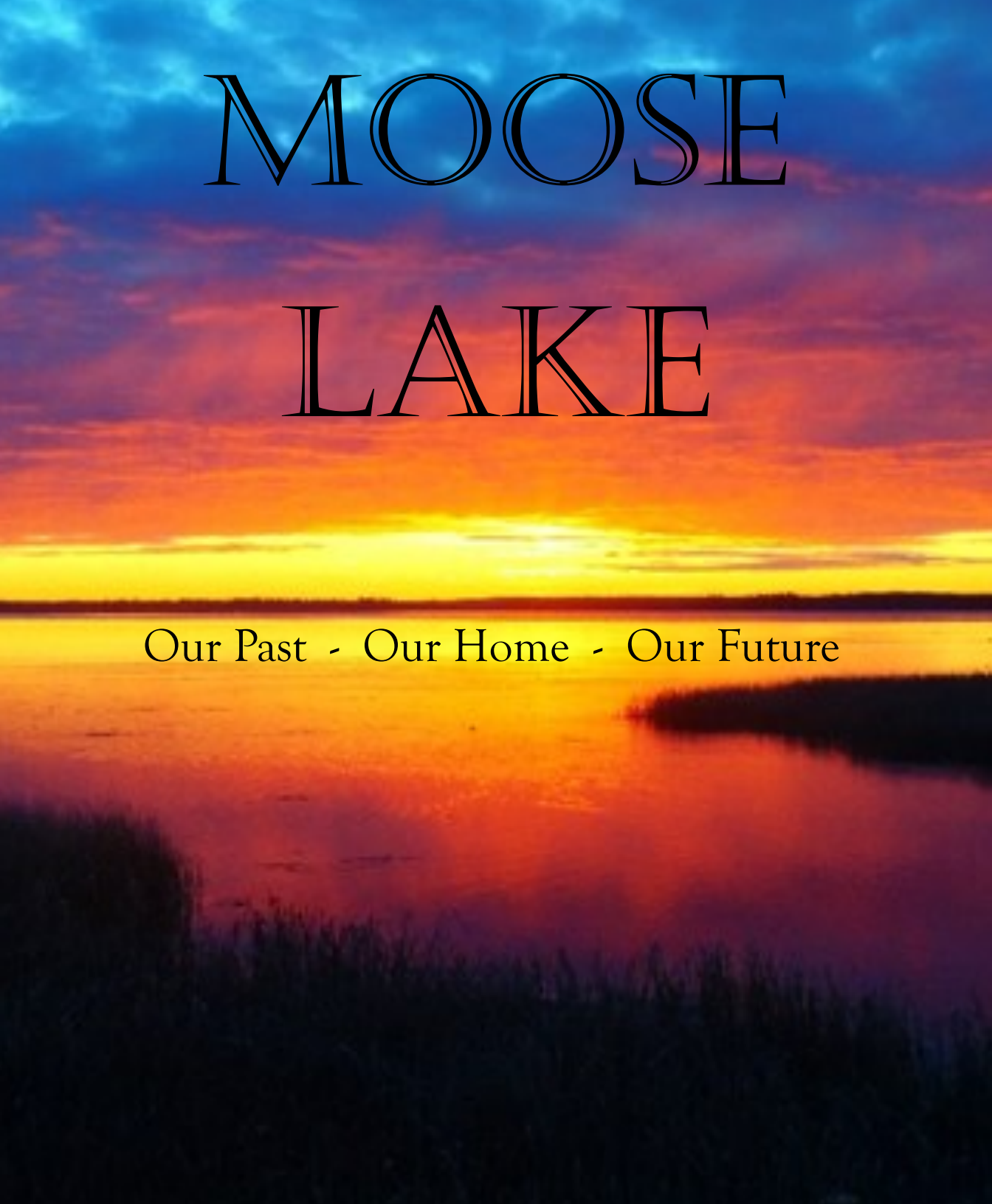
MOOSE
LAKE
Our Past - Our Home - Our Future

Moose Lake has a rich history starting with the fur trade and continually evolving to today with over 10,000 visitors annually. The area is under pressure from development such as subdivisions, lakelots, campgrounds, industry, agriculture and recreation; as well as the wildlife that make the lake their home. The Moose Lake Watershed Society (MLWS) recognizes that watershed management is vital to conserving the lake and maintaining its ecological value that we all can enjoy. The Moose Lake Watershed Society is pleased to provide this handbook, which helps us achieve our vision as well as work to complete our Moose Lake Watershed Management Plan goals.

Moose Lake Watershed Society

Vision

To maintain a healthy and functioning Moose Lake Watershed and recognize the importance of living within the capacity of the natural environment as a means of ensuring sustainable environmental, economic and social values.

Acknowledgments

This handbook was created for the Moose Lake Watershed Society by Kellie Nichiporik.
Thank you to the Lac La Nonne Enhancement and Protection Association, Waters Edge Resource Group and Lac La Nonne Watershed Stewardship Society for their pioneering accomplishments of the Lac La Nonne and Nakamun Lake Handbooks, upon which this project is based.
Thank you to Bill Fox for providing the history of Moose Lake. Thank you to Lakeland Agricultural Research Association and Cows and Fish for providing resources and assistance.
The Moose Lake Watershed Society wishes to acknowledge the financial assistance of the Watershed Stewardship Grant Program and the Land Stewardship Centre for making this handbook possible.
The Land Stewardship Centre (LSC) is pleased to contribute to the production of this handbook through the Watershed Stewardship Grant Program. LSC is committed to working with watershed stewardship groups to increase public awareness and the importance of the grassroots initiatives that are having a positive impact on watersheds and communities across Alberta. Opinions expressed in this publication are those of the MLWS and not necessarily LSC's.

Land Stewardship Centre

Moose Lake

Our Past - Our Home - Our Future

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THE HISTORY OF MOOSE LAKE

AS TOLD BY BILL FOX

The first known recorded activity on Moose Lake was the fur trading post built by Angus Shaw, a fur trader of Scottish origin, on the northwest corner of Moose Lake for the North West Company. This site was recorded by Peter Fidler, a surveyor and mapper of English descent, on his map of the area in 1789. The post was located on the north shore of the lake. This land was later owned by my Grandmother Fox and is still owned by the family. Before I started school, my Grandmother showed me this site where she said a trading post had been long ago.

The pits that were used in those days are still visible today as there has been no activity on the site since Angus Shaw, who after a two year stay, left to go to Buckingham House and Fort George on the North Saskatchewan River west of what is now Lindbergh. About five years ago, two local historians wished to see the site and I was able to find it after all that time. With a metal detector, we found bits of material – a brass button, snare wire, home-made nails and the like. There was about six inches of topsoil that have built up over about 220 years covering them when we found them.

This corner of Moose Lake is where the small rivers and lakes join Moose Lake. These rivers and lakes come from north of the North Saskatchewan River close to Lindbergh (Moosewa originally) into Kehiwin Lake, then flows through Kehiwin River into Bangs Lake (named after Jim Bangs who owned and lived on land on the northwest corner of Bangs Lake and is now owned by the Sandmeyer family). From there, the water flows north into the Thinlake River, Thin Lake and northeast to Moose Lake. This was the main waterway from the area north of the North Saskatchewan River to Moose Lake. Thin Lake was originally named Tyne Lake and Tyne Creek. From Moose Lake the water flows out through the Mooselake River into the Beaver River.

The CNR railroad came through the Franchere area to Cold Lake in 1928. The bridge was built over Thinlake River about the same time that the railroad came. The first bridge was a couple hundred feet west of the present bridge.

Before the bridge was built, there was a sand bar that crossed the corner of the lake east of the bridge and crossed near where the trading post was located. The lake was shallow enough that people could cross with horses and wagons or could walk across. The lake was much lower in those days than it is today.

In the early days there were many people living on the lakeshore – mostly fishermen, trappers and farmers. The Destrube Brothers from England came in 1907 to land north of Bangs Lake. After the railroad came, the north-south trail was improved to give the southern areas of Rife and Hoselaw access to the railroad. The original north-south road followed the higher land and was not straight. It went across country mostly. The road had several names as it went along…Little Muskeg, Caribou Hill, Big Muskeg, Crooked Sand Hill, and Burned area to name a few.

The large hill was named Caribou Hill as apparently there were caribou there many years earlier according to stories and was at one time apparently believed to be an island in a large lake area.

In about 1960, a crew from the University of Alberta and some historians were doing an exploration test on the hill. People were doing searches, digging holes, and screening the sand in the ground looking for historical artifacts. They found flint arrowheads but were looking for things that were older than that. We never did hear if they ever found anything they were looking for or what they actually found. No one has ever been back that we know about since that time.

Many of the areas around the lake were named after these early families or from things that may have happened in a certain area. Dead Man's Point was the spot that a man's body was found on the shore long ago and the name still exists. This was also said to be a good place to set nets for whitefish as the water was up to 60 feet deep. Pelican Point was named because pelicans collected and nested there. Other names included: Fox Point, McConnell's Bay, Anshaw Bay, Vezeau Beach, Colombes Beach, Opheim Beach, and Blind Bay.

The Opheim Family came in 1925 to the south shore of Moose Lake, then moved to Saskatchewan and returned in 1932. In 1935 they got a homestead on Moose Lake (1/2 mile of Lakeshore and 35 acres of land). They fished and trapped and ran a beach area in the summer. In 1942 they left the area for the coal mines of southwest Alberta. In the late 1940's this land was purchased by the Eastbourne community group and became the Eastbourne Beach. The original Bonnyville Trail Road went across this land. One half mile west of Eastbourne Beach was where the Government campsite used to be. In the earlier days, this was where people could cross with horses and wagons to the big island in the summer to pick berries, fish, and some cut hay on the island. The campsite is now gone, replaced with a private residence.

A lot of land that was owned in early years has now been subdivided and sold and is now residences for many families today.

Besides the Thinlake River in the northwest corner, a large amount of runoff water comes from the south into McConnell Bay in the spring and all summer on an average rainfall year. This is a fish spawning area as well as Thin Lake. Some fish are trapped if the water drops and the fish cannot get back to the lake.

The lake level today is higher than it was in 1940. The area where my dad had his fish net racks and ice house in 1940 is now under water. This could be due partly to the weirs (about 1945 or so) that were built on Mooselake River. This was originally built by a fellow named Lammie, hired to haul stones to the creek to build a dike that would raise the level of the lake. He hauled the stones all day and placed them in the creek. At night, sometimes another fellow, a store owner from Bonnyville, would go out and dig the rocks out and throw them away. In about 1980 a cement structure was placed in the outlet.

Before 1940 there were no beavers left in Moose Lake. There had been beavers there many years before. About 1946 beavers were found in Blind Bay and some on Thinlake River. They would have come from the North Sand River area. Today there is a very healthy beaver population. In pre-war years, a church camp was on the north shore. Today the area is Moose Lake Provincial Park. The area of Franchere Provincial Park was originally owned by Mr. Tellephson, a trapper. He used to rent boats to people for fishing.

About 1963, the Town of Bonnyville wanted to drain Jessie Lake into Moose Lake. This would have entered into Moose Lake at Vezeau Beach. This was stopped on the last day because of potential damages to Moose Lake's water quality.

This is a brief summary of the history of the Moose Lake area based on my recollections and what I have been told in the past. Moose Lake has always been important to my family and certainly means a lot to me personally.

What is in your Watershed?

A watershed is the land surrounding a body of water that provides a catchment basin for water. Moose Lake is one of 10 sub-watersheds in the Beaver River Basin.

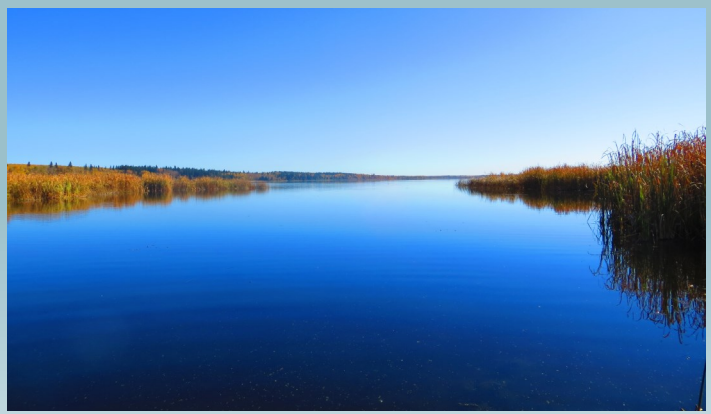
How big is the surrounding watershed? Moose Lake covers about 40.8 km^2, and drains a gross area of 755 km^2 (excluding the lake). Moose Lake has over 64 kilometers of irregular shoreline.

How deep is the lake? Moose Lake is comprised of four main bays which are Franchere Bay, Island Bay, Bonnyville Beach Bay and Vezeau Bay. The lake has a maximum depth of 19 metres and a mean depth of 5.6 metres. The last sounding depth measurement was conducted in 1962.

Where does the water from Moose Lake come from? Roughly 75% of the watershed runoff drains into Moose Lake through the Thinlake River. Five intermittent streams drain the remaining 25% of the catchment. Unlike many other Alberta watersheds which are glacier fed, the Beaver River Basin's water is sourced from precipitation and runoff into wetlands, streams, lakes and rivers. Kehewin Lake is the start of the main tributary feeding Moose Lake, the Thinlake River. A small portion of the water also enters via groundwater.

