

Birch 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	8060	descriptive
Lakeshed	Pleasant Lake - Boy River (806000)	descriptive
Ecoregion	Northern Lakes and Forest	descriptive
Lake Area	1,267 acres	descriptive
Miles of Shoreline	15.28	descriptive
Miles of Stream	1.96	descriptive
Miles of Road	14.9	descriptive
Lake Max Depth	45 ft. (13.7 m)	descriptive
Lake Mean Depth	15.8 ft. (4.8 m)	-
Water Residence Time	0.9 years	+
Municipalities	Hackensack	-
Sewage Management	Individual waste treatment systems (septic systems and holding tanks – last inspection 2007) and city sewer	+
Public Drainage Ditches	None	+
Lake Management Plan	Healthy Lakes & Rivers Partnership program, 2000	+
Lake Vegetation Survey/Plan	Survey Completed July 2006	+
Forestry Practices	None	+
Development Classification	General Development	-
Shoreline Development Index	3.1	-
Total Lakeshed to Lake Area Ratio (total lakeshed includes lake area)	3.9:1	x
Public Lake Accesses	1	x
Inlets	1 – Boy River	x
Outlets	1 – Boy River	x
Shoreland Conservation Potential (% shoreland identified for conservation)	24%	+
Feedlots	None	+
Agriculture Zoning	3 acres within 200 ft. of lake; 211 acres > 200 ft. from lake	-
Public Land : Private Land	0.25:1	-
Wetland Coverage	15%	+
Lake Transparency Trend	West basin–no trend; east basin–declining 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.

Birch 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). Birch Lake falls within **minor watershed 8060**, 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. Birch Lake falls within the **Pleasant Lake - Boy River (806000) lakeshed**, covering 4,992 acres (includes lake area) (Figure 3). Even though Birch Lake receives water from minor watershed 8019, for the purpose of this assessment it is decided that only the immediate lakeshed be inventoried and assessed.

Birch 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 Birch 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 (57%)					29%	Public (14%)		
	Developed	Agriculture	Forested Uplands	Other	Wetlands	Open Water	County	State	Federal
Land Use (%)	4%	2%	35%	6%	10%	29%	0%	14%	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

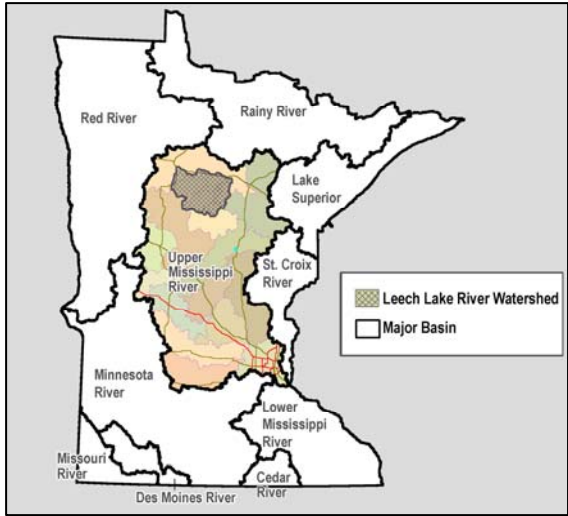


Figure 1. Upper Mississippi Basin and the Leech Lake River Watershed.

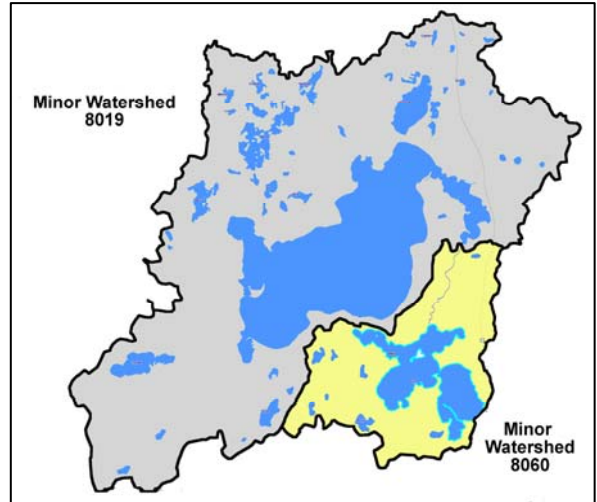


Figure 2. Minor Watersheds 8060 & 8019 contribute water to Birch Lake.

