

2007 & 2008 Project Abstract

For the Period Ending June 30, 2011

PROJECT TITLE: Intra-Lake Zoning to Protect Sensitive Lakeshore Areas

PROJECT MANAGER: Paul Radomski

AFFILIATION: Minnesota DNR

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FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: ML 2007, Chap. 30, Sec. 2, Subd. 5(h); ML 2008, Chap. 367, Sec. 2, Subd. 4(e)

APPROPRIATION AMOUNT: \$235,000 (2007: 110,000; 2008: 125,000)

Overall Project Outcome and Results

Protection of critical fish and wildlife habitat, particularly for 'species in greatest conservation need', is necessary given the substantial near-shore habitat losses estimated to date and the losses projected with future shoreland development. This cooperative Cass County/State project identified sensitive shoreland for the county's largest and most valuable waters. The project used objective, science-based criteria to identify sensitive shoreland parcels. Cass County selected seventeen lakes that were the highest priority for assessment (e.g., Ten Mile, Woman, and Leech). The objectives of this project were to: (1) identify and map sensitive shorelands, (2) develop and adopt shoreland ordinances to provide greater protection to sensitive areas, and (3) propose and implement zoning districts for identified sensitive shorelands.

Biological surveys were completed on the 17 priority lakes, as well as three connecting waterbodies. Species presence was recorded in extensive spatial detail. Botanists documented a total of 69 native aquatic plant taxa, including 42 submerged and free-floating, 7 floating-leaf, and 20 emergent taxa. Surveyors mapped over 2,000 acres of bulrush, and over 6,000 acres of other emergent and floating-leaf plant stands. Seventeen unique or rare plant species were documented. Biologists recorded four fish species in greatest conservation need. Pugnose shiners were the most widespread of these species, and were recorded on 10 study lakes. Longear sunfish, least darters, and greater redhorse were collected on four lakes each. Biologists documented 161 bird species, including 45 species in greatest conservation need. Four of these species are listed as Threatened in Minnesota and seven species are of Special Concern status. Mink and green frog breeding locations were identified on all surveyed lakes.

A total of 190.2 miles of shoreline, representing 40% of the total shoreline miles, were identified as sensitive. Nearly 28,000 acres of shoreland were identified as sensitive. Cass County proposed and adopted innovative zoning provisions within their shoreland ordinance to protect water quality and near-shore habitat.

Project Results Use and Dissemination

We completed sensitive lakeshore assessments on the 17 priority lakes, as well as three connecting waterbodies. Lake reports summarizing sensitive lakeshore assessments were completed for the 20 lakes. These reports describe the results of the biological surveys and provide maps of identified sensitive lakeshore. Reports were distributed to Cass County as well as to interested lake associations, organizations, and individuals. They are also available online at: <http://www.dnr.state.mn.us/eco/sli>

Public presentations explaining the sensitive area identification process and results were given to the Cass County Board of Commissioners, Cass County Planning Commission, Association of Cass County Lake Associations, U.S. Forest Service, multiple lake associations, and many other groups.

Several organizations have used the sensitive lakeshore identification information to help protect critical and vulnerable lakeshore areas. In 2010, Cass County received Environment & Natural Resource Trust Fund monies to provide assistance for donation of conservation easements to protect sensitive shoreland parcels in Cass County. The Leech Lake Area Watershed Foundation has identified large, undeveloped parcels that when overlaid with areas of sensitive shoreland have become priorities for conservation easements and acquisition. Recently implemented conservation easements on Wabedo Lake properties protect from development over 3500 feet of shoreline and nearly 70 acres of shoreland. Additional conservation easements that will protect another three to five miles of shoreline are currently in process. In addition, the information has been utilized within the DNR to help identify priority conservation areas (e.g., aquatic management areas). Finally, a project funded by an Outdoor Heritage Appropriation to the Leech Lake Area Watershed Foundation, Minnesota Land Trust, and DNR will pay for acquisition-related expenses and monitoring costs of donated permanent conservation easements on sensitive shorelands in north central Minnesota.

Cass County developed and adopted sensitive lakeshore and conservation subdivision ordinances. Other local governments are considering these ordinances for their own use. Crow Wing County modified Cass County's ordinance provisions for sensitive lakeshore protection, as the county is pursuing sensitive lakeshore zoning districts to better protect areas in their jurisdiction. In addition, the DNR used Cass County's conservation subdivision ordinance within its draft state shoreland standards.

Environment and Natural Trust Fund 2007 & 2008 Work Program Final Report

Date of Report: August 15, 2011

Final Report

Date of Work program Approval: 2007 5(h) 6/5/07 / 2008 4(e) Jun 2008

Project Completion Date: June 30, 2011

I. PROJECT TITLE: Intra-Lake Zoning to Protect Sensitive Lakeshore Areas

Project Manager: Paul Radomski
Affiliation: Minnesota DNR
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Location: Cass County

Total Trust Fund Project Budget:	2007	2008	Total
Trust Fund Appropriation:	\$110,000	\$125,000	\$235,000
Minus Amount Spent:	\$110,000	\$124,836	\$234,836
Equal Balance:	\$0	\$164	\$164

Legal Citation:

ML 2007, Chap. 30, Sec. 2, Subd. 5(h).

Appropriation Language: \$110,000 is from the trust fund to the commissioner of natural resources in cooperation with Cass County to identify sensitive shorelines of the highest priority lakes to protect water quality and near-shore habitat through improved shoreland zoning by Cass County.

ML 2008, Chap. 367, Sec. 2, Subd. 4(e).

Appropriation Language: \$125,000 is from the trust fund to the commissioner of natural resources for the second appropriation for a cooperative effort with Cass County to identify sensitive shorelines for the highest priority lakes and develop innovative zoning in Cass County to protect water quality and near-shore habitat. This appropriation is available until June 30, 2011, at which time the project must be completed and final products delivered, unless an earlier date is specified in the work program.

II. and III. FINAL PROJECT SUMMARY:

Protection of critical fish and wildlife habitat, particularly for 'species in greatest conservation need', is necessary given the substantial near-shore habitat losses estimated to date and the losses projected with future shoreland development. This cooperative Cass County/State project identified sensitive shoreland for the county's

largest and most valuable waters. The project used objective, science-based criteria to identify sensitive shoreland parcels. Cass County selected seventeen lakes that were the highest priority for assessment (e.g., Ten Mile, Woman, and Leech). The objectives of this project were to: (1) identify and map sensitive shorelands, (2) develop and adopt shoreland ordinances to provide greater protection to sensitive areas, and (3) propose and implement zoning districts for identified sensitive shorelands.

Biological surveys were completed on the 17 priority lakes, as well as three connecting waterbodies. Species presence was recorded in extensive spatial detail. Botanists documented a total of 69 native aquatic plant taxa, including 42 submerged and free-floating, 7 floating-leaf, and 20 emergent taxa. Surveyors mapped over 2,000 acres of bulrush, and over 6,000 acres of other emergent and floating-leaf plant stands. Seventeen unique or rare plant species were documented. Biologists recorded four fish species in greatest conservation need. Pugnose shiners were the most widespread of these species, and were recorded on 10 study lakes. Longear sunfish, least darters, and greater redhorse were collected on four lakes each. Biologists documented 161 bird species, including 45 species in greatest conservation need. Four of these species are listed as Threatened in Minnesota and seven species are of Special Concern status. Mink and green frog breeding locations were identified on all surveyed lakes.

A total of 190.2 miles of shoreline, representing 40% of the total shoreline miles, were identified as sensitive. Nearly 28,000 acres of shoreland were identified as sensitive. Cass County proposed and adopted innovative zoning provisions within their shoreland ordinance to protect water quality and near-shore habitat.

