

# Long 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	8070	descriptive
Lakeshed	Long Lake - Boy River (807000)	descriptive
Ecoregion	Northern Lakes and Forest	descriptive
Lake Area	1,009 acres	descriptive
Miles of Shoreline	14.83	descriptive
Miles of Stream	1.14	descriptive
Miles of Road	9.8	descriptive
Lake Max Depth	120 ft. (36.5 m)	descriptive
Lake Mean Depth	22.7 ft. (6.9 m)	+
Water Residence Time	16 - 17 years	-
Municipalities	None	+
Sewage Management	Individual waste treatment systems (septic systems and holding tanks – last inspection 2002)	+
Public Drainage Ditches	None	+
Lake Management Plan	Healthy Lakes & Rivers Partnership program, 2000	+
Lake Vegetation Survey/Plan	Survey Completed 2007	+
Forestry Practices	County timber sale – proposed even age large clear-cut on northeast side of lake	-
Development Classification	General Development	-
Shoreline Development Index	3.3	-
Total Lakeshed to Lake Area Ratio (total lakeshed includes lake area)	3.9:1	x
Public Lake Accesses	1	x
Inlets	None	NA
Outlets	None	NA
Shoreland Conservation Potential (% shoreland identified for conservation)	23%	+
Feedlots	None	+
Agriculture Zoning	None	+
Public Land : Private Land	1.1:1	+
Wetland Coverage	8%	+
Lake Transparency Trend	Improving trend (99.9% 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.

Long 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). Long Lake falls within **minor watershed 8070**, 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. Long Lake falls within the **Long Lake - Boy River (807000) lakeshed**, covering 3,919 acres (includes lake area) (Figure 3).

## Long 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.

Although the majority of Long Lake's lakeshed is made up of public land, the large amount of private forested uplands can be the focus of development and protection efforts in the lakeshed.

	Private (35%)					27% Open Water	Public (38%)		
	Developed	Agriculture	Forested Uplands	Other	Wetlands		County	State	Federal
<b>Land Use (%)</b>	3%	1%	25%	3%	3%	27%	0%	7%	31%
<b>Runoff Coefficient</b> Lbs of phosphorus/acre/year	0.45 - 1.5	0.26 - 0.9	0.09		0.09		0.09	0.09	0.09
<b>Description</b>	Focused on Shoreland	Cropland	Focus of development and protection efforts	Open, pasture, grassland, shrubland	Protected				
<b>Potential Phase 3 Discussion Items</b>	Shoreline restoration	Restore wetlands; CRP	Forest stewardship planning, 3 <sup>rd</sup> party certification, SFIA, local woodland cooperatives		Protected by Wetland Conservation Act		County Tax Forfeit Lands	State Forest	National Forest

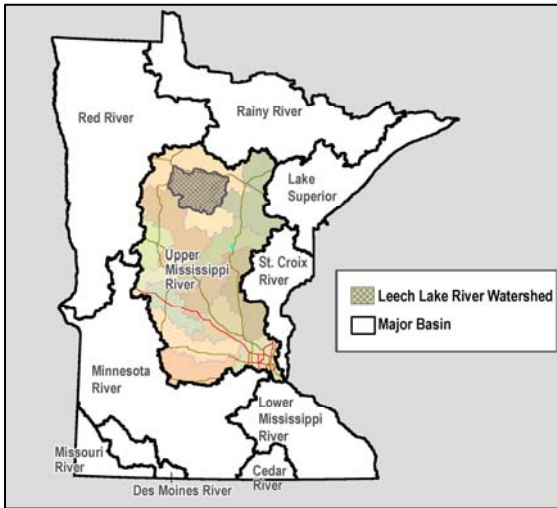


Figure 1. Upper Mississippi Basin and the Leech Lake River Watershed.

