

Natural, Cultural and Agricultural Resources Assessment

This chapter summarizes the key natural resource elements of Big lake and its region and describes programs and regulations being used for their protection. Natural resources are the foundation of this comprehensive plan.

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Major Natural and Cultural Resource Issues

- 1. Wetland Protection:** Can or should degraded or destroyed wetlands be restored and used as amenities in future neighborhoods?

Some wetlands in urban growth locations have been plowed and drained for farming.

- 2. Floodplain Use:** Should some portion of the Elk River floodplain be acquired for linear public park and trail? If so, which unit of government should lead in that effort, the County or the City? What should be their respective roles?

This idea was raised in the prior Park System Plan and 2009 Comprehensive Plan.

- 3. Protection during Development:** Can a sustainable balance be found between land development and natural resource protection?

- 4. Resource Stewardship:** How should we use what we have?



Protecting natural resources is a key element of community development.

Natural Resources

Big Lake is set among a wealth of natural resources including rivers, lakes, wetlands, productive soils and wildlife refuges. The location, extent and design of land development will be major subjects for this plan. Proper enforcement of existing regulations will help the community protect its water and soil resources as it grows. Capturing regional growth in a compact pattern in the city will help preserve land for farming. In the surrounding Township, a concern related to unsewered development is the highly permeable soils, which is explained below.

The major natural resources in and around Big Lake are depicted on Figure 3-1.

Watershed

Big Lake is in the Mississippi River-St. Cloud Watershed. Rivers and creeks in the watershed drain surface water to the Mississippi River. Thus, land use, including farming and urban development, affect the water quality in all of the streams, lakes and wetlands of the watershed.

Soils

Most of the soils in and around Big Lake are very sandy, which allows surface water to drain easily to the aquifer. An aquifer is an underground layer of rock and gravel that holds water and may be tapped for drinking or crop irrigation. Near Big Lake, the aquifer may be as close as 50 feet to the surface and easily produces large amounts of water.

Because of that geology, the groundwater in the vicinity of Big Lake is rated by the Minnesota Department of Natural Resources (DNR) as being Highly to Very Highly Sensitive to pollution from surface sources.

In contrast, soils near the Elk River and to the north of that stream tend to be “hydric,” meaning that they hold much water. This is a result of their geologic history and the high ground water level. Many such locations are mapped as wetlands on Figure 3-1.

Until 1981, all of the housing and businesses in Big Lake used on-site, private wastewater treatment systems. These systems, in combination with small lots and soils that are either too well or too poorly drained, (particularly near the lakes and in the north), may have posed health risks. Now, a municipal sanitary sewer system has mitigated most of that problem. However, there are still some small areas without public sewer lines.

Streams

Near Big Lake are the Mississippi River and the Elk River, two valuable and influential resources.

Both have several layers of public regulatory protection but both also have some measure of degradation caused by human activity in their drainage basins.

Shoreland zoning regulations, administered by the County and the City and based on a state law and model ordinance, address land within 300 feet of the certain streams, including the Mississippi and Elk. This zoning “overlay” sets standards for minimum lot size and width, and setbacks for buildings or wastewater treatment systems from the top of the “ordinary high water mark.” They also prohibit certain visual or ecological harms such as clear-cutting vegetation or excessive paving.

Floodplain zoning regulations limit the type and density of development, require elevating and/or flood-proofing buildings, and generally reduce damage from flood waters in the locality and up or down stream. The floodplain is divided into Floodway and a Flood Fringe sub-districts, and different standards apply to each. The approximate extent of so-called 100-year and 500-year floodplains are calculated by the Federal Emergency Management Agency and depicted on Figure 3-1.

Mississippi River: Land use along the Mississippi River near Big Lake is mostly residential except near the Highway 25 bridge, where there is some industrial or commercial development.

The Mississippi River near Big Lake is part of the larger Mississippi Wild and Scenic River, which was designated by the State in 1973. The land use regulations adopted in 1976 designated this reach of the river as “Recreational,” and set a minimum house lot size of 2 acres. A small area near the Highway 25 bridge was designated Special Use, allowing by special permit certain non-residential development that existed prior to 1979.

The Mississippi River flows through a defined gorge, which minimizes the number of nearby wetlands and confines the floodplain mostly to locations beneath the bluff.

Elk River: The Elk River winds across the relatively flat sand plain from Palmer Township to the Mississippi River at the City of Elk River. Because of the flat topography of its watershed, the Elk is lined in many locations with wetlands, and the forested floodplain often extends well beyond its banks. Please refer to Figure 3-1 for general locations. These conditions are evident all along the northern side of Big Lake.