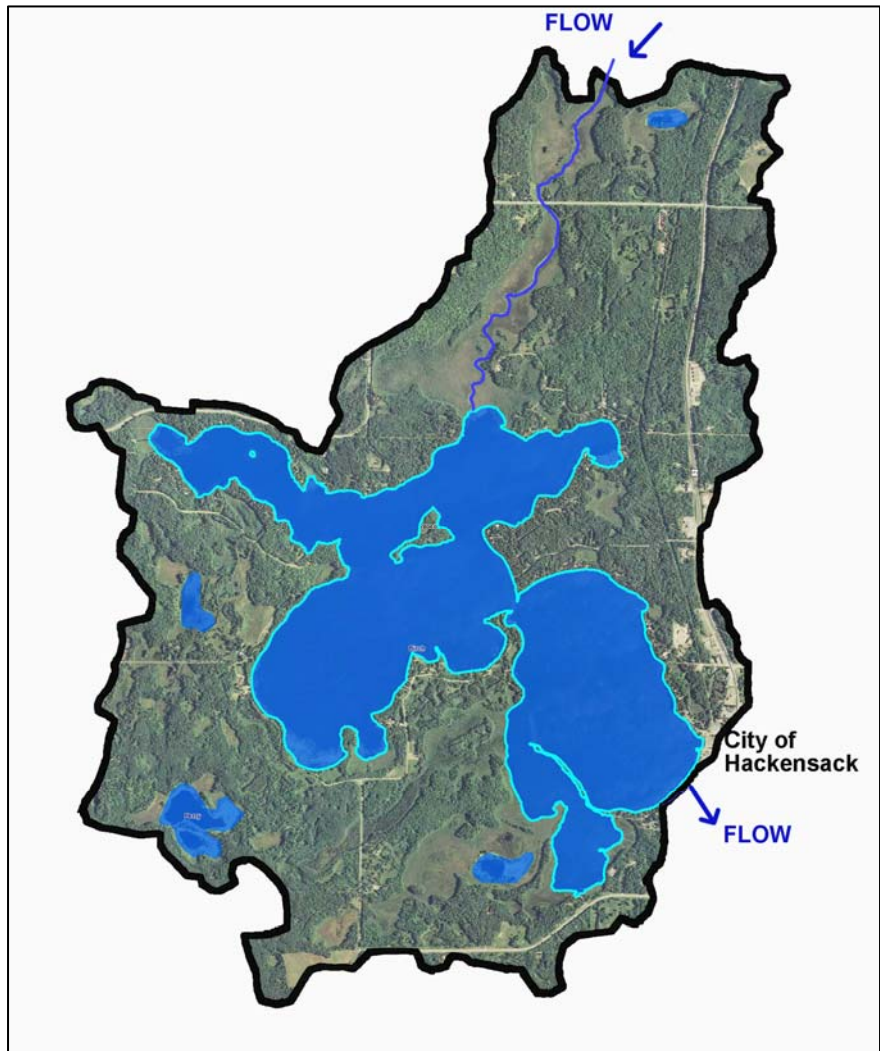


Figure 3. The Pleasant Lake - Boy River (806000) Lakeshed (Aerial Imagery 2008 1M).

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.

