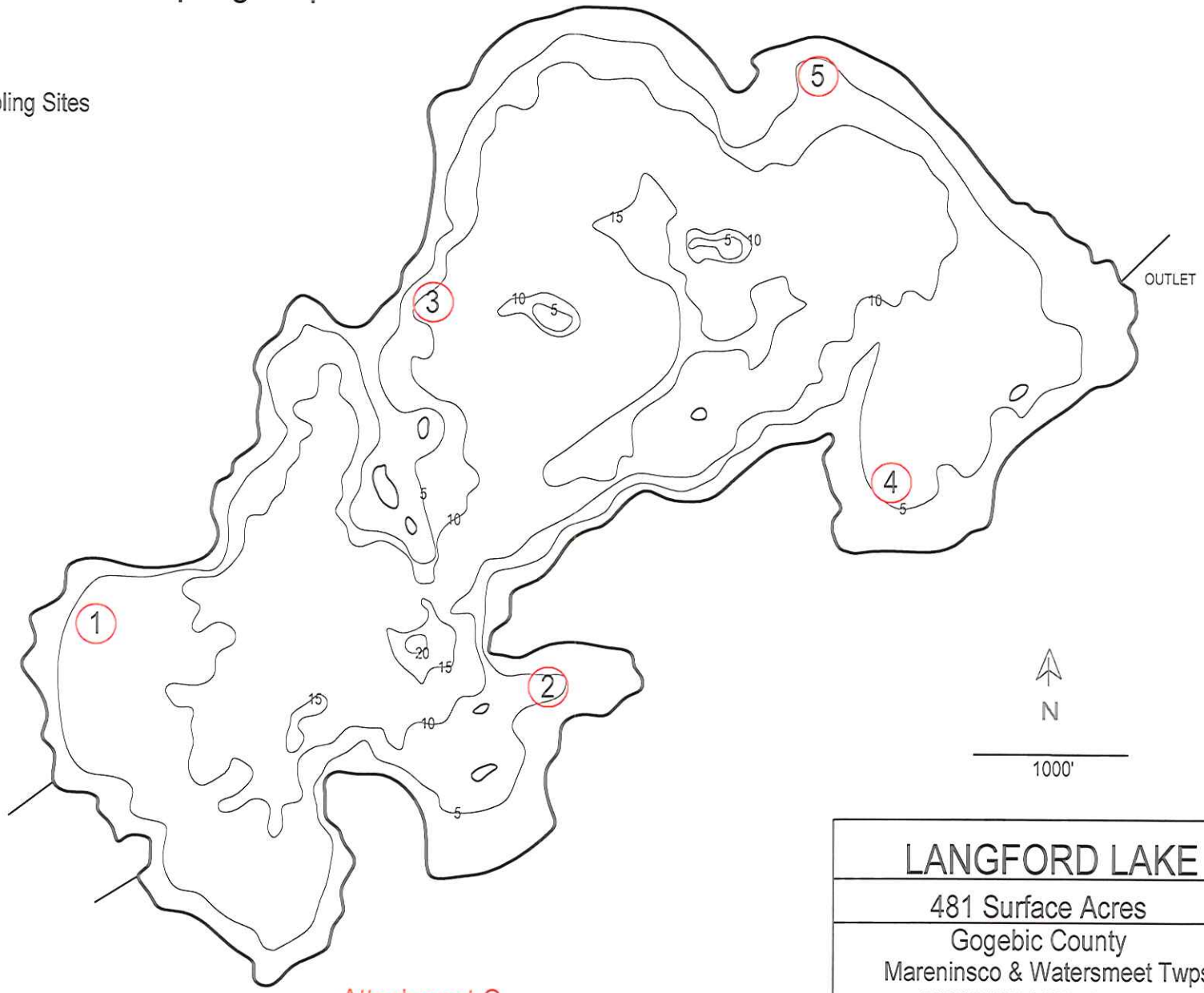
Fluridone: 6 ppb

Amount 68.72 qts 17.18 gals

Attachment P

Fluridone Residue Sampling Map

Fluridone Sampling Sites



Attachment Q

LANGFORD LAKE

481 Surface Acres

Gogebic County

Mareninsco & Watersmeet Twps

T45N R42W & T45N R41W

PLM Lake & Land Mgmt, P.O. Box 132, Caledonia, MI 49316 Phone (800) 382-4434

Meeting Notes
Langford Lake Eurasian watermilfoil status and plans
27 March 2012

Present
Dudley Pierce, President, Invasive Species Control Coalition of Watersmeet
Ken Wendt, Vice President, Invasive Species Control Coalition of Watersmeet
Steve Wilkinson, Treasurer, Invasive Species Control Coalition of Watersmeet
Barb Gajewski, Biologist, Invasive Species Control Coalition of Watersmeet
Jim Donlan, Treasurer, Langford Lake Eurasian Watermilfoil Association
Ian Shackleford, Botanist, US Forest Service, Ottawa National Forest

We reviewed the history of Eurasian watermilfoil in Langford Lake. The most recent treatment was 7150 pounds of Navigate applied by Marine Biochemists on June 14, 2011. Results were again disappointing. The herbicide knocks the Eurasian watermilfoil back but there was again at least 40 acres of milfoil in the lake by the end of the summer. The herbicide application used up the last of the 20 tons of Navigate donated by Nufarm and Applied Biochemists in 2007. The ISCCW was disappointed by the results of the five-year Army Corp research project. With all that work they hoped to see less Eurasian watermilfoil by now.

This past January Ian Shackleford, John Skogerboe, and Jim Donlan, began discussing treatment of the Eurasian watermilfoil with fluridone herbicide. The idea also came up at the January 17, 2012 ISCCW meeting.

