

# 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.



## 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, with the assistance of the staff of the Beaver River Watershed Alliance and reviewed by members of the Moose Lake Watershed Society. Photos by Kellie Nichiporik.

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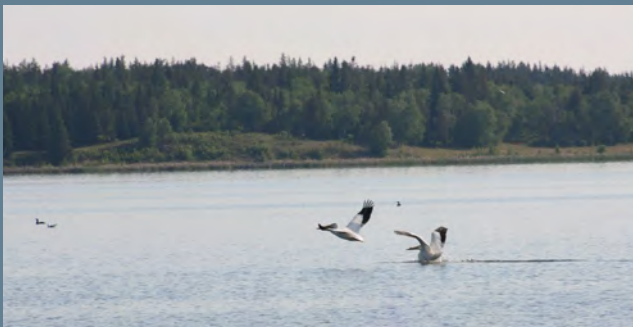


# Moose Lake

## 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 (Moosewau 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.

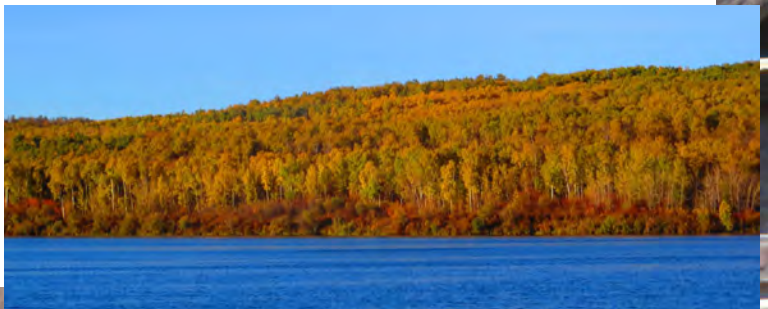
The CNR railroad came through the Franchere area to Cold Lake in 1928. The bridge was built over Thinlake River about the same time that the railroad came. The first bridge was a couple hundred feet west of the present bridge.

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<sup>2</sup>, and drains a gross area of 755 km<sup>2</sup> (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. 2014 was the 10th year that water quality data has been gathered on Moose Lake. These reports can be found on the ALMS website at [alms.ca](http://alms.ca).

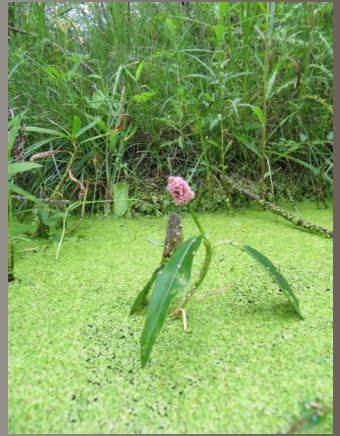
Water quality indicators that are measured include: water temperature, dissolved oxygen, pH, water clarity, and concentrations of nutrients and organic compounds such as nitrogen, phosphorous and chlorophyll-a.





# 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.



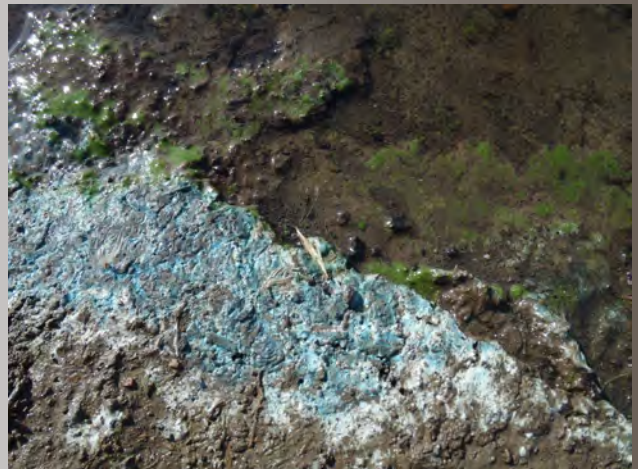
## Blooming Algae

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 health risk to humans and animals.