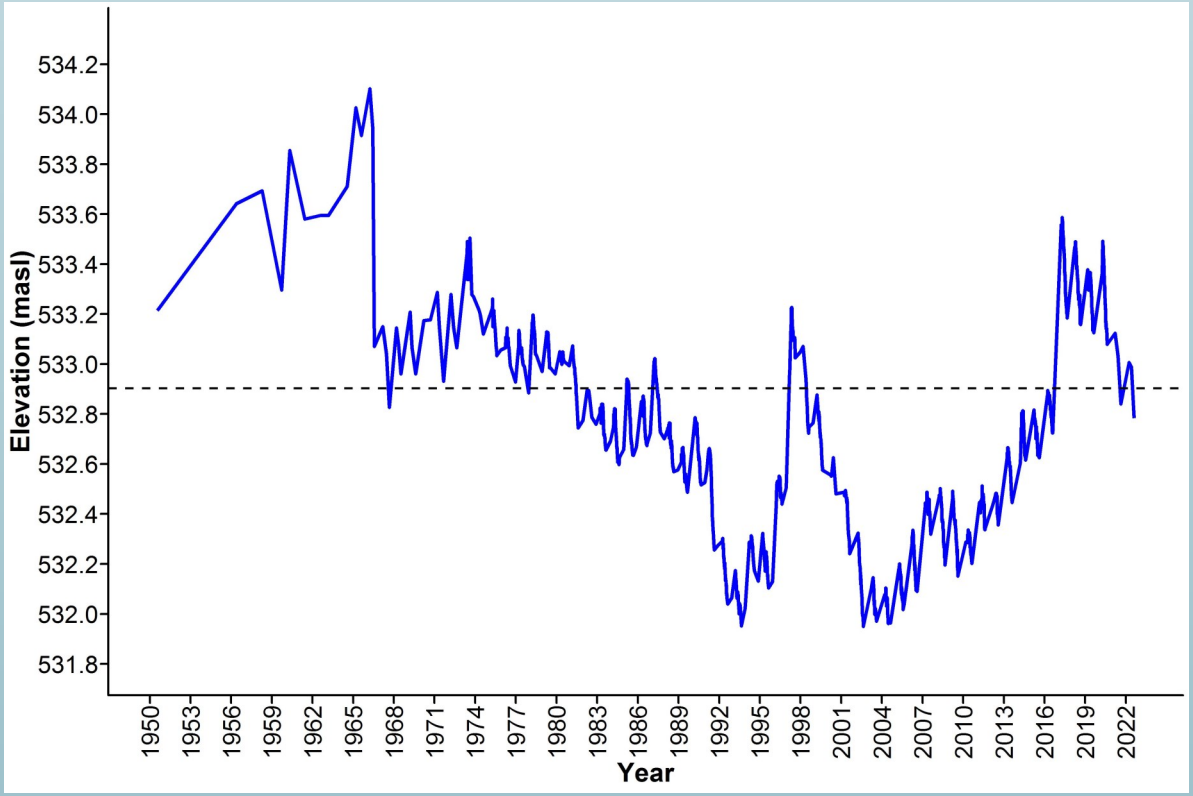
Where does the water from Moose Lake go? The outlet for Moose Lake is the Mooselake River on the northwest side of the lake. This flows north and connects with the Beaver River.

What is the turnover of water in the lake? The outflow and main inflow into the lake are both located within Franchere Bay. The residence time of water in Moose Lake is estimated at 7.5 years. This means that it takes 7.5 years on average for the lake to completely replace all the water within the lake with new water. The "new" water reaching the lake comes from precipitation draining from the watershed, collected in the tributaries that flow into the lake.



The Rise and Fall of Moose Lake

The water levels of Moose Lake have been regulated by a weir since 1951 to maintain a suitable lake level for fish and wildlife habitat, recreation and to supply the town of Bonnyville with water. The weir deteriorated by 1966 and a steady fluctuating decline of lake levels was recorded for the next two decades. A new weir was installed in 1986, however the weir was ineffective and lake levels continued to drop. The lowest recorded water level was in October of 2002.



The first settlers arrived in Bonnyville in 1907. By 1928, the construction of the railway ensured continued settlement of the area. By 1936 there were three commercial fish-packing plants in operation, as well as several mink farms and a flourishing agriculture industry. By 1950, water and sewage systems started to operate following the discovery of a natural gas field in Bonnyville in 1949, to accommodate the population growth.

Today Moose Lake is heavily used. There is extensive shoreline development including several subdivisions, a golf course, cottages, summer villages, church summer camps and campgrounds. Moose Lake is a very desirable recreation destination and many lake users can be found fishing, boating, camping, birding around the lake as well as sledding in the winter and OHV (off highway vehicle) use in the summer.

What is in the Water?

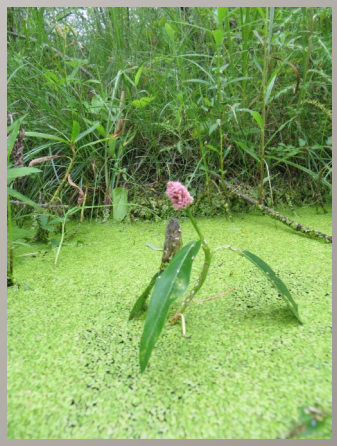
Moose Lake has been a eutrophic lake for many decades, meaning that it has high concentrations of sediment and nutrients such as phosphorous and nitrogen. Eutrophic lakes tend to be moderately clear, may experience oxygen depletion in deeper areas, and often boast productive fisheries. Moose Lake is now classified as a hypereutrophic lake meaning it contains very high levels of phosphorous and chlorophyll-a. It is common to have algal blooms lasting throughout the summer and well into the fall. Oxygen depletion can occur throughout the year and may extend to the surface, resulting in fish kills.

The nutrients nitrogen and phosphorous are primarily used as food for aquatic plants. Aquatic plants are an essential part of the lake food chain and ecosystem; providing food, shelter, spawning and rearing habitats for many species including fish, waterfowl, invertebrates, amphibians and mammals. Over time, lakes naturally become more productive with aquatic plant growth.

The Alberta Lake Management Society (ALMS) monitors lakes across the province for water quality, gathering data and creating LakeWatch reports. 2023 will be the 19th year that water quality data has been gathered on Moose Lake. These reports can be found on the ALMS website at alms.ca.

Water quality indicators that are measured include: water temperature, dissolved oxygen, pH, water clarity, and concentrations of nutrients and organic compounds such as nitrogen, phosphorous and chlorophyll-a.

Too Much of a Good Thing



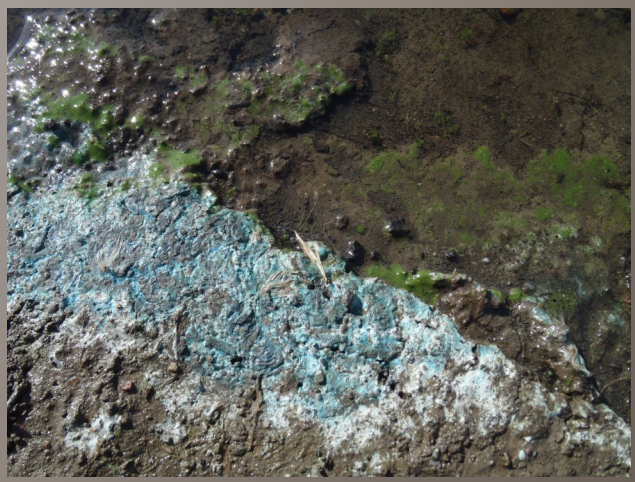
Human activities such as forest clearing, fertilizing and roadway creation all increase the rate and amount of sediment and nutrients entering streams and lakes. When excess nutrients such as phosphorous enter the lake, rapid plant growth occurs resulting in an overabundance of aquatic plants in the lake. Ironically, some recreational users and lake-lot owners try to remove this shoreline and aquatic vegetation, which can make the problem worse. Simply removing the plants will not solve the problem because as more nutrients are deposited in the lake, the more plant growth will continue to occur. Removal of shoreline vegetation can also leave the banks susceptible to erosion. Increasing sediment deposits in the lake will disturb and can destroy fish spawning grounds, putting species populations at risk. Only by reducing the amount of nutrients entering the lake can this problem be prevented.

Blooming Algae

When high nutrient conditions occur with warm, calm weather, algae along with aquatic plant populations explode. This makes the water appear green and opaque and is known as an algal bloom. Although plants and algae create oxygen through photosynthesis during the day, at night they use up oxygen from the air and water. Additionally, once this plant matter dies, the process of decomposition uses oxygen and decreases the amount of oxygen in the water. This can be very harmful and even deadly to fish and other aquatic life that rely on oxygen to survive.

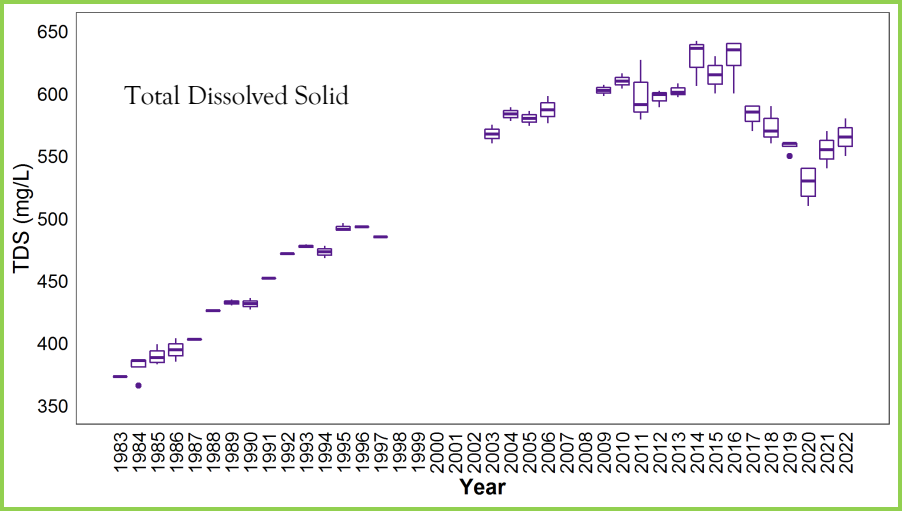
Blue Green Algae

Blue Green Algae are a unique group of bacteria (cyanobacteria) that have the ability to photosynthesize. There are more than 100 species of cyanobacteria in Alberta, with many being able to outcompete algae in a growing season. Many of Alberta's lakes are naturally nutrient rich to support cyanobacteria growth, but this can be exacerbated by extensive watershed development (industrial, urban and agricultural), and shoreline disturbance such as the removal of shoreline vegetation. Blooms are also weather dependent, so the occurrence, severity and persistence of the bloom can not be predicted .

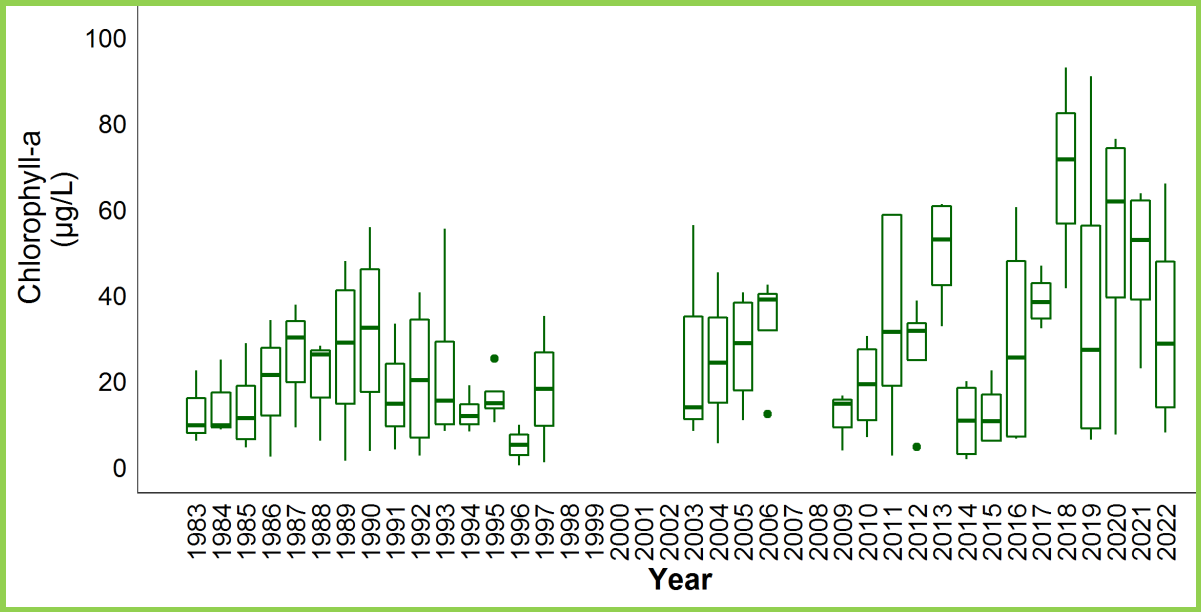


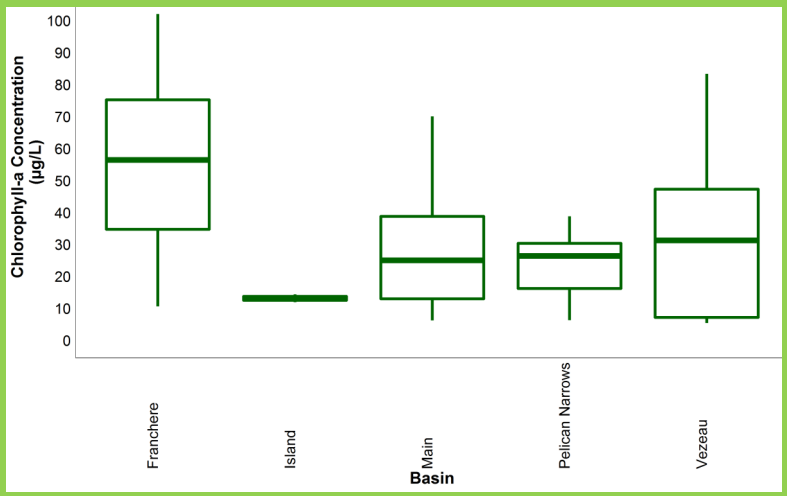
When the cyanobacteria decompose, oxygen is often depleted from the water and ammonia is produced. Also, certain strains of cyanobacteria can produce nerve and liver toxins during decomposition, which can pose a serious heath risk to humans and animals.