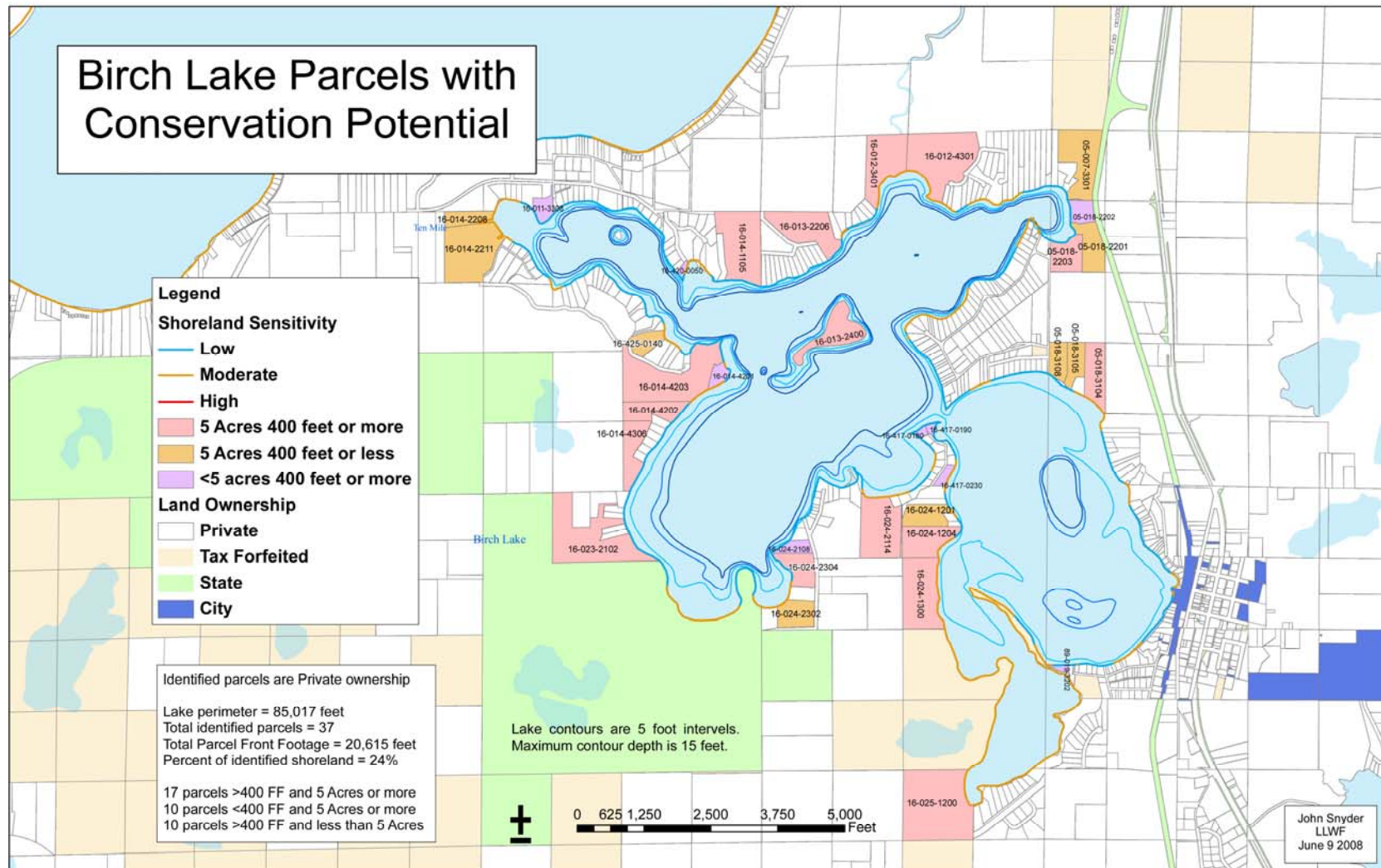


Figure 4. Lake parcels with conservation potential (developed by John Snyder, LLWF).

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.

