Wabedo Lake Lakeshed Assessment

The lakeshed vitals table identifies where to focus organizational and management efforts for each lake. Criteria were developed using limnological concepts to determine the effect to lake water quality.

Lakeshed Vitals		Rating
Major Basin	Upper Mississippi River	descriptive
Major Watershed	Leech Lake River	descriptive
Minor Watershed	8055	descriptive
Lakeshed	Little Boy Lake (805500)	descriptive
Ecoregion	Northern Lakes and Forest	descriptive
Lake Area	1,226 acres	descriptive
Miles of Shoreline	11.32	descriptive
Miles of Stream	1.04	descriptive
Miles of Road	11	descriptive
Lake Max Depth	95 ft. (29 m)	descriptive
Lake Mean Depth	NA	NA
Water Residence Time	NA	NA
Municipalities	None	+
Sewage Management	Individual waste treatment systems (septic systems and holding tanks – inspections completed 2003)	+
Public Drainage Ditches	None	+
Lake Management Plan	Healthy Lakes & Rivers Partnership program, 2001	+
Lake Vegetation Survey/Plan	Survey Completed 2007	+
Forestry Practices	None	+
Development Classification	Recreational Development	x
Shoreline Development Index	2.3	-
Total Lakeshed to Lake Area Ratio (total lakeshed includes lake area)	4.9:1	x
Public Lake Accesses	1	x
Inlets	3 – Stony Creek, Spring Creek, Unnamed	x
Outlets	1 – Unnamed	x
Shoreland Conservation Potential (% shoreland identified for conservation)	53%	+
Feedlots	None	+
Agriculture Zoning	172 acres > 200 ft. from lake	x
Public Land : Private Land	0.85:1	-
Wetland Coverage	17%	+
Lake Transparency Trend	No trend	+
Exotic Species	None	+

Rating Key:
+ beneficial to the lake
- possibly detrimental to the lake
x *warrants attention*

Lakeshed

Understanding a lakeshed requires the understanding of basic hydrology. A watershed is the area of land that drains into a surface water body such as a stream, river, or lake and contributes to the recharge of groundwater. There are three categories of watersheds: 1) basins, 2) major watersheds, and 3) minor watersheds.

Wabedo Lake is found within the **Upper Mississippi River Basin**, which includes the **Leech Lake River Major Watershed** as one of its sixteen major watersheds (Figure 1). The basin covers 20,000 square miles, while the Leech Lake River Watershed covers 1,335 square miles (approximately 854,349 acres). Wabedo Lake falls within **minor watershed 8055**, one of the 75 minor watersheds that comprise the Leech Lake River Major Watershed (Figure 2).

Within this watershed hierarchy, lakesheds also exist. A lakeshed is defined simply as the land area that drains to a lake. While some lakes may have only one or two minor watersheds draining into them, others may be connected to a large number of minor watersheds, reflecting a larger drainage area via stream or river networks. Wabedo Lake falls within the **Little Boy Lake (805500) lakeshed**, covering 5,963 acres (includes lake area) (Figure 3). Even though Wabedo Lake receives water from minor watersheds 8052 and 8054, for the purpose of this assessment it is decided that only the immediate lakeshed be inventoried and assessed.

Wabedo Lake Lakeshed Water Quality Protection Strategy

Each lakeshed has a different makeup of public and private lands. Looking in more detail at the makeup of these lands can give insight on where to focus protection efforts. The protected lands (easements, wetlands, public land) are the future water quality infrastructure for the lake. Developed land and agriculture have the highest phosphorus runoff coefficients, so this land should be minimized for water quality protection.

The majority of Wabedo Lake's lakeshed is made up of private forested uplands. This land can be the focus of development and protection efforts in the lakeshed.

