

Little Boy 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	8072	descriptive
Lakeshed	Little Boy Lake (807200)	descriptive
Ecoregion	Northern Lakes and Forests	descriptive
Lake Area	1,451 acres	descriptive
Miles of Shoreline	10.02	descriptive
Miles of Stream	0.38	descriptive
Miles of Road	7.9	descriptive
Lake Max Depth	74 ft. (22.5 m)	descriptive
Lake Mean Depth	24 ft. (7.3 m)	+
Water Residence Time	NA	NA
Municipalities	None	+
Sewage Management	Individual waste treatment systems (septic systems and holding tanks – inspections scheduled for 2009)	+
Public Drainage Ditches	None	+
Lake Management Plan	None	x
Lake Vegetation Survey/Plan	Survey Completed 2007	+
Forestry Practices	None	+
Development Classification	Recreational Development	x
Shoreline Development Index	1.9	+
Total Lakeshed to Lake Area Ratio (total lakeshed includes lake area)	2.8:1	x
Public Lake Accesses	1	x
Inlets	2 – unnamed	x
Outlets	1 – unnamed	x
Shoreland Conservation Potential (% shoreland identified for conservation)	47%	+
Feedlots	None	+
Agriculture Zoning	None	+
Public Land : Private Land	0.4:1	-
Wetland Coverage	8%	+
Lake Transparency Trend	Declining trend (95% probability)	-
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.

Little Boy 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). Little Boy

Lake falls within **minor watershed 8072**, 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. Little Boy Lake falls within the **Little Boy Lake (807200) lakeshed**, covering 4,035 acres (includes lake area) (Figure 3). Even though Little Boy Lake receives water from minor watershed 8055, for the purpose of this assessment it is decided that only the immediate lakeshed be inventoried and assessed.

Little Boy 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 Little Boy 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 (44%)					37%	Public (19%)		
	Developed	Agriculture	Forested Uplands	Other	Wetlands	Open Water	County	State	Federal
Land Use (%)	3%	0.5%	33%	2.5%	5%	37%	0%	19%	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 development and protection efforts	Open, pasture, grassland, shrubland	Protected				
Potential Phase 3 Discussion Items	Shoreline restoration	Restore wetlands; CRP	Forest stewardship planning, 3 rd party certification, SFIA, local woodland cooperatives		Protected by Wetland Conservation Act		County Tax Forfeit Lands	State Forest	National Forest

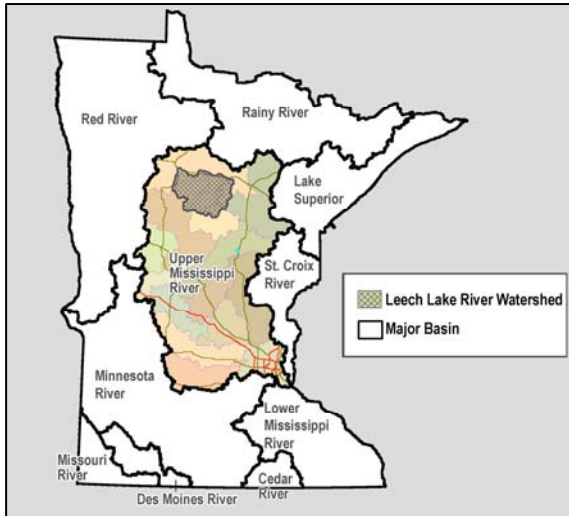


Figure 1. Upper Mississippi Basin and the Leech Lake River Watershed.

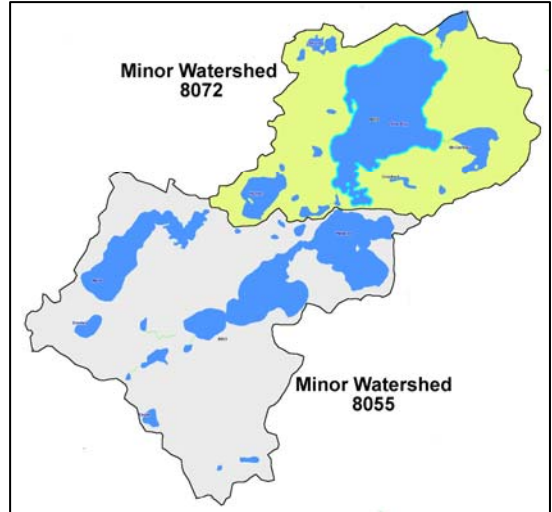


Figure 2. Minor Watersheds 8072 & 8055 contribute water to Little Boy Lake.