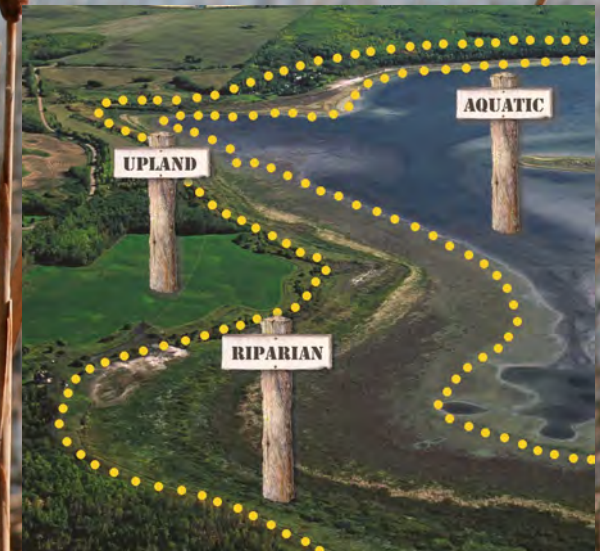


# One Foot In The Lake

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.





# 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

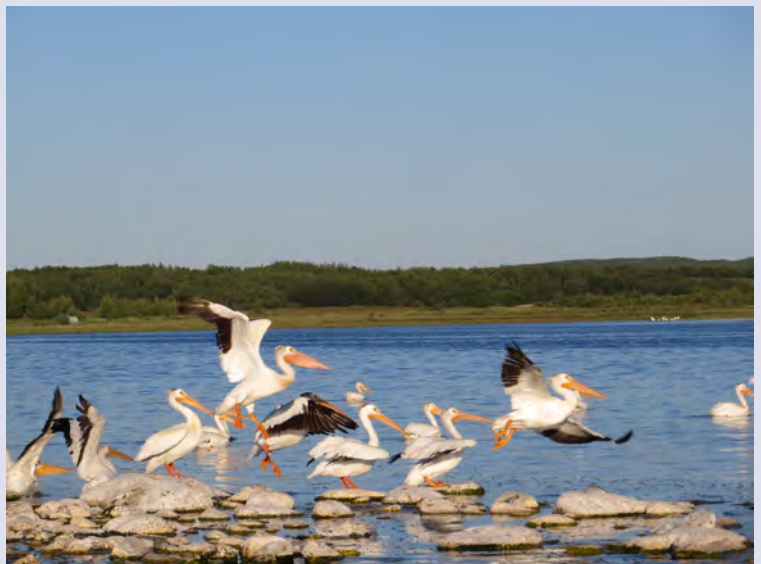
## Moose

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.



## 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.



## 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.

## 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



## Turkey Vulture

Although Turkey vultures 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.

## 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.



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

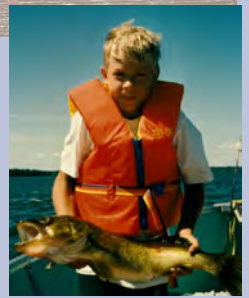
The name Walleye refers to the species' glassy, large pupils; light reflects from the back of their eyes, giving them a white, star-like look. This eye-shine allows the fish to see extraordinarily well in darker waters. Walleye, which are strictly carnivorous, are top predators, meaning that they do 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 Unwanted

## 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 out-compete cattails, rushes and sedges in riparian areas and due to shallow roots allow for erosion and destruction of shorelines.



## Clean • Drain • Dry

### Attention: Boaters and Anglers



Every time you remove your boat from the water, remember to **Clean, Drain and Dry** your watercraft and equipment.



Zebra Mussels



Quagga Mussels



European waterweed

**Clean** and inspect watercraft, trailer and gear. Remove all plants, animals, and mud.

**Drain** all water from bait buckets, coolers, bilges, internal compartments, livewells, ballasts, transom and motors.

**Dry** watercraft and gear completely between trips. Sponge out standing water and allow the wet areas of your boat to air dry.

Inspect and remove plants, animals and mud.



Report any mussels that are attached to your boat.

1-855-336-BOAT (2628)  
www.mywildalberta.com

Alberta  
Government

## 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



Photo courtesy of  
Kate Wilson, AESRD

quagga mussels after establishment. Prevention is key in these species. Zebra and Quagga mussels are filter feeders which will affect the entire ecosystem by removing food for fish and plant species. The mussels out-compete 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.