	Private (42%)					22%	Public (36%)		
	Developed	**Agriculture**	**Forested Uplands**	**Other**	**Wetlands**	**Open Water**	**County**	**State**	**Federal**
Land Use (%)	3%	1%	30%	0%	8%	22%	0%	36%	0%
Runoff Coefficient Lbs of phosphorus/acre/ year	0.45 - 1.5	0.26 - 0.9	0.09		0.09		0.09	0.09	0.09
Description	Focused on Shoreland	Cropland	Focus of develop-ment and protection efforts	Open, pasture, grass-land, shrub-land	Protected				
Potential Phase 3 Discussion Items	Shoreline restoration	Restore wetlands; CRP	Forest stewardship planning, 3rd party certification, SFIA, local woodland cooperatives		Protected by Wetland Conservation Act		County Tax Forfeit Lands	State Forest	National Forest

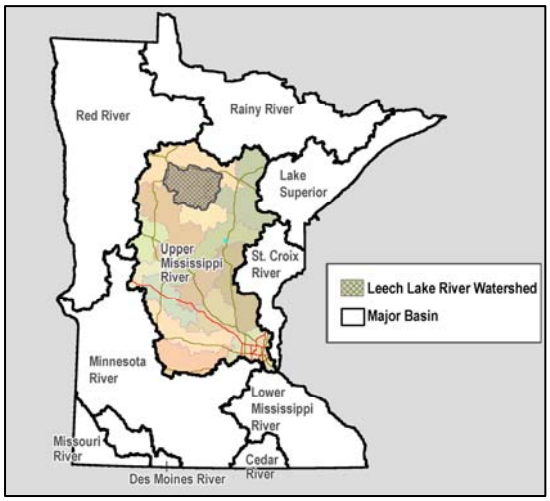

Figure 1. Upper Mississippi Basin and the Leech Lake River Watershed.

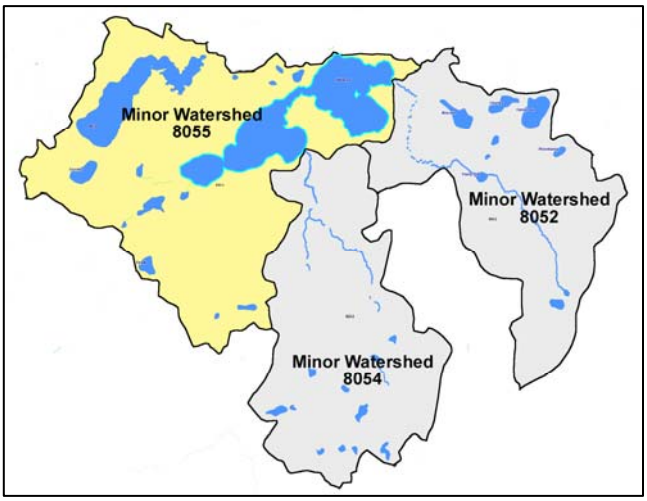

Figure 2. Minor Watersheds 8055, 8052, & 8054 contribute water to Wabedo Lake.