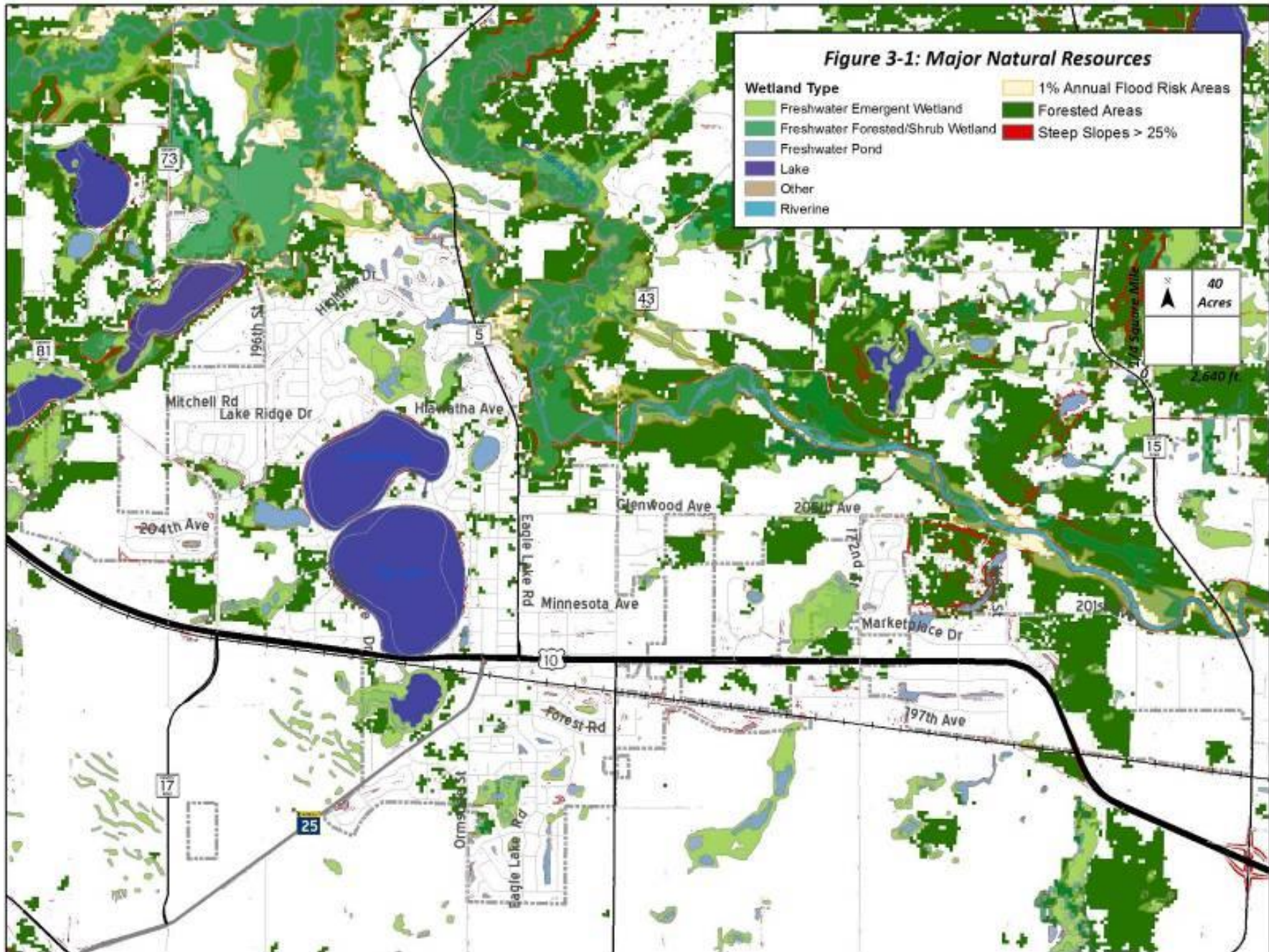
For the sake of water quality, fish, animals and other natural resources, it will be important for the City and Township of Big Lake, along with Sherburne County, to enforce existing regulations for the protection of wetlands, shorelands and floodplains as land development occurs near the river and throughout the river watershed.

The Minnesota DNR has classified the Elk River above Eagle Lake Road as Impaired. That means that water quality has been reduced, usually by increased nutrients from fertilizers, petroleum products and/or soil erosion. The management emphasis is on capturing such pollutants before they reach the stream by using buffer strips, cleansing ponds and/or better land use practices.

The Snake and St. Francis Rivers joins the Elk just north of the city.