Historical Trend Figures for Total Phosphorous, Chlorophyll-A, Secchi Depth, and Total Dissolved Solids:

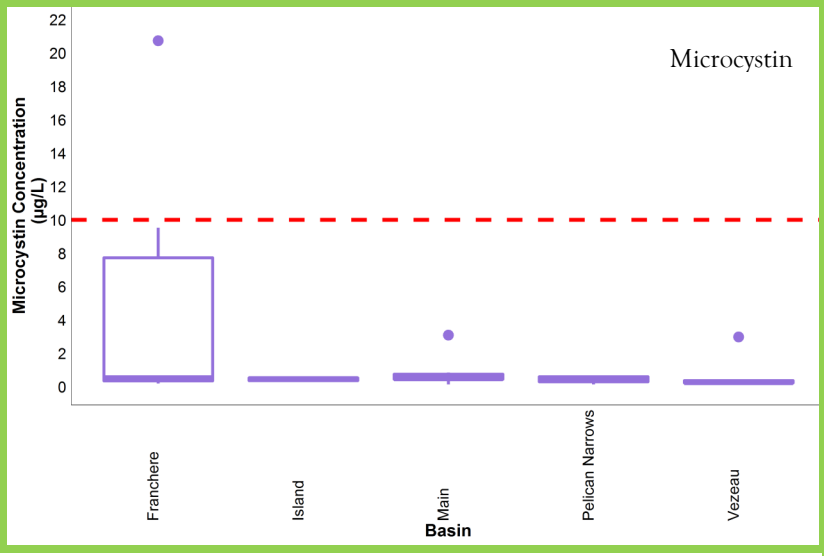


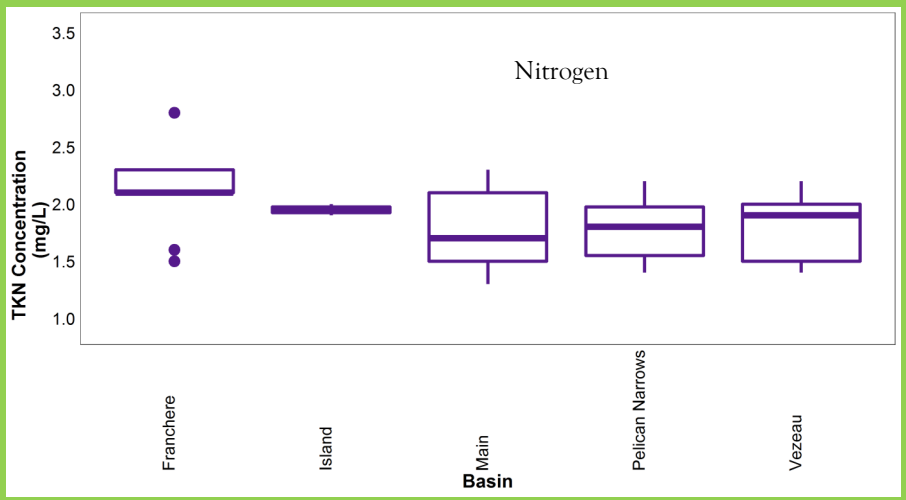
Phosphorus is a nutrient that drives the growth of algae and cyanobacteria. Moose Lake is similar to the majority of lakes in central Alberta that will have relatively high background levels of phosphorus due to the richness of soils in Alberta. However, increasing phosphorus in lakes over time can be the result of increased agricultural, industrial and residential developments within lake watersheds. Since lake monitoring began at Moose Lake in 1983, levels of Total Phosphorus have increased at a shallow rate, with the most appreciably high levels occurring between 2012-2018. The abundance of algae and cyanobacteria that are within a lake at any given time is most often represented by the concentration of Chlorophyll-a (ChlA), the green pigment which is produced by all algae and cyanobacteria. Since 1983, ChlA levels have increased in Moose Lake, indicating that in recent

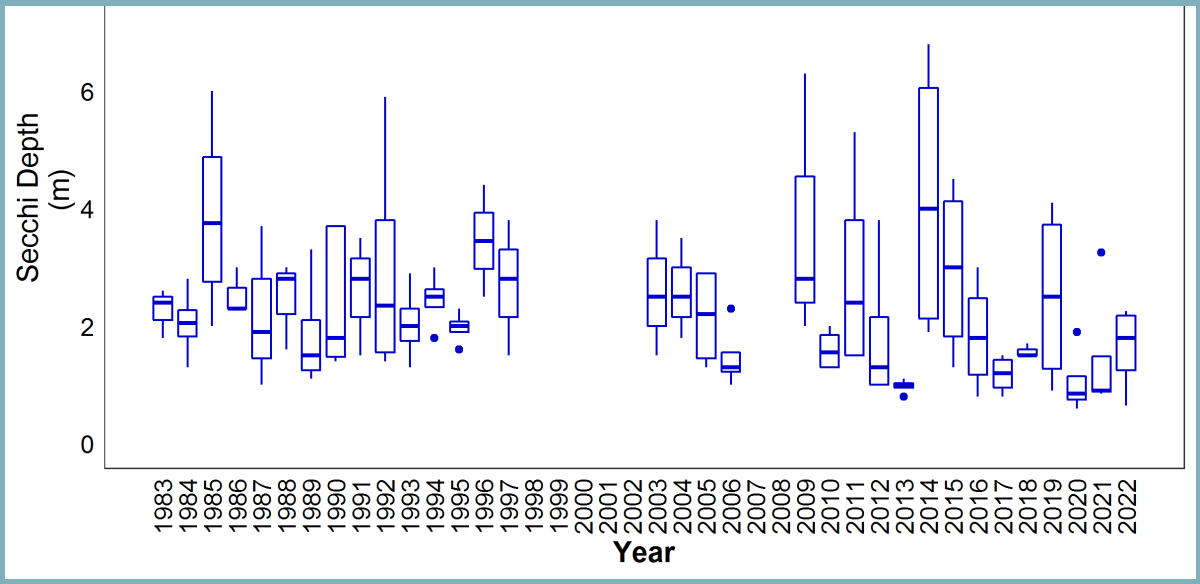




decades, algae and cyanobacteria have become abundant, relative to what was observed 30-40 years ago. Secchi Depth is a measurement taken on the boat during a water quality sampling event, which represents the depth to which a black and white checked disk is no longer visible, and provides a representation of water clarity. Since 1983, Secchi Depth levels have decreased in Moose Lake, indicating water clarity has decreased in recent decades compared to 30-40 years ago. While sediment and dissolved carbon levels can influence lake water clarity, the decrease in water clarity is likely the result of increased algae and cyanobacteria. The total levels of salts and other dissolved chemicals can be represented by Total Dissolved Solids (TDS), a common parameter measured as part of lake monitoring activities. Since 1983, levels of TDS have increased steadily and rapidly, with little variation observed within each year. The highest levels

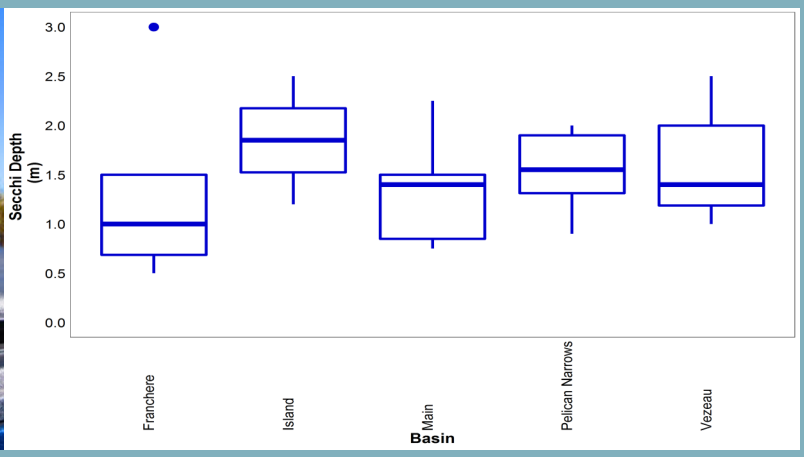




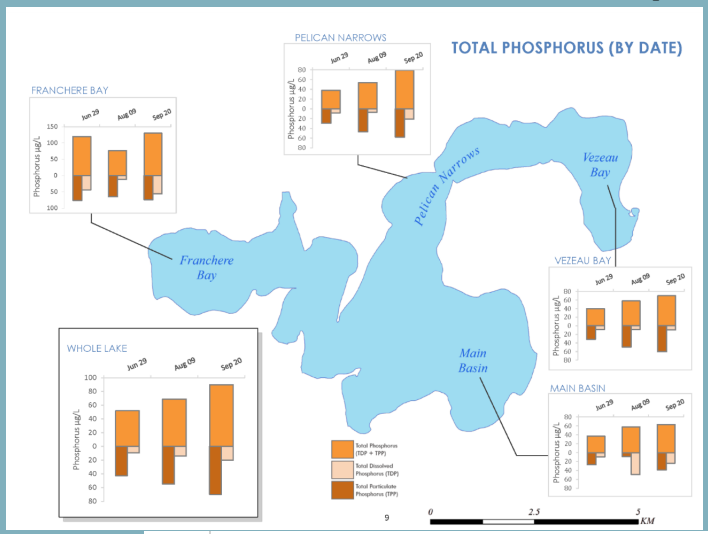


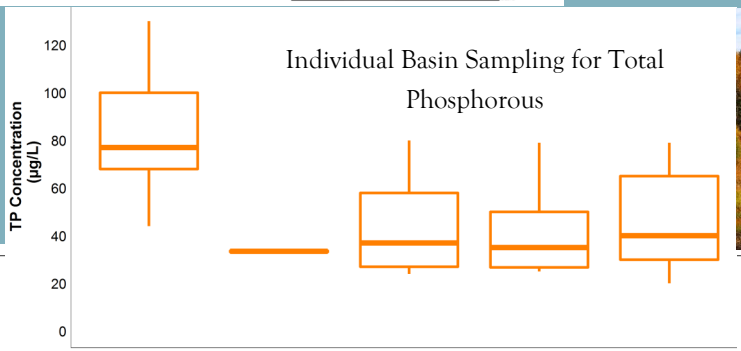
observed between 2014-2016 represent a 70% increase relative to levels in the 1980s. However, since 2017, levels have dropped appreciably and may be appearing to stabilize. The drop in TDS within this time is likely related to increased water within the Moose Lake Watershed, as observed through the water level spike in this time. If decreased precipitation and increased air temperatures occur in future years, evaporative water loss will lead to further increases of salt within Moose Lake, which may be exacerbated by salt run-off within the watershed as a result of human activities such as road maintenance and agriculture.