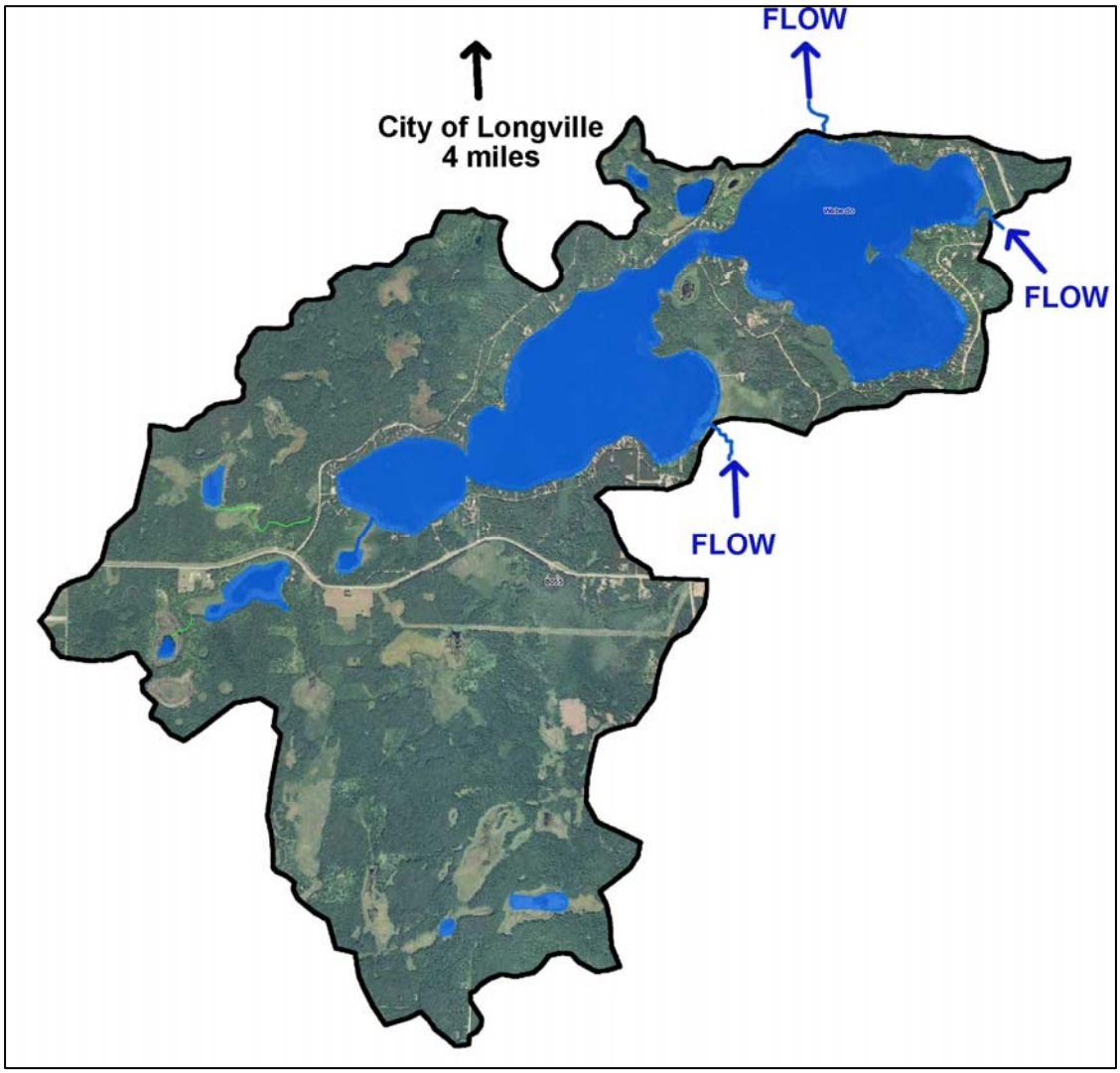

Figure 3. The Little Boy Lake (805500) Lakeshed (Aerial Imagery 2008 1M).

Conservation Easement Potential

In an ever-growing society, today's landscapes are being urbanized more and more to sustain the ever-growing population and behavior of recreational usage. In Minnesota, the land of ten thousand lakes, it is only natural to develop properties within the boundaries and beauty of our lakes and streams. Conservation efforts to limit or slow down the development process can only assist in the preservation of the lakeshed and inevitably the water quality of water bodies found within. Figure 4 identifies parcels within the lakeshed that are large enough to warrant the investigation of parcel conservation practices and purchase.

