



Living by the Water's Edge

Riding Mountain Biosphere Reserve

Riding Mountain Biosphere Reserve Water Stewardship Project

2012

A Project by:
Riding Mountain Biosphere Reserve
Centre for Sustainable Watersheds



My Shoreline Action Checklist

I Will...	I already completed or I am completing	I will complete in one year	I will complete in five years
1. Plant native trees and shrubs along areas of my shoreline that lack vegetation			
2. Not mow my lawn so close to the shoreline			
3. When it's safe, leave woody debris (logs, branches, etc.) for wildlife habitat			
4. Not use fertilizers, pesticides, or herbicides			
5. Regularly pump out my septic tank (every three to five years)			
6. Avoid septic tank additives			
7. Use phosphate-free or biodegradable soaps			
8. Switch to alternative cleaners (e.g. baking soda or vinegar)			
9. Install low-flow showerheads and toilets to help conserve water			
10. Conserve water by not running the tap when shaving or brushing my teeth			
11. Install eavestroughs to help reduce runoff from my roof			
12. Direct downspout water to a rain barrel or natural catch basin (e.g. stones or rain garden)			
13. Plant native trees and shrubs in areas with thinning grass or exposed soils to mitigate erosion			
14. Limit foot traffic on sensitive slopes by choosing one access point			
15. Replace hardenend (concrete) steps with raised wood stairs with open backs			
16. Soften any shoreline walls by coverting them to natural slopes			
17. Choose an environmentally friendly dock such as a floating, cantilever, or post dock			
18. Upgrade to a cleaner direct-injected two stroke or a four-stroke boat motor			
19. Refill portable fuel tanks on land using a funnel to minimize spills into the water			
20. Use boat racks to store canoes and kayaks instead of placing them on the ground			
21. Reduce light pollution by using efficient bulbs with shielded fixtures			
22. Keep boat clean to prevent polluting the water or spreading invasive species			

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Riding Mountain Biosphere Reserve

Dear Riding Mountain Biosphere Reserve Member,

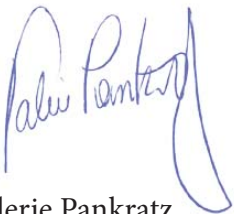
In partnership with the Centre for Sustainable Watersheds (CSW), the Riding Mountain Biosphere Reserve presents an engaging water stewardship education package for residents and users of lands adjacent to waterways in the Riding Mountain Biosphere Reserve.

Living by the water's edge, whether it be a lake, river, stream, or marsh, brings about more challenges and responsibilities to the landowner as their actions can directly impact the health of the waterbody. The shoreline is an extremely diverse environment that provides essential habitat for numerous plant and animal species. However, simple actions like excessive fertilizing or the removal of shoreline vegetation can destroy a shoreline and in time, the corresponding body of water.

In this guide, we have included a number of activities and steps for landowners to take in order to both preserve and enhance their shorelines. By encouraging activities like green boating, water conservation, proper septic maintenance, and habitat protection, we hope to ensure the preservation of the region's rich and diverse waterbodies.

By providing specific, relevant information, we hope to instill a sense of ownership that will propel residents to take positive environmental action to protect this unique area for future generations.

Sincerely,



Valerie Pankratz
Executive Director
Riding Mountain Biosphere Reserve

Acknowledgements

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- Centre for Sustainable Watersheds
- Riding Mountain National Park
- Friends of Riding Mountain National Park
- Little Saskatchewan River Conservation District
- Science Horizons
- Environment Canada

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The Riding Mountain Biosphere Reserve

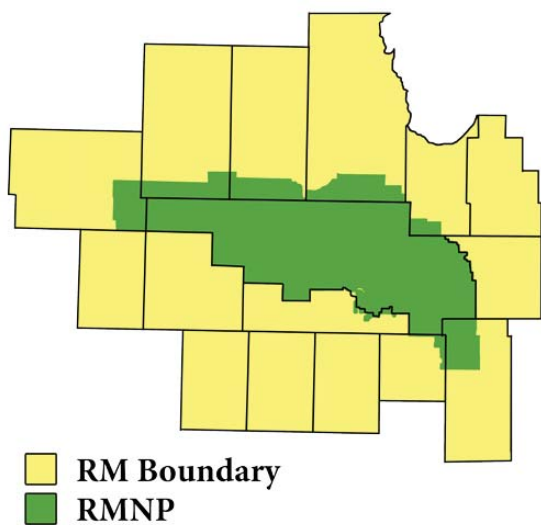
The Riding Mountain Biosphere Reserve (RMBR) is a non-profit organization that seeks to balance the conservation of natural and cultural heritage with sustainable resource development in the area surrounding Riding Mountain National Park. The RMBR includes the voluntary support of local business, community, educational, and government partners working cooperatively to support prosperous local economies while maintaining healthy ecological communities.

What Does “Biosphere Reserve” Mean?

A “biosphere reserve” is a designation of recognition from the United Nations Educational, Scientific, and Cultural Organization (UNESCO) for an area that demonstrates a “balanced relationship between humans and the biosphere.” Through collaborative efforts among people in the biosphere reserve, we promote the sustainability of local economies and communities and the conservation of their ecosystems. Biosphere reserves are intended as special areas where people demonstrate better approaches to conservation and sustainable resource use. A biosphere reserve also serves as a mechanism for regional planning and multi-sector collaboration. It offers an opportunity for the community to conceive what they want for the region and to work toward achieving it.

The Biosphere Reserve does not have any law-making or land-use changing powers. Rather, it promotes voluntary initiatives, with the main goal being to seek a balance between the conservation of natural and cultural heritage and sustainable economic development.

To learn more about the function of a biosphere reserve, please visit our website at www.rnbr.ca.



Biodiversity

Our protected core is Riding Mountain National Park, and the area of cooperation includes fifteen surrounding rural municipalities. The core area covers some 3,000 km² (1,660 mi²) of mixedwood forest (white spruce and trembling aspen, known locally as white poplar), eastern deciduous forest (ash, oak, elm, and cottonwood), and rough fescue prairie.

The surrounding area of cooperation comprises an additional 12,000 km² (4,600 mi²), containing 29,000 residents, and has largely been developed for the growing of grain and forage crops and the production of livestock. In addition, the area is rich in lakes, streams, and natural habitat. Hunting, guiding, and eco-tourism contribute to the local economy.

Research

Biosphere reserves provide excellent opportunities for research. The core area of the Riding Mountain Biosphere Reserve, Riding Mountain National Park, preserves the diversity of local forms of life and serves as a baseline against which we can measure our use of resources. Some day we may desperately need the genes of plants or animals that have disappeared on land that is cultivated or grazed. Professionals can also study the interaction between wildlife and humans and can suggest ways to avoid conflict.

People

Biosphere reserves are not places set aside from human use and development – human activity and the health of people and communities are an essential part of the biosphere reserve program. Residents and organizations in a biosphere reserve use a variety of activities to address conservation and sustainable development in ways that are meaningful for them; they also have opportunities to share their discoveries with others.

Management

The Riding Mountain Biosphere Reserve is managed by a committee of area residents appointed by member rural municipalities. In addition to these individuals, professionals provide advice and scientific information. Biosphere reserves can teach us principles of harmonious existence, which help us develop attitudes that will permit future generations to also have a good life.

Three Functions of a Biosphere Reserve

1. Conservation of Biodiversity

- Protecting the long-term health, integrity, and diversity of flora, fauna, and the region's natural landscape

2. Sustainable Development

- Helping citizens, businesses, and government find sound approaches to land use and resource use that is sustainable for society and the environment, now and in the future

3. Capacity Building

- Helping citizens, businesses, and government make informed decisions using scientific research, monitoring, education, and training.

UNESCO Designated

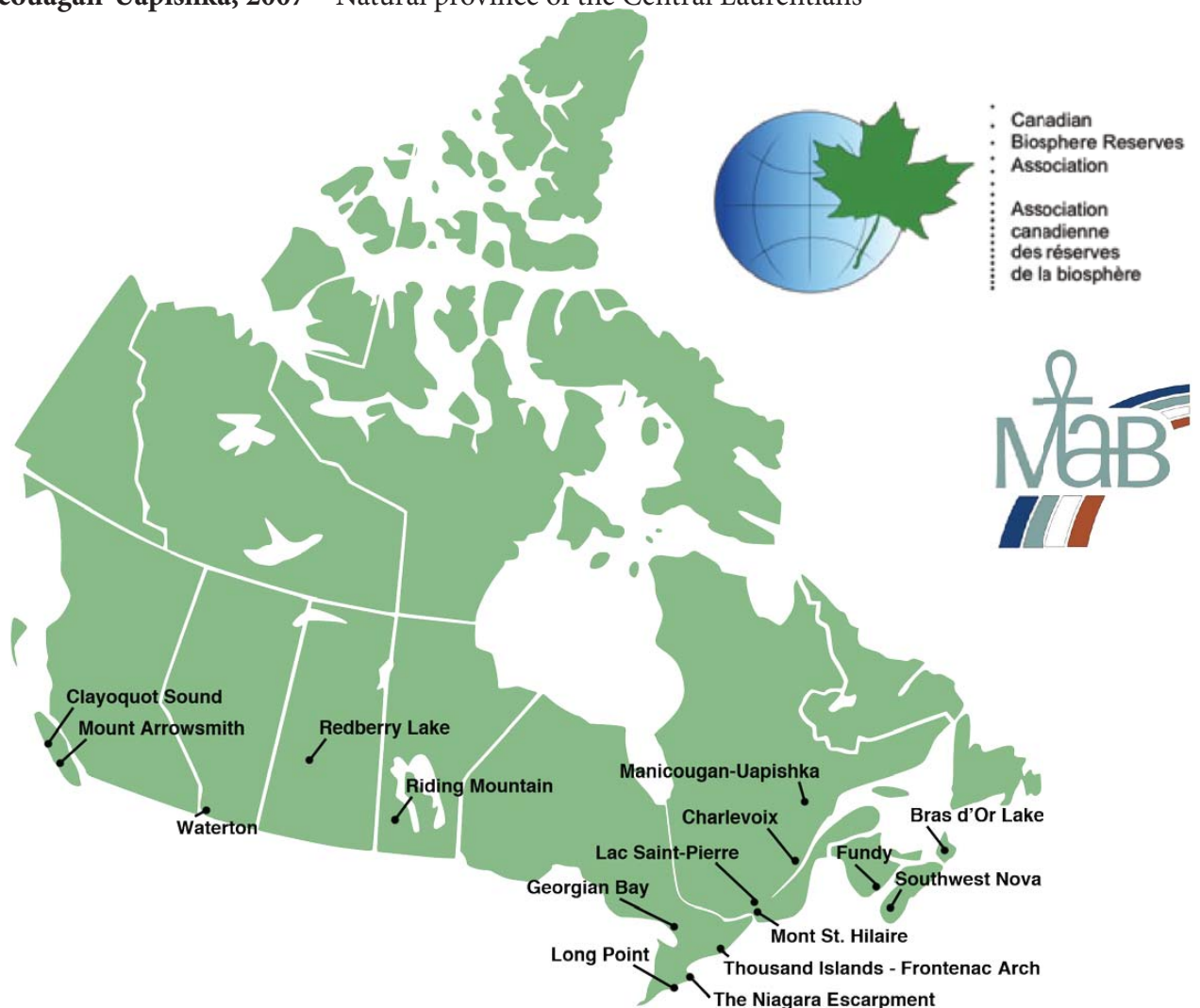
The Riding Mountain Biosphere Reserve was designated in 1986, following application to UNESCO from the fifteen rural municipalities that make up the area of cooperation, the Province of Manitoba, and Riding Mountain National Park of Canada.