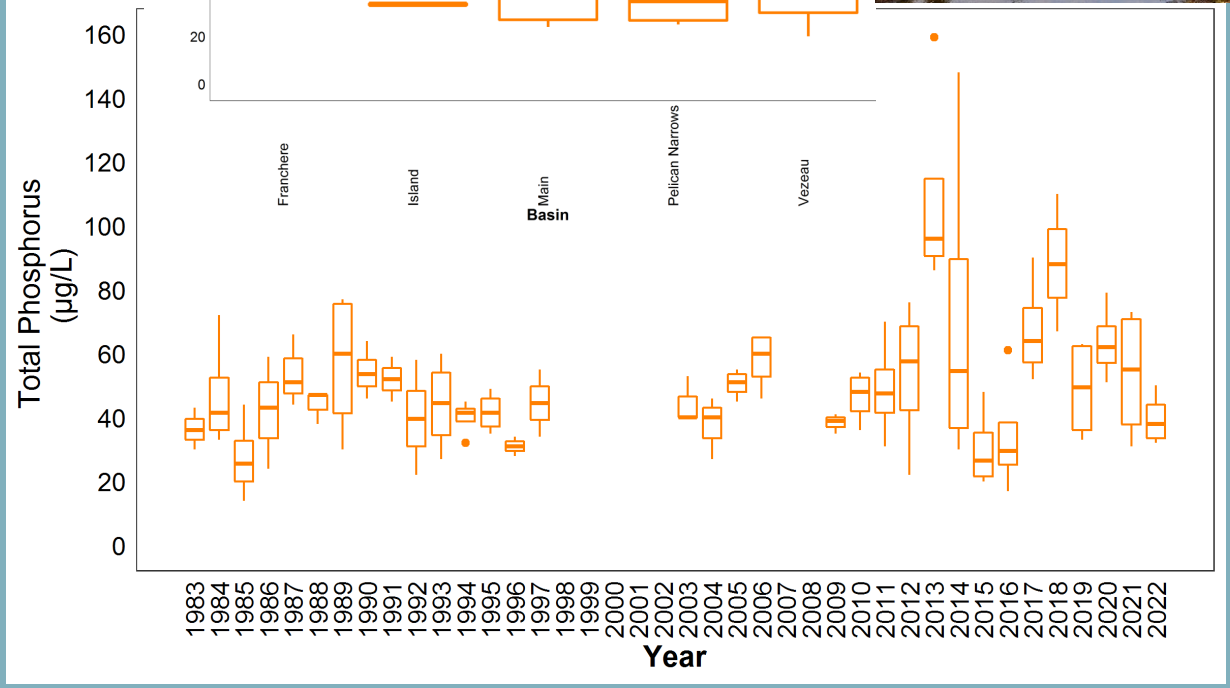
Multi-basin sampling occurred at Moose Lake in 2016, 2017, and 2020. This sampling took place to explore the differences in water quality within major basins on Moose Lake. Island, on the southwest side of the lake, was only sampled in 2017 as high water in that year enabled a motorized boat to access and sample the basin. Island displayed the lowest levels of Total Phosphorus (TP) and Chlorophyll-a (ChlA), as well as the highest Secchi Depth values. Main, Pelican Narrows, and Vezeau



all displayed similar levels of TP, ChlA, and Secchi Depth, at higher levels than observed at Island Basin for TP and ChlA, and lower levels for Secchi Depth. Finally, Franchere displayed the highest observed levels of TP and ChlA, and the lowest Secchi Depth levels, indicating that Franchere has higher nutrient, algae and cyanobacteria levels of any basin on the lake, and lower water clarity as well. TP, ChlA and Secchi Depth values tend to vary more within Franchere, Main, Pelican Narrows and Vezeau compared to Island, but this could be a result of sampling Island only in 2017, and not in 2016 and 2020.





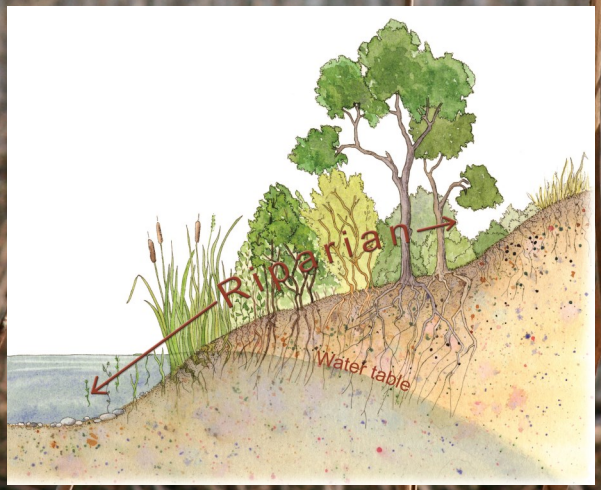


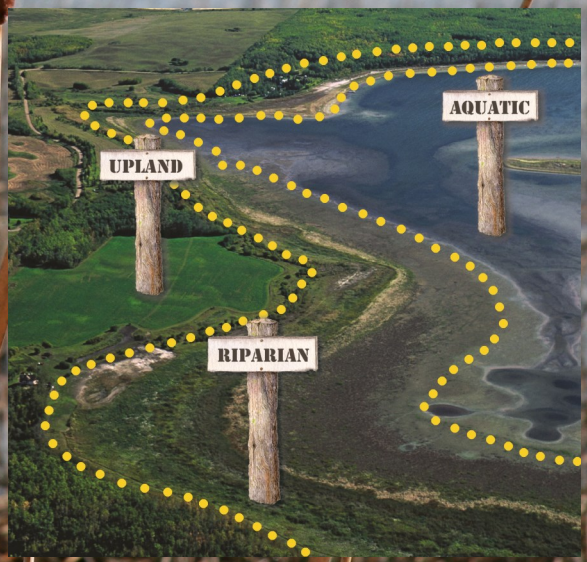
One Foot In The Lake

Riparian areas are found between a body of water and the surrounding dry upland area. They are important transition zones between water and terrestrial ecosystems. A healthy riparian area is rich in natural vegetation with little exposed soil or rock.

Important Riparian Functions

- Traps sediment and prevents it from entering the water, helping build a stable shoreline.
- Healthy plant roots and vegetation growth prevent erosion.
- Creates a buffer which helps prevent flooding and droughts.
- Provides fish and wildlife habitat and improves biodiversity.
- Filters pollutants and prevents excess nutrients from entering the watershed.





 Source: http://www.cowsandfish.org/riparian/riparian.html

Riparian Plants

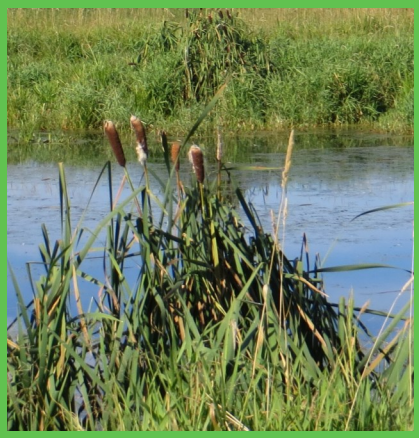
Riparian plants thrive near lakes, wetlands, rivers and creeks because of their higher water content in the soil and higher water table surrounding it. Riparian plants are the "glue" that binds the shoreline together, protecting it from wind and wave erosion. They also act like a sponge by storing water in the soil and making it available in times of drought.

Sedges

These are grass-like plants with triangular shaped stems and spiky seed heads. Their deep root systems help stabilize banks.

Willows

These plants are important in stabilizing the shoreline and providing wildlife habitat.



Cattails

Cattails help purify water by removing nutrients and trapping sediment. Cattail seeds are viable for up to 100 years!

Rushes

These leafless round stems and dense seed heads provide critical nesting habitat for marsh birds such as ducks, grebes and bitterns. They also provide important refuge and foraging zones for fish.

Wonderful Wildlife

Moose

Moose are the largest members of the deer family, and can stand taller at the shoulder than the largest saddle horse. Thanks to their long stilt-like legs, moose are powerful swimmers and can dive up to 5.5 metres or more to reach plants at the bottom of a lake. They are commonly found in muskegs or treed areas near water where they can feed on aquatic plants, shoots and tree bark. Despite their large size and broad antlers, they can travel silently through the forest. Although their eyesight is poor, moose compensate with a good sense of smell and hearing.

Loon

With their three-toed webbed feet, loons are built to be swimmers and can dive up to 80 metres due to their solid bones, unlike many other bird species which have hollow bones. When on land, loons look extremely awkward as their feet are placed too far back on their body and their legs aren't designed for walking. For this reason, loons can only take flight off of water.

Pelicans

There are only a few lakes in Alberta that are able to support breeding pelicans. Because of the lack of undisturbed breeding lakes, the White Pelican is classified as a "sensitive species" in Alberta. White Pelicans cooperate when feeding. They coordinate their swimming to drive schooling fish toward shallow areas. The pelicans can then easily scoop up these corralled fish from the water. White Pelicans must provide roughly 150 pounds of food to nourish a chick from its birth to the time it's ready to forage on its own.

Grebe

Western Grebes spend most of their time in water as they are very awkward when on land. Similar to loons, their legs are so far back on their body that walking is very difficult. During courtship, grebes partake in a display known as “rushing”, where two birds turn to one side, lunge forward in synchrony with their bodies completely out of the water, and race across the water side by side with their necks curved gracefully forward.

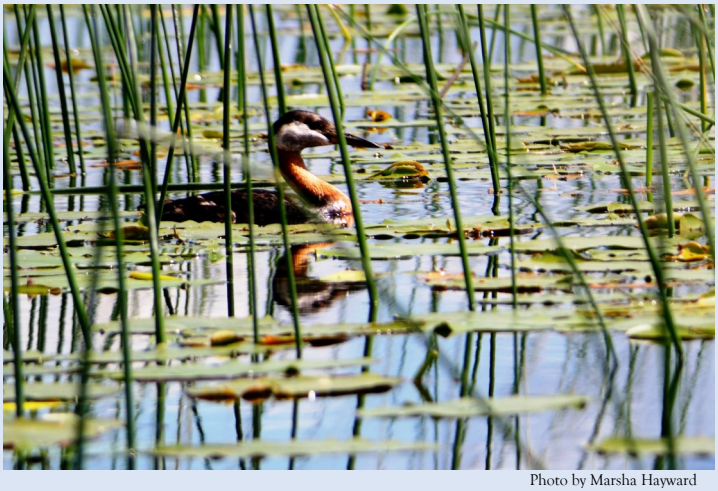


Photo by Marsha Hayward

Osprey

The Osprey is a large, powerful raptor, also known as a bird of prey. Osprey catch fish by diving with their wings half closed and claws stretched forward, disappearing under the water in a great spray.

Turkey Vulture

Although Turkey vulture breed from northern Mexico to southern Canada, there is only a small, albeit growing population in Alberta. In 2012, 28 nests were documented in east-central Alberta. Their wings, which are held in a definite "V", can reach a wingspan of up to 1.8 metres (6 feet). On Moose Lake they can be found near Pelican Point.

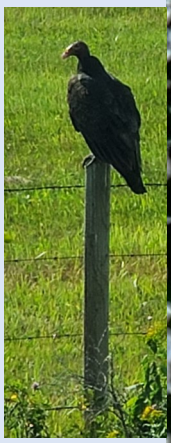


Photo by Marsha Hayward

Black Bear

Black bears are not always black, but actually range from black to a blonde colour. Besides being smaller than other Canadian bear species, they also lack a shoulder hump.

Black bears are omnivores and feed on a wide source of food from berries, grubs, plants and other animals. Black bear sightings are becoming increasingly frequent, but practicing habits such as cleaning up attractants such as garbage, compost, barbeques, and pet food can help prevent encounters with bears searching for food.

Damselfly

Damselflies are insects that look a lot like dragonflies, but are smaller and fold their wings back over their bodies. Females lay eggs on aquatic plants and the nymphs (larvae) that hatch are important sources of food for some fish.

Garter Snake

Garter snakes can live in just about any environment, making it the most widespread snake in North America. Garter snakes hibernate from late October until early April in natural burrows or holes and under rocks. Once they emerge from hibernation, they begin the mating process. Female garter snakes can have as many as 70 to 80 young in a single litter!

Perch

Perch are a skulking species, as their striped bodies make it easy for them to hide amongst aquatic vegetation. They are often found living close to beds of reed and bulrush. Perch commonly feed on worms, small fish, nymphs, and larvae.

Photo provided by Cedric Yuschyshyn

Photo provided by Grant Ferbey

Walleye

The name Walleye refers to the species' glassy, large pupils; light reflects from the back of their eyes, giving them a white, staring look. This eye-shine allows the fish to see extraordinarily well in darker waters. Walleye, which are strictly carnivorous, are top predators, meaning that they do not have any natural predators in their habitat except for humans.

Northern Pike (Jackfish)

Jackfish inhabit almost every type of freshwater, from cold deep lakes, to warm shallow ponds, to muddy rivers. Because they have a broad range of tolerances to water temperature, clarity, and dissolved oxygen, they are an especially adaptable species. Jackfish are a carnivorous, aggressive, solitary fish. They are typically lurkers, but are able to attack quickly. Their eyes are highly movable and are able to see in practically any direction.

Bottom 3 photos provided by Grant Ferbey

The Unwanteds

Darn Daisies
Both scentless chamomile and Oxeye daisy have daisy-like, yellow disk centered flowers with white ray petals. Both are quick to establish and can produce thousands of seeds per flower. With shallow roots they enable erosion of banks.

Himalayan Balsam
They have the potential to take over native vegetation, forming a monoculture and destroying wildlife habitat and waterfowl breeding grounds. They can outcompete cattails, rushes and sedges in riparian areas and due to shallow roots allow for erosion and destruction of shorelines.

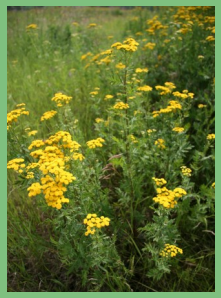
Flowering Rush
Originally from Eurasia, flowering rush (Butomus umbellatus) it was introduced as an ornamental garden plant in the 1890s. This invasive aquatic plant is now found across Canada and the United States. It can grow as an emergent plant along shorelines or partially submerged in lakes and rivers up to 4 m in depth. This hardy perennial can survive tough winters and drought conditions. Flowering Rush can reproducer by root system fragments or rhizome buds called bulbils. The dense stands that it forms can reduce water availability and can interfere with boat propellers and reduce areas for swimming.

Purple Loosestrife Native to Asia and Europe, purple loosestrife (Lythrum salicaria) was likely introduced to North America as an ornamental plant and has since been found in sporadic locations in Alberta. In the 1990s, a purple loosestrife eradication program in Alberta was successful in reducing most locations in the province. It prefers to grow in moist, highly organic soils with neutral to alkaline pH. Purple loosestrife leaves are slightly hairy, lance-shaped, and can be opposite or whorled. Flowers attach closely to the square, woody stem in a tall vertical spike; petals are pink to purple surrounding a yellow centre. It reproduces primarily by seed, producing more than 2 million seeds per plant annually but can also spread through stem cuttings and root fragmentation.