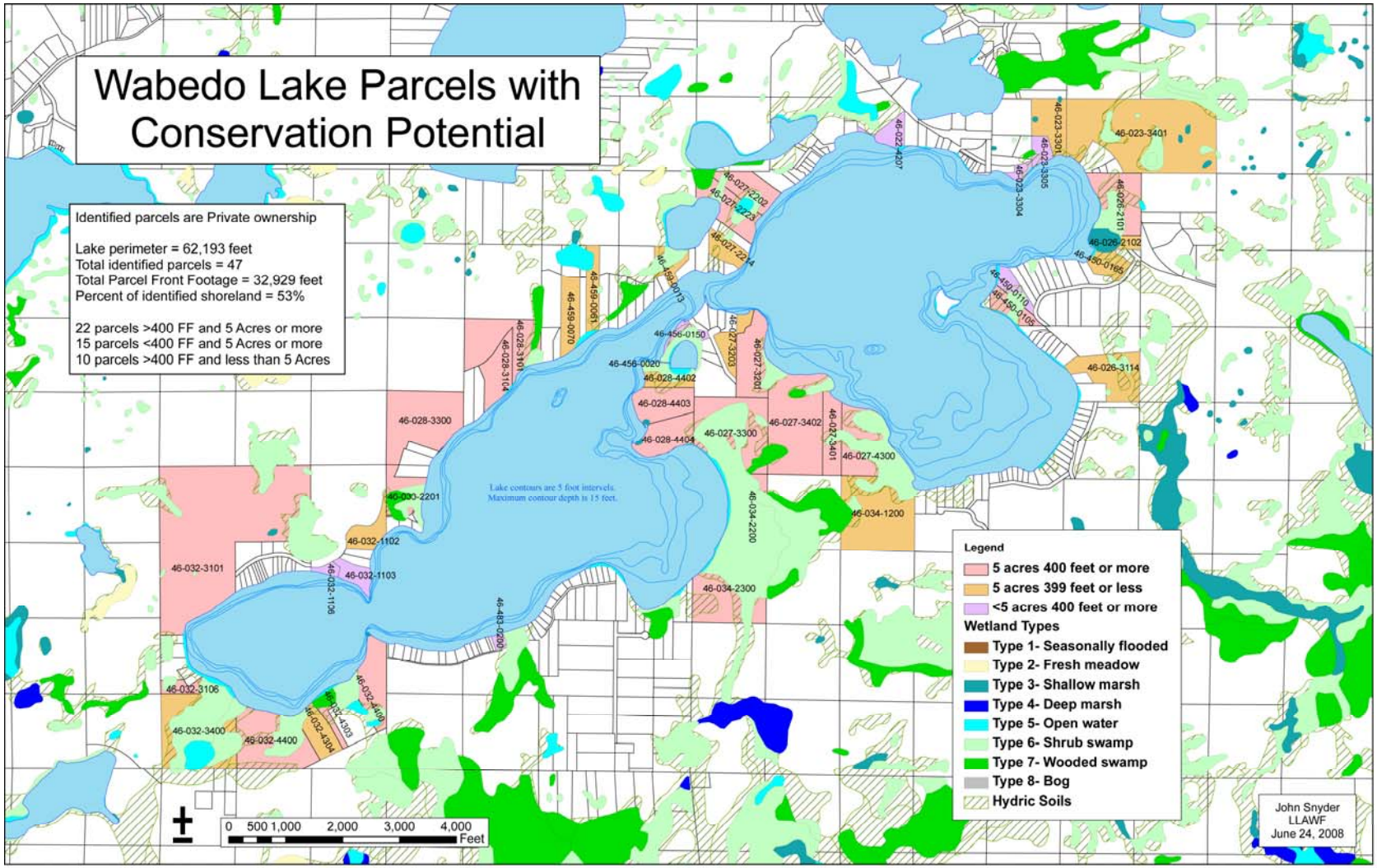

Figure 4. Lake parcels with conservation potential (developed by John Snyder, LLAWF).

Land Cover / Land Use

The activities that occur on the land within the lakeshed can greatly impact a lake. Land use planning helps ensure the use of land resources in an organized fashion so that the needs of the present and future generations can be best addressed. The basic purpose of land use planning is to ensure that each area of land will be used in a manner that provides maximum social benefits without degradation of the land resource.