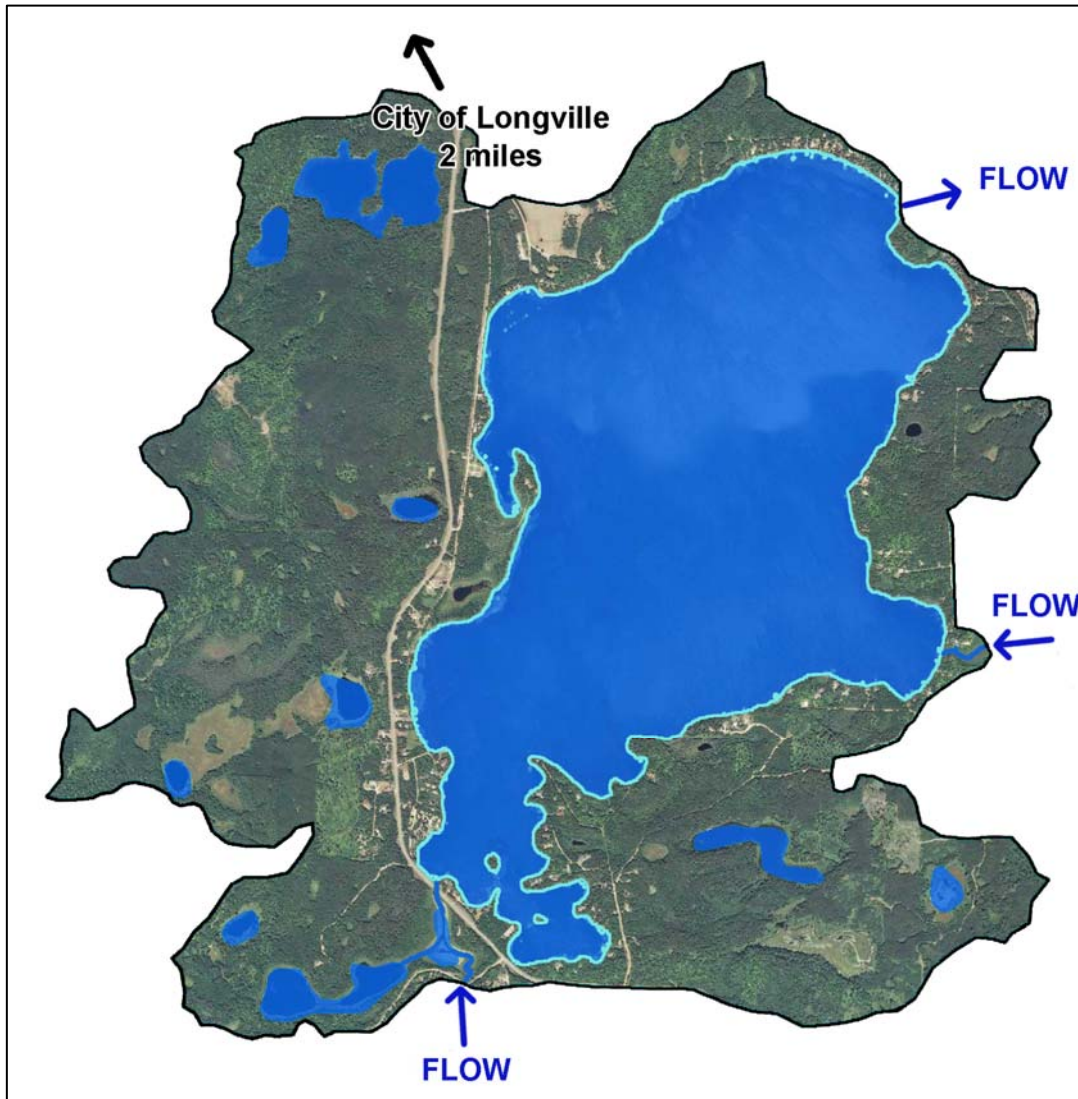


Figure 3. The Little Boy Lake (807200) Lakeshed (Aerial Imagery 2008 1M).