IV. OUTLINE OF PROJECT RESULTS:

Result 1: Identify and Map Sensitive Shorelands

Description: Conduct comprehensive field surveys of aquatic and near-shore habitat and animal presence using Minnesota’s Sensitive Lakeshore Survey Protocol. Surveys will be completed for 17 of the highest priority lakes in Cass County. Ecological models will be used to assist in the determination of sensitive areas. Criteria in a spatial ecological model will come from the science-based surveys, and the value of the shoreland with regard to aquatic habitat and vulnerability to water quality degradation will be objectively assessed. Lake-specific reports and digital GIS files will be produced and delivered to Cass County.

Summary Budget Information for Result 1:

	2007	2008	Total
Trust Fund Budget:	\$110,000	\$115,000	\$225,000
Amount Spent:	\$110,000	\$114,836	\$224,836
Balance:	\$0	\$164	\$164

Deliverable	Completion Date	Budget	Status
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1. 4 lakes surveyed & mapped	Jun 2008	\$58,000	complete
2. 5 lakes surveyed & mapped	Jun 2009	\$60,000	complete
3. map critical habitat on Leech Lake	Jun 2010	\$37,000	complete
4. 7 lakes surveyed & mapped	Jun 2010	\$70,000	complete

Final Report Summary: We completed sensitive lakeshore assessments on the 17 priority lakes, as well as three connecting waterbodies. Aquatic plant surveys were completed, including the mapping of vulnerable bulrush beds on all lakes. Fish, bird and frog surveys were completed and locations of species presence were documented. An ecological model based on fundamental conservation principles was used to assess lakeshore sensitivity. The model incorporated the results of the biological surveys and analysis of additional data (e.g., soils, wetland presence, County Biological Survey data, etc.). A total of 15 attributes were used to identify sensitive lakeshore. Scores for each of the attributes were summed, and the resulting total score represents an index of sensitivity. Once the total score index was determined, clusters with similar values were identified using GIS. These areas were buffered and defined as most likely highly sensitive lakeshore. Lake reports summarizing sensitive lakeshore assessments were completed for the 20 lakes. These reports describe the results of the biological surveys and provide maps of identified sensitive lakeshore. These reports were distributed to Cass County as well as to interested lake associations, organizations, and individuals. They are also available online at:

<http://www.dnr.state.mn.us/eco/sli>

Public presentations explaining the sensitive area identification process and results were given to the Cass County Board of Commissioners, Cass County Planning Commission, Association of Cass County Lake Associations, U.S. Forest Service, multiple lake associations, and many other groups.

Result 2: Cass County Ordinance Development and Adoption for Sensitive Shorelands

Description: Cass County’s Environmental Services staff will develop provisions in their land use ordinance that will require conservation-oriented development standards for reclassified bays and sensitive area districts. Minnesota’s Alternative Shoreland Management Standards (version 1, December 12, 2005) will be used to provide guidance in the ordinance revision process. All required processes for public input, review and comment will be adhered to, including the rights afforded to challenge such proposed changes.

Summary Budget Information for Result 2:

	2007	2008	Total
Trust Fund Budget:	\$0	\$2,500	\$2,500
Amount Spent:	\$0	\$2,500	\$2,500
Balance:	\$0	\$0	\$0

Deliverable	Completion Date	Budget	Status
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1. Revised ordinance Sept 2009 \$2,500 complete

Completion Date: January 1, 2010 (ordinance went into effect)

Final Report Summary: On January 1, 2010, a new Cass County sensitive lakeshore ordinance went into effect. The ordinance details the process for shoreland reclassification based on sensitive lakeshore surveys of Result 1. The county process includes township involvement, Planning Commission review and decision-making criteria, public hearings, and DNR verification and approval. Sensitive lakeshores can be reclassified as resource protection districts or bays of lakes can be reclassified into the Natural Environment shoreland classification. New developments within reclassified shorelands will receive the most protective and the highest standards in the county, which exceed current state standards.

The purpose of this reclassification is to accommodate limited rural residential housing, agricultural uses and forest management activities in a fashion that protects sensitive lakeshores from the adverse effects of intensive development. This new ordinance will help minimize disturbance to critical aquatic and shoreland habitat, prevent damage from erosion, floods, siltation and water turbidity, prevent the loss of vegetation, fish, wildlife and natural habitat, protect the quality of ground and surface waters, and conserve natural and scenic areas within and adjacent to riparian areas for the community's benefit.

In addition, Cass County developed a conservation subdivision ordinance that the DNR is using as a draft state standard.

Result 3: Propose and Implement Zoning Districts for Sensitive Areas

Description: Cass County's Planning Commission will review locations and maps of sensitive shorelines. They will then propose and implement resource protection zoning districts based on the resources and conditions assessed in Result 1. Any districting or reclassification will proceed following Cass County's ordinance provisions on land use reclassification.

Summary Budget Information for Result 3:

	2007	2008	Total
Trust Fund Budget:	\$0	\$7,500	\$7,500
Amount Spent:	\$0	\$7,500	\$7,500
Balance:	\$0	\$0	\$0

Deliverable	Completion Date	Budget	Status
1. Implement Zoning for 2 to 4 lakes	Oct 2009	5,000	
2. Implement Zoning for 2 to 4 lakes	Jun 2010	2,500	
3. Implement Zoning for 4 to 9 lakes	Jun 2011	0	

Completion Date:

Final Report Summary: Cass County reviewed locations and maps of sensitive areas and held numerous meetings with interested organizations on reclassification procedures. To date, no resource protection districts have been created to provide greater protection to identified sensitive lakeshore. Several organizations have used the sensitive lakeshore identification information to help protect critical and vulnerable lakeshore areas. The Leech Lake Area Watershed Foundation has mapped large, undeveloped parcels on each of the study lakes. These parcels, when overlaid with areas of sensitive shoreland, have become priorities for conservation easements and acquisition. Several landowners on Wabedo Lake recently implemented conservation easements on four properties, protecting from development over 3500 feet of shoreline and nearly 70 acres of shoreland. Additional conservation easements that will protect another three to five miles of shoreline are currently in process.

V. TOTAL TRUST FUND PROJECT BUDGET:

Staff or Contract Services: \$198,000 total (2007: \$84,000; 2008: \$114,000); unclassified Natural Resource Specialist

Equipment: \$37,000 total (2007: \$31,000; 2008: \$6,000)

Development: \$ 0

Restoration: \$ 0

Acquisition, including easements: \$ 0

TOTAL TRUST FUND PROJECT BUDGET: \$235,000 (2007: \$110,000; 2008: \$125,000)

Explanation of Capital Expenditures Greater Than \$3,500: From the 2007 appropriation, \$16,000 for one watercraft suitable for electrofishing, seining and trap net deployment. This equipment will continue to be used for its useful life within the DNR for comprehensive field surveys of aquatic and near-shore habitat and animal presence.

VI. OTHER FUNDS & PARTNERS:

A. Project Partners: Cass County, Environmental Services Department, John Sumption, Director (\$10,000). Leech Lake Reservation, Division of Resources Management (LLRDRM), John Ringle.

B. Other Funds Proposed to be Spent during the Project Period: Four other funds were used to complete the project. Federal funding via a State Wildlife Grant and State funding to the Minnesota Department of Natural Resources were used. Cass County funded their activities related to this project (\$25,000 per year in inkind value), and LLRDRM funded their activities (\$10,000 in inkind value for field surveys).

C. Past Spending: SWG: \$115,000 in FY09 state match; SWG: \$150,000 in FY08; State: \$150,000 in FY08; SWG: \$135,000 in FY07; State: \$150,000 in FY07 used to develop survey protocol. DNR staff provided additional technical advice to Cass County in FY06.