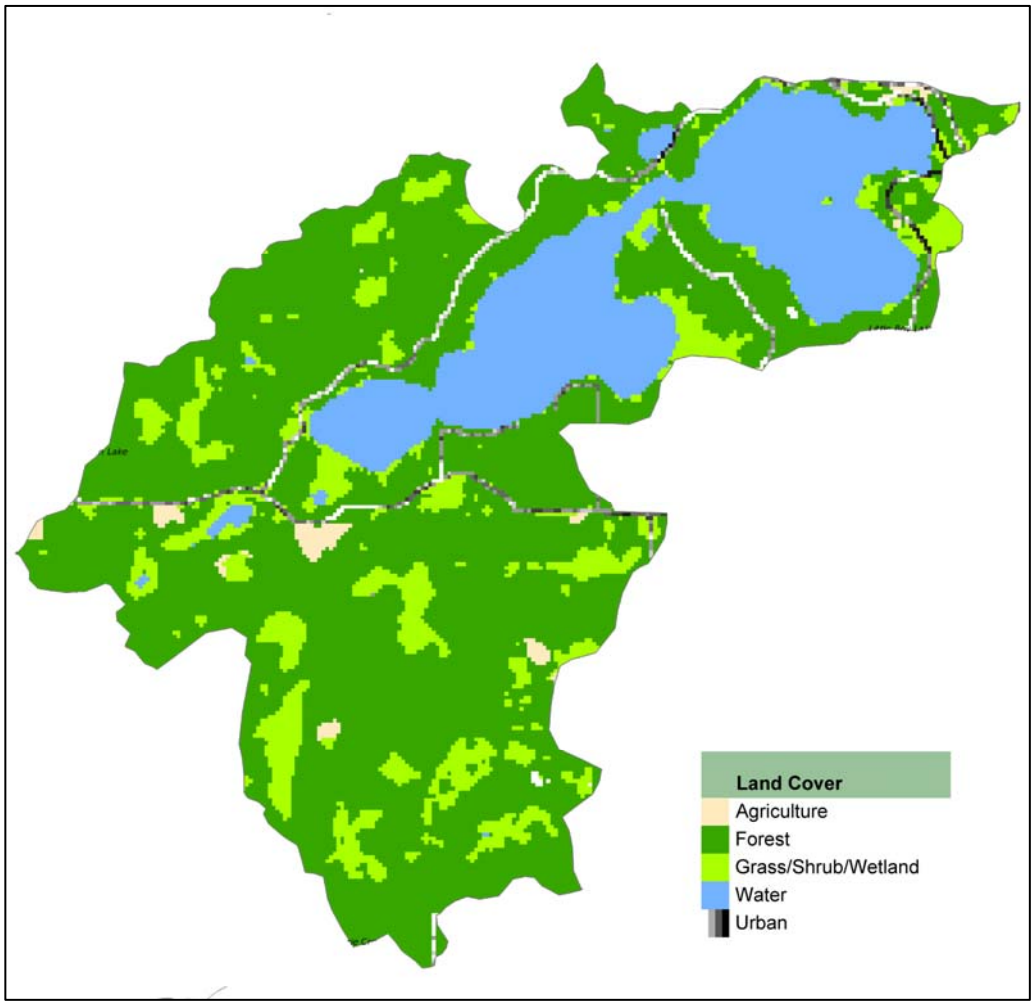

Figure 5. The Little Boy Lake (805500) lakeshed land cover (http://land.umn.edu).

Changes in land use, and ultimately land cover, impact the hydrology of a lakeshed. Land cover is also directly related to the lands ability to absorb and store water rather than cause it to flow overland (gathering nutrients and sediment as it moves) towards the lowest point, typically the lake. Impervious intensity decribes the lands inability to absorb water, the higher the % impervious intensity the more area that water cannot penetrate in to the soils. Monitoring the changes in land use can assist in future planning procedures to address the needs of future generations.

Phosphorus export, which is the main cause of lake eutrophication, depends on the type of land cover occurring in the lakeshed. Figure 5 depicts Wabedo Lake's lakeshed land cover.