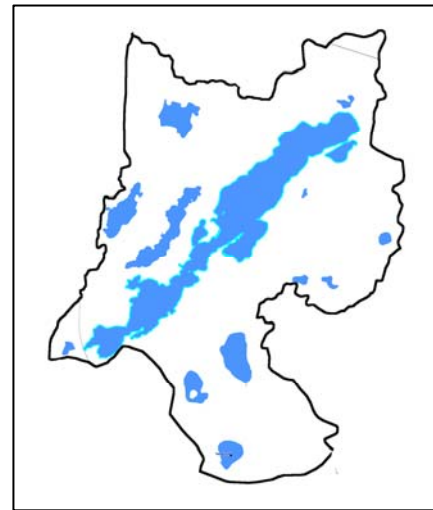


Figure 2. Minor Watershed 8070 contributes water to Long Lake.

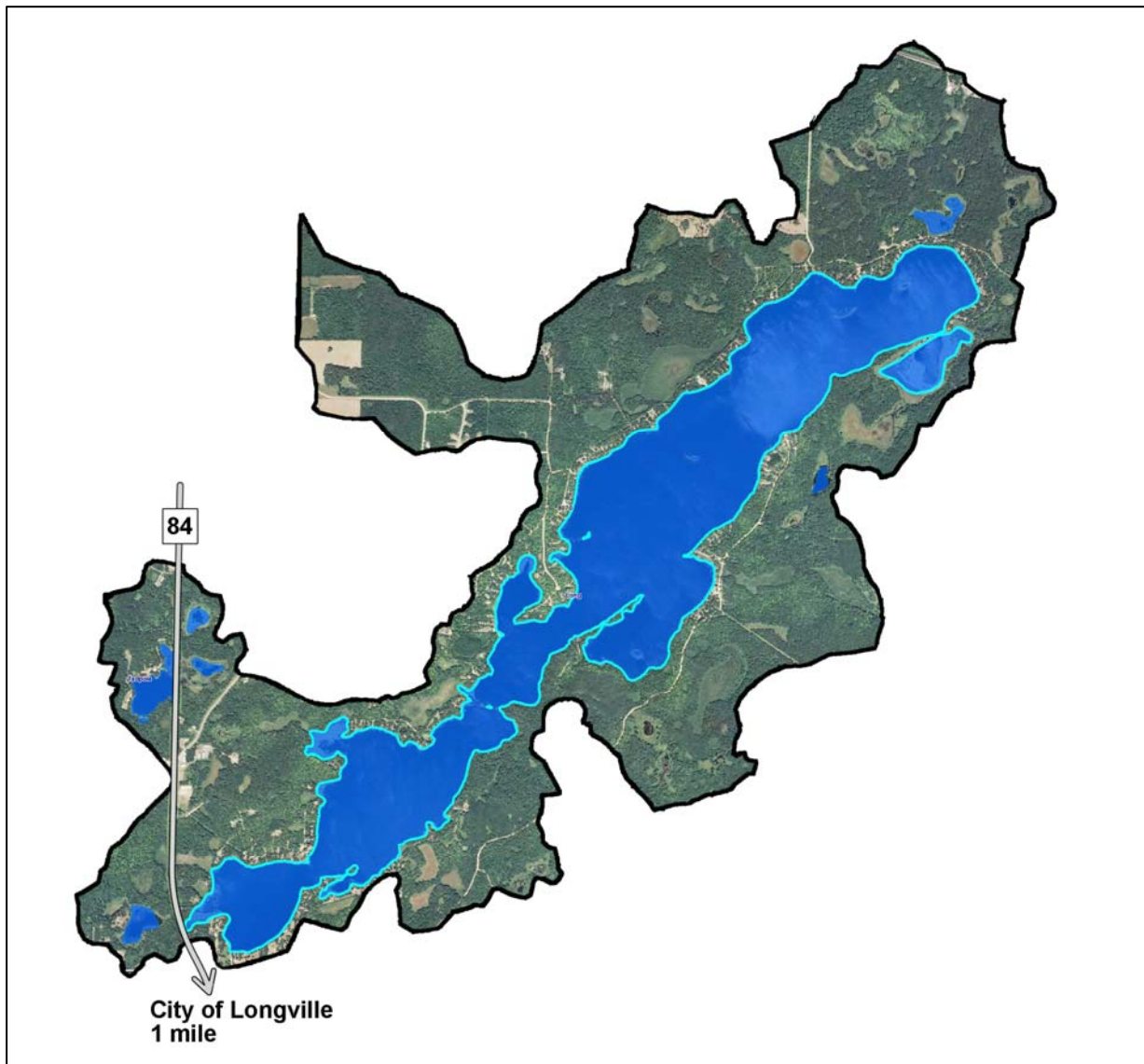


Figure 3. The Long Lake - Boy River (807000) Lakeshed (Aerial Imagery 2008 1M).