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.

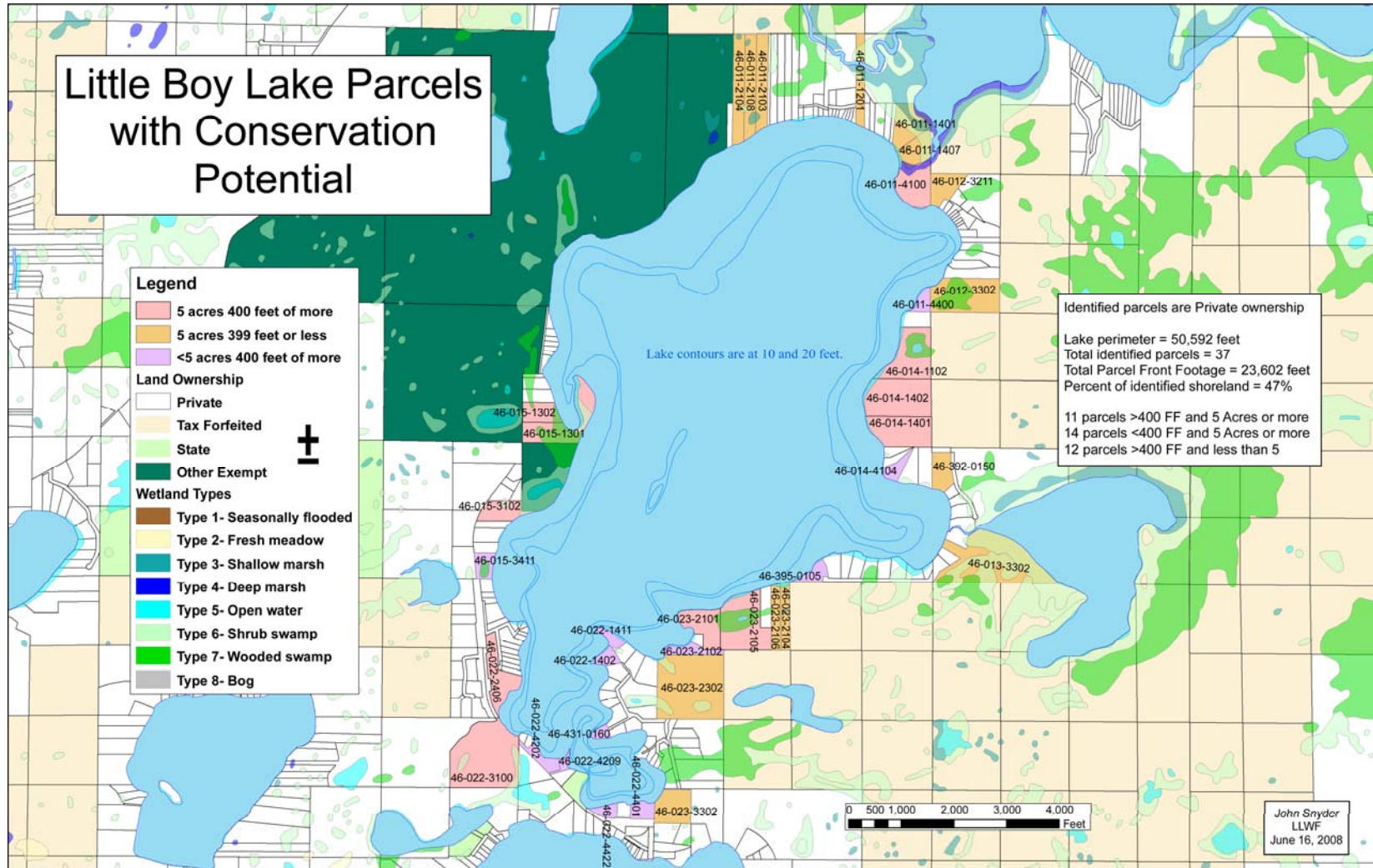


Figure 4. Lake parcels with conservation potential (developed by John Snyder, LLWF).