D. Time: This was a multi-year project ending on June 30, 2011. Several openwater seasons were needed to complete field surveys. The DNR completed its field work in FY10, and implementation of revised zoning ordinances in Cass County will continue.

VII. DISSEMINATION:

We completed sensitive lakeshore assessments on the 17 priority lakes, as well as three connecting waterbodies. Lake reports summarizing sensitive lakeshore assessments were completed for the 20 lakes. These reports describe the results of the biological surveys and provide maps of identified sensitive lakeshore. Reports were distributed to Cass County as well as to interested lake associations, organizations, and individuals. They are also available online at: <http://www.dnr.state.mn.us/eco/sli>

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Cass County developed and adopted sensitive lakeshore and conservation subdivision ordinances. Other local governments are considering these ordinances for their own use. Crow Wing County modified Cass County's ordinance provisions for sensitive lakeshore protection, as the county is pursuing sensitive lakeshore zoning districts to better protect areas in their jurisdiction. In addition, the DNR used Cass County's conservation subdivision ordinance within its draft state shoreland standards.

VIII. REPORTING REQUIREMENTS:

Periodic work program progress reports were submitted on January 2008, November 2008, March 2009, November 2009, March 2010, and November 2010.

Figure 1. Locations of study lakes in Cass County.

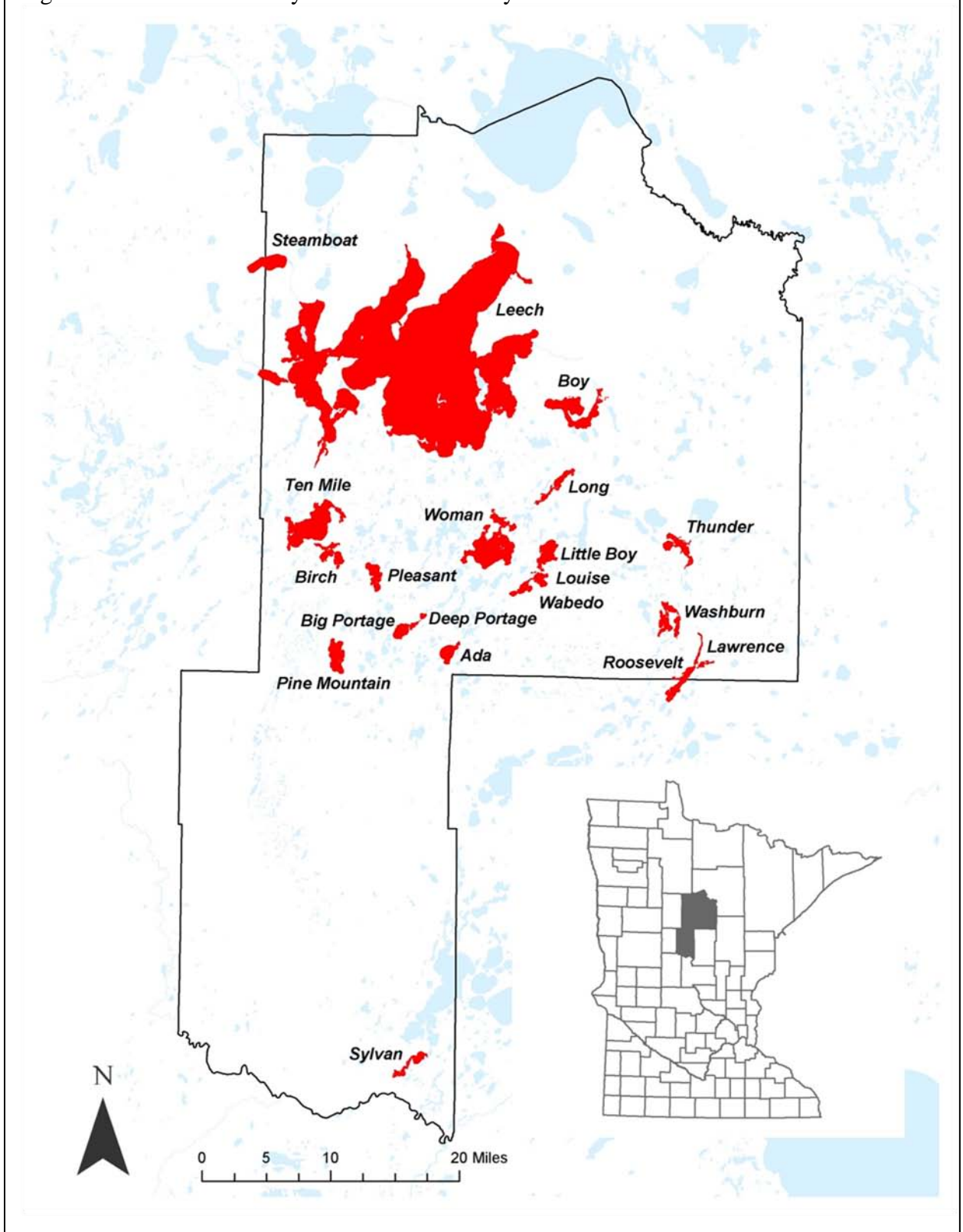


Table 1. Sensitive Lakeshore project study lakes.

Lake name	DOW number	Lake area (acres)	Shoreland area (acres)	Shoreline length (mi)
Ada	11-0250-00	1044	1096	7.5
Big Portage	11-0308-00	956	1131	7.7
Birch	11-0412-00	1262	1825	15.7
Boy	11-0143-00	3404	3412	25.9
Deep Portage	11-0237-00	129	416	1.9
Lawrence	11-0053-00	224	729	4.8
Leech	11-0203-00	~109000	25942	229.3
Little Boy	11-0167-00	1396	1412	10.0
Long	11-0142-00	926	1827	15.6
Louise	11-0537-00	22	305	1.2
Pine Mountain	11-0411-00	1657	1374	9.5
Pleasant	11-0383-00	1038	1214	9.0
Roosevelt	11-0043-00	1561	2597	18.4
Steamboat	11-0504-00	1761	1401	8.2
Sylvan	11-0304-00	882	1553	11.1
Ten Mile	11-0413-00	4640	3120	25.2
Thunder	11-0062-00	1316	1966	15.9
Wabedo	11-0171-00	1272	1704	11.3
Washburn	11-0059-00	1768	2188	19.5
Woman	11-0201-00	5360	3980	30.7

Table 2. Summary of aquatic vegetation survey results, 2006 – 2010.

Lake Name	Total acres	Acres surveyed	Number of survey points	Total aquatic taxa ^a	Submerged/free-floating taxa	Floating-leaf taxa	Emergent taxa	Bulrush acres mapped	Other acres mapped	Unique/rare species
Ada	1044	424	479	42	28	4	10	10	41	7
Big Portage	956	901	833	28	22	4	2	14	378	3
Birch	1262	755	1046	41	27	6	8	50	50	7
Boy	3404	2007	919	34	24	3	7	170	608	2
Deep Portage	123	31	132	18	11	4	3	13	2	3
Lawrence	225	87	351	33	23	3	7	36	8	2
Leech ^b	109415	57994	NA	NA	NA	NA	NA	1315	4613	NA
Little Boy	1396	466	577	35	22	4	9	163	39	1
Long	926	356	1501	45	29	5	11	3	34	10
Louise	33	–	85	26	19	3	4	0	12	1
Pine Mountain	1657	737	829	39	22	5	12	153	150	2
Pleasant	1038	410	503	38	26	4	8	3	51	6
Roosevelt	1561	390	992	37	24	6	7	32	20	0
Steamboat	1761	532	632	30	20	3	7	90	27	1
Sylvan	882	367	420	35	25	4	6	6	125	4
Ten Mile	4640	1316	1465	47	28	6	13	NA ^c	NA	7
Thunder	1316	226	1160	33	21	4	8	36	9	1
Wabedo	1272	295	526	27	17	5	5	39	55	0
Washburn	1768	748	703	55	34	5	16	NA	NA	6
Woman	5360	1953	2126	41	28	4	9	NA	NA	6

^a Total aquatic taxa, submerged/free-floating taxa, floating-leaf taxa, and emergent taxa numbers were obtained from grid point-intercept surveys and near-shore surveys. Wetland and terrestrial plant species recorded during near-shore surveys are not included in these results. Plant taxa documented by the Minnesota County Biological Survey are not included with these results. In addition, the totals include only native plant taxa.