Education

The Riding Mountain Biosphere Reserve actively participates in and promotes programs developed to help the youngest members of our society learn about biosphere reserves' conservation of biodiversity and sustainable development.

The Biosphere Reserves of Canada

- **Bras d'Or Lake, 2011** – Unique estuarine ecosystem
- **Charlevoix, 1988** – Boreal needleleaf forests and woodlands
- **Clayoquot Sound, 2000** – Temperate rainforests, including marine/coastal component
- **Fundy, 2007** – Acadian Forest, estuarine systems, and non-forest ecosystems
- **Georgian Bay Littoral, 2004** – Freshwater coastline and islands
- **Lac Saint-Pierre, 2000** – Estuarine systems and freshwater wetlands
- **Long Point, 1986** – Temperate and sub-polar broadleaf forests and woodlands including lake system
- **Mont Saint-Hilaire, 1978** – Temperate broadleaf forests and woodlands
- **Mount Arrowsmith, 2000** – Temperate rainforest, including marine components
- **Niagara Escarpment, 1990** – Temperate broadleaf forests and woodlands
- **Redberry Lake, 2000** – Temperate grassland and saline lake
- **Riding Mountain, 1986** – Temperate grasslands, boreal needleleaf forests, and woodlands
- **Southwest Nova, 2001** – Boreal needleleaf forests and woodlands
- **Thousand Islands - Frontenac Arch, 2002** – Temperate and sub-polar broadleaf forests, woodlands, and boreal needleleaf forests
- **Waterton, 1979** – Mixed mountain and highland systems, lakes, and freshwater wetlands
- **Manicouagan-Uapishka, 2007** – Natural province of the Central Laurentians



Projects in the Riding Mountain Biosphere Reserve

Native Species Garden

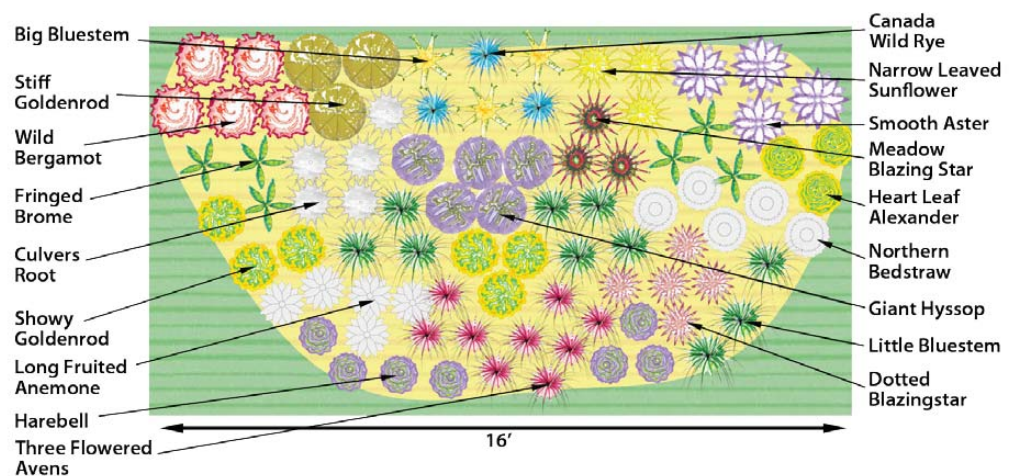
In the Summer of 2011, the Riding Mountain Biosphere Reserve began work on three new Native Species Gardens at the Erickson office. In total, three gardens were dug and planted but more are planned for the near future. These gardens are intended to highlight the area's native species and to encourage others to plant similar species. One of the many advantages of planting native plant species is that they provide excellent shelter and food to native animal species. Each garden has a theme related to the characteristics of its species.

The Butterfly Garden is a collection of native species that butterflies find delicious. A wide variety of wildflowers were included to ensure that this garden would remain colourful throughout the summer! The species planted here include Giant Hyssop, Prairie Sage, Dwarf Milkweed, and Prairie Crocus.

The Bird Garden includes native plants that birds flock to due to plentiful amounts of insects and natural cover in both summer and winter. These species are highly adaptable to a variety of weather conditions and include species like Big Bluestem, Gaillardia, Wild Bergamot, and Tall Coneflower.

The final garden is the Deer Resistant Garden. As its name suggests, the species planted here naturally discourage deer from defoliating the garden. Though, these species are unpalatable for the deer, this certainly doesn't detract from their beauty! Species planted here include Showy Goldenrod, Harebell, Smooth Aster, and Dotted Blazingstar.

Deer Resistant Garden 90 Plants



If you are interested in learning more about the gardens and native species in the area, please visit our website at www.rmbr.ca/projects/native-species-garden. Check out the Riding Mountain Biosphere Reserve Native Species Garden located at the RMBR Erickson office located at 61 2nd Street NE.

Parkland Habitat Partnership: Invasive Species Network

In partnership with the Parkland Habitat Partnership, the Riding Mountain Biosphere Reserve is examining the presence of invasive species in the area. As part of its commitment to ensuring that the Biosphere Reserve's waterbodies and waterways remain healthy in the future, this project will be studying invasive species on the land as well as those in the water.

For more information, visit our website at www.rmbr.ca/projects/rmbr-invasive-species-network.

At the Farm Gate Market

We all know that there is a growing trend of people who are following the “100-mile Diet”, eating locally, cooking more meals at home, and becoming aware of sustainable eco-conscious eating and green foods. These same people are concerned about the quality of the food that they are eating, their health and the health of the environment.

The Riding Mountain Biosphere Reserve would like to help these “locavores” find locally produced, fresh products that many of our small family farms are already producing and selling “At the Farm Gate”, such as farm fresh eggs, grass-fed or free-range beef, pork, and chicken, jams, jellies and preserves, baking, fruits, vegetables, and much more.

Our goal is to help build a stronger rural regional economy by encouraging people who live, work, and play in the RMBR region to purchase food and other necessities locally, to get to know where their food comes from, and to get to know their farmer. In order to do so, we need to show them where these products are available.

At the Farm Gate Markets are held twice a year, once in the spring and again in the fall.

To learn more about the At the Farm Gate Market and local producers and artisans, visit our website at www.rnbr.ca/projects/at-the-farm-gate



Riding Mountain National Park

The rich wilderness of Riding Mountain National Park encompasses an area of almost 3,000 km² (1,660 mi²) of rolling hills and valleys. Located in the midst of Manitoba's prairie landscape, Riding Mountain National Park's broad forests, meadows, lakes, and lofty heights of the Manitoba Escarpment stand in stark contrast to the surrounding region. Home to numerous species of wildlife including hundreds of bird species, deer, moose, elk, wolves, lynx, black bears, and a captive bison herd, Riding Mountain National Park is an extremely diverse environment.

It is for these reasons that Riding Mountain National Park was selected as the core protected area of the Riding Mountain Biosphere Reserve.

First designated a forest reserve in 1895, Riding Mountain National Park officially opened on July 26, 1933. Hundreds of years before the first European explorers and settlers visited the area, this area was some of the favourite hunting and fishing grounds of the Cree, Assiniboine, and Ojibway. With the arrival of the first Europeans in the mid-1700s and the installation of the Canadian Pacific Rail, settlers established themselves around Riding Mountain. In the 1920s, land leases were issued for those who wanted to build cottages and the area became an increasingly important destination for tourists.

Today, Riding Mountain National Park remains a popular destination for tourists and cottagers with approximately 300,000 visitors every year.



Watersheds and the Riding Mountain Biosphere Reserve

What is a Watershed?

Watersheds are defined areas of land in which water flows to a common drainage point like a large river, basin, or sea. Within watersheds, surface and ground water is collected and drained through a network of waterways or through layers of soil.