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.

Changes in land use, and ultimately land cover, impact the hydrology of a lakeshed. Land cover is also directly related to the land's 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 describes the land's inability to absorb water, the higher the % impervious intensity the more area that water cannot penetrate into the soils. Monitoring the changes in land use can assist in future planning procedures to address the needs of future generations.

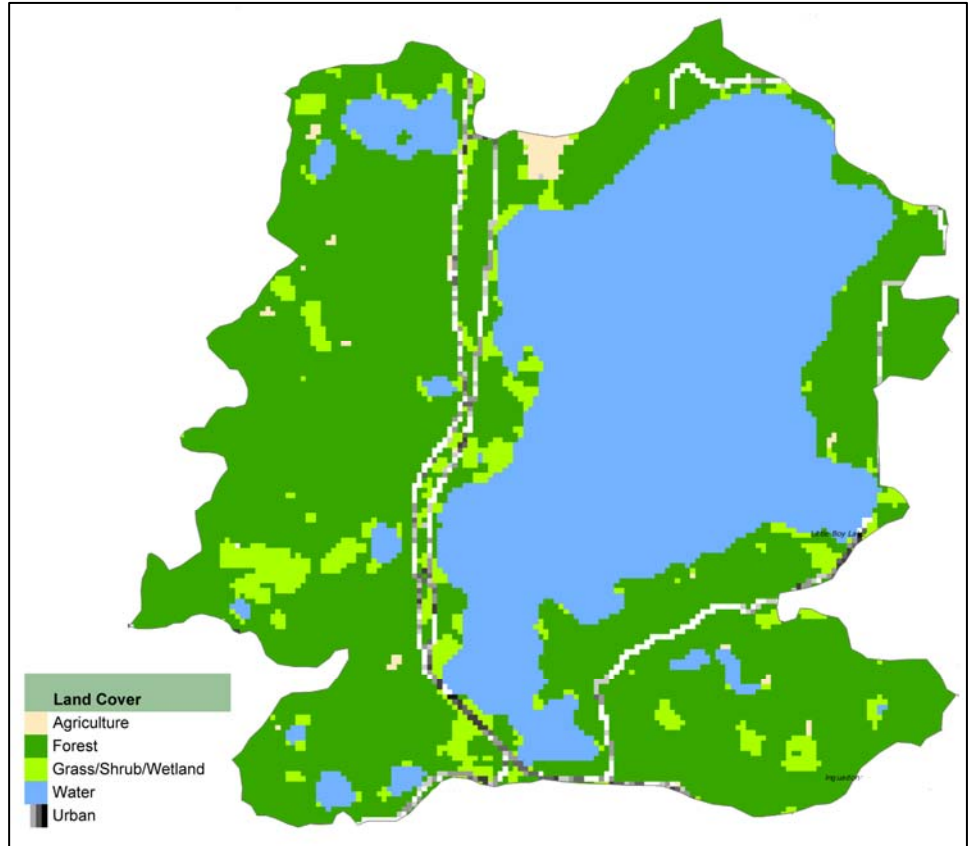


Figure 5. The Little Boy Lake (807200) lakeshed land cover (<http://land.umn.edu>).

Phosphorus export, which is the main cause of lake eutrophication, depends on the type of land cover occurring in the lakeshed. Figure 5 depicts Little Boy 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 Little Boy 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 and grass/shrub/wetland acreages. The largest change in percentage is the decrease in agriculture cover (48.9%); however, in acreage, water cover has decreased the most (64 acres). In addition, the impervious intensity has increased, which has implications for storm water runoff into the lake.

Table 1. Little Boy Lake's lakedshed land cover statistics and % change from 1990 to 2000 (<http://land.umn.edu>).