The Elk River above County Highway 43



Lakes

Big Lake includes twelve lakes recognized by the Minnesota Department of Natural Resources and protected by the City's shoreland management overlay zoning district. Eight are classified as Natural Environment Lakes and receive the highest level of protection, one (Black's) is classified as Recreational and three (Big, Mitchell and Keller) as General Development. The shoreland zoning for lakes extends 1,000 feet back from the defined ordinary high water level. The same features are regulated for lakes as for streams.

The Natural Environment lakes are Beaudry, Beulah, Landia, Preusse, Thompson, Kerber, McDowell and one large but unnamed wetland.

Big and Mitchell Lakes are "seepage lakes," meaning that they get their water from the ground or from surface runoff in their relatively small drainage areas. There are many storm sewers that drain to these lakes without being filtered by intermediary ponds. These features make them highly susceptible to pollution.

In 1986, the City connected Big Lake and Lake Mitchell to the Elk River via a pipe in order to control their levels and reduce the high groundwater levels nearby.

Wetlands

Numerous wetlands exist in and around the city. These surface features have many benefits such as providing wildlife habitat, reducing flooding, recharging groundwater aquifers and cleansing runoff.

As indicated by Figure 3-1, most but not all of these are near the Elk River, as the sandy soils elsewhere do not usually suspend water and support wetland vegetation. There is a large wetland southeast of the Northstar rail station and several lesser sites also south of the railroad track.

The City administers a wetland overlay zoning district, Section 1006 of the City Code. This ordinance, based on the Minnesota Wetland Conservation Act of 1991, requires that land developers find and record the boundary and quality of any wetland on or near their property through field tests conducted by a certified professional.

An undisturbed buffer strip of 30 to 50 feet, depending on the quality of the wetland, must be preserved around each. An additional building setback from the buffer is required.

Wellhead Protection Areas

Minnesota law requires that local governments that operate public water wells must regulate and limit the types of land use that can occur near those wells. The danger is that surface pollutants could enter the wells and drain easily to the aquifer.

In Big Lake, there are several municipal wells. The City has adopted zoning regulations that apply near those wells for that purpose. The sandy, well-drained soils make these regulations especially important.

The Minnesota DNR has mapped many private wells in or near Big Lake as being polluted from agricultural or on-site wastewater sources. (Refer to the 2010 Sherburne County Comprehensive Plan, page 36.) The municipal wells of Big Lake have not shown those problems and provide water that is safe for drinking.

Ecosystem and Wildlife

Much of the native ecosystem, vegetation and wildlife habitat in or around Big Lake has been altered or lost through human activity. The original vegetation consisted of prairie, cedar openings or wet prairie.

Sherburne County is within the Anoka Sand Plain subsection of the Eastern Broadleaf Forest. The Anoka Sand Plain is well-known for sand hill cranes, trumpeter swans, bald eagles, bobolinks, and lark sparrows. Other important species are badgers, Blanding's turtles, and gopher snakes.

Important habitats include dry prairie associated with scattered wetlands, rivers, and streams which provide excellent habitat for Blanding's turtles, both species of hognose snakes, and bull snakes. Some of the best examples of dry oak savanna in the state occur in this subsection. The Sherburne national Wildlife Refuge is an important stopover site for migratory birds.

The Minnesota DNR has identified 97 Species in Greatest Conservation Need known or predicted to inhabit the Anoka Sand Plain, most commonly found in proximity of the Sherburne National Wildlife Refuge and the Sand Dunes State Forest. Of these, 34 species within Sherburne County have been designated: 4 as endangered, 7 as threatened and 23 of special concern. Endangered species include the insect; Uncas Skipper, and vascular plants; Tubercled Rein-Orchid, Cross-leaved Milkwort, and Tall Nut-rush. Endangered and threatened species have certain protections under state laws.

Wildlife Refuges

Three major natural conservation areas exist approximately five miles northeast of Big Lake in central Sherburne County. See Figure 3-2.

- The Sherburne National Wildlife Refuge (31,000 acres)
- The Sand Dunes State Forest (8,900 acres)
- Uncas Dunes State Scientific and Natural Area.

These refuges are celebrated both for their wildlife and extraordinary opportunities provided to visitors. The upland habitats are dynamic, ranging from grasslands to oak savanna to forest. These are interspersed with a variety of wetland and river habitats ranging from sedge meadow to deep water marsh. Today, visitors may still discover the excitement that might have been felt over 100 years ago, as early pioneers stepped out of the “Big Woods” and onto the edge of Minnesota’s magnificent tall grass prairie.

The Sand Dunes and Uncas Dunes contain relic dune fields associated with Glacial Lake Grantsburg.

Species and features of particular interest include the sand hill crane, Blanding’s turtle, oak savanna, wet meadows, lakes, marshes, pine plantations (restoration projects) and the pristine St. Francis River.