## 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.

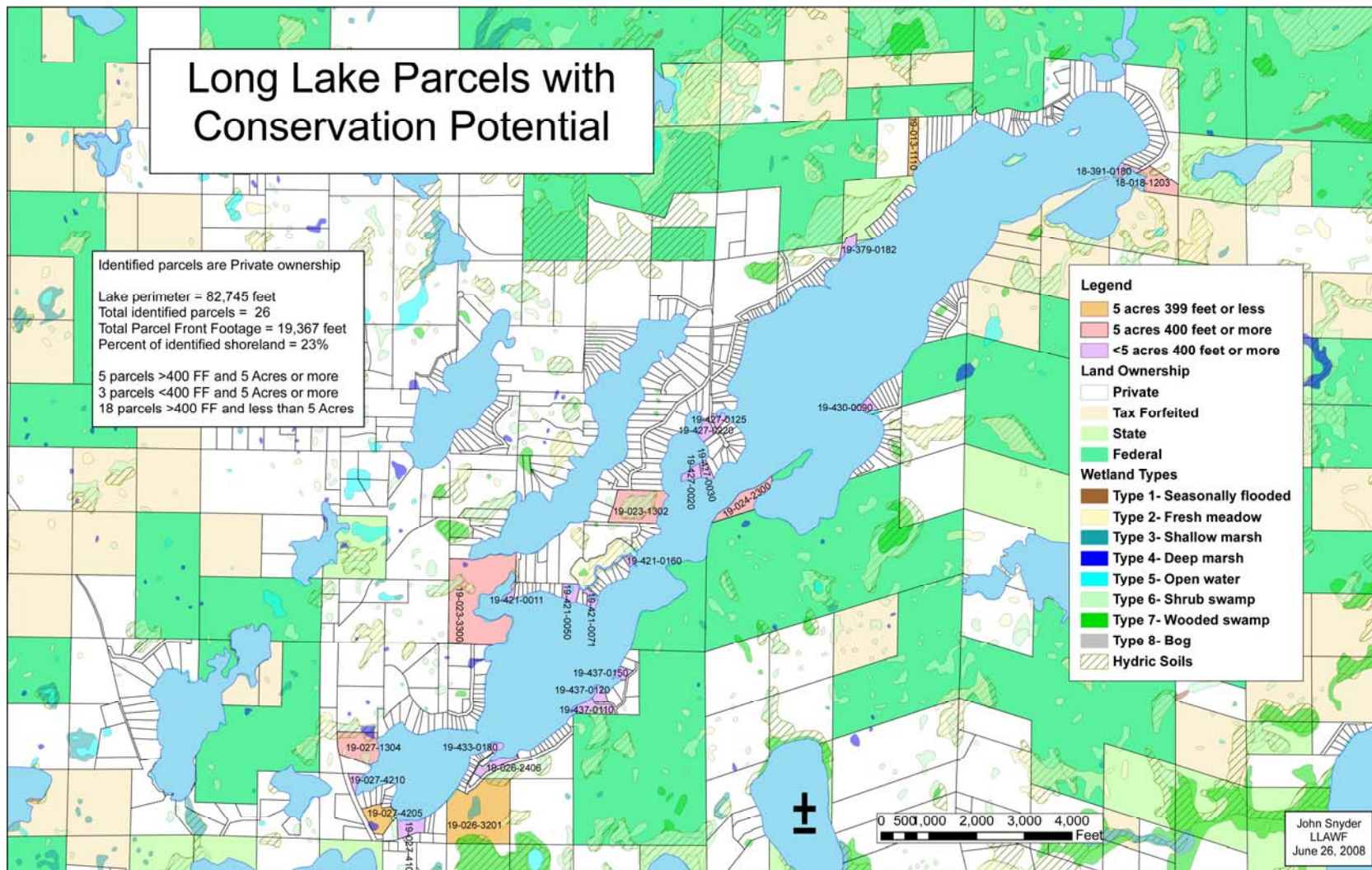


Figure 4. Lake parcels with conservation potential (developed by John Snyder, LLAWF).