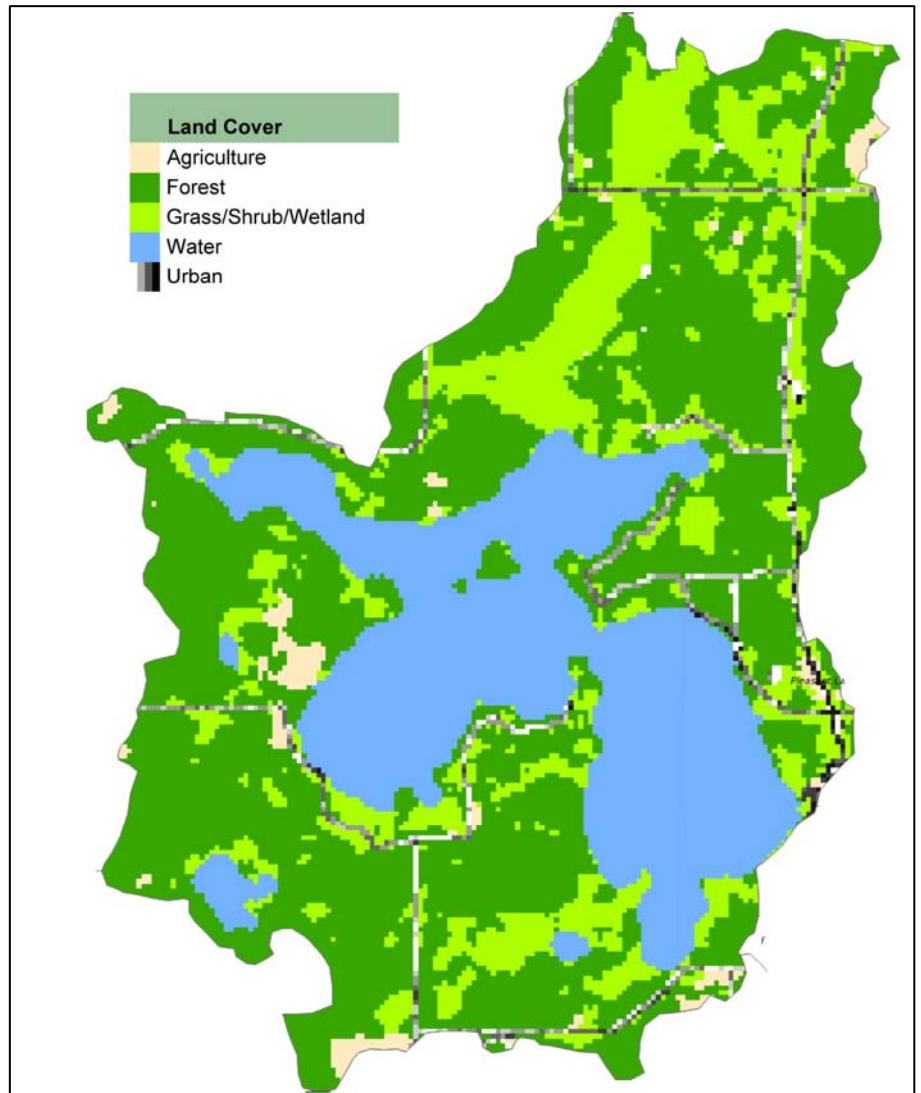


Figure 5. The Pleasant Lake - Boy River (806000) lakeshed land cover (<http://land.umn.edu>).

Phosphorus export, which is the main cause of lake eutrophication, depends on the type of land cover occurring in the lakeshed. Figure 5 depicts Birch 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 Birch 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 (50.7%); however, in acreage, forest cover has increased the most (152 acres). In addition, urban acreage has increased, which has implications for storm water runoff.