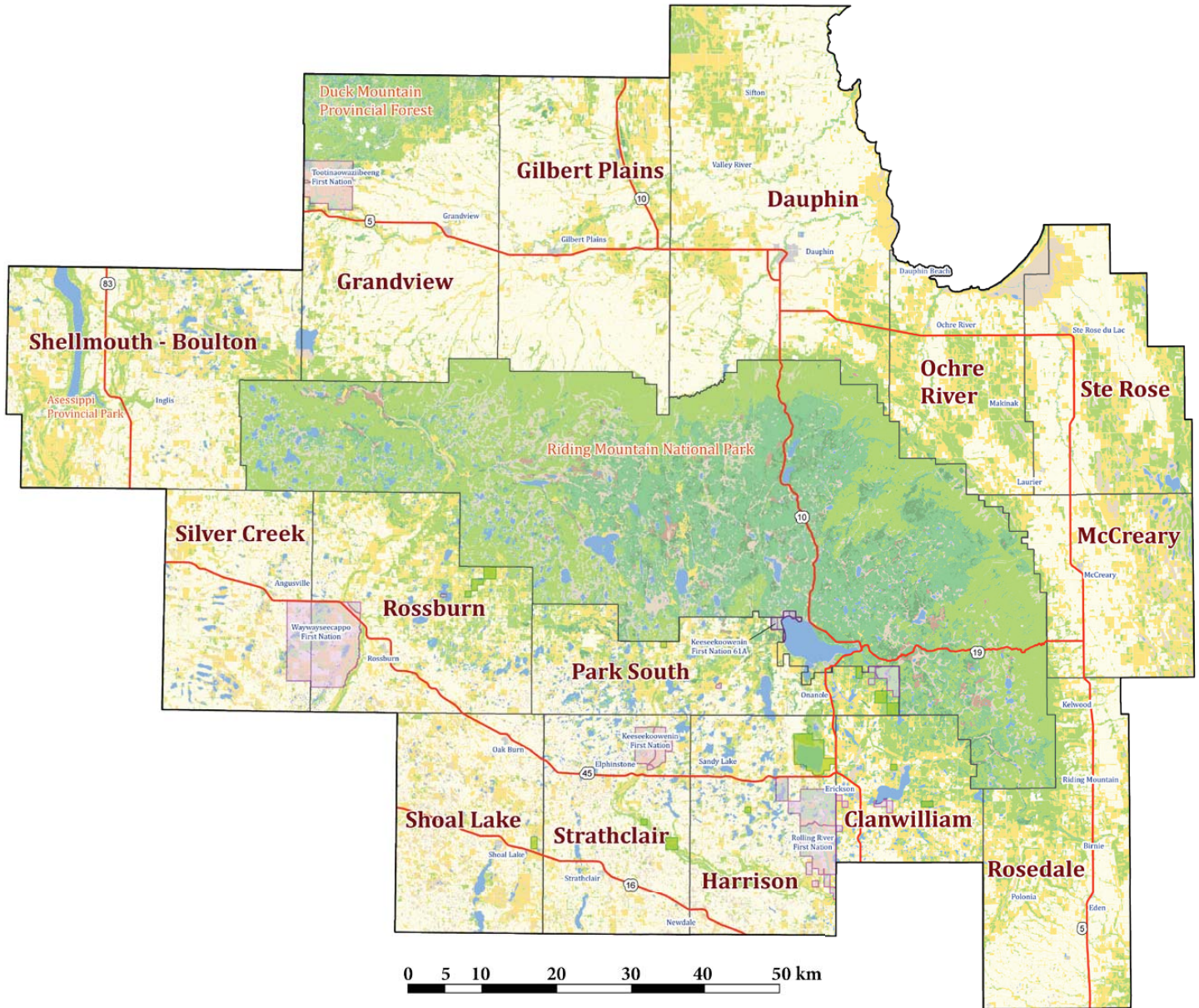
As the water within watersheds is constantly moving, activities that reduce water quality have a lasting impact on both the immediate area as well as the areas to which the water moves. It is essential to understand how our use of water can have a severe effect on areas downstream and therefore, we must ensure that our activities have a limited impact.

Watersheds in the Riding Mountain Biosphere Reserve

The Riding Mountain Biosphere Reserve contains sections of six watersheds. The features of Riding Mountain National Park divide these six watersheds with the Dauphin Lake and Whitemud River watersheds forming part of the larger Lake Manitoba Basin while the remaining four are part of the Assiniboine River basin. As with all waterways in Manitoba, they eventually make their way north and empty into the Hudson Bay.

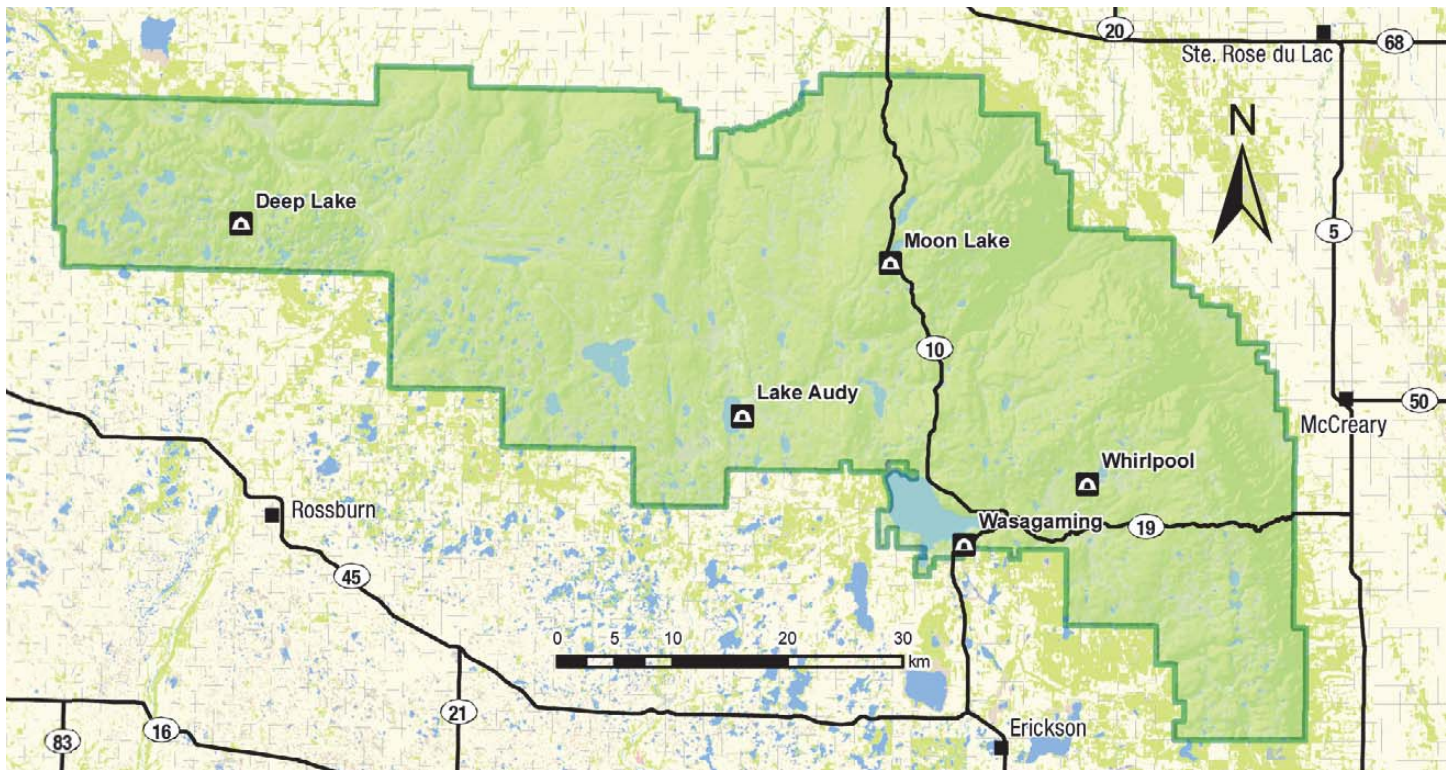
- **Dauphin Lake**
 - The Dauphin Lake Watershed is the region's largest, draining an area of over 8,000 km² (3,000 mi²). Turtle River, Ochre River, Vermillion River, Wilson River, Edwards Creek, and Valley River are the watersheds main waterways, all eventually draining into Lake Manitoba.
- **Whitemud River**
 - The Whitemud River Watershed covers an area of over 7,000 km² (2,700 mi²), stretching from Riding Mountain National Park to Lake Manitoba. The Pine, Squirrel, and Boggy Creek feed into the Whitemud River, which eventually drains into Lake Manitoba.
- **Little Saskatchewan River**
 - With a total area of over 4,000 km² (1,500 mi²), the Little Saskatchewan River Watershed extends from Riding Mountain National Park to the Assiniboine River. Two rivers, the Little Saskatchewan River and the Rolling River, are two of its major waterways.
- **Arrow-Oak River**
 - Covering approximately 5,000 km² (1,900 mi²), the Arrow-Oak River Watershed's major waterways include Arrow River, Bosshill Creek, Gopher Creek, Kenton Creek, Oak River, and the Assiniboine River.
- **Assiniboine Birdtail**
 - Extending from Riding Mountain National Park to the Trans-Canada highway, the Assiniboine-Birdtail Watershed covers an area of 6,900 km² (2,700 mi²). As its name suggests, two of its major waterways are the Assiniboine River and Birdtail Creek but it also contains Conjuring Creek, Minnewasta Creek, and Scissor Creek.
- **Shell River**
 - Straddling the Manitoba-Saskatchewan border, the Manitoba portion of the Shell River Watershed covers approximately 3,000 km² (1,160 mi²). The Shellmouth Reservoir, or Lake of the Prairies, is the watershed's dominant waterbody and the Assiniboine River, Shell River, and Big Boggy Creek are its major waterways.

Maps

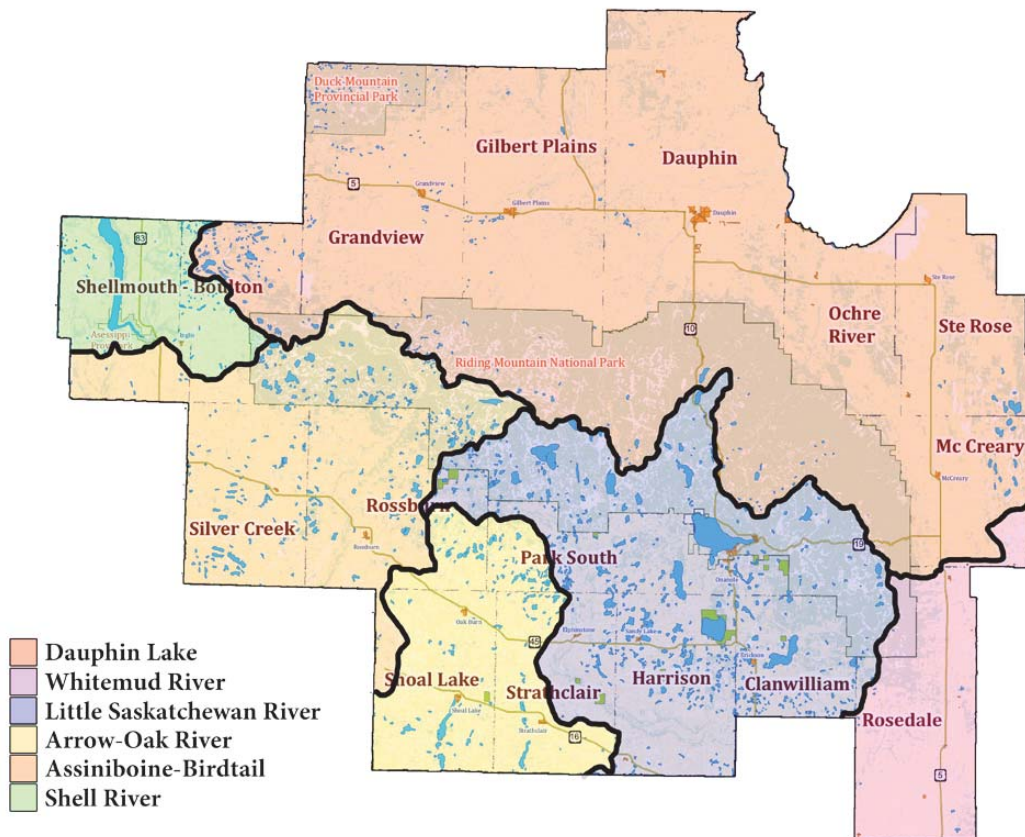


Map 1: Riding Mountain Biosphere Reserve

The Riding Mountain Biosphere Reserve includes Riding Mountain National Park as its core protected area and the surrounding fifteen rural municipalities. With a total area of over 15,000 km² (5,800 mi²), the Biosphere Reserve encompasses a diverse array of ecosystems.