^b Results include only those collected during the Sensitive Lakeshore Survey project. Some Leech Lake results are not included, as the grid point-intercept plant surveys that took place on this lake were conducted as part of another project.

^c NA - Minnesota Department of Natural Resources Area Fisheries crews conducted the emergent and floating-leaf plant bed mapping on Ten Mile, Washburn, and Woman Lakes.

Table 3. Unique and rare plant species documented during grid point-intercept and near-shore vegetation surveys, 2006 – 2008.

		Ada	Big Portage	Birch	Boy	Deep Portage	Lawrence	Leech ^a	Little Boy	Long	Louise	Pine Mtn	Pleasant	Roosevelt	Steamboat	Sylvan	Ten Mile	Thunder	Wabedo	Washburn	Woman	
Bog rosemary	<i>Andromeda glaucophylla</i>				X			—														
Water arum	<i>Calla palustris</i>	X		X		X		—				X	X				X					X
Wiregrass sedge	<i>Carex lasiocarpa</i>							—				X					X					X
Leatherleaf	<i>Chamaedaphne calyculata</i>			X				—														
Three-way sedge	<i>Dulichium arundinaceum</i>	X		X				—	X	X							X				X	X
Pipewort	<i>Eriocaulon aquaticum</i>							—		X	X											
Cottongrass	<i>Eriophorum</i> sp.					X		—														
Mare's tail	<i>Hippurus vulgaris</i>							—					X		X							
Leafless watermilfoil	<i>Myriophyllum tenellum</i>							—		X											X	
Vasey's pondweed	<i>Potamogeton vaseyi</i>							—		X												
Creeping spearwort	<i>Ranunculus flammula</i>	X						—		X											X	
Water bulrush	<i>Schoenoplectus subterminalis</i>	X						—		X			X			X	X				X	
Narrow-leaved burreed	<i>Sparganium angustifolium</i>							—		X											X	
Floating-leaved burreed	<i>Sparganium fluctuans</i>			X				—														
Humped bladderwort	<i>Utricularia gibba</i>	X	X	X				—		X			X			X	X					X
Flat-leaved bladderwort	<i>Utricularia intermedia</i>	X	X	X	X	X	X	—		X			X			X	X	X			X	X
Lesser bladderwort	<i>Utricularia minor</i>	X	X	X			X	—		X			X			X	X					X

^a Results include only those collected during the Sensitive Lakeshore Survey project. Leech Lake results are not included, as the grid point-intercept plant surveys that took place on this lake were conducted as part of another project.

Table 4. Aquatic plant taxa list. Includes all native aquatic plant taxa documented during Sensitive Lakeshore surveys, 2006 – 2008.

Description	Common Name	Scientific Name
Submerged/free-floating	Watermoss	Not identified to genus
	Water marigold	<i>Bidens beckii</i>
	Coontail	<i>Ceratophyllum demersum</i>
	Muskgrass	<i>Chara</i> sp.
	Canada waterweed	<i>Elodea canadensis</i>
	Pipewort	<i>Eriocaulon aquaticum</i>
	Water stargrass	<i>Heteranthera dubia</i>
	Mare's tail	<i>Hippuris vulgaris</i>
	Quillwort	<i>Isoetes</i> sp.
	Lesser duckweed	<i>Lemna minor</i>
	Star duckweed	<i>Lemna trisulca</i>
	Northern watermilfoil	<i>Myriophyllum sibiricum</i>
	Leafless watermilfoil	<i>Myriophyllum tenellum</i>
	Whorled watermilfoil	<i>Myriophyllum verticillatum</i>
	Bushy pondweed	<i>Najas flexilis</i>
	Southern naiad	<i>Najas guadalupensis</i>
	Stonewort	<i>Nitella</i> sp.
	Large-leaf pondweed	<i>Potamogeton amplifolius</i>
	Ribbon pondweed	<i>Potamogeton epihydrus</i>
	Leafy pondweed	<i>Potamogeton foliosus</i>
	Fries' pondweed	<i>Potamogeton friesii</i>
	Variable pondweed	<i>Potamogeton gramineus</i>
	Illinois pondweed	<i>Potamogeton illinoensis</i>
	White-stem pondweed	<i>Potamogeton praelongus</i>
	Very small/small pondweed	<i>Potamogeton pusillus</i>
	Clasping-leaf pondweed	<i>Potamogeton richardsonii</i>
	Robbin's pondweed	<i>Potamogeton robbinsii</i>
	Snail-seed pondweed	<i>Potamogeton spirillus</i>
	Straight-leaved pondweed	<i>Potamogeton strictifolius</i>
	Vasey's pondweed	<i>Potamogeton vaseyi</i>
	Flat-stem pondweed	<i>Potamogeton zosteriformis</i>
	White water buttercup	<i>Ranunculus aquatilis</i>
	Creeping spearwort	<i>Ranunculus flammula</i>
	Water bulrush	<i>Schoenoplectus subterminalis</i>
	Greater duckweed	<i>Spirodela polyrhiza</i>
	Sago pondweed	<i>Stuckenia pectinata</i>
	Humped bladderwort	<i>Utricularia gibba</i>
	Flat-leaved bladderwort	<i>Utricularia intermedia</i>
	Lesser bladderwort	<i>Utricularia minor</i>
	Greater bladderwort	<i>Utricularia vulgaris</i>
	Wild celery	<i>Vallisneria americana</i>
Watermeal	<i>Wolffia</i> sp.	

Table 4, continued.

Description	Common Name	Scientific Name
Floating-leaf	Watershield	<i>Brasenia schreberi</i>
	Yellow waterlily	<i>Nuphar variegata</i>
	White waterlily	<i>Nymphaea odorata</i>
	Floating-leaf smartweed	<i>Persicaria amphibia</i> (<i>Polygonum amphibium</i>)
	Floating-leaf pondweed	<i>Potamogeton natans</i>
	Narrow-leaved burreed	<i>Sparganium angustifolium</i>
	Narrowleaf burreed	<i>Sparganium emersum</i>
Emergent	Water arum	<i>Calla palustris</i>
	Sedges	<i>Carex</i> spp.
	Three-way sedge	<i>Dulichium arundinaceum</i>
	Needlegrass	<i>Eleocharis acicularis</i>
	Spikerush	<i>Eleocharis erythropoda</i>
	Small spikerush	<i>Eleocharis palustris</i>
	Water horsetail	<i>Equisetum fluviatile</i>
	Soft rush	<i>Juncus effusus</i>
	Juncus	<i>Juncus</i> sp.
	Giant cane	<i>Phragmites australis</i>
	Arum-leaved arrowhead	<i>Sagittaria cuneata</i>
	Broad-leaved arrowhead	<i>Sagittaria latifolia</i>
	Sessile-fruited arrowhead	<i>Sagittaria rigida</i>
	Hard-stem bulrush	<i>Schoenoplectus acutus</i>
	Three-square bulrush	<i>Schoenoplectus pungens</i>
	Soft-stem bulrush	<i>Schoenoplectus tabernaemontani</i>
	Nuttall's burreed	<i>Sparganium americanum</i>
Giant burreed	<i>Sparganium eurycarpum</i>	
Broad-leaf cattail	<i>Typha latifolia</i>	
Wild rice	<i>Zizania palustris</i>	

Table 5. Frogs and toads recorded during frog surveys, 2007 – 2009. Incidental anuran detections during Sensitive Lakeshore fish, bird, and aquatic plant surveys are also included.