Some species found in an ecosystem are not healthy. These non-native invasive species can quickly spread, forcing out natural vegetation and wildlife. Invasive plants often have shallow root systems which prevent them from holding the shoreline together causing soil erosions and sedimentation. Removing invasive plants is an important part of taking care of and cleaning up shorelines. Some invasive plant species can be purchased at garden centres unknowingly so be careful when choosing what you plant. For more information on invasive species and how to control them visit:
The Alberta Invasive Species Council https://www.abinvasives.ca

Dwarf Mistletoe

The Jack Pine forests surrounding Moose Lake are very unique and beautiful; however they are also suffering from a parasitic flowering plant called Dwarf Mistletoe. The parasite feeds off the trees causing their branches to form tangled clusters that resemble brooms, hence why it is also called witches broom. The brooms weaken the branches and can easily cause them to fall off, which can be dangerous to the people using the forest for recreation. Mistletoe eventually kills its host tree, which creates deadfall, and fuel for forest fires.



Eurasian Milfoil

Eurasian Milfoil is easily confused with native milfoil species and other submersed aquatic vegetation. It is currently found in eastern Canada and British Columbia and most of the United States. Eurasian milfoil is a submerged, rooted, and fast growing perennial that can grow to lengths of 2-3 metres. Three to six deeply divided leaves are in whorls around the stem and are feathery in appearance. The flowers of Eurasian milfoil are small and reddish in colour that appear above the water's surface and bloom in late July to early August.

Eurasian Water-Milfoil is one of the most widely distributed invasive species. It can interbreed with native varieties and form an even more aggressive invasive species. The large mats/colonies that it forms block out the sunlight from reaching other plants. When the plants start dying in the fall, the decaying matter reduces the oxygen content in the water and can result in fish kills. The thick mats make the water unsuitable for recreation as it prevents people from swimming and fishing. Boat propellers can get entangled, as well chop the Eurasian milfoil into tiny fragments. Each of those fragments can re-grow, and be redistributed to other locations to form new colonies.

Physical removal of Eurasian milfoil is the only control option.

Zebra and Quagga Mussels

These mussels originated in the Caspian and Black Sea and were discovered in North America in the late 1980s; having quickly spread across the Midwest states and Ontario. They are freshwater mollusks that were introduced via ships from Europe through ballast water. They spread quickly, laying up to one million eggs per year with their larval offspring being microscopic and free floating. Zebra and Quagga mussels can live up to 30 days out of water. They attach to hard surfaces such as boats, docks and infrastructure in the water along with softer surfaces such as sand and vegetation, eventually carpeting entire shorelines. These species have the ability to attach to different substrates whereas native mussels do not have the ability to attach to anything. There is **no control method** so it is impossible to eradicate both zebra and quagga mussels after establishment. Prevention is key in these species.

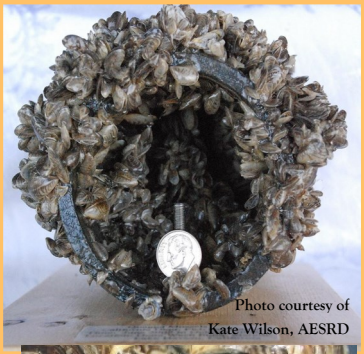
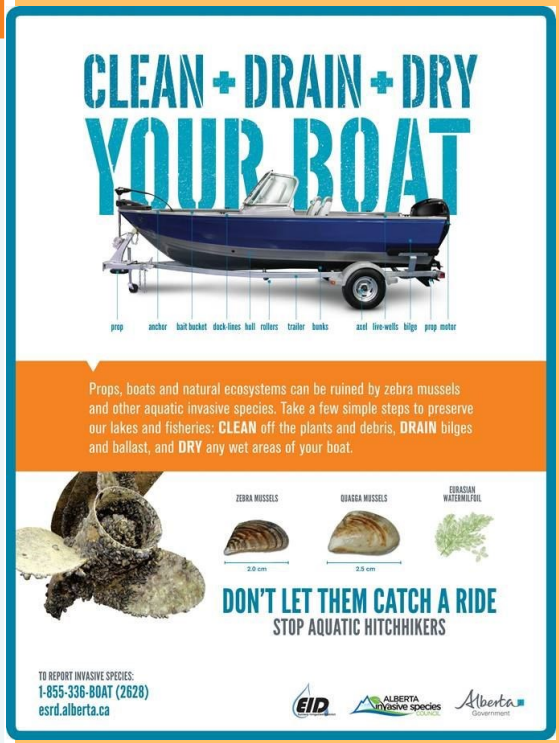


Photo courtesy of Kate Wilson, AESRD

Zebra and Quagga mussels are filter feeders which will affect the entire ecosystem by removing food for fish and plant species. The mussels outcompete native species. They accumulate toxins and pollute the water leading to an increased frequency and duration of toxic algae blooms such as blue-green algae.



Goldfish and Koi

Goldfish (Carassius auratus) and koi (Cyprinus rubrofuscus) are common ornamental fish that can pose significant harm to aquatic ecosystems when released into the wild.

As goldfish breed, they can loose their colouring

Goldfish and koi are native to eastern Asia. Both species have been introduced in Alberta as ornamental fish that have been released into waterbodies.

Over 100 locations of goldfish are known in Alberta, mainly in urban storm water ponds. Due to continuing illegal release of aquarium fish into the wild, more locations of goldfish in Alberta are found each year.

Goldfish Identification: plump and deep-bodied; large head with terminal mouth; gold-orange in colour, can also range from olive-bronze to silvery-white; large scales, 25 to 31 along lateral line; forked tail; lack barbels on face; and distinguished by first dorsal fin ray and first anal fin ray being strongly serrated.

Koi Identification: distinguished from goldfish by prominent barbels on chin; adult typical length is 30 to 60 cm; body is long and narrow; and vary largely in colour – often bright orange, can have black and white colour patterns.

Reproduction

- ◊ Goldfish and koi are prolific reproducers, allowing their populations to rapidly increase.
- ◊ Female goldfish are ready to spawn within one year and can spawn up to 3 times per year. A single female goldfish can lay on average 500 to 1000 eggs per spawning period.
- ◊ Koi are able to spawn as early as 3 years of age. A single large koi female can lay up to 100,000 eggs in a spawning period.

Issues

- ◊ Both species are extremely hardy, rapidly reproduce, can tolerate low oxygen levels and poor water quality, where native fish cannot survive.
- ◊ Both can carry pathogens capable of infecting other fish species.
- ◊ Increase water turbidity with their destructive feeding habits, which reduces suitable habitat and available food for native fish.
- ◊ Invasive fish response is extremely costly, difficult to manage, contain and remove once established.
- ◊ Growth of cyanobacteria in goldfish intestines can increase risk of algal blooms.

Photo: Jason Cooper, Alberta Environment and Parks

Another similar species: **Prussian carp**

Goldfish lose their orange colouration in the wild, making them indistinguishable from another invasive species in Alberta called Prussian carp. DNA analysis is needed to confirm the identification between goldfish and Prussian carp.

Shoreline Keepers

All of us that live, work and play around Moose Lake are responsible for taking care of the lake and its environment. Neighbours must work together in order to improve water quality and the health of the lake. While the lake is a sum of its watershed and the activities within it, every single individual can play a role by taking measures that will help to enhance the lake.

Residents

Rather than removing trees, try pruning them so you can still maintain your view and privacy, but still provide vital habitat to wildlife and birds.

Try adding willows to your shoreline, which provide protection, improve shoreline stability and attract wildlife.

Encourage beneficial plants such as cattails, rushes and sedges and remove invasive species to help protect your shoreline by reducing bank erosion and improving water filtration.

Visitors

When out enjoying the watershed, stick to designated pathways, public beach areas and parks, to prevent disturbances that can lead to vegetative damage, erosion and sedimentation. Only camp in designated campgrounds.

Please, Do Not Feed The Lake

While a well vegetated shoreline can help filter out nutrients, improving water quality, even a healthy riparian area can only do so much. There are many things that cottagers, boaters, visitors and landowners can do to avoid adding further nutrients into the lake and "feeding" the aquatic plants and algae.

Avoid dumping wastes into waterways and the lake. Use designated dumping stations to dispose of your waste products.

Top Tips For Creating and Maintaining a Healthy Shoreline

- Retain all trees and shrubs. If they are overwhelming your property, prune them rather than remove them.
- Hang on to all shoreline sedges, rushes and cattails. They will prevent wind and wave erosion from eating away your shoreline.
- Limit access to the lakeshore to one point to reduce trampling of vegetation and erosion.
- Keep ATVs out of the riparian area.
- Minimize lawn grass as it provides very little to no shoreline protection. Do not fertilize near the lakeshore.
- Build a "high and dry" beach instead of disturbing natural shoreline vegetation.
- Avoid disturbing areas with nesting birds, especially between the months of May to July.

Diet Plan to Cut Back on Lake Nutrients

Boaters

- Refuel tanks away from the water and avoid topping off fuel (stop when near full).
- Avoid spills, but have cloths ready for mopping up in the case of accidental spilling.
- Follow all safety rules and laws (ESRD, Transport Canada)

Cottagers

- Use phosphate-free detergents and cleaners.
- Avoid using lawn fertilizer, as the majority of it gets washed into the lake when it rains.
- Maintain and inspect your septic tank regularly.
- Clean up after your pets.
- Control invasive species which reduce and replace native deep rooted species and can alter fish and wildlife habitat and create shorelines susceptible to erosion.
- Reduce your water use. Activities like harvesting rain water for gardening, installing low flush toilets, and taking shorter showers can all help reduce water use.

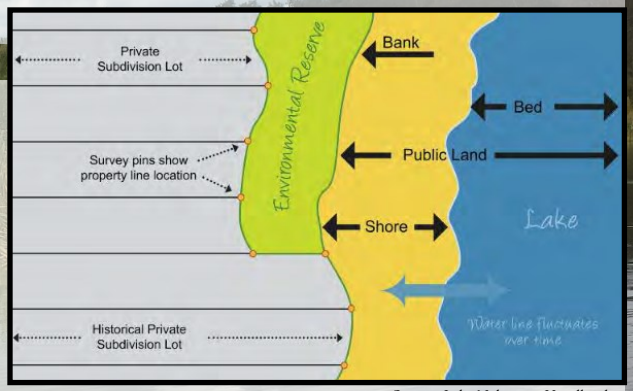
Landowners

- Investigate ways to reduce your fertilizer and pesticide use to prevent runoff into water bodies.
- Establish and maintain a buffer zone between the riparian area and land-use activities.
- Use best management practices for agricultural activities such as reduced tillage, establishment of perennial forage crops in rotations to improve soil structure and reduce runoff and erosion. Establish off-site watering systems for livestock to protect and improve water quality.
- Adopt the ideas suggested for cottagers to reduce the impact of your residence.

Frequently Asked Questions

Does my property go right up to the water's edge?

Most lake properties do not extend to the water's edge. Certificates of title used with survey plans for lake subdivisions will show whether the lake-ward boundary of the owner's property is the bank or a municipal reserve. It's important to remember that the subdivision survey plan shows the location of the property boundary, not the water's edge. To determine the location of a bank or boundary, contact an Alberta Land Surveyor. The Public Lands Act, Section 3, states that the beds and shores of all naturally occurring lakes, rivers and streams belong to the Government of Canada or to the Province, unless your land title (rarely) specifically states that your property does include the bed and lakeshore. The bank of the lake is the legal line that separates private land from the bed and shore of the lake. In most cases, the distinct line is formed by the normal, long-continued action or presence of surface water along the land at the edge of the lake. (Guidelines for Lakeshore Use, ESRD)



Source: Lake Nakamun Handbook

What is an Environmental Reserve?

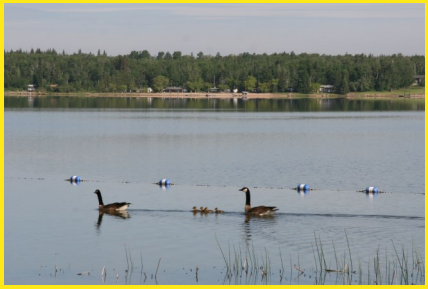
An Environmental Reserve or ER is public land owned by the municipality which means that anyone can access and utilize it. The purpose of an ER is to prevent pollution, preserve wildlife habitat and provide access to the shore. When using an ER please do not: discard litter or contaminate; dig in the earth or remove any natural feature; remove or alter vegetation other than weeds; utilize pesticides or fertilizers; discharge or ignite fireworks; park or operate a motorized vehicle and/or trailer; camp or light any outdoor fire; and hunt or trap animals.

Can I mow the grass in the Environmental Reserve in front of my property?

No, you cannot alter the Environmental Reserve in any way without permission from the municipality. It is illegal to modify environmental reserve lands without permission from the municipal authority, and it is illegal to alter the shore or lakebed below the bank without permission from provincial Public Lands and Water Management agencies. Environmental Reserves are intended to maintain the integrity of natural features that are considered to be environmentally sensitive, such as a waterway or a steep slope. They help to protect water quality and quantity, ensure public access to lakeshores, and conserve environmentally sensitive areas. (Lake Nakamun Handbook & Caring for Shoreline Properties, ACA)

Can I remove the aquatic plants and emergent plants that are in the water?