Map 2: Riding Mountain National Park



Map 3: Watersheds in the Riding Mountain Biosphere Reserve

The Importance of Healthy Shorelines

For cottagers and waterfront residents, maintaining the shoreline is an essential part of protecting the adjacent waterbody. As the health of the waterbody is directly dependent on the health of the shoreline, it is crucial that the role of the shoreline remains undisturbed.

A shoreline is one of the most ecologically productive places on Earth, supporting plants, microorganisms, insects, amphibians, birds, mammals, and fish. The first ten to fifteen meters (thirty to fifty feet) of land that surrounds lakes and rivers support 90% of lake life that is born, raised, and fed there. Often referred to as the “Ribbon of Life”, shorelines are up to 500% more diverse than other areas upland.

The Functions of a Healthy Shoreline

1. Help Maintain Clean Water and Water Quality

The shoreline vegetation on your property is vital in retaining, treating, and filtering surface runoff before it can reach the water. Runoff is rain and melted snow that runs along the surface of the ground. Runoff can contain pollutants such as fertilizers, pesticides, sediment, manure, pet feces, trash, motor fluids, and road salt. These pollutants have negative effects on our waterways: nutrients act as fertilizers that stimulate algae and plant growth, pathogens can contaminate drinking water, and sediment can harm fish habitat.

2. Prevent Soil Erosion

Shoreline vegetation and plants help keep soil in place with their underground root systems and prevent topsoil from being exposed and washed away into the lake.

3. Reduce the Impact of Flooding

Well-vegetated shorelines provide barriers that slow the flow of water and reduce the force, height, and volume of floodwaters. A robust barrier that spreads out horizontally across the floodplain reduces the potential for damage to your property.

4. Provide Wildlife with Food and Habitat

Healthy shorelines are vital to many different animals throughout their development and life cycle as they protect wildlife from weather and predators. For example, woody debris, such as tree trunks or roots in the water, provides cover for fish to hide, basking areas for turtles, and resting sites for waterfowl.

Shoreline Zones

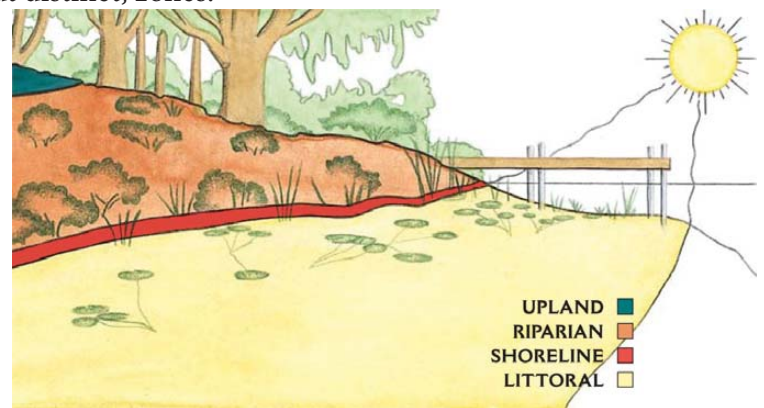
Within a shoreline zone, there are three overlapping, but distinct, zones.

1. Upland Zone

Generally, this higher and drier ground is home to various trees, shrubs, and animals. Your residence is likely located here.

2. Riparian Zone

This zone is the transitional area between dry land and water. Here you will find a wide variety of plants and wildlife species because water provides organisms with food and shelter.



3. Littoral Zone

The littoral zone extends from the water's edge to the area in the lake where sunlight no longer penetrates. It is home to algae and aquatic plants, fish, amphibians, and waterfowl.

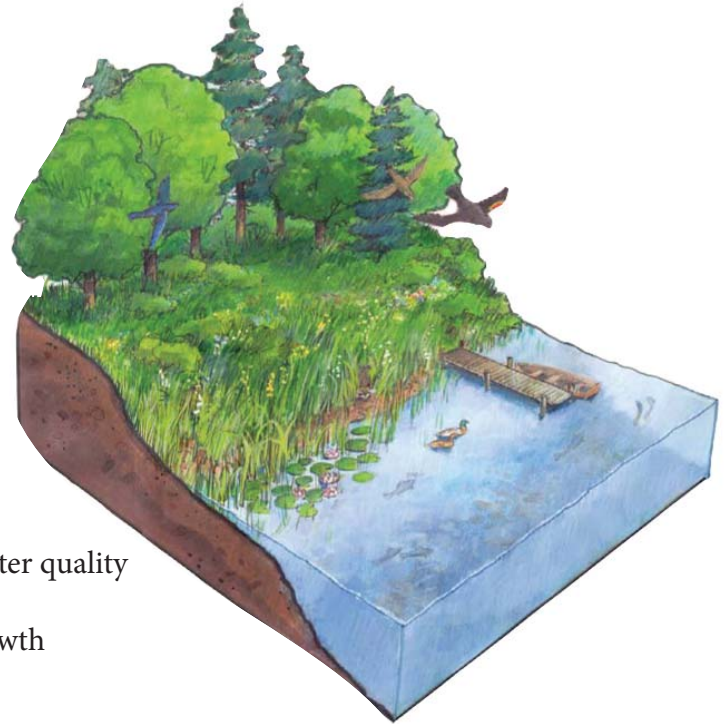
Healthy vs. Unhealthy Shorelines

Common Signs of a Healthy Shoreline

- Lots of native vegetation
- Different levels of vegetation from taller trees to smaller shrubs and plants
- Dead snags and stones
- Birds, fish, and other wildlife

Common Signs of an Unhealthy Shoreline

- Area(s) cleared of all or most vegetation
- Lawn that extends right to the water's edge
- The natural shoreline replaced by a hardened structure such as a breakwall
- Problems such as shoreline erosion and poor water quality in the lakes
- Prominent algae blooms and excessive weed growth



Nutrients and Unhealthy Shorelines

An unhealthy shoreline can result in accelerated runoff, increased erosion, and an increased amount of nutrients entering the water, particularly nitrates and phosphates. Large amounts of these nutrients are harmful to aquatic environments, triggering a process known as eutrophication. Eutrophication occurs as follows:

1. Algae Blooms

Large amounts of nitrate and phosphate released from the land stimulate massive algae blooms. The result is algae so thick that it competes with other plankton species and blocks light to bottom-dwelling plants.

2. Bacteria Multiply

As the algae blooms die, the bacteria that break them down multiply and consume large amounts of oxygen in the waterbody.

3. Remaining Species Die

Without enough oxygen, the remaining species die off (sometimes drastically – for this reason, some newly eutrophic lakes have many floating fish carcasses).

4. Polluted Waterbody

The final result is a waterbody that is polluted, impoverished, and not capable of supporting many types of plants and animals.

Shoreline Buffers

A buffer is a permanent strip of trees, shrubs, grasses, and ground cover alongside a watercourse that helps to protect or 'buffer' the waterbody from human action or natural processes. The ideal buffer size is unique to each property but a proper buffer can vastly improve the health of the shoreline, waterbody, and the property as a whole. The most effective buffer strip is one that is at least thirty to fifty metres deep, extending from the lake and heading upland. A buffer strip of this size may not be feasible in all areas but any size buffer is better than none at all.

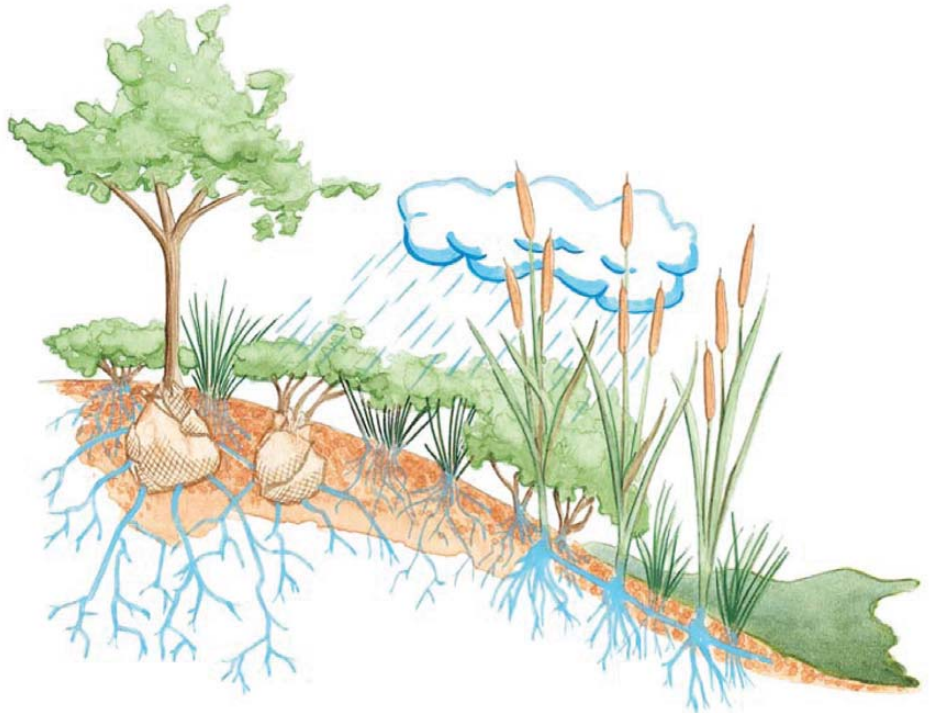
Why Plant Buffers?