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:

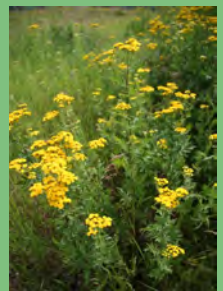
The Alberta Invasive Species Council <https://www.abinvasives.ca>

### 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.



**Eurasian Watermilfoil**

*Myriophyllum spicatum*

Photo courtesy of Kate Wilson, AESRD



# 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.

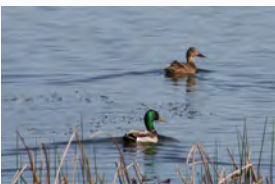


## Visitors

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.

## Give Your Shoreline a Make-Over



### Let's Talk

1. Cleared, manicured lot – loses shade and privacy; loss of native plants leads to more erosion, runoff... and work for you!
2. Runoff – flows over solid surfaces accelerating erosion; pollutants and excess silt degrade habitat for aquatic life.
3. Chemical fertilizers and pesticides – degrade water quality, are hazardous to your health, can be deadly for fish and other wildlife.
4. Lawn to the water's edge – lacks deep roots required to stabilize bank.
5. Hardened shoreline – can deflect erosion downstream, eliminates “natural filtering” of pollutants and sediment, degrades habitat.
6. Artificial beach – requires ongoing sand replacement, reduces water quality, degrades aquatic habitat.
7. Old 2-stroke engine – dumps 25–40% of fuel, un-combusted, into water and air.
8. Solid crib dock – destroys aquatic habitat, alters currents, can deflect erosion downstream.
9. Malfunctioning septic system – allows phosphorous and bacteria to leach into adjacent waterways.
10. Harmful household chemicals and cleaners – damage septic system and degrade water quality.



### Let's Fix

1. Prune trees rather than removing them; plant low maintenance native trees and shrubs to reduce erosion and absorb runoff.
2. Replace solid surfaces with porous materials where possible; redirect runoff into settling areas, away from the water's edge.
3. “Mow it high and let it lie” – leave grass 8 cm (3”) high to retain moisture, mulch clippings for fertilizer.
4. Start a buffer – leave some grass uncut along the water's edge; restore with deep rooting native plants.
5. “Soften” your shoreline – improve erosion protection with native trees, shrubs, grasses and aquatic plants.
6. Create a “dry land” beach above the high water mark; let imported sand erode away naturally and native plants grow back.
7. Use a well maintained electric motor, or a 4 or 2-stroke engine that meets or exceeds EPA 2006 guidelines.
8. Remove solid dock – try a pipe, cantilever or floating dock, avoid treated wood; use public access where possible.
9. Replace and properly maintain your septic system – consult an expert.
10. Use environment-friendly products, or alternatives like baking soda and vinegar.