## 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.

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.

Phosphorus export, which is the main cause of lake eutrophication, depends on the type of land cover occurring in the lakeshed. Figure 5 depicts Long 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 Long 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, grass/shrub/wetland, and water acreages to forest and urban acreages. The largest change in percentage is the decrease in agriculture cover (33.3%); however, in acreage, forest cover has increased the most (201 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.

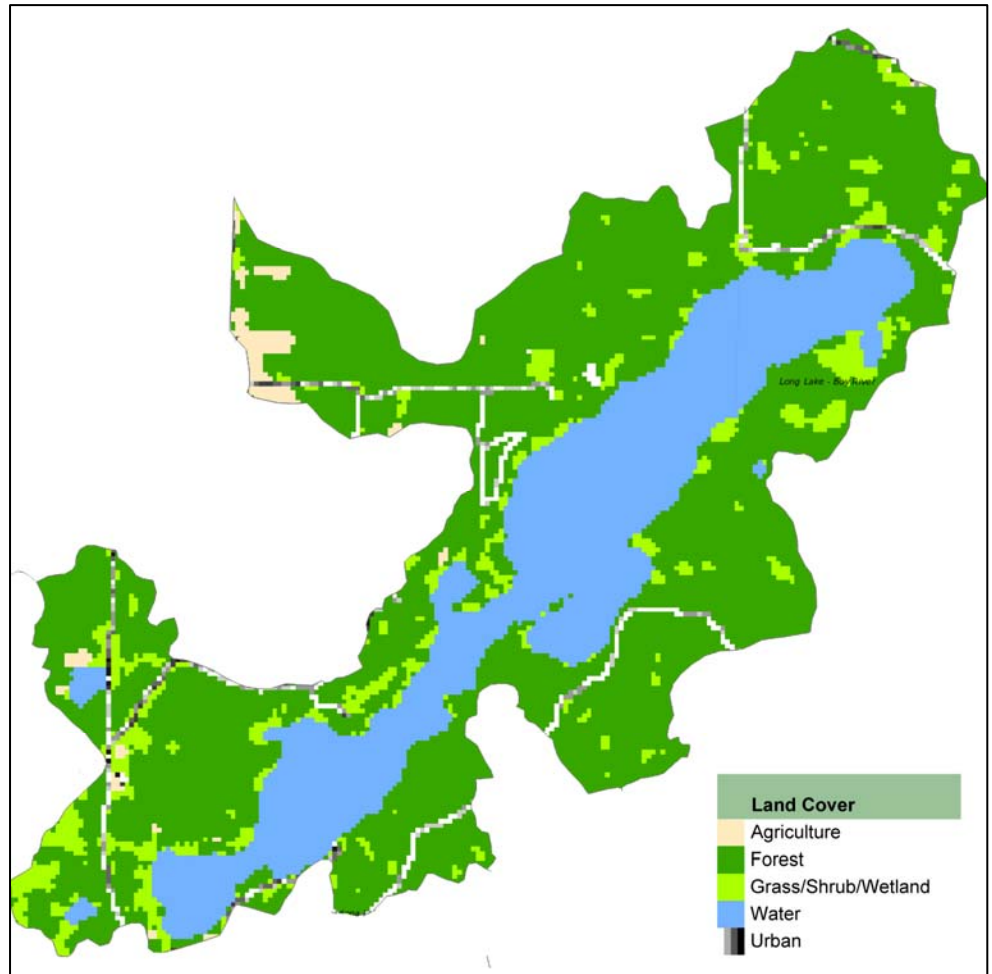


Figure 5. The Long Lake - Boy River (807000) lakeshed land cover (<http://land.umn.edu>).