Table 1. Birch 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	209	4.19	103	2.06	50.7 % Decrease
Forest	2,389	47.86	2,541	50.9	6.4 % Increase
Grass/Shrub/Wetland	834	16.71	898	17.99	7.7 % Increase
Water	1,362	27.28	1,245	24.94	8.6 % Decrease
Urban	200	4.01	207	4.15	3.5 % Increase
Impervious Intensity %					
0	4,823	96.58	4,823	96.58	No Change
1-10	33	0.66	35	0.7	6.1 % Increase
11-25	55	1.1	58	1.16	5.5 % Increase
26-40	34	0.68	40	0.8	17.6 % Increase
41-60	25	0.5	19	0.38	24 % Decrease
61-80	16	0.32	11	0.22	31.3 % Decrease
81-100	8	0.16	8	0.16	No Change
Total Area	4,992		4,992		
Total Impervious Area (Percent Impervious Area Excludes Water Area)	53	1.46	50	1.33	5.7 % Decrease

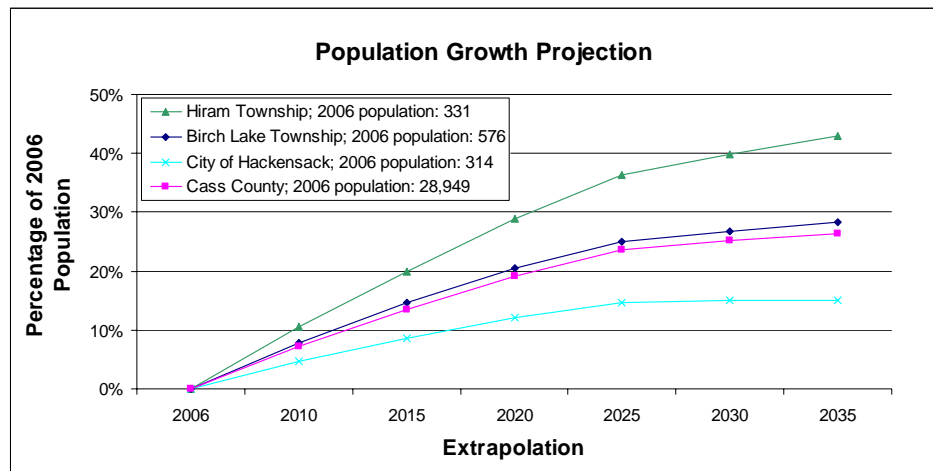
Demographics

Birch 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 Hiram and Birch Lake Townships have higher extrapolated growth projections, whereas the City of Hackensack has a lower extrapolated growth projection.



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



Status of the Fishery (DNR, as of 8/18/2003)

Birch Lake is a 1284-acre lake located near Hackensack, MN that has 14 miles of shoreline and a maximum depth of 45 feet. There is a city-owned public access located in Hackensack. The Minnesota Department of Natural Resources (DNR) has classified Minnesota's lakes into 43 different classes based on physical, chemical, and other characteristics. Birch Lake is in Lake Class 25; lakes in this class are generally deep, clear, hard water, and irregularly shaped lakes. This lake is primarily managed for northern pike and walleye and secondarily for bluegill, largemouth bass, black crappie, and yellow perch.

Northern pike were abundant in Birch Lake when compared to similar lakes of Lake Class 25. Fish up to 32 inches were sampled with an average length of 19 inches. Size structure consisted of smaller fish with 84% of the fish sampled were under 21 inches. Walleye abundance has increased from the previous survey. The 2001 year-class was dominant in our sampling gear, which will provide some fishing opportunities in the future. In 2004 and following years, the 1995 and 1996 year-classes will provide opportunities to catch walleye 21 inches and larger. The mean length for walleye caught in DNR test nets in 2003 was 17 inches and fish up to 30 inches were sampled. Bluegill numbers were consistent with previous surveys but the average size was considerably smaller. The average length was 5 inches, but fish up to 9 inches were sampled. Black crappie abundance was low but fish up to 11 inches were sampled. Largemouth bass up to 17 inches were found during the survey.

Other fish species that are available to anglers to catch are black bullhead, bowfin (dogfish), brown bullhead, pumpkinseed sunfish, rock bass, white sucker, yellow bullhead, and yellow perch.

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 Birch 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=11041200>