The University of Minnesota has online records of land cover statistics from years 1990 and 2000 (http://land.umn.edu). Table 1 describes Wabedo Lake's lakeshed land cover statistics and percent change from 1990 to 2000. Due to the many factors that influence demographics, one cannot determine with certainty the projected statistics over the next 10, 20, 30+ years, but one can see the transition within the lakeshed from agriculture and water acreages to forest, grass/shrub/wetland, and urban acreages. The largest change in percentage is the decrease in agriculture cover (34.9%); however, in acreage, water cover has decreased the most (116 acres). In addition, the impervious intensity has increased, which has implications for storm water runoff into the lake. The increase in impervious intensity is consistent with the increase in urban acreage.

Table 1. Wabedo Lake's lakeshed land cover statistics and % change from 1990 to 2000 (http://land.umn.edu).

	1990		2000		% Change
Land Cover	**Acres**	**Percent**	**Acres**	**Percent**	**1990 to 2000**
Agriculture	86	1.44	56	0.94	34.9 % Decrease
Forest	3,705	62.13	3,804	63.79	2.7 % Increase
Grass/Shrub/Wetland	678	11.37	726	12.18	7.1 % Increase
Water	1,332	22.34	1,216	20.39	8.7 % Decrease
Urban	159	2.67	160	2.68	0.6 % Increase
Impervious Intensity %					
0	5,865	98.39	5,846	98.07	0.3 % Decrease
1-10	25	0.42	26	0.44	4 % Increase
11-25	38	0.64	44	0.74	15.8 % Increase
26-40	21	0.35	24	0.4	14.3 % Increase
41-60	10	0.17	13	0.22	30 % Increase
61-80	3	0.05	7	0.12	133.3 % Increase
81-100	0	0	0	0	No Change
Total Area	5,963		5,963		
Total Impervious Area (Percent Impervious Area Excludes Water Area)	21	0.45	29	0.61	38.1 % Increase

Demographics

Wabedo Lake is classified as a recreational development lake. Recreational development lakes usually have between 60 and 225 acres of water per mile of shoreline, between 3 and 25 dwellings per mile of shoreline, and are more than 15 feet deep.

The Minnesota Department of Administration Geographic and Demographic Analysis Division extrapolated future population in 5-year increments out to 2035. These projections are shown in Figure 6 below. Compared to Cass County as a whole, Wabedo Township has a slightly higher extrapolated growth projection.

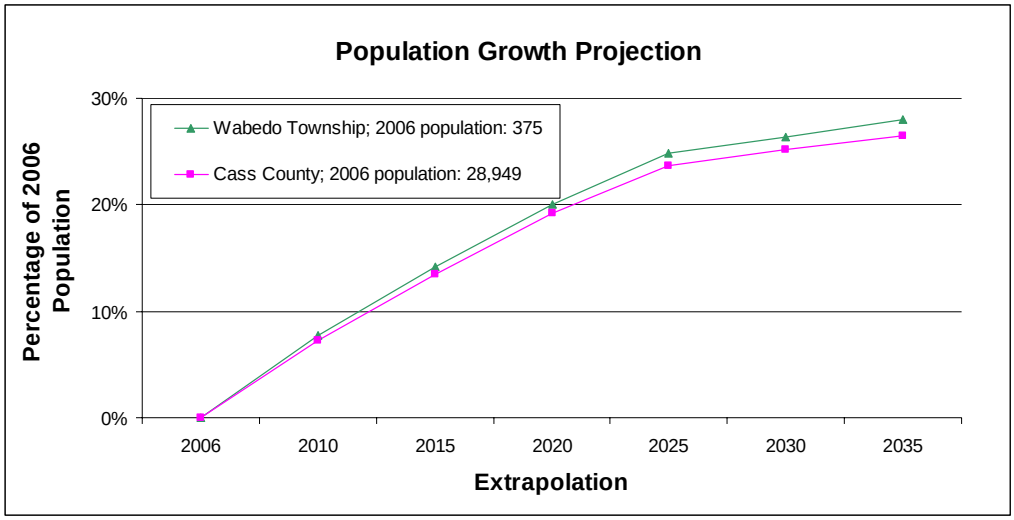

Figure 6. Population growth projection for Wabedo Township and Cass County (source: http://www.demography.state.mn.us/resource.html?Id=19332).