# 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.



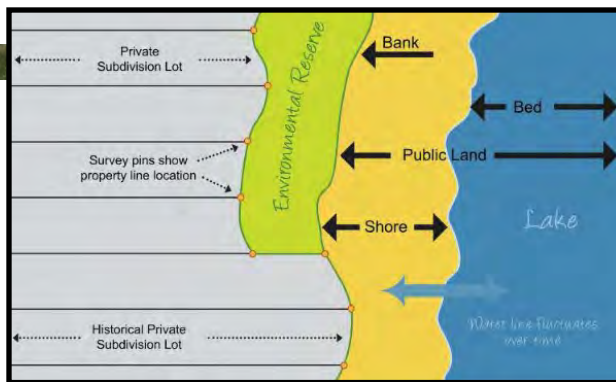
# Frequently Asked Questions

## 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)

## 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.



Source: Lake Nakamun Handbook

## 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)

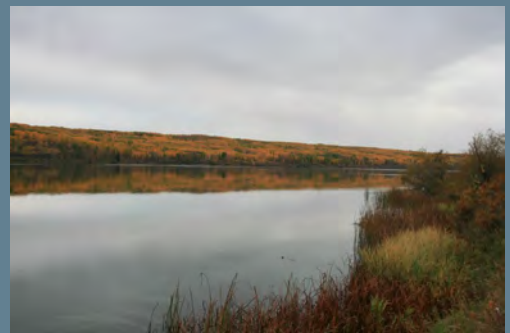


## Can I put a dock in the lake?

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

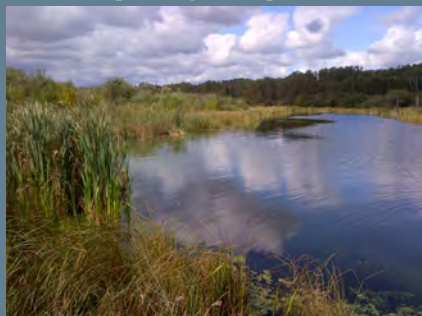
The Moose Lake Watershed Society (MLWS) was founded in 2002 as the Moose Lake Water for Life committee, and became a society in 2008. This group was formed to address the health of Moose Lake, increase public knowledge and interest, and improve water quality as well as fish and wildlife habitat. This 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.

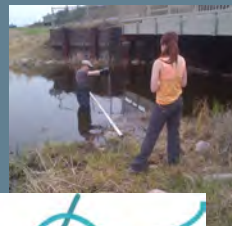