Common Name	Scientific Name	Ada	Big Portage	Birch	Boy	Deep Portage	Lawrence	Leech	Little Boy	Long	Louise	Pine Mtn	Pleasant	Roosevelt	Steamboat	Sylvan	Ten Mile	Thunder	Wabedo	Washburn	Woman
Green frog	<i>Rana clamitans</i>	x	x	x	x	x	x	x	x	x	–	x	x	x		x	x	x	x	x	x
Mink frog	<i>Rana septentrionalis</i>	x	x	x	x			x		x	–	x	x	x		x	x			x	x
American toad	<i>Bufo americanus</i>							x			–								x	x	
Gray treefrog	<i>Hyla versicolor</i>		x	x	x	x	x	x	x	x	–	x	x	x	x	x	x	x	x	x	x
Northern leopard frog	<i>Rana pipiens</i>							x		x	–	x						x			
Spring peeper	<i>Pseudacris crucifer</i>		x					x		x	–					x					
Wood frog	<i>Rana sylvatica</i>							x			–										

Table 6. Fish species of greatest conservation need and proxy species recorded during nongame fish surveys, 2006 – 2008.

Common Name	Scientific Name	Ada	Big Portage	Birch	Boy	Deep Portage	Lawrence	Leech	Little Boy	Long	Louise	Pine Mtn	Pleasant	Roosevelt	Steamboat	Sylvan	Ten Mile	Thunder	Wabedo	Washburn	Woman
Pugnose shiner	<i>Notropis anogenus</i>	x	x	x	x			–	x				x		x		x		x		x
Longear sunfish	<i>Lepomis megalotis</i>					x	x	–									x				x
Least darter	<i>Etheostoma microperca</i>						x	–						x			x	x			
Greater redhorse	<i>Moxostoma valenciennesi</i>				x			–	x					x							x
Blackchin shiner	<i>Notropis heterodon</i>	x	x	x	x	x	x	–	x	x		x	x		x	x	x	x	x	x	x
Blacknose shiner	<i>Notropis heterolepis</i>	x	x	x	x	x		–	x	x	x	x	x	x	x	x	x	x		x	x
Banded killifish	<i>Fundulus diaphanus</i>	x	x	x	x	x	x	–	x	x		x		x	x	x	x	x	x	x	x

Table 7. Fish species list. Includes all species documented during Sensitive Lakeshore surveys, 2006 – 2008.

Description	Common Name	Scientific Name
Bowfins	Bowfin	<i>Amia calva</i>
Minnows/carps	Spotfin shiner	<i>Cyprinella spiloptera</i>
	Common shiner	<i>Luxilus cornutus</i>
	Hornyhead chub	<i>Nocomis biguttatus</i>
	Golden shiner	<i>Notemigonus crysoleucas</i>
	Pugnose shiner	<i>Notropis anogenus</i>
	Emerald shiner	<i>Notropis atherinoides</i>
	Blackchin shiner	<i>Notropis heterodon</i>
	Blacknose shiner	<i>Notropis heterolepis</i>
	Spottail shiner	<i>Notropis hudsonius</i>
	Mimic shiner	<i>Notropis volucellus</i>
	Northern redbelly dace	<i>Phoxinus eos</i>
	Finescale dace	<i>Phoxinus neogaeus</i>
	Bluntnose minnow	<i>Pimephales notatus</i>
	Fathead minnow	<i>Pimephales promelas</i>
	Longnose dace	<i>Rhinichthys cataractae</i>
Creek chub	<i>Semotilus atromaculatus</i>	
Suckers	White sucker	<i>Catostomus commersonii</i>
	Shorthead redhorse	<i>Moxostoma macrolepidotum</i>
	Greater redhorse	<i>Moxostoma valenciennesi</i>
North American freshwater catfishes	Black bullhead	<i>Ameiurus melas</i>
	Yellow bullhead	<i>Ameiurus natalis</i>
	Brown bullhead	<i>Ameiurus nebulosus</i>
	Tadpole madtom	<i>Noturus gyrinus</i>
Pikes	Northern pike	<i>Esox lucius</i>
	Muskellunge	<i>Esox masquinongy</i>
Mudminnows	Central mudminnow	<i>Umbra limi</i>
Salmon	Cisco	<i>Coregonus artedi</i>
Burbots	Burbot	<i>Lota lota</i>
Killifishes	Banded killifish	<i>Fundulus diaphanus</i>
Sticklebacks	Brook stickleback	<i>Culaea inconstans</i>
Sculpins	Mottled sculpin	<i>Cottus bairdii</i>
Sunfishes	Rock bass	<i>Ambloplites rupestris</i>
	Green sunfish	<i>Lepomis cyanellus</i>
	Pumpkinseed	<i>Lepomis gibbosus</i>
	Bluegill	<i>Lepomis macrochirus</i>
	Longear sunfish	<i>Lepomis megalotis</i>
	Smallmouth bass	<i>Micropterus dolomieu</i>

Table 7, continued.

Description	Common Name	Scientific Name
Sunfishes	Largemouth bass	<i>Micropterus salmoides</i>
	Black crappie	<i>Pomoxis nigromaculatus</i>
Perches	Iowa darter	<i>Etheostoma exile</i>
	Least darter	<i>Etheostoma microperca</i>
	Johnny darter	<i>Etheostoma nigrum</i>
	Yellow perch	<i>Perca flavescens</i>
	Logperch	<i>Percina caprodes</i>
	Walleye	<i>Sander vitreus</i>

Table 8. Bird species of greatest conservation need recorded during bird surveys and casual observation, 2007 – 2010.

Common Name	Scientific Name	Ada	Big Portage	Birch	Boy	Deep Portage	Lawrence	Leech	Little Boy	Long	Louise	Pine Mtn	Pleasant	Roosevelt	Steamboat	Sylvan	Ten Mile	Thunder	Wabedo	Washburn	Woman	
Trumpeter Swan	<i>Cygnus buccinator</i>		x		x			x														
American Black Duck	<i>Anas rubripes</i>																x					
Northern Pintail	<i>Anas acuta</i>							x														
Common Loon	<i>Gavia immer</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Horned Grebe	<i>Podiceps auritus</i>				x										x							
Red-necked Grebe	<i>Podiceps grisegena</i>	x						x				x										x
American White Pelican	<i>Pelecanus erythrorhynchos</i>		x		x			x				x	x		x	x	x		x			
American Bittern	<i>Botaurus lentiginosus</i>			x	x			x											x			
Least Bittern	<i>Ixobrychus exilis</i>							x														
Bald Eagle	<i>Haliaeetus leucocephalus</i>	x	x	x	x	x		x	x	x		x	x	x	x	x	x	x	x	x	x	x
Northern Harrier	<i>Circus cyaneus</i>				x			x														
Red-shouldered Hawk	<i>Buteo lineatus</i>																x					
Yellow Rail	<i>Coturnicops noveboracensis</i>				x			x														
Virginia Rail	<i>Rallus limicola</i>				x			x				x					x					
Semipalmated Sandpiper	<i>Calidris pusilla</i>							x														
Dunlin	<i>Calidris alpina</i>							x														
Franklin's Gull	<i>Leucophaeus pipixcan</i>							x														
Black Tern	<i>Chlidonias niger</i>	x	x		x			x	x			x										
Common Tern	<i>Sterna hirundo</i>	x	x	x	x			x				x	x		x		x	x				x
Forster's Tern	<i>Sterna forsteri</i>							x														
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>		x		x			x		x												x
Common Nighthawk	<i>Chordeiles minor</i>		x	x	x			x	x	x	x		x	x			x		x	x		
Eastern Whip-poor-will	<i>Caprimulgus vociferus</i>						x															
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	x		x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x

Table 8, continued.