Planting and maintaining buffers will help to prevent some of our most serious environmental problems. Ground and surface water is at risk of pollution from a variety of contaminants including chemicals, waste, viruses, and bacteria that can severely decrease water quality. By planting buffers, these potential contaminants are trapped before they can reach the waterbody. Buffer zones also help reduce erosion by helping to hold the soil and sediment together to prevent increased water turbidity while making the landscape more beautiful and properties more valuable. In addition, natural buffers provide important habitats for native animals and plants as well as travel corridors between these habitats and the waterbodies.

How to Create a Buffer

Before creating a buffer strip, consider the layout of the lot, how the property is used (e.g., paths, recreation), the budget, how much time you want to spend on it, the look you want to achieve, the size (the bigger the better!), and privacy issues. The following steps will help you establish a buffer (ranging from a passive approach to a more active approach):

- Stop mowing and let nature take over. Dormant seeds, as well as seeds brought by birds and other wildlife species, will start to grow
- Leave natural debris such as fallen trees, stumps and boulders in place (when not hazardous)
- Weed out non-native species, especially in highly developed areas
- Plant a few trees or shrubs to help nature along (this allows a buffer to be established more quickly than by natural processes alone)
- Combine a natural shoreline with the visual appeal of plants, well-defined and pleasing curves, and other accents like benches, stepping stones, etc. (this requires considerably more time and money)



Shoreline Planting Tips

There are a number of things you have to consider before planting buffers along the shoreline. Here are a few tips to help improve the quality of your shoreline buffer:

- **Remove Invasive Species**
 - To ensure that your project results in a healthy shoreline buffer, remove all invasive species. Invasive species not only pose risks to native plants and animals but they can severely reduce the health of both the shoreline and waterbody. For more information on about invasive species in the area, please consult the Invasive Species section.
- **Plant Native Species**
 - Survey the area around your property and note the plants and trees that are abundant and healthy. While this will indicate what type of vegetation has the best chance for success, check with your local Conservation District to ensure that they are native species.
- **Plant a Variety of Species and Ages**
 - Planting a variety of native species and species of various ages will help minimize the chance of a disease being transferred from the new plants to the already existing plants on your property.
- **Aquatic Plants**
 - Native aquatic plants provide excellent habitats to a wide variety of animals, insects, and wildlife while also serving as an important food source and as nesting material for water fowl.
 - Aquatic plants are important buffer plants as they cushion the shore from the force generated by waves and help stabilize the shoreline. These plants also improve water quality by using large amounts of nutrients that may otherwise contribute to algae blooms and absorbing potentially toxic chemicals.
 - Contrary to popular belief, aquatic plants do not attract leeches as they prefer shallow, calm water without excessive plant life. Mosquito breeding grounds are also less likely to be found in areas with aquatic plants as fish and aquatic insects living in these plants feed upon mosquito larvae.
- **Where and When to Plant**
 - When planting new plants try to mimic how they grow in the wild. Plants prefer to be in groups of their own kind; for example, instead of having a cedar every two metres; plant them in clumps of three, spaced out with groups of other species. The position (low wetlands, mid-slope, lakeshore, etc.) of plants already on your property can indicate where the same species is most likely to succeed. When planting you also need to consider the spacing of wild plants as some cluster together while others need space.
 - Upland plants can be planted in the spring or autumn when it is cool. Aquatic plants should be planted in early summer, after June 30, to protect fish spawning. This allows them to establish root systems capable of keeping them alive over the winter.
- **Mulching**
 - Mulching is the process of spreading out a layer of some kind of shredded protective material (bark mulch, straw, etc.) over a site. It is usually a good idea to mulch around any freshly planted site – particularly one with water nearby. Mulch prevents the freshly turned soil from eroding, discourages competing plants, and holds moisture in the soil. Note: dyed mulches may contain harmful additives. When selecting mulch, choose organic products (bark, shredded hardwood, clean straw) to reduce the impacts chemically treated mulches may have on the environment.

Erosion

Shoreline erosion is a common and natural process. Natural erosion occurs at a very slow rate, much slower than we would notice; lakes naturally accumulate sediment at an average rate of about 1 mm per year ($\frac{1}{32}$ inch per year). However, non-natural causes, including human disturbances, can greatly accelerate this process. Sediments deposited by erosion are considered a pollutant when excessive levels occur due to human activities. By volume, sediment is the greatest water pollutant in North America.

Erosion can increase due to varying factors but there are steps that homeowners can take to prevent further erosion while improving the quality of the shoreline. Natural erosion is the result of wind, ice, water, and gravity and these effects can all contribute to significant damage to an unprotected shoreline. Nature has adapted to these natural forces but it has not adapted to human impact. Human causes of shoreline erosion can range from the removal of shoreline vegetation, runoff from hard surfaces, boat wakes, heavy foot traffic, and shoreline alterations. The combination of any of these factors can lead to a wide variety of effects including loss of property, unstable shorelines, loss of wildlife habitat, reduction of water clarity, and an increase in chemical pollutants.

How to Prevent Erosion

Here's what you can do to protect your shoreline and prevent erosion on your property:

- **Protect the Natural Shoreline**
 - The best insurance policy against erosion is to retain the natural characteristics of the shoreline. This means keeping lots of vegetation, maintaining a good buffer strip (no mowing to the water's edge), and, when safe, leaving in place all of the stones, boulders, snags, and dead branches found along the shoreline. These materials absorb the energy from erosive forces and keep the shoreline "glued" together.
- **Reduce and Re-Direct Runoff**
 - In general, try to plant and retain native vegetation wherever possible, as this will prevent large amounts of runoff from entering the lake. In addition, encourage rainwater to infiltrate the soil rather than traveling over it and washing it away. To encourage infiltration, minimize the amount of paved or hard surfaces on your property (e.g. driveways, decks, patios). Runoff from the driveway can be directed into a settling area and runoff from the roof should go into a rain barrel or soaking area.
- **Minimize Wake from Motorized Watercraft**
 - Boat wakes not only erode the shoreline, they can damage docks and boats, upset canoes and small boats, endanger swimmers, disturb aquatic ecosystems, and swamp the nests of loons and other waterfowl. The best way to reduce the effects of boat wash and wake on shorelines is simply to slow down. In Manitoba, by law, boats must slow down to 10 km/hr (6 mph) within 30 m (98 ft) from the shore. If the boat doesn't have a speedometer, remember that at 10 km/hr (6mph) there will be little or no wake.
- **Take Precautions during Construction**
 - If you are starting a new building project on your property, plan to control erosion and to keep the disturbed area as small as possible. Ask your contractor to be aware of potential erosion and discuss erosion protection and any vegetation you want to maintain. Strongly recommend the use of erosion control equipment such as filter cloths, hay bales, and silt fences. Fill piles should be covered with tarps to prevent soil from being carried away by runoff. If possible, construction should be avoided during wet seasons as softer soil is more prone to damage by heavy equipment.

- **Limit Impacts of Foot Traffic**
 - Foot traffic can trample vegetation – especially on steep slopes – causing soils to loosen and fall from the shore. Depending on the degree of the problem, you can exclude access to that portion of the shoreline, or control access. Fences, hedges, brush, terraces, boardwalks, or stairs (open-back stairs are best) can reduce access and the impact.
- **Contour and Cover Pathways**
 - Pathways that extend from a building to the water’s edge tend to take the shortest route to the water, which is often a direct downward route. This encourages erosion, since gravity can pull soils and runoff straight down the path toward the water. A better option is to position (or if necessary, re-route) pathways to follow the contours of the slope, following an “S” curve pattern.
 - Any exposed soil on pathways and heavy traffic areas should be covered with wood chips, straw, and pine needles to prevent the soil from washing away.

How to Deal with Erosion

If you believe that there is some erosion of your property, there are several steps that you can take to determine the best course of action.

1. **Identify Areas of Erosion**
 - Examine your property to identify the areas of erosion.
2. **Identify the Cause**
 - It is crucial to try to identify the cause of the problem. Trying to fix an erosion problem may be a waste of time, money, and effort if the cause is not addressed. Look around and beyond your property to see if any of the natural forces or human disturbances mentioned earlier could be the cause. Remember, a combination of factors could be causing your problem.
3. **Site Conditions**
 - Certain site conditions, such as steep slopes and aggressive water movement, require more aggressive control measures and extra consideration and care during project work.

Control Methods

Many methods can be used to control soil erosion. Sometimes the best course of action is a combination of methods. There are three main erosion control methods:

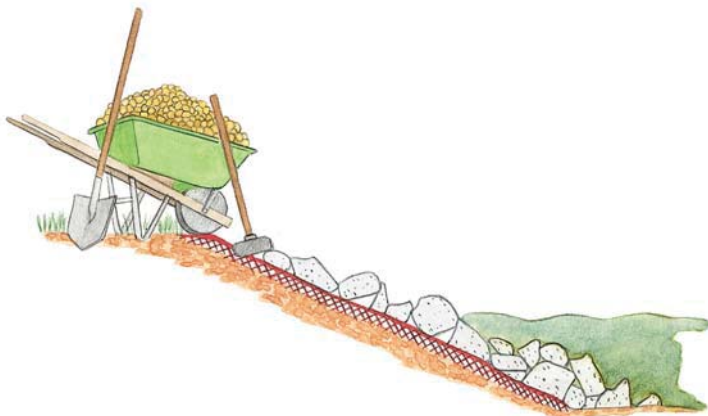
1. **Natural Buffers**
 - Vegetation is the best defense against most erosion problems. Allowing natural vegetation to grow along shorelines and upland slopes is a great way to control and prevent soil erosion. As mentioned, the roots of vegetation grip the soil and prevent it from blowing or falling away.
2. **Soil Bioengineering**
 - This more active approach uses structures made with living plant material that eventually takes root. Often native plants collected or purchased within the immediate area are used to ensure that the plant material is adapted to the site conditions. Soil bioengineering works immediately to control erosion. Over time it becomes more effective as the natural development of a diverse plant community stabilizes the site by creating vegetative cover and a reinforcing root matrix. Plants often used include willows, dogwoods, and other plants with extensive root systems.
 - Bioengineering Techniques for Above Water
 - ◆ These include live stakes (cuttings), fascines (bundles of cuttings tied in a roll), brush layers (cuttings placed loose in a trench), and brush mattresses (branches wired together to form a mat-like covering). Once installed, the soil should be kept moist and structures

should be monitored and repaired as needed. Plants should start to take root within six weeks. Since high water can uproot and kill new plantings, hay bales or fascines can be placed in front of plantings until they establish.