To do a fluridone treatment in 2013, we would need to prepare a DEQ-required Lake Management Plan and obtain a DEQ permit. If we want to use federal dollars (including the $12,500 remaining on the Langford Lake RAC grant) then the Forest Service would need to update the "Ottawa National Forest Non-Native Invasive Plant Control Project." That National Environmental Policy Act (NEPA) project did not include fluridone.

There was a discussion on how to pay for a fluridone treatment.

We went through the DEQ Lake Management Plan template. Ian would like to offer a contract for someone to prepare the Lake Management Plan. John Skogerboe could do the AVAS survey.

Barb Gajewski pointed out that phosphorous and alkalinity need to be measured soon, two weeks after ice out. ISCCW said they could arrange for Barb to collect that data. ISCCW also offered to pay for a PlanTEST of the EWM.

We all agreed to do no treatment in 2012, and focus on doing a whole-lake fluridone treatment in 2013.

Attachment R

Langford Lake Temperature, Wind, and Water Clarity Data 2012

26 September 2012

Collected by Jim Donlan
4810 W. Langford Lake Road
Marenisco MI 49947
(906) 842-3616

Date	Outside Temperature	Water Temperature	Wind (direction, knots)	Surface	Time	**Secchi depth (feet)**
5/16/2012	58	61	calm	smooth	15:35	**8**
5/24/2012	80	65	N 10	choppy	15:40	**8**
5/31/2012	61	66	SW 10	choppy	15:50	**7.5**
6/7/2012	81	68	S 5	choppy	15:45	**8**
6/13/2012	65	70	S 10	choppy	15:30	**7.5**
6/21/2012	70	74	Light	smooth	16:00	**6.5***
6/27/2012	88	74	SE 8	choppy	14:10	**6**
7/3/2012	92	78	SW 7	light choppy	15:30	**5**
7/12/2012	88	80	SSW 8	light choppy	16:15	**5**
7/19/2012	74	78	E 8	choppy	16:15	**5**
7/25/2012	86	80	NNW 4	smooth	14:50	**5.5**
8/2/2012	84	78	NW 4	smooth	16:10	**5.5**
8/10/2012	72	70	NNE 10	choppy	16:35	**5**
8/14/2012	75	75	calm	smooth	16:20	**5.75**
8/22/2012	87	70	SE 5	light choppy	14:25	**6.75**
8/29/2012	86	74	SE 6	light choppy	16:35	**7.25**
9/5/2012	66	72	calm	smooth	15:40	**7**
9/13/2012	68	64	NW 7	light choppy	13:10	**7.5**

* 2.5 inches of rain the night before

Attachment S