Recreational opportunities include hunting, fishing, hiking, bird watching, photography, wildlife observation, horseback riding and nature study.

Each is undergoing some form of long-term habitat restoration.

Cultural Resources

There are two properties in Big Lake that are eligible to be listed on the National Register of Historic Places but for which nominations have not been formally submitted:

- **Big Lake Public School**
Northwest corner of US Highway 10 and Powell Street
- **Hanson House**
Northwest corner of Pleasant Avenue East and Eagle Lake Road

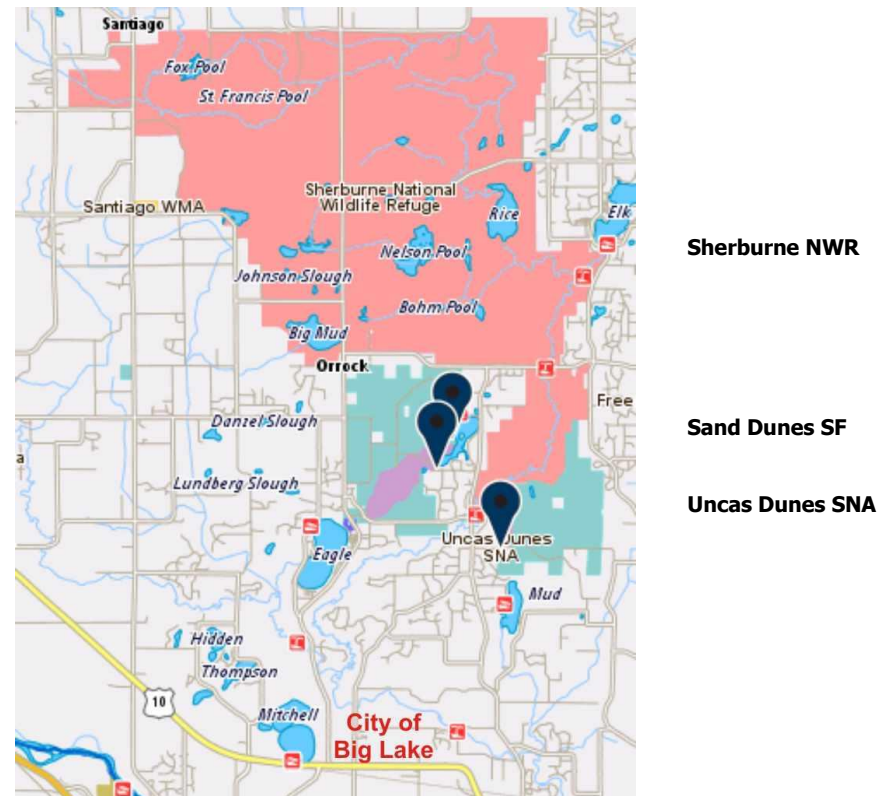


Figure 3-2: Major Conservation Areas

Soils for Farming

South of the urbanized area are large tracts of land currently in cultivation. According to the Crop Productivity Index of the US Department of Agriculture, soils there are generally only of moderate quality for agriculture. They are not rated as “prime for agriculture.”

These soils are level but very sandy, moderately to excessively well drained, and low in nutrients, all of which diminish their crop productivity. Nonetheless, they can be highly productive if irrigated and given supplemental nutrients.

Some land owners have invested in field irrigation systems that draw large amounts of water from the aquifer to produce specialty or other crops.

Solar Energy

In 2016, the City approved the private development of 5-megawatt solar garden on approximately 27 acres of land just between Highways 17 and 25. The City previously owned the land and had used it for spreading sewage sludge, which is a common and normally safe practice.

The “community solar garden” creates enough power during an average year to offset the electricity consumed by approximately 875 typical Minnesota houses in a year.

Green Step City

Big Lake became a Green Step City in 2016.

Green Step Cities is a free and voluntary program designed to help Minnesota cities achieve their environmental sustainability goals through any of 29 best practices. There are now 106 cities and two tribal nations in Minnesota that have completed one or more participation steps since the program began in 2010. Forty-nine cities are in Step One.

Each of the Green Step Cities program’s 29 best practices can be implemented by completing one or more specific actions from a list of four to eight actions in the areas of transportation, buildings and lighting, environmental management, land use, and economic and community development. The

actions are tailored to all types of Minnesota cities, and they focus on cost savings, energy use reduction, and encouraging innovation.

Cities achieve Step One recognition by passing a resolution to become a Green Step City. Cities designated Step Two have applied up to eight of the program’s best practices, and Step Three-designated cities have implemented up to 16 of the best practices. Some cities have completed more than one of the three steps in a year.