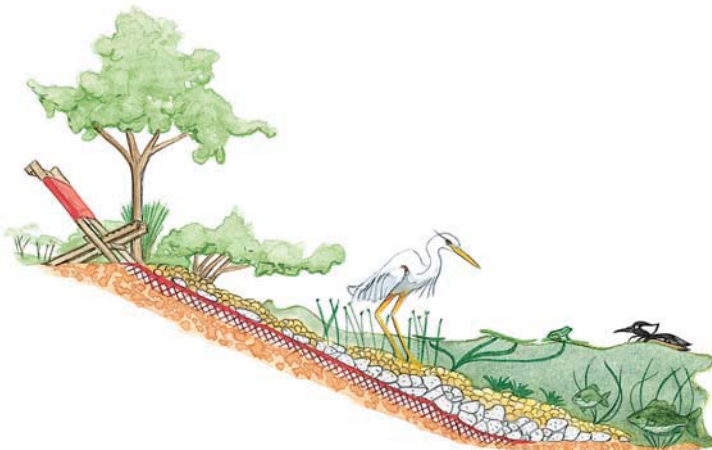
- Bioengineering Techniques for In the Water
 - ♦ These include fibre rolls or bundles (rolled up mats of fibre), brush bundles (piles of branches tied together into a cylinder), fibre mats (fibre rolled or woven into mats or blankets, these help ensure aquatic plants take root), and fibre bags (a fabric bag weighted with rocks with a rooting aquatic plant inside). Plant anchors may be needed to hold plants in place until they take root.

3. Hardened Structural Controls

- Structures made from rock, concrete, metal, and other materials were once commonly used when it was thought that the only way to combat erosion was to take a hard and aggressive approach. Although they work well in the short term to prevent erosion, a further look reveals they often do much more harm than good.



On shorelines experiencing excessive erosion, one solution is to lay down erosion control blankets weighted with rocks.



Eventually new growth grows up from the erosion control blankets, encouraging the return of aquatic species while effectively controlling erosion.

Water Sources and Wells

Approximately fifteen percent of the population of Manitoba depends on private water supplies as their source of drinking water. Manitoba has an abundant supply of good quality drinking water but in some cases, contamination does happen. The presence of bacteria in groundwater and wells can cause health risks to those who drink contaminated water. To ensure that bacteria outbreaks do not occur in your water supply, it is encouraged to have your well regularly tested for bacteria and other sources of contamination.

The province of Manitoba recommends that testing for bacterial contamination should occur at least once a year. However, the frequency of testing also depends on the characteristics of the water source and any treatment processes. Wells should be tested after servicing, after a noticeable change in the water quality, and when the risk of contamination increases due to environmental changes (heavy rains, flooding, drought, etc.). For homeowners depending on surface water for their water source, please contact your local Drinking Water Officer to determine the optimal testing frequency.

- Dauphin Office: 204-638-8626
- Brandon Office: 204-726-6567

Almost $\frac{3}{4}$ of Manitobans rely on surface water for their drinking water

Water Sources

There are two sources of water: surface water and ground water.

1. Surface Water

- This water comes from lakes, streams, and rivers and it runs the highest risk of contamination from outside sources such as manure storage, landfills, mishandled fuels, pesticides, and other chemicals.

2. Ground Water

- Originating from the water cycle, ground water starts with rain or snow precipitation that is filtered through soil and rock and ends up in the water table. Water table depth fluctuates due to the amount of precipitation and the demand from users. It is also subject to contamination from many sources.

Types of Wells

Dug or bored wells have a relatively wide opening (45 to 90 cm or 18 to 36 in) and can only access the top levels of the water table. They rely heavily on rain for replenishment. Dug wells are usually used in areas where the water table is close to the surface, so this type of well is susceptible to contamination.

Drilled wells are relatively small in diameter (10 to 20 cm or 4 to 8 in) and are sunk to a greater depth than a dug well (up to several hundred metres). This makes them less susceptible to contamination since water at that depth has usually been thoroughly filtered. Drilled wells have a watertight casing which may extend quite deep below the surface to prevent surface water from entering the well unfiltered. Drilled wells are low-maintenance and typically stay watertight over extended periods of time.

Approval Process

Permits are not required for the construction or alteration of private water systems (supplying to a single home) but semi-public (supplying water to the public but with less than fifteen connections) and public (more than fifteen connections for public use) require permits from the Office of Drinking Water.

Well Inspection

A visual inspection of the well should be carried out at least once a year as follows:

- Ensure the well cap is secure and that no wildlife or dead plant material has entered the well
- Check for erosion around the well cap or well casing, which can allow runoff to enter the well
- The well casing should also be checked by an inspector every two years for defects (e.g. leaks)

Well Testing

The province of Manitoba has agreed to subsidize one bacteriological sample per year to encourage the sampling of private water systems. As of 2011, the cost for homeowners for the testing is \$8.03 and some Conservation Districts and Rural Municipalities coordinate testing programs. If a tested sample indicates the presence of contaminants, the province will cover the cost for another sample to be analyzed once the appropriate measures have been taken to kill the bacteria. Homeowners are responsible for costs associated with shipping or transporting the samples.

Contaminant and Problems	Potential Source of Contaminants
Pathogens (bacteria, viruses, and protozoa) - can cause illness	<ul style="list-style-type: none">• Storm water runoff (rainwater can carry animal fecal matter)• Inadequately treated wastewater and faulty septic systems
Minerals (fluoride and iron) - can be serious issue with high levels	<ul style="list-style-type: none">• Naturally occurring but can increase over time
Pesticides and fuels - health risks	<ul style="list-style-type: none">• Spraying pesticides• Spills
Nitrates - health risk to infants	<ul style="list-style-type: none">• Found naturally but also from fertilizers and failing septic systems
Lead - severe health risks	<ul style="list-style-type: none">• Can enter via plumbing pipes and solder joints

There are two accredited laboratories in Manitoba that perform tests for nitrate and naturally occurring trace elements sometimes found in Manitoba well water. Please contact them for more information:

- ALS Laboratory Group: 800-607-7555
- Maxxam Analytics: 204-772-7276

Why to Test Your Water Regularly

Groundwater quality can change for many reasons. The most common is human activity – such as farming, chemical spills, or faulty wastewater treatment systems. Your water may taste, smell, and look fine, but contaminants may be present. If so, your well must be treated to ensure safe drinking water. Some contaminants are listed on the following page; however, other harmful contaminants not listed could also be present.

Water Treatment Methods

If contaminants are found, a number of treatments are available. Depending on the conditions of the water, a combination may be used.

Treatment	Removes	Issues with Treatment
Ultraviolet Radiation (exposure to UV radiation)	<ul style="list-style-type: none"> Most bacteria and viruses 	<ul style="list-style-type: none"> Not all bacteria removed Usually combined with other treatment
Chlorination (addition of chlorine to the water)	<ul style="list-style-type: none"> Most bacteria and viruses 	<ul style="list-style-type: none"> Not all parasites removed Excess chlorine and by-products
Ozonation (exposure to ozone gas)	<ul style="list-style-type: none"> Most bacteria, viruses, and organic compounds (pesticides) 	<ul style="list-style-type: none"> Needs additional treatment (chlorine) Can be expensive
Distillation (evaporating then condensing water)	<ul style="list-style-type: none"> Most microbes, pesticides, heavy metals, and nitrates 	<ul style="list-style-type: none"> Time consuming and expensive
Reverse Osmosis (filtration)	<ul style="list-style-type: none"> Nitrates, most microbes, and some pesticides 	<ul style="list-style-type: none"> Can be expensive
Carbon Filters (filtration)	<ul style="list-style-type: none"> Many chemicals 	<ul style="list-style-type: none"> Bacteria can become stuck in the filter Filter must be regularly replaced

For more information, please contact:

- Office of Drinking Water
 - Dauphin: 204-638-8626
 - Brandon: 204-726-6567
- Manitoba Conservation and Water Stewardship
 - Dauphin: 204-622-2030
 - Brandon: 204-726-6064
- Manitoba Water Services Board
 - Dauphin: 204-622-2116
 - Brandon: 204-726-6079

Private On-Site Septic Systems

Septic systems are a good way to treat wastewater as long as they function properly. In areas near shorelines it is particularly important to maintain your septic system because soil and water conditions here may make the system less efficient. If too many solids escape from the tank to the leaching bed, the entire system will clog up. Faulty septic systems can be extremely hazardous since improperly treated effluent can harm both your health and that of the environment. Pathogens found in wastewater can spread diseases such as hepatitis and dysentery and can also make the water unsafe for recreation.

What is a Septic System?

Because wastewater can contain bacteria, viruses, and other contaminants, it needs to be treated before it is released back into the environment. A properly functioning septic system uses natural processes to treat contaminants so they will not harm the environment or human health. Septic systems have two main components: the septic tank and the leaching bed. Both components use a combination of physical, chemical, and biological processes.

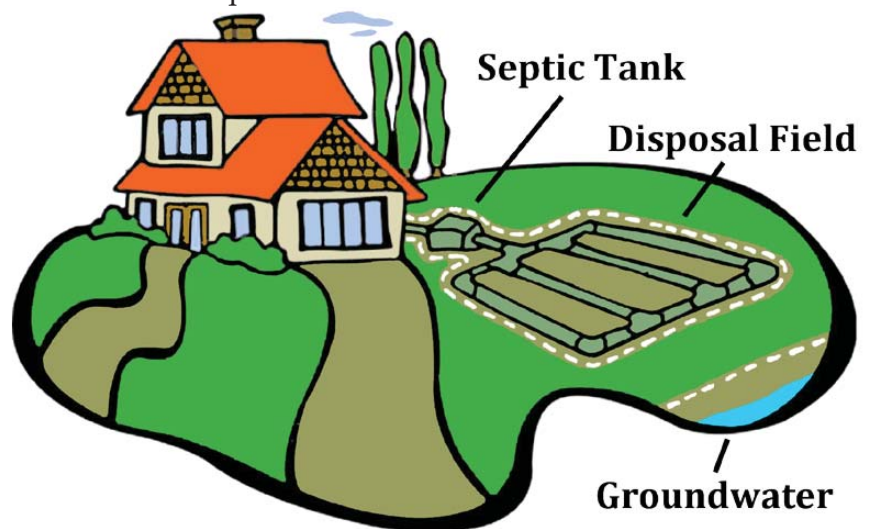
The average Manitoban uses about 227 litres (60 gallons) of water per day

In Manitoba, there are a number of systems available including septic tanks and disposal fields, holding tanks, package treatment plant, privies, and greywater pits. The most efficient and cost-effective type of system can be determined by a thorough evaluation of your onsite conditions. The most common type of system in the province is a septic tank and disposal field system.