***Riparian Health Inventory*** - In 2008 and 2014 a riparian health inventory was conducted by Cows and Fish on the tributaries of Moose Lake to monitor for health and changes to the sites. The purpose is to provide a state of the environment report to the community and help land-owners make beneficial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



***Tributary Signage*** - Informative tributary signs were created and are to be 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. This data will be used in the future to create a nutrient budget for Moose Lake.





# 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.

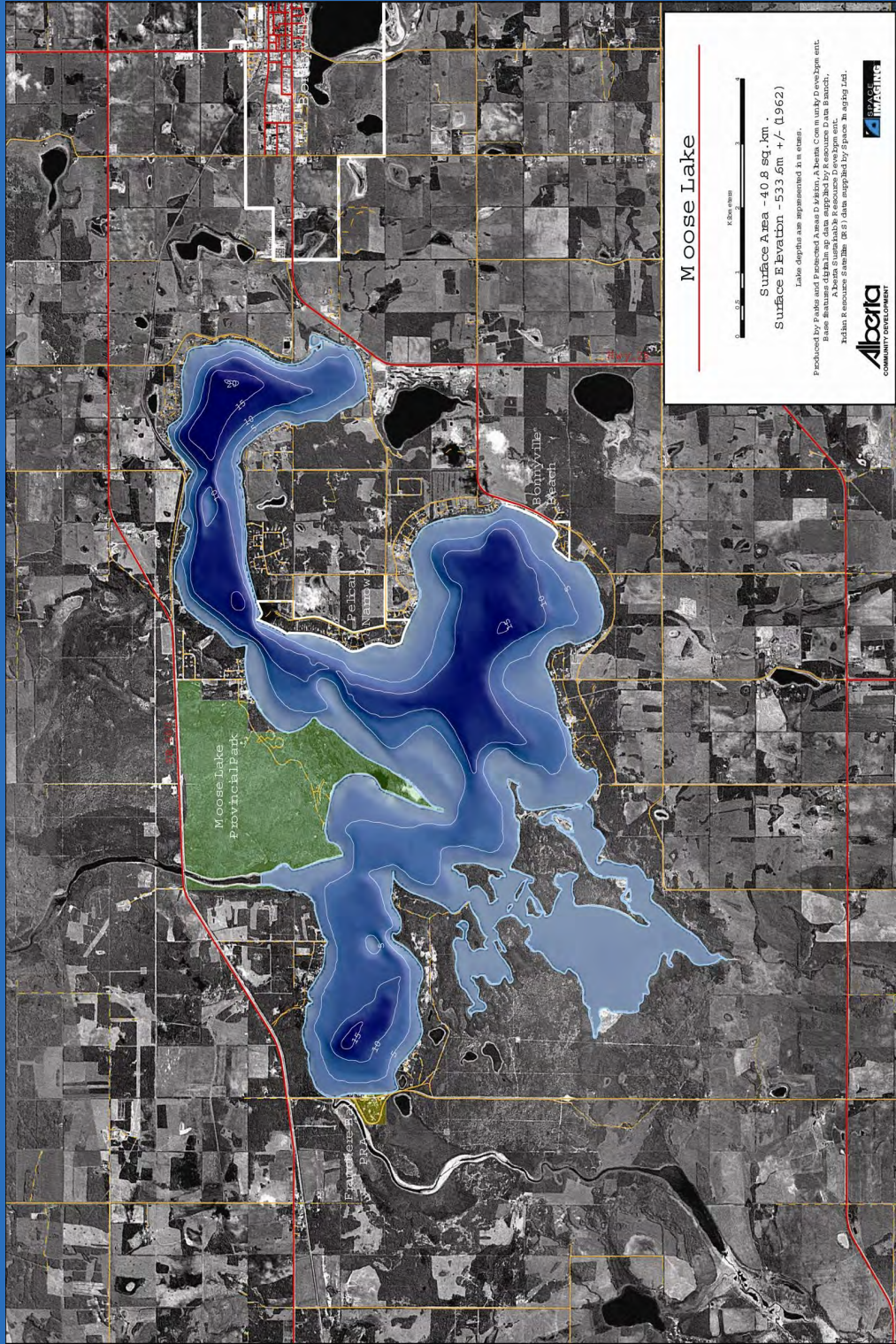
Although the watershed is dominated by mixed-wood forest, it lies in Alberta's boreal forest natural region marking the southern limit of closed forest and the northern advance of agriculture. Agricultural lands cover one-third of the watershed, much of this associated with the dark grey chernozemic 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.