Table 1. Long Lake's lakeshed 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	81	2.07	54	1.38	33.3 % Decrease
Forest	2,258	57.62	2,459	62.75	9 % Increase
Grass/Shrub/Wetland	366	9.34	309	7.88	15.6 % Decrease
Water	1,086	27.71	968	24.7	10.9 % Decrease
Urban	129	3.29	130	3.32	0.8 % Increase
<b>Impervious Intensity %</b>					
0	3,885	99.11	3,854	98.32	0.8 % Decrease
1-10	15	0.38	24	0.61	60 % Increase
11-25	12	0.31	23	0.59	91.7 % Increase
26-40	5	0.13	12	0.31	140 % Increase
41-60	3	0.08	5	0.13	66.7 % Increase
61-80	0	0	2	0.05	200 % Increase
81-100	0	0	1	0.03	100 % Increase
<b>Total Area</b>	<b>3,919</b>		<b>3,919</b>		
<b>Total Impervious Area</b> (Percent Impervious Area Excludes Water Area)	<b>6</b>	<b>0.21</b>	<b>14</b>	<b>0.47</b>	<b>133.3 % Increase</b>

## Demographics

Long Lake is classified as a general development lake. General development lakes usually have more than 225 acres of water per mile of shoreline 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, both Inguadona and Kego Townships have higher extrapolated growth projections.

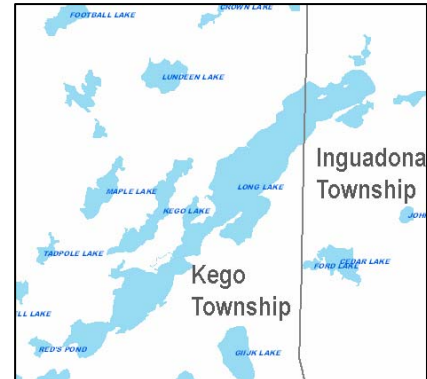
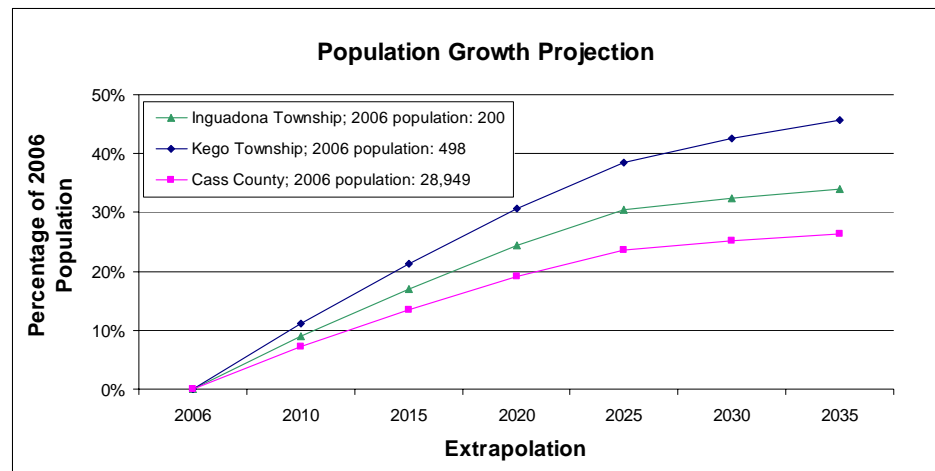


Figure 6. Population growth projection for the townships around Long Lake and Cass County (source: <http://www.demography.state.mn.us/resource.html?id=19332>).



## Status of the Fishery (DNR, as of 07/09/2007)

Long Lake is a 926-acre lake located near Longville, MN that has 13.7 miles of shoreline and a maximum depth of 115 feet. The DNR has classified Minnesota's lakes into 43 different classes based on physical, chemical and other characteristics. Long Lake is in Lake Class 25; lakes in this class are deep, clear, and irregularly shaped lakes. This lake is primarily managed for northern pike and largemouth bass and secondarily for walleye, black crappie, bluegill, and cisco.

Northern pike are present in Long Lake with moderate numbers when compared to other Lake Class 25 lakes. The mean length of the fish sampled was 21 inches and fish up to 38 inches are present. Few largemouth bass were sampled but fish up to 18 inches are present.

Other fish species that are available to anglers to catch are black bullhead, black crappie, bluegill, brown bullhead, cisco, pumpkinseed sunfish, rock bass, walleye, 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 Long 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=11014200>