Common Name	Scientific Name	Ada	Big Portage	Birch	Boy	Deep Portage	Lawrence	Leech	Little Boy	Long	Louise	Pine Mtn	Pleasant	Roosevelt	Steamboat	Sylvan	Ten Mile	Thunder	Wabedo	Washburn	Woman	
Olive-sided Flycatcher	<i>Contopus cooperi</i>												X									
Eastern Wood-Pewee	<i>Contopus virens</i>	X	X	X	X	X		X	X	X		X	X	X	X	X		X		X		
Least Flycatcher	<i>Empidonax minimus</i>	X	X		X	X	X	X	X	X	X		X	X		X	X	X		X	X	
N. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>		X		X			X	X								X					
Winter Wren	<i>Troglodytes hiemalis</i>								X			X			X					X		
Sedge Wren	<i>Cistothorus platensis</i>		X		X			X				X			X					X	X	
Marsh Wren	<i>Cistothorus palustris</i>				X			X				X				X						
Veery	<i>Catharus fuscescens</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Wood Thrush	<i>Hylocichla mustelina</i>								X							X				X	X	
Brown Thrasher	<i>Toxostoma rufum</i>							X														
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	X	X	X			X	X	X	X				X	X	X	X			X	X	
Cape May Warbler	<i>Dendroica tigrina</i>				X			X										X			X	
Ovenbird	<i>Seiurus aurocapilla</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Connecticut Warbler	<i>Oporornis agilis</i>							X														
Canada Warbler	<i>Wilsonia canadensis</i>							X														
Le Conte's Sparrow	<i>Ammodramus leconteii</i>				X			X														
Nelson's Sparrow	<i>Ammodramus nelsoni</i>				X			X														
Swamp Sparrow	<i>Melospiza georgiana</i>		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White-throated Sparrow	<i>Zonotrichia albicollis</i>			X	X		X	X		X		X	X		X		X	X	X	X	X	
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
Bobolink	<i>Dolichonyx oryzivorus</i>				X			X														

Table 9. Bird species list. Includes all species documented during Sensitive Lakeshore bird surveys and casual observation of lakes, 2007 – 2010.

Description	Common Name	Scientific Name
Waterfowl	Canada Goose	<i>Branta canadensis</i>
	Trumpeter Swan	<i>Cygnus buccinator</i>
	Wood Duck	<i>Aix sponsa</i>
	Gadwall	<i>Anas strepera</i>
	American Wigeon	<i>Anas americana</i>
	American Black Duck	<i>Anas rupripes</i>
	Mallard	<i>Anas platyrhynchos</i>
	Blue-winged Teal	<i>Anas discors</i>
	Northern Pintail	<i>Anas acuta</i>
	Green-winged Teal	<i>Anas crecca</i>
	Canvasback	<i>Aythya valisineria</i>
	Redhead	<i>Aythya americana</i>
	Ring-necked Duck	<i>Aythya collaris</i>
	Bufflehead	<i>Bucephala albeola</i>
	Common Goldeneye	<i>Bucephala clangula</i>
Hooded Merganser	<i>Lophodytes cucullatus</i>	
Common Merganser	<i>Mergus merganser</i>	
Red-breasted Merganser	<i>Mergus serrator</i>	
Grouse/turkeys	Ring-necked Pheasant	<i>Phasianus colchicus</i>
	Ruffed Grouse	<i>Bonasa umbellus</i>
Loons	Common Loon	<i>Gavia immer</i>
Grebes	Horned Grebe	<i>Podiceps auritus</i>
	Pied-billed Grebe	<i>Podilymbus podiceps</i>
	Red-necked Grebe	<i>Podiceps grisegena</i>
	Eared Grebe	<i>Podiceps nigricollis</i>
Cormorants	Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Pelicans	American White Pelican	<i>Pelecanus erythrorhynchos</i>
Herons/bitterns	American Bittern	<i>Botaurus lentiginosus</i>
	Least Bittern	<i>Ixobrychus exilis</i>
	Great Blue Heron	<i>Ardea herodias</i>
	Green Heron	<i>Butorides virescens</i>
Vultures	Turkey Vulture	<i>Cathartes aura</i>
Hawks/eagles	Osprey	<i>Pandion haliaetus</i>
	Bald Eagle	<i>Haliaeetus leucocephalus</i>
	Northern Harrier	<i>Circus cyaneus</i>
	Sharp-shinned Hawk	<i>Accipiter striatus</i>
	Cooper's Hawk	<i>Accipiter cooperii</i>
	Red-shouldered Hawk	<i>Buteo lineatus</i>
	Broad-winged Hawk	<i>Buteo platypterus</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>	

Table 9, continued.

Description	Common Name	Scientific Name
Falcons	Merlin	<i>Falco columbarius</i>
Rails/coots	Yellow Rail	<i>Coturnicops noveboracensis</i>
	Virginia Rail	<i>Rallus limicola</i>
	Sora	<i>Porzana carolina</i>
	American Coot	<i>Fulica americana</i>
Cranes	Sandhill Crane	<i>Grus canadensis</i>
Plovers	Killdeer	<i>Charadrius vociferus</i>
Sandpipers/allies	Spotted Sandpiper	<i>Actitis macularius</i>
	Solitary Sandpiper	<i>Tringa solitaria</i>
	Lesser Yellowlegs	<i>Tringa flavipes</i>
	Semipalmated Sandpiper	<i>Calidris pusilla</i>
	Least Sandpiper	<i>Calidris minutilla</i>
	Dunlin	<i>Calidris alpina</i>
	Wilson's Snipe	<i>Gallinago delicata</i>
Gulls/terns	Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>
	Franklin's Gull	<i>Leucophaeus pipixcan</i>
	Ring-billed Gull	<i>Larus delawarensis</i>
	Herring Gull	<i>Larus argentatus</i>
	Caspian Tern	<i>Hydroprogne caspia</i>
	Black Tern	<i>Chlidonias niger</i>
	Common Tern	<i>Sterna hirundo</i>
	Forster's Tern	<i>Sterna forsteri</i>
Doves	Mourning Dove	<i>Zenaida macroura</i>
Cuckoos	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>
Owls	Great Horned Owl	<i>Bubo virginianus</i>
	Barred Owl	<i>Strix varia</i>
Goatsuckers	Common Nighthawk	<i>Chordeiles minor</i>
	Eastern Whip-poor-will	<i>Caprimulgus vociferus</i>
Swifts	Chimney Swift	<i>Chaetura pelagica</i>
Hummingbirds	Ruby-throated Hummingbird	<i>Archilochus colubris</i>
Kingfishers	Belted Kingfisher	<i>Megaceryle alcyon</i>
Woodpeckers	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>
	Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>
	Downy Woodpecker	<i>Picoides pubescens</i>
	Hairy Woodpecker	<i>Picoides villosus</i>
	Northern Flicker	<i>Colaptes auratus</i>
	Pileated Woodpecker	<i>Dryocopus pileatus</i>

Table 9, continued.