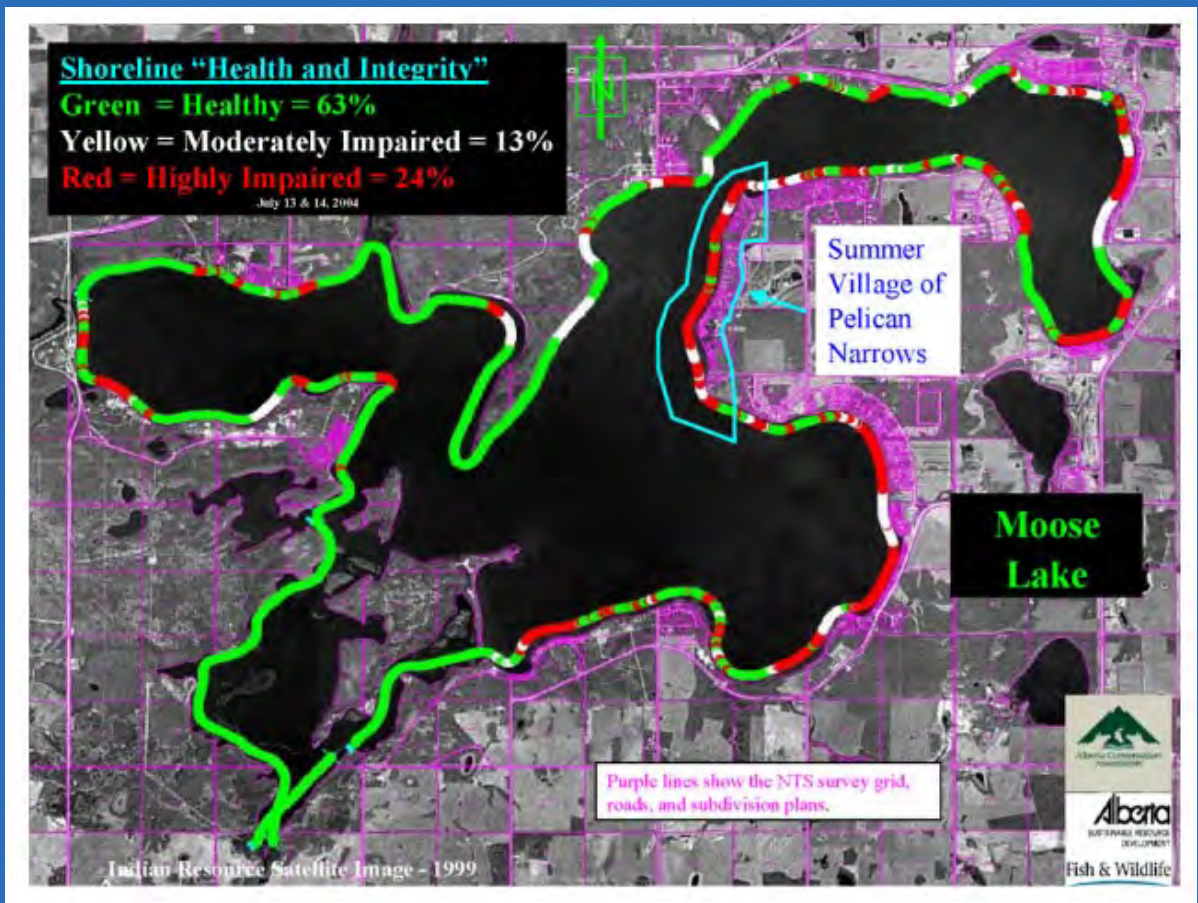
## Beaver River Watershed Alliance



# Moose Lake Bathymetry







## Moose Lake Shoreline Health and Integrity Survey

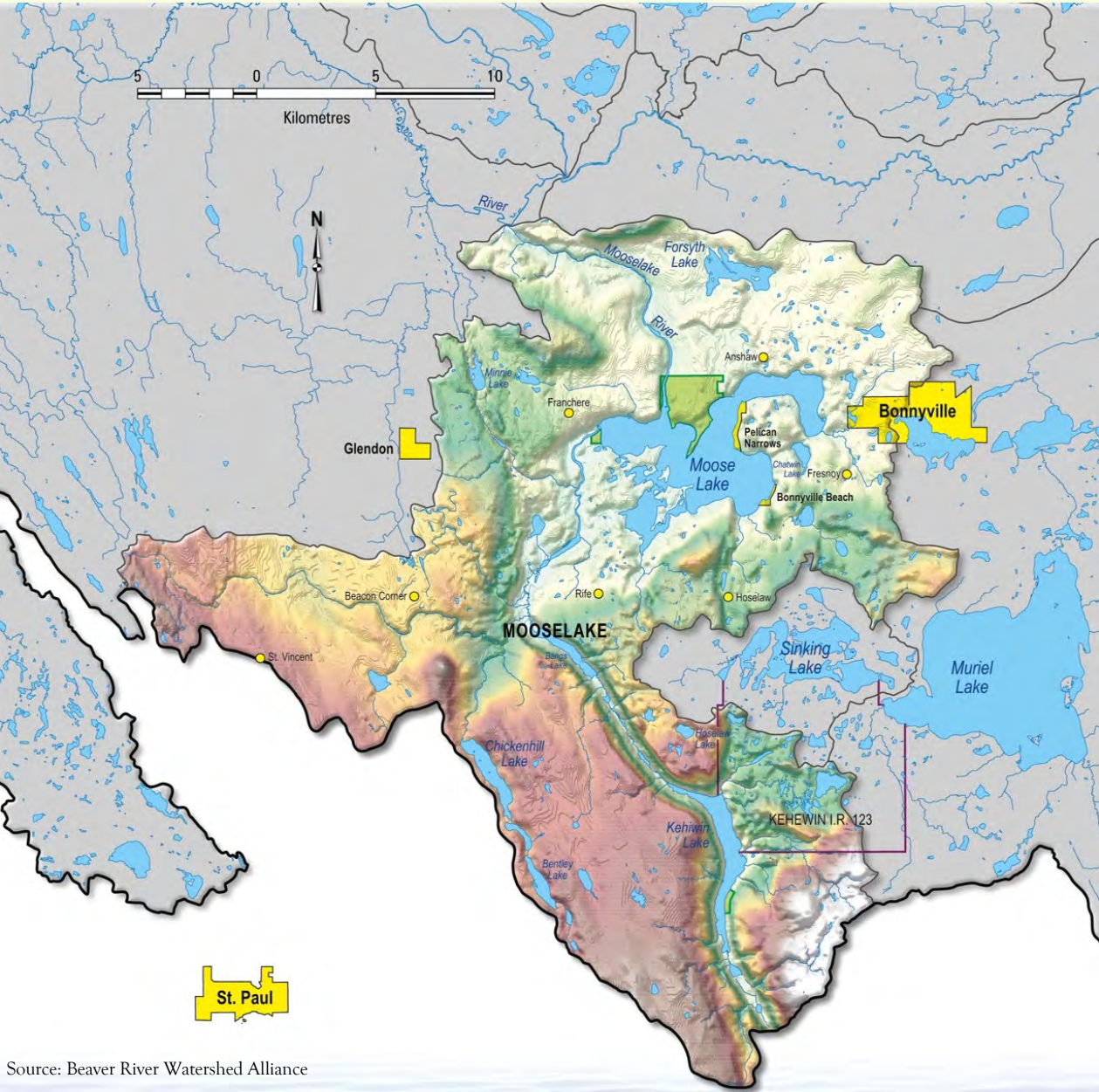
In the summer of 2004, aerial videography was completed along the entire shoreline of Moose Lake. The Alberta Conservation Association (ACA) developed and implemented the Riparian Habitat Assessment Project (RHAP) in an effort to quantify the status of riparian habitat around the lake. Due to dramatic 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.