Septic Tanks

Septic tanks are large watertight and corrosion-resistant containers made of various materials that are designed to receive wastewater from the home. In the tank, there are usually two chambers: the sedimentation chamber and the control chamber. The sedimentation chamber holds twenty-four hours of wastewater flow and sludge and is designed for the settling and breakdown of sludge. In this chamber, the heavy solids and lighter scum separate in a process known as primary treatment. Overflow liquid enters the control chamber and when the effluent reaches a set level, the contents are pumped to a treatment area. Here, secondary treatment takes place with the breakdown and purification of the effluent.

Steel septic tanks used to be the more popular type but they are no longer legal to install. These tanks are one-chambered, allowing for more solids to escape when compared to modern designs and they are also prone to rusting. Concrete tanks are now the most popular tank and use several methods to slow water movement to improve the settling and breakdown of sludge. However, these tanks are also prone to deterioration over the years due to water action, leaks, and use of chemicals. Plastic and fibreglass tanks are lightweight and available in varying sizes. However, they are more fragile than concrete tanks and can break if the ground shifts.



Disposal Fields

Disposal fields manage and control the wastewater effluent that is discharged from septic tanks. As the effluent is discharged, it is treated naturally as it filters through the soil. In Manitoba, the two most common types of disposal fields are trench types and total area types. Trench types use trenches filled with graded stone and a perforated pipe. The trenches are then covered with a layer of approved material (e.g. geotextile fabric), topsoil, and grass. Total area types include a shallow excavation with perforated pipe evenly laid out from a central distribution box. This excavation is filled with graded stone, an approved material, topsoil, and grass.

Effluent Filters

Effluent filters are strainers installed into the outlet pipe from the tank. They are required in any new tanks and are strongly recommended in older tanks. They reduce stress on the leaching bed and prolong the life of the system by removing 90% of the suspended solids that would have otherwise moved to the bed. The filters can be added to new systems or retrofitted to older systems and are easy to maintain. Once a year, slide the filter out and wash it off with a garden hose over the tank. Some filters even come with an alarm that sounds when they need cleaning.

Holding Tanks

Where disposal fields are not permitted, holding tanks are often used instead. These tanks have a single compartment and have to be regularly pumped out by a sewage hauler. The minimum capacity of sewage holding tanks in Manitoba is 4,500 litres (1,000 gallons).

Approval Process

To select the optimal treatment system, a thorough site evaluation is required. When installing a new system, homeowners should consider its placement and the relevant regulations, the soil conditions, the water table, and the bedrock depth. Manitoba Conservation and Water Stewardship requires that a soil sample be completed before installation to determine if a disposal field is permitted.

Registration is required before the construction, modification, or replacement of wastewater management systems. To register, an application must be submitted to your local environment officer and the registration must be paid in full. Forms and site plan templates are available at your local Manitoba Conservation office.

Upon review from an environment officer, authorization to proceed will be given to acceptable applications. To arrange an inspection time, you or your installer must notify your local environment officer at least forty-eight hours before construction begins.

Separation Distances

Due to the hazardous materials present in wastewater, regulations have been put into place regarding minimum separation distances. Septic tanks must be one metre away from a building, three metres from a property boundary, eight metres from a well, fifteen metres from a watercourse (excluding ditches), eight metres from a cut or embankment, three metres from a swimming pool, and three metres from a cistern or water holding tank. Sewage holding tanks follow the same requirements but should also be located where a sewage hauler can easily access them.

Disposal fields must also be set away from existing features to prevent contamination. These fields must be separated by six metres from a dwelling without a basement, eleven metres from a dwelling with a basement, thirty metres from a watercourse (excluding ditches), fifteen metres from a cut or embankment, eight metres from a swimming pool, eight metres from water service pipes, fifteen metres from a well (drilled and cased to a minimum of six metres), thirty metres from other wells and springs, and eight metres from property boundaries.

Maintaining Septic Systems

The maintenance and care of your septic system is your responsibility. To maintain a healthy system, watch what goes down the drain, inspect your system, and pump out the tank regularly. Under optimum conditions, septic systems usually last between fifteen and twenty-five years so it is essential to monitor your septic system on a regular basis.

If a septic system is not properly maintained, it can malfunction. Because the wastewater from a failing septic system can contaminate your well, your neighbour's well and the shoreline environment, a failing system is not just your concern, but a concern for everyone in the area. If you notice a problem, deal with it right away for the sake of everyone's health.

Maintenance Tips

Know your system. You should know the type of system and the location of the tank and bed. You should also keep a written history of when it was installed, pumped, inspected, etc. Aside from knowing your system, there are four main things you can do to properly maintain it:

- **Regular Sludge Removal**
 - Sludge and scum should be removed from septic tanks every one to three years, depending on the amount of wastewater produced. For new homes, a septic tank should be pumped out within one year to remove potential bacterial growth inhibitors. Sludge should not be higher than one-third of the depth of the tank. For septic tanks that receive smaller volumes of wastewater, thirty centimetres of liquid should be left in the tank after pumping to minimize the risk of freezing and allow bacterial action to continue.
- **Regular Inspections**
 - It is important to inspect a septic system regularly. It is recommended that you hire a professional such as a licensed septic inspector, a licensed contractor who installs or repairs septic systems, or a licensed representative of a firm that pumps out septic tanks. A good opportunity for inspection is when the tank is being pumped out. The system should be inspected as follows:
 - ◆ Check the scum and sludge depth
 - ◆ Inspect the structure of the tank and baffles: look for any large cracks or deterioration
 - ◆ Check the fit of the access lids and arrange for repairs as necessary. The lids should fit firmly into the receiving grooves of the tank and should not be cracked or chipped.
 - ◆ Listen for water running into the tank once it's been emptied. If you hear water entering the tank from the house when no one is using any water, there may be leaks or a running toilet.
 - ◆ Water running into the tank from the walls or top can indicate cracks or breached seals
 - ◆ Water running into the tank from the outlet pipe can indicate leaching bed problems (either as simple as a blocked leader or header pipe, or as complicated as a malfunctioning, saturated bed)

- **Protect the Disposal Field**

- Keep heavy machinery, like cars, and heavy foot traffic off the disposal fields to prevent cracking the piping
- Avoid saturating the leaching bed by overwatering
- Keep trees away from the septic system especially ones with creeping roots such as willow, birch, poplar and cedar. It is recommended that a distance of 5 m (16 ft) around the tank be kept clear of trees and shrubs (at least 10 m (32 ft) from poplar and willow trees).
- Create or maintain a vegetated buffer between your leaching field and a lake or stream
- In winter, insulate the disposal field with a layer of straw at least thirty centimetres (twelve inches) thick

- **Control Inputs**

- To reduce stress on the septic system and the environment, it is important to control the volume of both liquids and solids put into the system. Canadians are among the world's biggest wasters of water, using on average 340 litres (90 gallons) of water per day. You can reduce your water footprint with the following actions:

Average Water Usage:
16% Shower/Bath
23% Laundry
28% Drinking/Cooking
33% Toilet

- ◆ Install water saving devices (e.g. water saving taps, showerheads, toilets and appliances) which will significantly reduce the amount of wastewater entering the system. This will greatly reduce the chance of the system being overloaded and contaminating ground and surface water.
- ◆ Practice water saving techniques: don't leave the tap running unnecessarily (e.g. shaving, brushing teeth, doing the dishes). Use dishwashers and washing machines only when fully loaded and spread loads out over the week.
- ◆ Fix leaky taps or running toilets right away; a tap that drips can waste up to 55 litres (15 gallons) in twenty-four hours.
- ◆ Avoid using commercial cleaners and opt for environmentally friendly alternatives. Chemical cleaners, solvents, antifreeze, and cigarette butts all contain toxins that will kill the beneficial bacteria in a septic system.
- ◆ Reduce the amount of solids that have to be broken down. Items that normally go in the garbage should not be added to wastewater; a good rule of thumb is, 'if you didn't produce it, it shouldn't be going down your system'. Fats, oils, and greases can clog pipes and cause the system to back up. Garburators and other systems that add solids should be avoided.

Avoid Additives

Many property owners wonder if they should use septic additives in their systems: you should not use additives as they are not effective. Common additives such as starters (which claim to help “restart” bacteria after a pump out), feeders (which help feed bacteria), and cleaners (which clean the tank and pipes) are unnecessary.

How to Tell if There is a Problem

Unfortunately, it isn't always easy to tell when there is a problem with a septic system. Since most of the components are underground, it is common to discover a problem long after the breakdown has occurred.

However, there are a few symptoms that may indicate a problem:

- Patches of abnormally healthy looking grass or vegetation on the leaching bed. These patches may be thriving because wastewater nutrients are sitting in the soil just below the surface. This indicates the leaching bed is full. Normally these nutrients would filter down through the soil with the effluent, making

room for more effluent to move through.

- If the ground over the leaching bed is soft or spongy, it can indicate that the leaching bed is full.
- Pools of dark water on the surface point to the same problem.
- When toilets and drains start backing up or they make gurgling noises and take a long time to drain, it can indicate that there is a blockage in the system or that the system is full.
- Odours can also indicate a problem. When the beneficial bacteria that break down contaminants in the soil are drowned out or suffocated by a saturated leaching bed, another bacteria group takes over. These anaerobic bacteria work in the absence of oxygen and produce a strong odor when breaking down contaminants. This odor can warn of a saturated leaching bed or indicate that the tank cover is not completely sealed or buried.
- Foul smells in the house can indicate that wastewater is backing up into the house or that the house-to-tank pipe is broken causing wastewater to leak around the foundation.

The Dangers of a Failing Septic System

One of the biggest dangers associated with faulty septic systems is bacterial contamination of drinking water. Often, only a small amount of contaminated water can be extremely harmful. When ingested, through drinking water or when swimming, bacteria such as *E. coli* and Fecal Streptococci can cause serious health problems and some strains are fatal.

Nutrients such as phosphorus enter the system through detergents and cleaners used in the house as well as through regular waste. If nutrients are not properly absorbed by septic system soils, they can reach surface water. Once this happens, a whole host of lake-wide problems can ensue including algae blooms and the depletion of oxygen in the water.

Alternative Wastewater Treatment Technologies

Conventional septic systems don't meet everyone's needs. Alternative systems give you more options when building or retrofitting and include privies, composting, and greywater pits. Some of the cases where you should consider alternative systems are cottages that are being converted to full-time residences, old or abused leaching beds, homes or cottages that are close to lakes and rivers, areas where there is shallow bedrock or a high groundwater table, and heavily sloped sites.