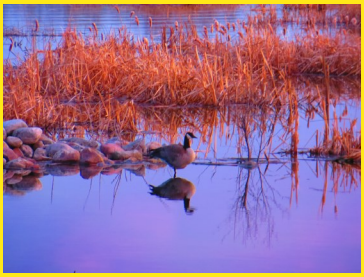
Under the Water Act, an approval is required for all aquatic vegetation removal. Under the Public Lands Act, it is prohibited to disturb the bed and shore of a water body without prior authorization. Approval is also required under this act where the removal site is located in or adjacent to a Restricted Development Area on a lake, or if the method of removal will alter or modify the lakebed or shoreline. Removing aquatic vegetation from the lake and its shores can significantly impact the lake environment by adversely affecting fish and wildlife habitat and increasing the potential for erosion and loss of uplands. Rooted aquatic plants growing in shallow waters of lakes are often seen as nuisance weeds, but they are important to the health of lakes. These plants stabilize the bed and shore by providing a physical barrier to wave action and by reducing soil movement and erosion. They are also important areas for fish, waterfowl and wildlife. Aquatic plants also use nutrients in lakes that would otherwise contribute to unwanted algae growth. (Guidelines for Lakeshore Use, ESRD)



Can I bring sand in and make a beach?

Creating beaches by dumping sand or other material on the bed and shore requires authorization as it alters the natural characteristics of the lake and can cause harmful effects to water quality and fish habitat. Imported material can be a source of pollution that introduces nutrients into the lake, enhancing algae growth and turning the lake green. When algae decays it uses oxygen in the water and can contribute to late summer or winter fish kills. Bringing sand in would require approval from Alberta Public Lands and the Department of Fisheries and Oceans. (Guidelines for Lakeshore Use, ESRD & Aquatic Vegetation Removal from Alberta Lakes, ESRD)

Can I bring in rocks, trees, or concrete to stop my shoreline from eroding?



The best protector of your shoreline is natural vegetation. By leaving plants in place or restoring your shoreline to a more natural state, it will be protected from wave erosion. The same rules apply as importing sand, permission is required for any changes to your shoreline, including adding rocks, trees or concrete. (Lake Nakamun Handbook)

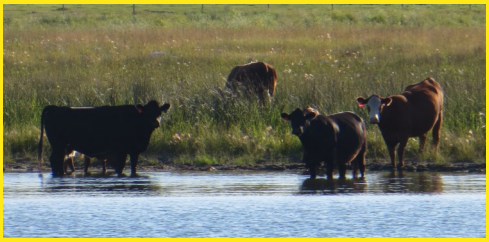
Does my septic system have to conform to a standard?

All septic systems within the M.D. of Bonnyville and Summer Villages must abide by the Alberta Private Sewage System Standard of Practice (SOP). The SOP indicates that septic tanks must conform to the standards set forth by the Canadian Standards Association. Faulty systems create health hazards and may contaminate the environment. A permit from the M.D. of Bonnyville Planning Department is required before installation of a septic system may begin. It is recommended that you hire a certified contractor, and the tank must be inspected prior to the concealment of any installed system. To obtain a copy of the Alberta Private Sewage Systems Standard of Practice, contact Alberta Safety Codes Council. (Tips on Private Sewage Systems, M.D. of Bonnyville)

Where can I drive my quad?

You are permitted to drive your ATV on your own property (not in riparian areas) and on designated trails. As per municipal bylaw 1440, you must have a written authorized permit to operate a motorized vehicle, such as an ATV, within an environmental reserve. Additionally, you may not operate an ATV in lakes, wetlands, or on exposed shorelines. When operating an ATV on public land, you must ensure that you have valid insurance, at least one white headlamp, a valid license plate and registration, an approved muffler and spark arrestor, and one red rear lamp. Be sure to minimize your impact by staying on the trail and keeping out of streams and wetlands. Try to avoid spinning your tires or skidding, and wash your vehicle between uses to prevent the spread of invasive species. (Take the Lead, ESRD)

Can my livestock use the lake?



Watering livestock directly out of the lake can lead to more nutrients being added to the lake. It can also result in trampling and erosion of the shoreline. Where cattle are grazing near the lake, a better approach is to establish alternative watering sources away from the shoreline, and to avoid grazing the riparian area when soils are very wet. The Agricultural Operation Practices Act defines lake setbacks for manure spreading, manure storage, and for corrals, as well as placement of seasonal feeding and breeding. For more information about alternative watering sources and grazing strategies, contact Cows and Fish or the Alberta Public Lands. (Lake Nakamun Handbook)

Can I put a dock in the lake?

As per municipal bylaw 1440, no person shall, without a development permit, construct a permanent structure. Permits for lakeshore projects must be obtained before construction begins from the Government of Canada's Department of Fisheries and Oceans and Alberta Public Lands. A temporary dock in front of your property may be permissible, but it must be removed on to your land (not on to public land) at the end of the season. The temporary dock must not interfere with the general public's access along the shore of the lake.

Which regulations affect and outline what I can and cannot do in the water, on the shoreline and on the lands adjacent to the lake?

The lake basin, which stretches from shoreline to shoreline, is regulated by two federal acts, the Fisheries Act and the Navigable Waters Protection Act, as well as provincially by the Public Lands Act. The shoreline and adjacent lands are covered under the Water Act, the Environmental Protection and Enhancement Act, Alberta Land Stewardship Act, the Safety Codes Act (for private sewage system standards of practices), and locally by the Municipal Government Act.

The Moose Lake Watershed Society

The Moose Lake Watershed Society (MLWS) was founded in 2002 as the Moose Lake Water for Life committee, and became a society in 2008. This group was formed to address the health of Moose Lake, increase public knowledge and interest, and improve water quality as well as fish and wildlife habitat. This group was initiated due to concerns by residents regarding water quality, heavy recreational use, algal blooms, and excessive development and the society is currently made up of volunteers from the area. If you want to get involved with the MLWS please contact the Moose Lake Watershed Society.

Moose Lake Watershed Society Initiatives:

Walking With Moose - Walking with Moose allows grade five students to be further educated about the ecosystem of Moose Lake, supplementing their curriculum, learning about biodiversity, healthy shorelines and forest ecology. The students also learn about water quality, wetlands and larger animals that live along the shore such as birds and fish. On average approximately 400 students go through the program annually.

Creek Restoration Project - In 2012 an offsite watering system and well were placed upland from Thinlake River with the riparian area fenced off to prevent cattle from drinking from the river, protecting water quality and improving the riparian area.

Riparian Health Inventory - In 2008 and 2014 a riparian health inventory was conducted by Cows and Fish on the tributaries of Moose Lake to monitor for health and changes to the sites. The purpose is to provide a state of the environment report to the community and help landowners make beneficial management choices.

Tributary Signage - Informative tributary signs were created and were installed. Watch for them in the watershed!

Island Bay Park Proposal - The proposal concerns thirteen sections of land, including the island, in the southwest portion of Moose Lake. This area is very sensitive and integral for fish spawning habitat; it acts as a filter for Moose Lake, improving water quality. Island Bay also contains a unique dry pine forest, is home to many species of lichen and is important habitat for wildlife. Currently the proposal is being reviewed by the Alberta Parks Ministry.

Tributary Monitoring - An initial tributary sampling took place in 2013, with a more extensive monitoring program in 2014 looking at the nutrients entering the lake. Tributary sampling continued in following years and the data was used to create a nutrient budget for the lake.in 2021

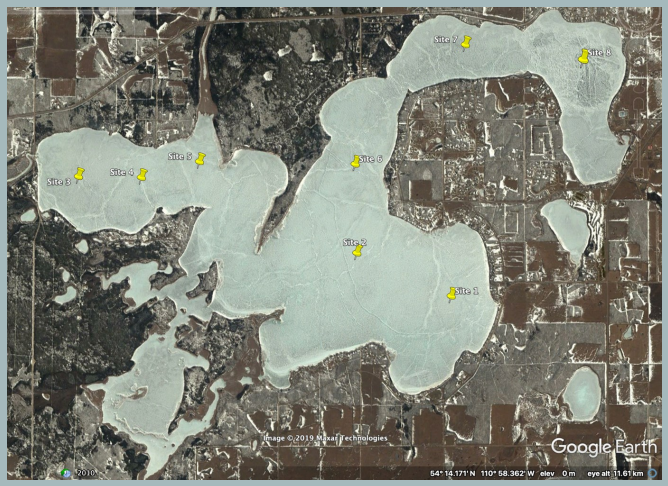
Moose Lake Watershed Society

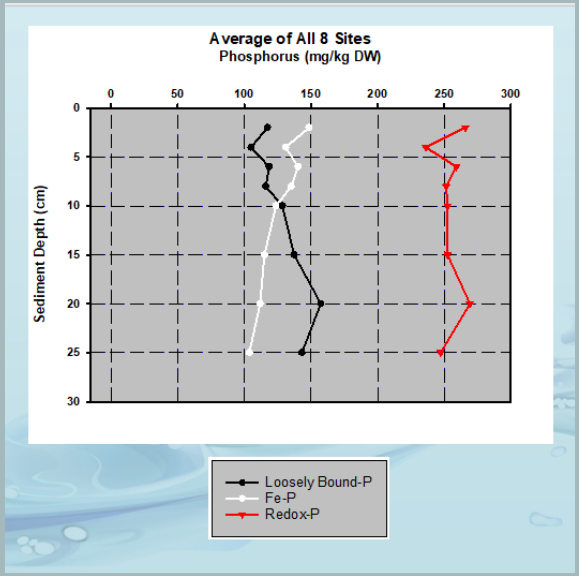
Moose Lake Watershed Society Accomplishments

- Nutrient Sampling by AB Enviro – 2005
- Caffeine Sampling – 2004/05
- Aerial Riparian Health Survey by ACA - 2004
- State of the Watershed Report – 2005
- Drained Wetland Inventory (DU) – 2005/06
- Wetland Restoration Projects – 2006/2012
- Paleolimnological Study – 2007
- Watershed Management Plant – 2007
- Tree Planting Restoration Programs – 2009/10
- Wetland Assessments in Partnership with the MD – 2010/11
- Island Bay Park Proposal (began in 2008) submitted in 2013
- Moose Lake Riparian Health Inventory Re-visit– 2014
- Moose Lake Handbook – 2015
- Moose Lake Watershed Nutrient Export Study – 2015
- Tributary Signs – 2015
- Moose Lake Game Board - 2018
- Keep Our Lake Blue—2018
- Phosphorous Flux and Core Sampling-2019
- Moose Lake Nutrient Budget– 2021

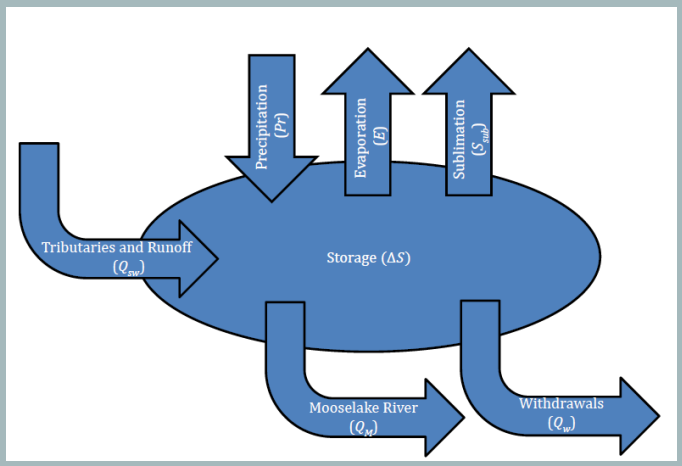
Moose Lake Phosphorous Sampling and Nutrient Budget

In 2019, a phosphorous flux and core sampling was done on Moose Lake. In the image below were the sample locations. This data was utilized, along with years of tributary and lake monitoring data to create a nutrient budget for the lake to better understand where the phosphorous was coming from, how it was stored, released and transported through the watershed and potential impacts to algal blooms and water quality concerns.