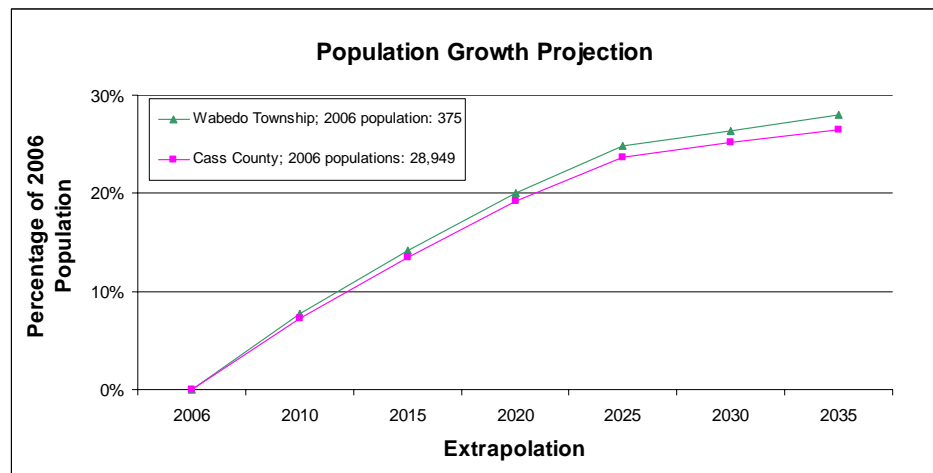
Land Cover	1990		2000		% Change 1990 to 2000
	Acres	Percent	Acres	Percent	
Agriculture	45	1.12	23	0.57	48.9 % Decrease
Forest	2,068	51.25	2,131	52.81	3.0 % Increase
Grass/Shrub/Wetland	174	4.31	226	5.6	29.9 % Increase
Water	1,616	40.05	1,552	37.72	4.0 % Decrease
Urban	131	3.25	131	3.25	No Change
Impervious Intensity %					
0	3,966	98.34	3,964	98.29	0.1 % Decrease
1-10	21	0.52	23	0.57	9.5 % Increase
11-25	18	0.45	23	0.57	27.8 % Increase
26-40	15	0.37	13	0.32	13.3 % Decrease
41-60	10	0.25	7	0.17	30 % Decrease
61-80	1	0.02	1	0.02	No Change
81-100	0	0	2	0.05	200 % Increase
Total Area	4,035		4,035		
Total Impervious Area (Percent Impervious Area Excludes Water Area)	15	0.62	15	0.6	No Change

Demographics

Little Boy 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)

Little Boy Lake (DOW # 110167) is a 1,372-acre lake located about two miles south of the City of Longville, MN. Little Boy Lake is connected to Wabedo 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. Little Boy 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. Little Boy Lake is managed primarily for muskellunge, walleye and northern pike and secondarily for smallmouth bass, largemouth bass, bluegill, black crappie, cisco (tullibee), and yellow perch.

The 2005 survey did not target muskellunge, however there is a good population of this species in Little Boy Lake. Walleye abundance in the 2005 sampling in Little Boy Lake was similar to the average for ecologically similar lakes. Fish from 7 to 27 inches were sampled in MNDNR test nets. For several decades, Little Boy Lake has been stocked with walleye fry (small, newly-hatched fish) about every third year. The management plan for this lake has been revised so that Little Boy Lake will be stocked with fry every other year. However, natural reproduction plays a major role in maintaining a healthy walleye population in this lake. Both the number and average size of northern pike in Little Boy Lake is good; sampled fish ranged from 14 to 31 inches and had an average length of 23 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. Yellow perch are abundant in Little Boy Lake. Most of the yellow perch sampled in MNDNR test nets were small, and ranged in size from 4.5 to 10.6 inches. Other species present include bluegill, black crappie, bowfin (dogfish), brown bullhead, cisco (tullibee), hybrid sunfish, largemouth bass, pumpkinseed sunfish, rock bass, shorthead redhorse, 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 Little Boy 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.

Only if more lakeshore owners manage their shoreline in a natural condition can fish and wildlife populations on Minnesota lakes remain healthy and abundant. More specific information on protecting or restoring shorelines and watersheds is available through the local DNR Fisheries office.

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=11016700>