For more information on the study visit: <http://www.ab-conservation.com/go/default/custom/uploads/reportseries/29.pdf>

For the State of the Environment of Moose Lake visit: [http://www.aquality.ca/uploads/news/id52/Aquality\\_Moose\\_Lake\\_SoW\\_2005.pdf](http://www.aquality.ca/uploads/news/id52/Aquality_Moose_Lake_SoW_2005.pdf)

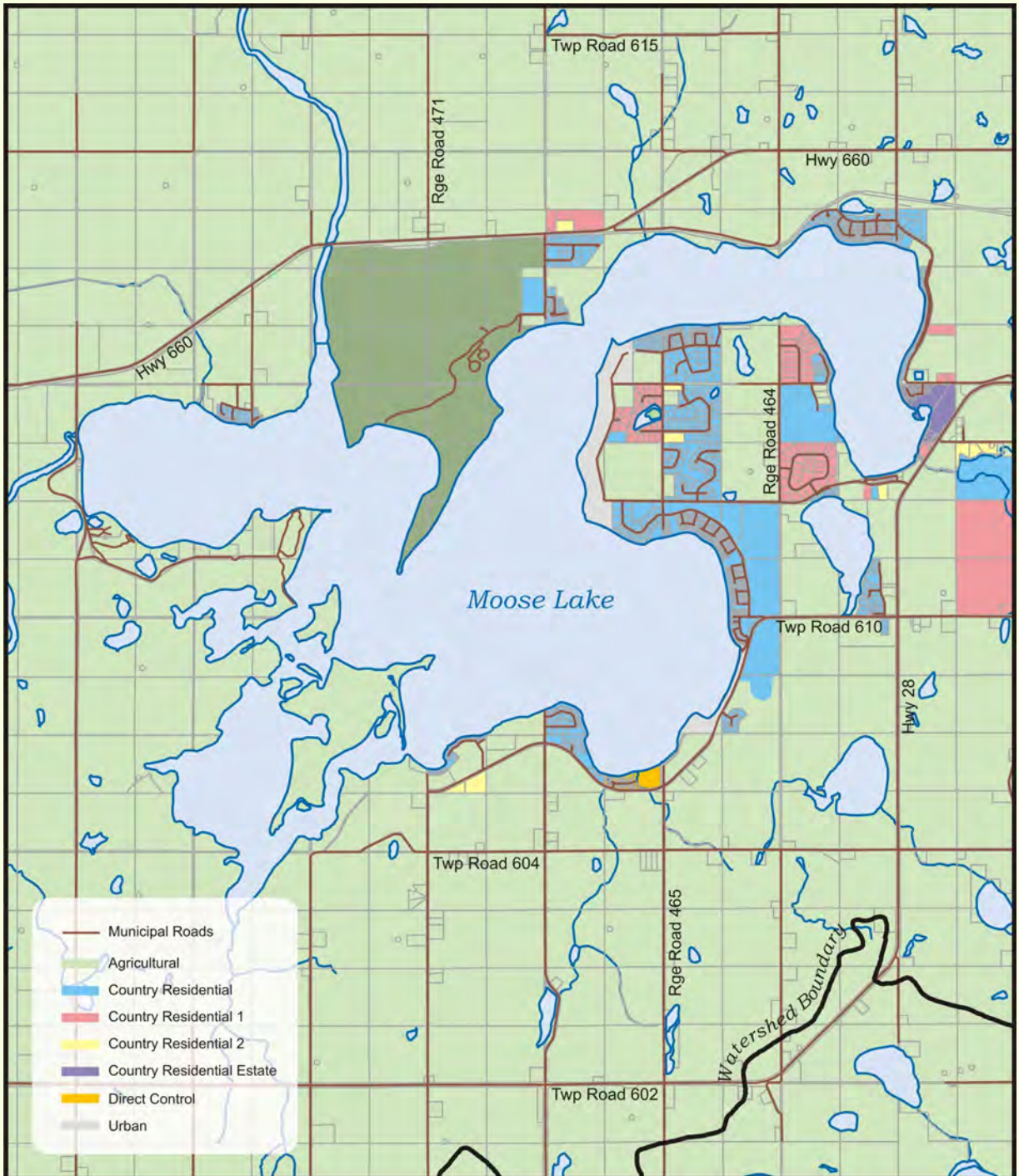


# Moose Lake Watershed Boundary





# Roads, Developments and Zoning Around Moose Lake



Source: Municipal District of Bonnyville



# Moose Lake from Above



Source: Municipal District of Bonnyville 2012

# Ready References

## **Alberta Agriculture and Rural Development**

<http://www.agric.gov.ab.ca/app21/rtw/index.jsp>

## **Alberta Conservation Association (ACA)**

<http://www.ab-conservation.com/go/default>

## **Alberta Environment and Sustainable Resource Development (ESRD)**

<http://esrd.alberta.ca>

## **Alberta Fish and Game Association**

[www.afga.org](http://www.afga.org)

## **Alberta Health Services**

<http://www.albertahealthservices.ca/>

## **Alberta Lake Management Society (ALMS)**

[www.alms.ca](http://www.alms.ca)

## **Alberta Ministry of Tourism and Parks**

<http://tpr.alberta.ca/>

## **Alberta Municipal Affairs**

<http://www.municipalaffairs.alberta.ca>

## **Alberta Stewardship Network (Land Stewardship Centre)**

<http://www.landstewardship.org/ASN>

## **Association of Summer Villages in Alberta (ASVA)**

<http://www.asva.ca>

## **Atlas of Alberta Lakes**

<http://alberta-lakes.sunsite.ualberta.ca>

## **Beaver River Watershed Alliance**

<http://beaverriverwatershed.ca>

## **Cows and Fish (Alberta Riparian Habitat Management Society)**

<http://www.cowsandfish.org>

## **Environmental Law Centre**

<http://www.elc.ab.ca>

## **Environment Canada**

[www.ec.gc.ca](http://www.ec.gc.ca)

## **Fisheries and Oceans Canada (DFO)**

<http://www.dfo-mpo.gc.ca/index-eng.htm>

## **Lake Nakamun Handbook**

<http://www.laclanonnewatershed.com/docs/Nakamun%20Handbook%202012.pdf>

## **Lakeland Agricultural Research Association**

[www.laraonline.ca](http://www.laraonline.ca)

## **Living by Water Project Nature Alberta: Federation of Alberta Naturalists**

<http://naturealberta.ca/programs/living-by-water>

## **Municipal District of Bonnyville**

<http://md.bonnyville.ab.ca>

## **Natural Resources and Conservation Board**

<https://www.nrcb.ca>

## **Town of Bonnyville**

<http://town.bonnyville.ab.ca>

## **Transport Canada**

<http://www.tc.gc.ca/eng/marine-menu.htm>

## **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)