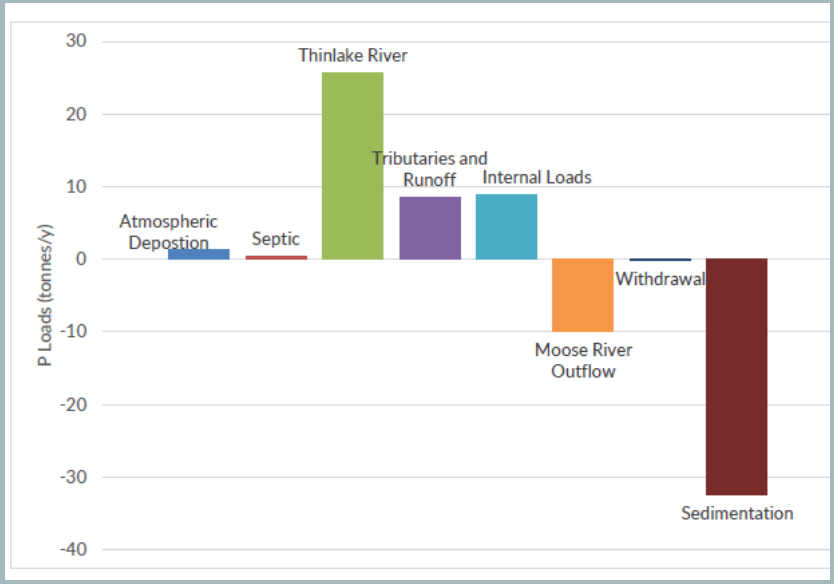


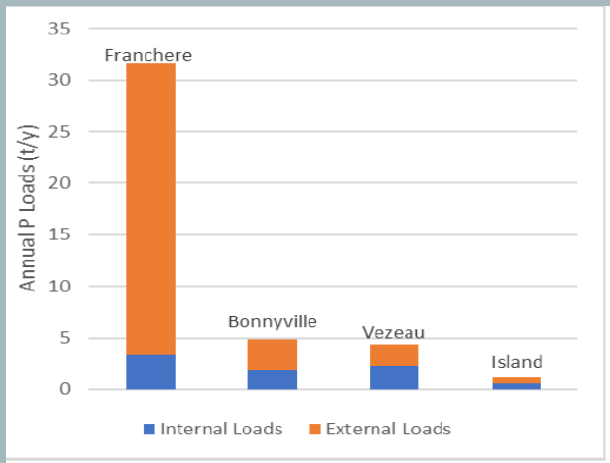


A water balance was required for the lake, which is depicted below. Developing the water budget for Moose Lake was an important step to confirm the lake

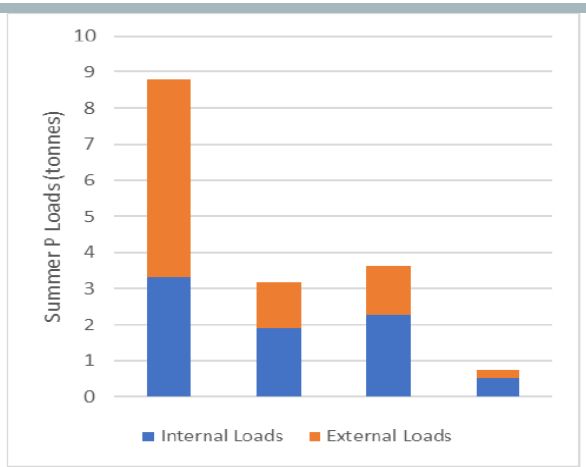


phosphorus budget, as phosphorus is transported into the lake mainly through precipitation and streamflow and is lost from the lake through outflow. In the diagram to the right, it is highlighting the P loads and losses by source/pathway. Below is the annual and summer internal loads vs external P loads by Bay.





Annual



Summer

Keep Our Lake Blue What we do in the watershed has compounding impacts on the health of our lakes and rivers. Impermeable surfaces don't allow water to soak into the ground. Instead, this water runs off of the surface, carrying sediments, salts, chemicals, and excess nutrients like phosphorous into the lake. Excess nutrients, like phosphorus, can also result in the formation of cyanobacteria, also known as blue-green algae, which are a unique group of bacteria that photosynthesize. When cyanobacteria decompose, they produce nerve and liver toxins that can pose a serious health risk to humans and animals. You can help prevent algae blooms by reducing runoff, phosphorus, and other pollutants on your property. The Moose Lake Watershed Society offers the Keep Our Lake Blue campaign, where you can commit to taking one or as many actions as you like to help reduce runoff into the watershed and protect water quality. Check out the next page for the list of actions you can take.

Actions to Improve Water Quality

Keep our Lake Blue

Actions to Reduce Runoff

Make Impermeable Surfaces On Your Property Smaller

- [ ] Convert your driveway or parking area to a permeable surface
- [ ] Make your pathways out of stone or pavers (instead of poured concrete or asphalt)

Reduce The Size Of Your Lawn

- [ ] Plant more trees and shrubs around property edges and work your way in
- [ ] Plant shrubs and groundcovers instead of grass

Use Water Wisely

- [ ] Water your lawn or garden in the morning or evening to minimize evaporation
- [ ] Adjust sprinklers to only water the lawn (not the side of the house or sidewalk)
- [ ] Install a rain sensor so your sprinklers don't turn on when it's raining
- [ ] Spread organic mulch around plants to retain moisture
- [ ] Install drip irrigation for shrubs and trees
- [ ] Convert some lawn space to a patio (with permeable paving stones) to reduce the area needing to be watered
- [ ] Landscape with native plants that won't need irrigation once established
- [ ] Install a rain barrel to collect runoff from your roof to use for watering your garden
- [ ] Direct downspouts onto plants, lawn, or a rain barrel and away from impermeable surfaces
- [ ] Fix any leaking faucets/pipes
- [ ] Use a broom instead of a hose to clean driveways and sidewalks

Plant A Vegetative Shoreline Buffer

- [ ] Cover 50—75% of your property line with native species
- [ ] Plant appropriate shrubs, trees, flowers, and groundcover on your property beside the lake

Plant A Rain Garden

- [ ] Pick a location that you can direct a downspout and build a rain garden

Plant Native Plants

- [ ] Plant native plants in your garden or on your lakefront property line - they reduce stormwater runoff and are low maintenance

Actions to Eliminate Pollutants

Eco-Friendly Lawn Care

- [ ] Apply fertilizer at the recommended rate – spring is the best time and never before a storm or on frozen ground
- [ ] Skip chemical fertilizers all together or use compost
- [ ] Keep yard waste out of the street, ditches, storm drains
- [ ] Leave grass clippings on the lawn
- [ ] Mow higher – 2 to 3" is healthier for your lawn
- [ ] Pick up pet waste
- [ ] Use pesticides sparingly, and only when needed. Do not apply chemical pesticides as part of a "routine maintenance plan"

Maintain Your Septic System

- [ ] Have your septic system inspected every 2 years
- [ ] Pump your septic system every 1-2 years
- [ ] Don't dispose of hazardous wastes in sinks or toilets
- [ ] Plant only grass or groundcover with shallow roots over your drainfield
- [ ] Reduce water use to reduce stress on the septic system
- [ ] Instead of doing laundry all in one day, spread it out over the week
- [ ] Make sure water softeners or filters aren't flushing into the septic system
- [ ] Reduce the use of antibacterial products and harsh cleaners

Don't Flush Drugs

- [ ] Take expired and unused medications to a collection site, such as a pharmacy, instead of flushing them

Use Phosphorus-Free Fertilizer

- [ ] If you buy fertilizer, buy phosphorous-free

Minimize Erosion During Any Construction Projects On Your Property

- [ ] Preserve existing vegetation where possible
- [ ] Install a silt fence or straw bales to trap sediment on the downslope of your lot
- [ ] Replant the disturbed area as soon as possible
- [ ] Fence the construction area to limit activity to the necessary area
- [ ] Divert runoff around disturbed areas

Maintain Your Vehicle

- [ ] Make sure your car is not leaking oil or other fluids onto your driveway
- [ ] Use kitty litter to clean up oil spills instead of washing it down the storm drain
- [ ] Wash your car on your lawn or at a commercial car wash instead of on the street or your driveway

Conserve Water In Your Home

- [ ] Install high efficiency showerheads
- [ ] Turn off faucets while shaving or brushing teeth
- [ ] Only run the dishwasher when full
- [ ] Install aerators in the kitchen and bathroom faucets
- [ ] Replace dishwashers, toilets, and washing machines with high efficiency models

Reduce Household Hazardous Waste

- [ ] Use hazardous substances such as gasoline, oil, paints, solvents, paint thinners, fertilizers, pesticides, and cleaners in the smallest amount possible
- [ ] Use biodegradable products when possible
- [ ] Use phosphate-free soap

Moose Lake Watershed Society

Moose Lake and Agriculture

Moose Lake is a diverse watershed with many industries, residences and uses, but a large part of the greater watershed is used for agricultural purposes. There are plenty of mixed farms, a few intensive operations and grazing leases throughout the watershed. Agriculture can have negative impacts on water quality, but many producers are utilizing beneficial management practices that can help protect water quality.

Regenerative agriculture is becoming more attractive to agricultural producers. Following this way of farming there are several principles that farmers put into effect. This includes:

- Minimal soil disturbance: reduced or no-till practices minimize soil disturbance and maintain a living root in the soil for as much as possible. This allows the soil to maintain its aggregation, and helps promote the growth of beneficial microorganisms that support soil health and improved water infiltration and prevent soil erosion.
- Armour the soil and build organic matter: with increased amounts of organic matter the soil structure improves and increases water holding capacity. This helps mitigate flooding and creates resilient conditions during drought. This is achieved through the use of cover crops, compost, and other organic matter inputs such as manure applications.
- Integrating livestock: animal integration onto the landscape mimics natural systems (think of when the bison roamed the lands) and improves soil health. The use of off-site watering systems aids in protecting water quality, as well as improves animal health by providing clean water.
- Keeping a living root for as long as possible: having plants growing for as long as possible improves soil aggregation, soil health, supports the microbiome, improves water infiltration and increases biodiversity above and below the soil. This improvement of water infiltration and storage helps mitigate floods and drought as well as improves water quality, reduces runoff and erosion.
- Reducing synthetics and increasing crop rotation: crop rotation can help prevent soilborne diseases and pest and improve soil structure and fertility. Reducing the use of synthetics (fertilizers and pesticides) improves microbial function and nutrient cycling (that is facilitated through microbes) and improves soil aggregation. This also leads to less runoff (of things like phosphorous) into our water bodies.