Description	Common Name	Scientific Name
Flycatchers	Olive-sided Flycatcher	<i>Contopus cooperi</i>
	Eastern Wood-Pewee	<i>Contopus virens</i>
	Alder Flycatcher	<i>Empidonax alnorum</i>
	Least Flycatcher	<i>Empidonax minimus</i>
	Eastern Phoebe	<i>Sayornis phoebe</i>
	Great Crested Flycatcher	<i>Myiarchus crinitus</i>
	Eastern Kingbird	<i>Tyrannus tyrannus</i>
Vireos	Yellow-throated Vireo	<i>Vireo flavifrons</i>
	Warbling Vireo	<i>Vireo gilvus</i>
	Red-eyed Vireo	<i>Vireo olivaceus</i>
Jays/crows	Blue Jay	<i>Cyanocitta cristata</i>
	American Crow	<i>Corvus brachyrhynchos</i>
	Common Raven	<i>Corvus corax</i>
Swallows	Purple Martin	<i>Progne subis</i>
	Tree Swallow	<i>Tachycineta bicolor</i>
	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
	Bank Swallow	<i>Riparia riparia</i>
	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
	Barn Swallow	<i>Hirundo rustica</i>
Chickadees	Black-capped Chickadee	<i>Poecile atricapilla</i>
Nuthatches	Red-breasted Nuthatch	<i>Sitta canadensis</i>
	White-breasted Nuthatch	<i>Sitta carolinensis</i>
Creepers	Brown Creeper	<i>Certhia americana</i>
Wrens	House Wren	<i>Troglodytes aedon</i>
	Winter Wren	<i>Troglodytes hiemalis</i>
	Sedge Wren	<i>Cistothorus platensis</i>
	Marsh Wren	<i>Cistothorus palustris</i>
Kinglets	Golden-crowned Kinglet	<i>Regulus satrapa</i>
	Ruby-crowned Kinglet	<i>Regulus calendula</i>
Thrushes	Eastern Bluebird	<i>Sialia sialis</i>
	Veery	<i>Catharus fuscescens</i>
	Swainson's Thrush	<i>Catharus ustulatus</i>
	Hermit Thrush	<i>Catharus guttatus</i>
	Wood Thrush	<i>Hylocichla mustelina</i>
	American Robin	<i>Turdus migratorius</i>
Mockingbirds	Gray Catbird	<i>Dumetella carolinensis</i>
	Brown Thrasher	<i>Toxostoma rufum</i>
Starlings	European Starling	<i>Sturnus vulgaris</i>
Waxwings	Bohemian Waxwing	<i>Bombycilla garrulus</i>
	Cedar Waxwing	<i>Bombycilla cedrorum</i>

Table 9, continued.

Description	Common Name	Scientific Name
Warblers	Golden-winged Warbler	<i>Vermivora chrysoptera</i>
	Nashville Warbler	<i>Vermivora ruficapilla</i>
	Northern Parula	<i>Parula americana</i>
	Yellow Warbler	<i>Dendroica petechia</i>
	Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>
	Cape May Warbler	<i>Dendroica tigrina</i>
	Yellow-rumped Warbler	<i>Dendroica coronata</i>
	Black-throated Green Warbler	<i>Dendroica virens</i>
	Blackburnian Warbler	<i>Dendroica fusca</i>
	Pine Warbler	<i>Dendroica pinus</i>
	Palm Warbler	<i>Dendroica palmarum</i>
	Blackpoll Warbler	<i>Dendroica striata</i>
	Black-and-white Warbler	<i>Mniotilta varia</i>
	American Redstart	<i>Setophaga ruticilla</i>
	Ovenbird	<i>Seiurus aurocapilla</i>
	Northern Waterthrush	<i>Seiurus noveboracensis</i>
	Connecticut Warbler	<i>Oporornis agilis</i>
Common Yellowthroat	<i>Geothlypis trichas</i>	
Wilson's Warbler	<i>Wilsonia pusilla</i>	
Canada Warbler	<i>Wilsonia canadensis</i>	
Sparrows/allies	Chipping Sparrow	<i>Spizella passerina</i>
	Clay-colored Sparrow	<i>Spizella pallida</i>
	Savannah Sparrow	<i>Passerculus sandwichensis</i>
	Le Conte's Sparrow	<i>Ammodramus leconteii</i>
	Nelson's Sparrow	<i>Ammodramus nelsoni</i>
	Song Sparrow	<i>Melospiza melodia</i>
	Swamp Sparrow	<i>Melospiza georgiana</i>
White-throated Sparrow	<i>Zonotrichia albicollis</i>	
Cardinals/allies	Scarlet Tanager	<i>Piranga olivacea</i>
	Northern Cardinal	<i>Cardinalis cardinalis</i>
	Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>
	Indigo Bunting	<i>Passerina cyanea</i>
Blackbirds	Bobolink	<i>Dolichonyx oryzivorus</i>
	Red-winged Blackbird	<i>Agelaius phoeniceus</i>
	Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>
	Common Grackle	<i>Quiscalus quiscula</i>
	Brown-headed Cowbird	<i>Molothrus ater</i>
	Baltimore Oriole	<i>Icterus galbula</i>

Table 9, continued.

Description	Common Name	Scientific Name
Finches	Purple Finch	<i>Carpodacus purpureus</i>
	House Finch	<i>Carpodacus mexicanus</i>
	Red Crossbill	<i>Loxia curvirostra</i>
	Pine Siskin	<i>Spinus pinus</i>
	American Goldfinch	<i>Spinus tristis</i>
Old World Sparrows	House Sparrow	<i>Passer domesticus</i>

Table 10. Summary of sensitive lakeshore identified on Sensitive Lakeshore project study lakes, 2006 - 2010.

Lake name	Shoreline length (mi)	Sensitive shoreline (mi)	% Sensitive shoreline	Shoreland area (acres)	Sensitive shoreland (acres)	% Sensitive shoreland
Ada	7.5	3.6	48	1096	484	44
Big Portage	7.7	2.2	29	1131	310	27
Birch	15.7	5.1	32	1825	759	42
Boy	25.9	8.2	32	3412	1860	55
Deep Portage	1.9	0.2	11	416	114	27
Lawrence	4.8	0.7	14	729	204	28
Leech	229.3	107	47	25942	13693	53
Little Boy	10.0	4.1	40	1412	542	38
Long	15.6	3.6	23	1827	812	44
Louise	1.2	0.1	8	305	150	49
Pine Mountain	9.5	2.0	21	1374	422	31
Pleasant	9.0	3.3	37	1214	557	46
Roosevelt	18.4	5.5	30	2597	773	30
Steamboat	8.2	2.2	26	1401	594	42
Sylvan	11.1	4.3	39	1553	764	49
Ten Mile	25.2	11.6	46	3120	1825	58
Thunder	15.9	7.0	44	1966	802	41
Wabedo	11.3	2.9	26	1704	688	40
Washburn	19.5	4.7	24	2188	830	38
Woman	30.7	11.9	39	3980	1808	45

Figure 2. Example of sensitive lakeshore delineation (Ten Mile Lake).