Status of the Fishery (DNR, as of 07/18/2005)

Wabedo Lake is a 1,185-acre lake located about two miles south of the City of Longville, MN. It is connected to Little Boy Lake by a navigable channel. The Minnesota Department of Natural Resources (MNDNR) has classified Minnesota's lakes into 43 different classes based on physical, chemical and other characteristics. Wabedo Lake is in Lake Class 22; lakes in this class are generally clear, very large, very deep, have a low percentage of shallow water area, and have very irregularly shaped shoreline with many bays or points. Wabedo Lake is managed primarily for muskellunge, black crappie, and walleye and secondarily for northern pike, smallmouth bass, largemouth bass, bluegill, cisco (tullibee), and yellow perch.

Muskellunge are present in Wabedo Lake, but the 2005 survey did not include spring trap netting targeting this species. Black crappie abundance was similar to other lakes of this type, and these fish ranged from 4.3 to 12.2 inches. Walleye abundance in the 2005 sampling in Wabedo Lake was below the average in ecologically similar lakes. Fish from 9 to 30 inches were sampled in MNDNR test nets. For several decades, Wabedo Lake has been stocked with walleye fry (small, newly-hatched fish) about every third year. However, it does not appear that walleye fry stocking has been successful at increasing the Wabedo Lake walleye population. In an attempt to increase walleye abundance and due to the lack of success with fry stocking, the Wabedo Lake management plan has been revised to call for stocking walleye fingerlings every other year beginning in 2006. Both the number and average size of northern pike in Wabedo Lake is good; sampled fish ranged from 13 to 33 inches and had an average length of almost 25 inches. There is a 24 to 36-inch protected slot limit regulation in effect on this lake. The bluegill population is comparable to other lakes of this type, and fish up to 7.6 inches were found, however most of the bluegill are small. Yellow perch are abundant in Wabedo Lake. Most of the yellow perch sampled in MNDNR test nets were small, and ranged in size from 4.4 to 10.7 inches. Other species present include black bullhead, bowfin (dogfish), brown bullhead, cisco (tullibee), hybrid sunfish, largemouth bass, muskellunge, smallmouth bass, pumpkinseed sunfish, rock bass, smallmouth bass, white sucker, and yellow bullhead.

Anglers can help maintain or improve the quality of fishing by practicing selective harvest. Selective harvest allows for the harvest of smaller fish for table fare, but encourages release of medium- to large-sized fish. Releasing these fish can help maintain balance in the fish community in Wabedo Lake and provide anglers the opportunity to catch more and larger fish in the future.

Shoreline areas on the land and into the shallow water provide essential habitat for fish and wildlife that live in or near Minnesota's lakes. Overdeveloped shorelines can't support the fish, wildlife, and clean water that are associated with natural undeveloped lakes. The combined effects of all lakeshore owners "fixing up" their property can destroy a lake's valuable natural shorelines.

Shoreline habitat consists of aquatic plants, woody plants and natural lake bottom soils. Plants in the water and at the water's edge provide habitat, prevent erosion and absorb excess nutrients. Shrubs, trees, and woody debris such as fallen trees or limbs provide good habitat both above and below the water and should be left in place. Natural lake bottom materials like silt or gravel are more ecologically productive than pure sand trucked in for a swimming beach. A tidy lawn and a sandy beach make great spots for sunbathing and swimming but do little to provide habitat for fish and wildlife. By leaving a buffer strip of natural vegetation along the shoreline, property owners can reduce erosion, help maintain water quality, and provide habitat and travel corridors for wildlife.

See the link below for specific information on gillnet surveys, stocking information, and fish consumption guidelines. http://www.dnr.state.mn.us/lakefind/showreport.html?downum=11017100