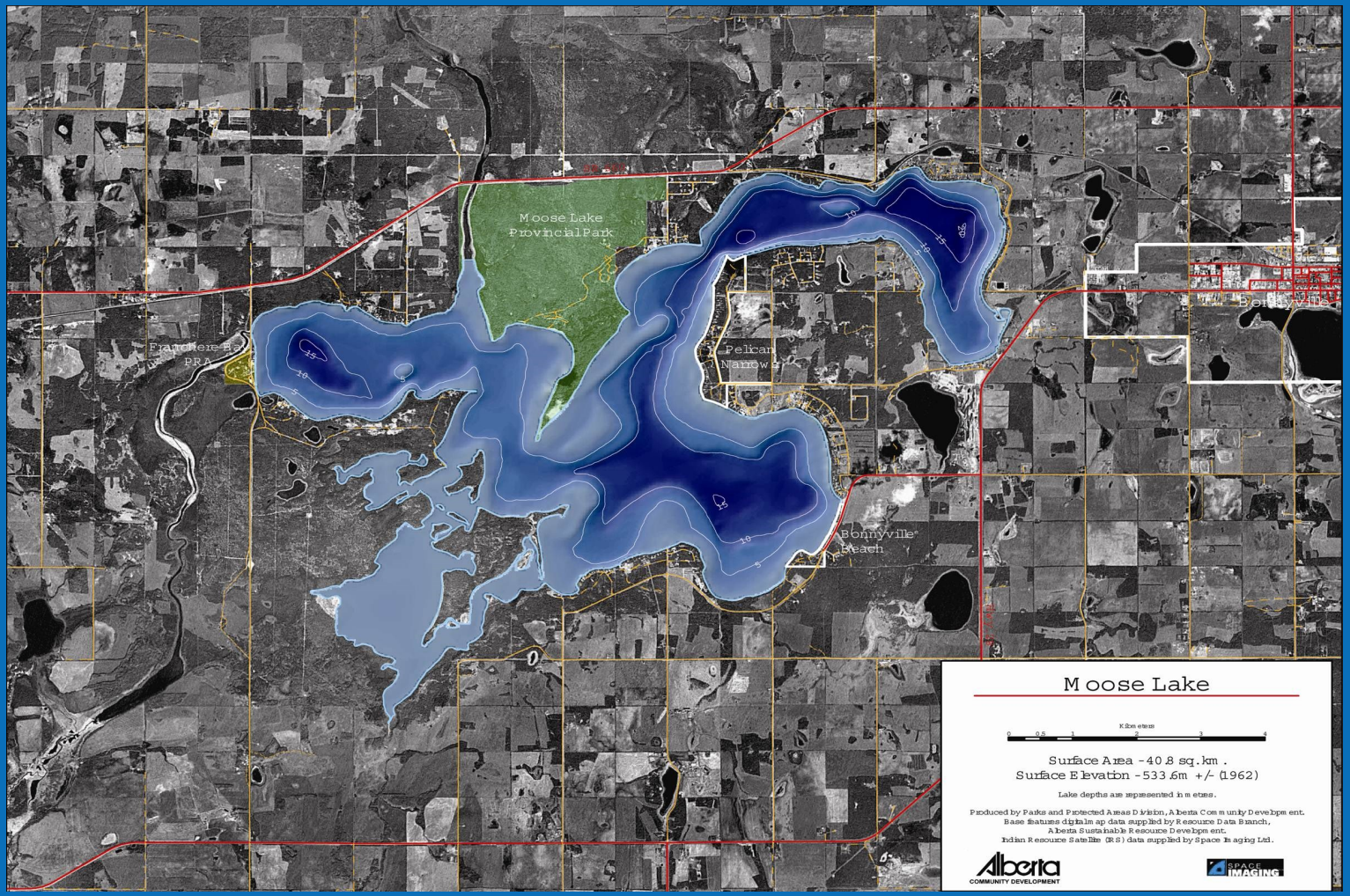
The Bigger Picture

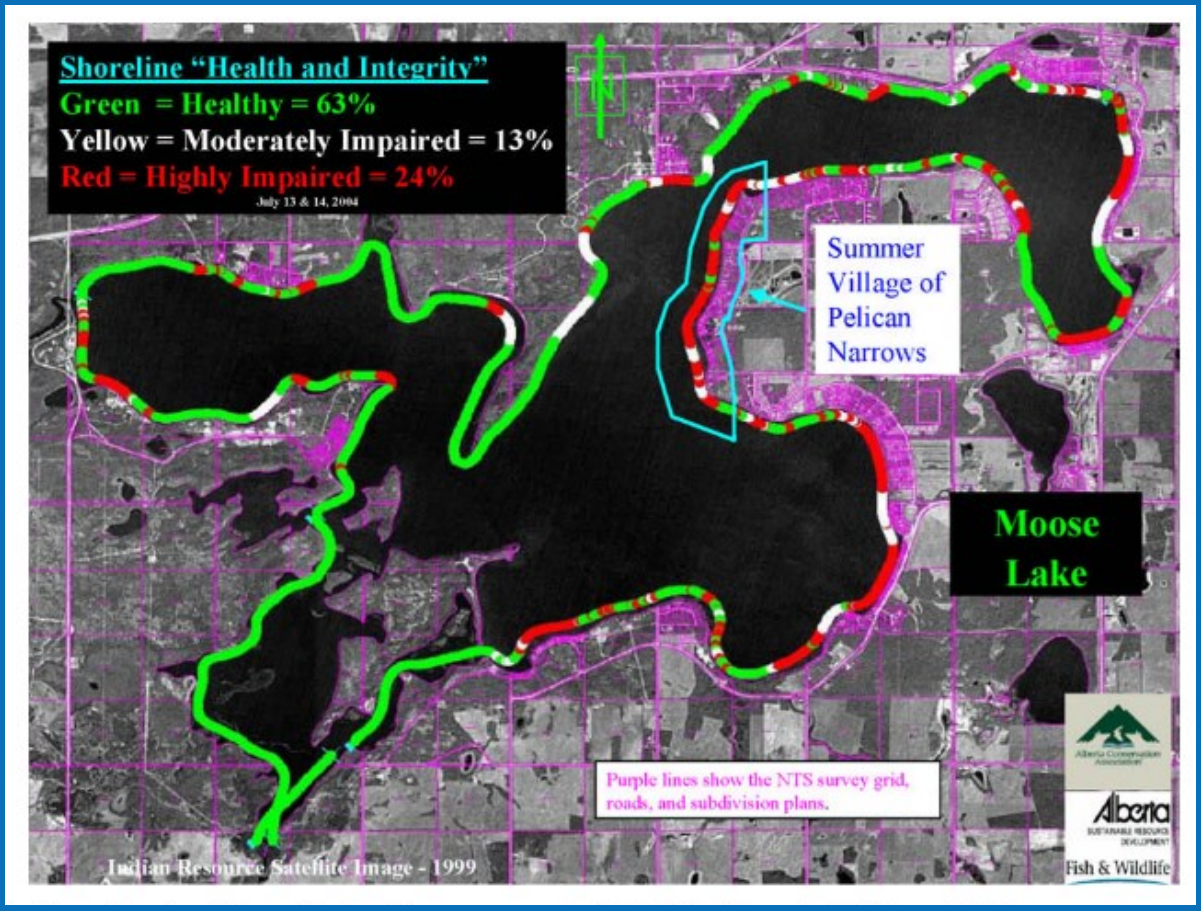
About the Beaver River Watershed

The Beaver River watershed is located in the boreal plain of east-central Alberta and west-central Saskatchewan, about 300 km northeast of Edmonton. The name beaver is likely a translation from the Cree name, Amisk, and appears as such on maps from as early as 1790. Unlike many rivers in Alberta, the Beaver River originates on the boreal plain rather than on the eastern slopes of the Rocky Mountains. The Beaver River originates near the town of Lac La Biche as the outflow from Beaver Lake and flows generally east for about 250 km passing to the south of Cold Lake – the largest lake in the Alberta portion of the watershed – to enter Saskatchewan. The Cold River originates at the east end of Cold Lake in Saskatchewan and flows east, eventually to join the Beaver River. It turns north joining the Churchill River at Île-à-la-Crosse to flow to Hudson Bay.

Although the watershed is dominated by mixed-wood forest, it lies in Alberta's boreal forest natural region marking the southern limit of closed forest and the northern advance of agriculture. Agricultural lands cover one-third of the watershed, much of this associated with the dark grey chernozemic soils and dark grey luvisols of the Beaver River lowlands and the Mooselake River watershed. The Beaver River watershed has an abundance of lakes; more than 2000 have been identified. This watershed contains the highest concentration of recreational lakes and high-quality beaches in Alberta. The most common type of lake found in the Beaver River watershed is a typical prairie lake or slough with shallow depths and gently sloping sides. These shallow depressions may be occupied by wetlands or beaver dams in parts of the basin. Such lakes are very sensitive to climate-driven, water level fluctuations. A significant number of wetlands are found in the watershed. The northern portions are almost completely forested and contain ecologically important areas of poorly drained fens and swamps.

Moose Lake Bathymetry

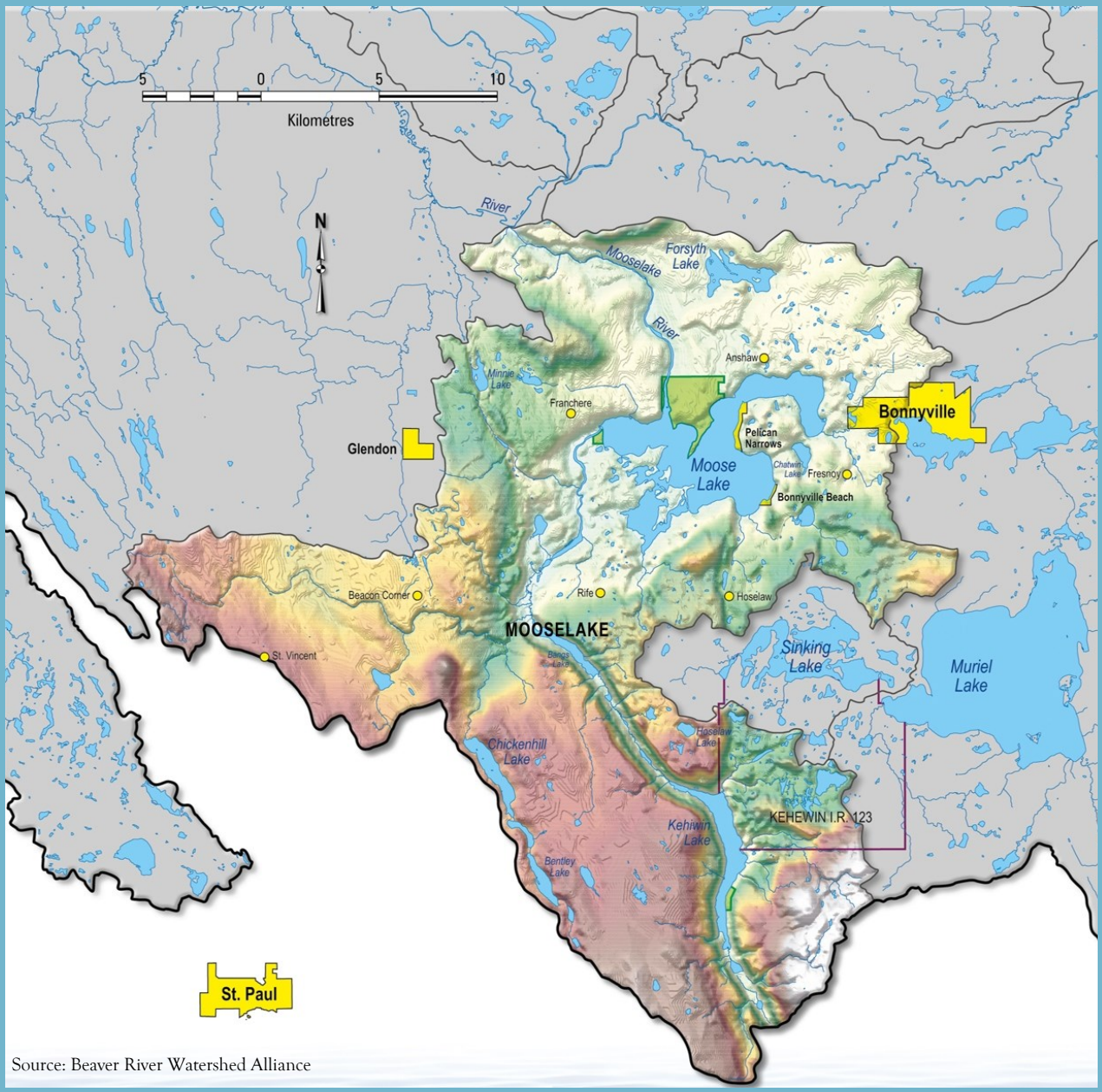




Moose Lake Shoreline Health and Integrity Survey

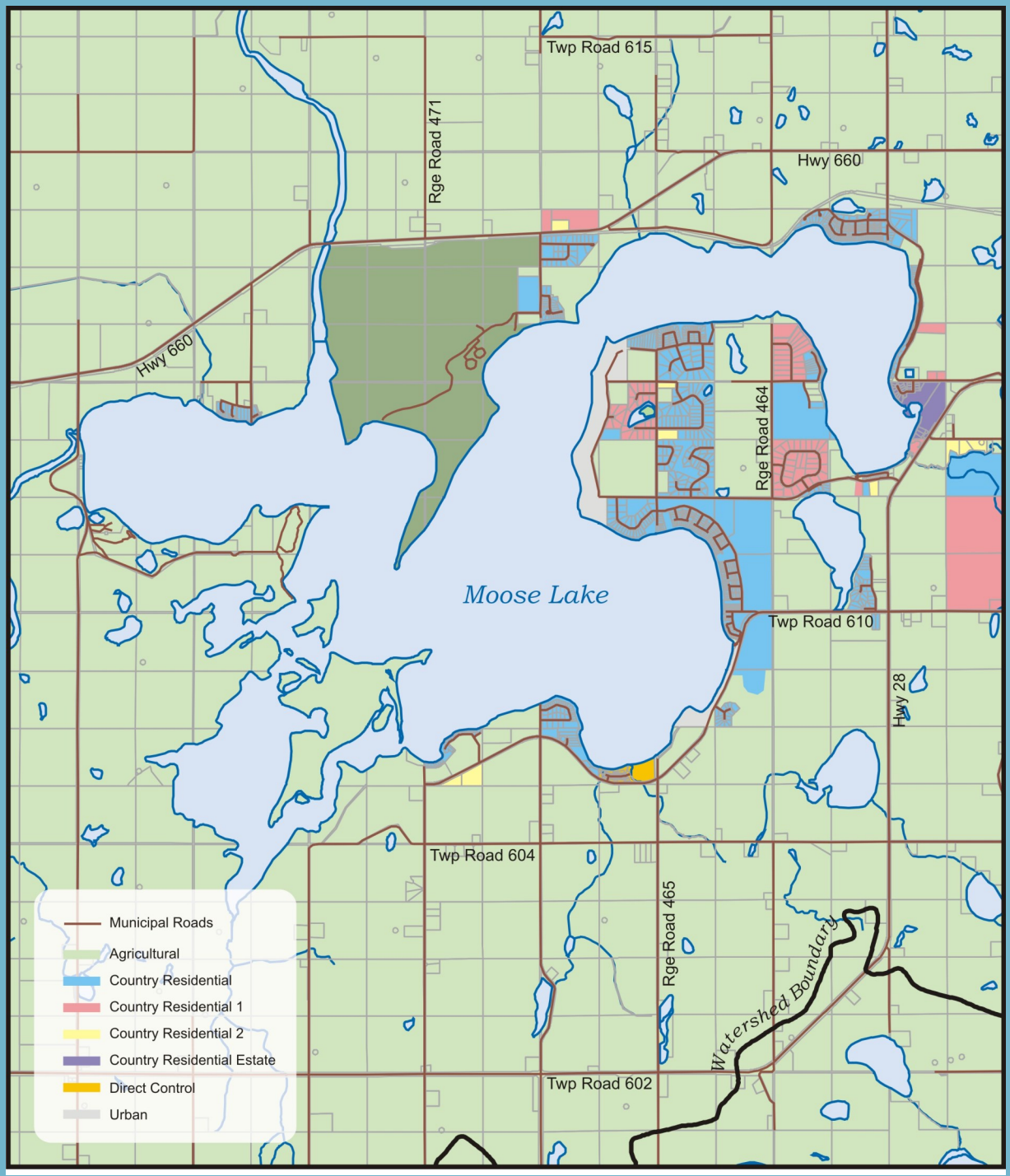
In the summer of 2004, aerial videography was completed along the entire shoreline of Moose Lake. The Alberta Conservation Association (ACA) developed and implemented the Riparian Habitat Assessment Project (RHAP) in an effort to quantify the status of riparian habitat around the lake. Due to dramatic expansions in development around the lake, serious concerns have been raised regarding the effects of human activities on lake fish, wildlife populations and the health of the ecosystem of Moose Lake.

Moose Lake Watershed Boundary



Source: Beaver River Watershed Alliance

Roads, Developments and Zoning Around Moose Lake



Source: Municipal District of Bonnyville

Moose Lake from Above

Source: Municipal District of Bonnyville 2012

Ready References

24-hour Environment and Complaint Hotline
1-800-222-6514

Alberta Aquatic Invasive Species Hotline
1-855-336-BOAT(2628)

Alberta Pest Surveillance System
310-APSS (2777)

Photo by Rob Fox

Photo by Kellie Nichiporik

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