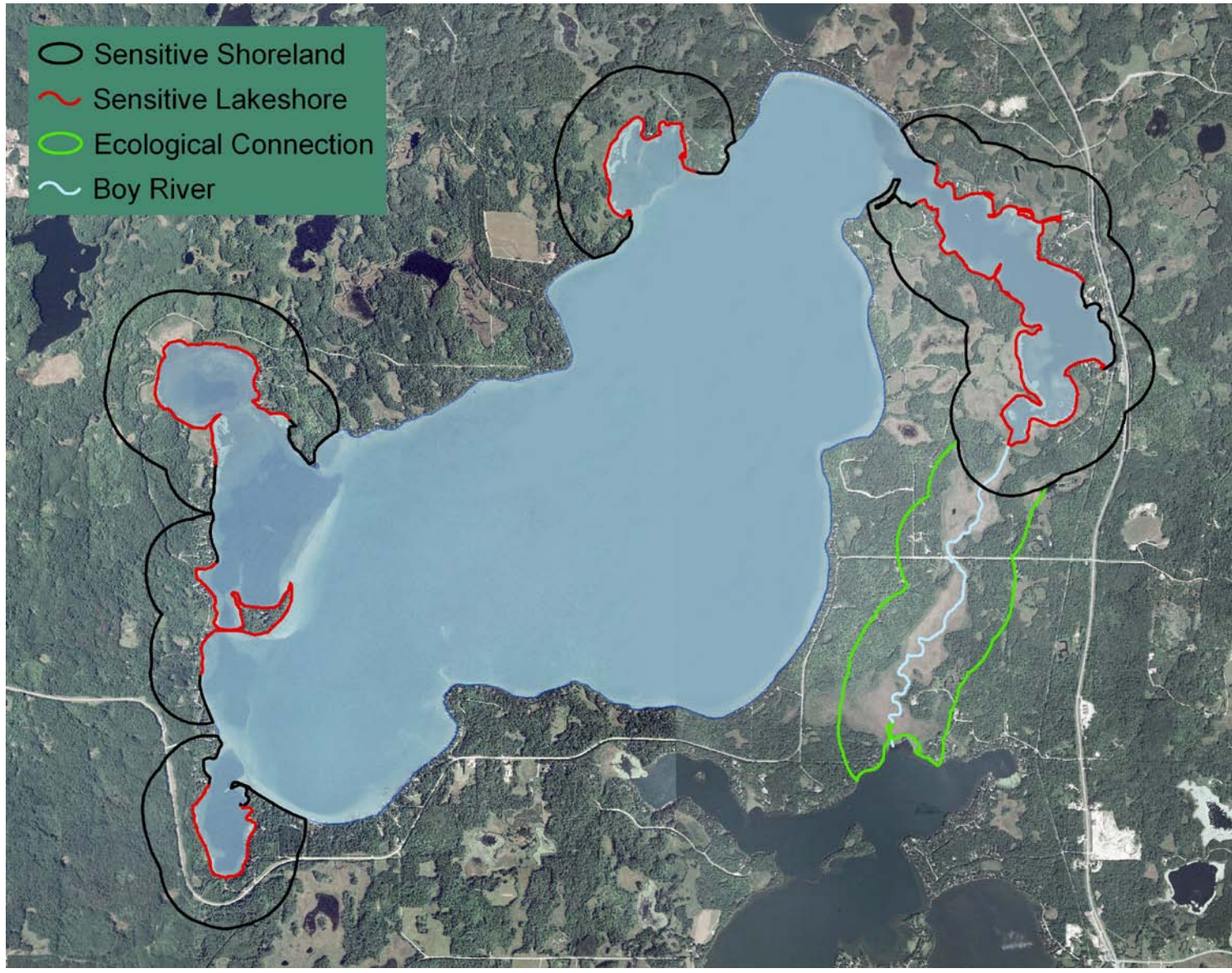


Exhibit A. Intra-lake Zoning to Protect Sensitive Lakeshore Areas. List of study lakes and completed survey work.

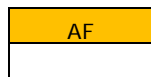
Lake Name	DOWLKNUM	Acres	Percent shoreline private and in large parcels	Grid aquatic plant survey	Emergent/ floating-leaf beds delineated from aerial photos	Bulrush beds mapped	Shoreline habitat plots	Frog survey	Fish survey	Bird survey	Sensitive areas forwarded to County
Leech	11020300	109415		2002-05	yes	2008-10		2007-09		2010	2011
Woman	11020100	5360	16	2006	yes	AF	2006-07	2006	2006	2007	2008
Ten Mile	11041300	4640	26	2006	yes	AF	2006-07	2006	2006	2007	2008
Birch	11041200	1262		2006	yes	2006	2006-07	2007	2007	2008	2009
Long	11014200	926		2007	yes	2007	2007	2007	2007	2008	2009
Little Boy	11016700	1396	32	2007	yes	2007	2007	2007	2007	2008	2009
Louise*	11057300	22		2007	yes				2007	2008	2009
Wabedo	11017100	1272	32	2007	yes	2007	2007	2007	2007	2008	2009
Ada	11025000	1044	7	2007	yes	2007	2007	2007	2007	2008	2009
Pine Mountain	11041100	1657	41	2007	yes	2007	2008	2008	2007	2008	2009
Pleasant	11038300	1038	38	2007	yes	2008	2008	2008	2007	2008	2009
Washburn	11005900	1768		2006	yes	AF-2008	2007	2007	2007	2008-09	2010
Thunder	11006200	1316	42	2008	yes	2008	2008	2008	2008	2009	2010
Boy	11014300	3404		2008	yes	2008		2008	2008	2009	2010
Roosevelt	11004300	1561	9	2008	yes	2008	2008	2009	2008	2009	2010
Lawrence*	11005300	224		2008	yes	2008		2009	2008	2009	2010
Deep Portage*	11023700	129		2008	yes	2008	2008	2009	2008	2009	2010
Sylvan	11030400	882		2008	yes	2008		2009	2008	2009	2010
Big Portage	11030800	956		2008	yes	2008		2009	2008	2009	2010
Steamboat	11050400	1761	38	2008	yes	2008	2008	2009	2008	2009	2010

KEY



Completed

In progress



AF DNR Fisheries data

Not completed or planned

* Additional lakes (connecting waterbodies)

Attachment A: Final Budget Detail for Total for 2007 & 2008 Projects											
Project Title: <i>Intra-Lake Zoning to Protect Sensitive Lakeshore Areas, [2007: Subd. 5(h) 2008: Subd. 4(e)]</i>											
Project Manager Name: <i>Paul Radomski</i>											
Trust Fund Appropriation: \$ 235,000 (\$110,000 in 2007 + \$125,000 in 2008)											
1) See list of non-eligible expenses, do not include any of these items in your budget sheet											
2) Remove any budget item lines not applicable											
2007 & 2008 Trust Fund Budget	Revised Result 1 Budget:	Amount Spent (06/30/2011)	Balance (06/30/2011)	Result 2 Budget:	Amount Spent (06/30/2011)	Balance (06/30/2011)	Result 3 Budget:	Amount Spent (06/30/2011)	Balance (06/30/2011)	TOTAL BUDGET	TOTAL BALANCE
	<i>Identify and Map Sensitive Shorelands</i>			<i>Cass County Ordinance Development and Adoption for Sensitive Shorelands</i>			<i>Propose and Implement Zoning Districts for Sensitive Areas</i>				
BUDGET ITEM						0			0	0	0
PERSONNEL: wages and benefits	193,000	200,735	-7,735			0	5,000	5,000	0	198,000	-7,735
Other direct operating costs (fleet expenses)	10,000	9,493	507			0			0	10,000	507
Capital Equipment (watercraft suitable for electrofishing, seining and trap deployment)	16,000	12,571	3,429			0			0	16,000	3,429
Equipment / Tools (sampling equipment and biological supplies)	6,000	2,037	3,963			0			0	6,000	3,963
Office equipment & computers - NOT ALLOWED unless unique to the project			0			0			0	0	0
Printing			0	2,500	2,500	0	2,500	2,500	0	5,000	0
Other Supplies (education material and mailing)			0			0			0	0	0
Travel expenses in Minnesota			0			0			0	0	0
Travel outside Minnesota (where?)			0			0			0	0	0
Other (Describe the activity and cost)			0			0			0	0	0
COLUMN TOTAL	\$225,000	\$224,836	\$164	\$2,500	\$2,500	\$0	\$7,500	\$7,500	\$0	\$235,000	\$164