For more information on these alternative wastewater treatment options, please contact your nearest Manitoba Conservation Office. Note that minimum horizontal clearance distances for various systems are also required.

Advanced Treatment Systems

Typically, a traditional septic tank only partially treats raw sewage and produces a primary quality effluent. An advanced treatment unit will treat wastewater to a higher standard, which can make it easier to dispose of. These systems may be added on to an existing septic tank or may replace the tank completely. The unit will still be hooked up to a leaching bed of some kind, but because the effluent is cleaner, the leaching bed carries a lighter sediment load. For this reason it can legally be much smaller than a standard system.

Advanced treatment types depend on aerobic (with oxygen) bacteria to break down the waste. Aerobic bacteria break down waste faster than the anaerobic (without oxygen) types in a conventional septic system and produce fewer odours.

Aerobic Tanks and Package Treatment Plants

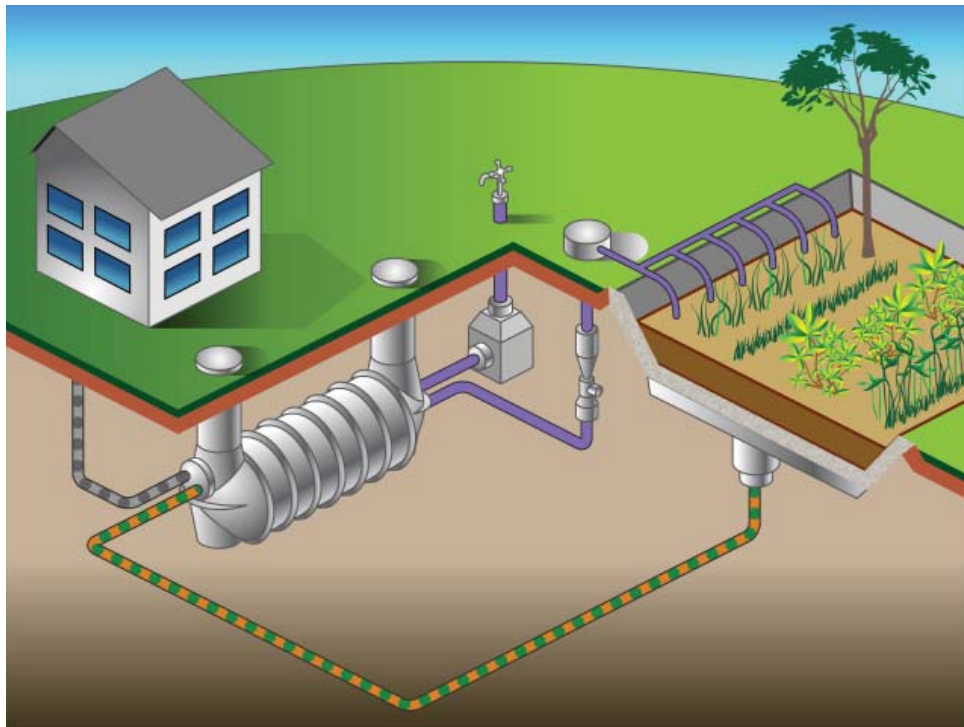
Usually more expensive than septic tanks, aerobic tanks have an advantage in that they release a purer effluent. Aerobic tanks mix air with wastewater to encourage the growth of oxygen-using bacteria that break down some of the compounds. Like septic tanks, the effluent is released into disposal fields for further treatment. This system requires semi-annual monitoring by an authorized package treatment plant operator and an annual effluent test done by an accredited testing agency. These samples must be submitted to Manitoba Conservation and Water Stewardship.

ECOCYCLET (Evapotranspiration Bed)

In addition to the use of advanced treatment technologies, some groups are rethinking the way we treat our waste entirely. For instance, a small group of organizations (including the Centre for Sustainable Watersheds) have been researching the use of water gardens to treat wastewater. One of their solutions is the ECOCYCLET.

ECOCYCLET systems are closed-loop and environmentally sustainable by recycling wastewater through gardens. Instead of staying in holding tanks or exiting through a disposal field, wastewater effluent is instead recirculated through a bed of sand, stone, and gravel. There, microorganisms convert the wastewater into nutrients for plant growth and the plants then transpire the wastewater.

For more information on the ECOCYCLET system, please visit the Centre for Sustainable Watersheds website at www.watersheds.ca



ECOCYCLET: Wastewater is sent to a septic tank where it then travels to the garden. Here the effluent is broken down into nutrients which are absorbed by the plants. Excess liquid is then recirculated into the system.

Household Products

One of the most common and serious problems affecting waterbodies is the inflow of excess nutrients, primarily phosphorus and nitrogen, that pollute the water and contribute to declining health of waterbodies and a rise in algae levels. Within the province, approximately 8,000 tonnes of phosphorus runoff enters Lake Winnipeg every year. One source of this excess phosphorus are the phosphates present in laundry detergents and cleaning products.

While government restrictions have been established in regards to dishwasher and laundry detergents, many household products still contain high levels of phosphates. To help reduce our impact on the environment, there are a number of environmentally friendly alternatives that are biodegradable, natural, non-toxic, and do not harm most plants and animals.

Help Reduce Your Impact

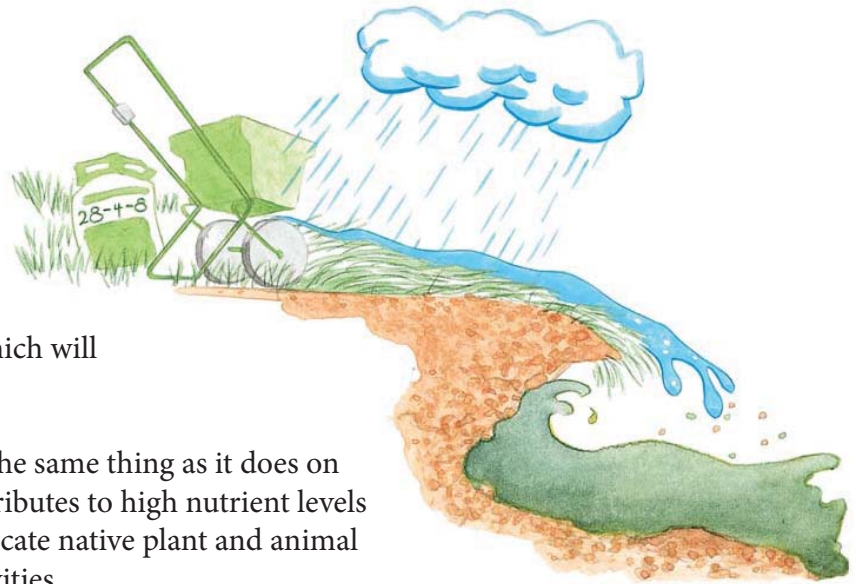
To help limit your impact on the environment, read the label of household products to see what chemicals may be flushed down the drain and later end up in lakes and rivers and reduce or eliminate those containing phosphorus. These products can be replaced by more environmentally-friendly products, some of which are already found throughout the household and include:

- **Vinegar and Baking Soda**
 - Among the most popular environmentally friendly cleaning products, these products can both remove mildly unpleasant odours and when mixed together, they can form a cleaning solution that can scrub most non-porous surfaces like kitchen counters, floors, and toilet bowls.
 - An equal part mixture of vinegar and water can also be used to clean glass and when wiped down with newspaper, leaves a streak-free shine.
- **Salt**
 - To remove grease spots, immediately pour salt over the affected area as it will absorb the grease and prevent staining. Salt can also be used to clean ovens if they are still warm and when it cools down, just scrape off the grime and wash.
- **Baking Soda**
 - To clean appliances, vinyl, stainless steel sinks, toilets, and drains, baking soda is an alternative scouring and deodorizing agent.
- **Pure Soap**
 - Pure soap can be used as an all-purpose cleaner for a wide variety of products.
- **Borax**
 - Due to its natural quality of inhibiting mold, sodium borate or borax can be used to clean and deodorize floors, walls, and tiles.
- **Natural Oils**
 - To clean furniture or as a substitute for furniture polish, you can substitute potentially harmful products with mixtures of lemon oil, mineral oil, and even olive oil.

Despite the wide variety of natural or less-harmful alternative household products, they are not always available for use. In the case where potentially hazardous products have to be used, make sure to properly dispose of them when finished. Many hazardous products can be disposed of at hazardous household waste depots or some recycling depots. Note: A list of drop-off centers for used oil, oil Filters and containers is available at www.usedoilrecycling.com

Fertilizers

Fertilizers are widely used to improve the overall quality of plants on our lands but overuse or improper use can cause significant problems to the environment. If overused or applied at the wrong time, fertilizer can be washed off lawns and gardens into ditches, drains, and creeks, which will eventually flow into rivers and lakes.



Once fertilizer enters a waterbody, it does the same thing as it does on the ground: helps plants grow. Runoff contributes to high nutrient levels that cause toxic algae blooms that can suffocate native plant and animal species and interfere with recreational activities.

To prevent fertilizers from entering our water systems, ensure that fertilizers are applied properly and during the correct time period, for example, avoid applying fertilizers before rains as rain will contribute to increased runoff. However, the most effective method of reducing nutrient runoff is to reduce or eliminate the use of fertilizers. Instead of these potentially harmful fertilizers, consider alternatives like manure, compost, and mulch.

EcoLogo Certified Products

Founded in 1988 by the Government of Canada, EcoLogo has become North America's largest and most respected environmental and certification mark. Products marked with "Certified EcoLogo" are guaranteed to meet or exceed EcoLogo's strict standards of environmental leadership. Now recognized around the globe, thousands of EcoLogo Certified products are on the market that allow consumers to continue their everyday activities while limiting their impact on the world around them.

EcoLogo certified products cover a wide range and include household cleaners, printers, flooring, soaps, batteries, and coffee.

For more information and a full list of EcoLogo Certified products, please visit their website at www.ecologo.org



Light and Noise Pollution

Light Pollution

People come to the many lakes of the Riding Mountain Biosphere Reserve for pristine nature, sunshine, clean water, and especially, bright starry nights. Improper or excessive property lighting can not only be an inconvenience but a navigational hazard. Spotlights pointed out to the lake, high-powered mercury lights and beacons all pose problems to your neighbours and others on the lake. When installing lights, remember that they may also shine on your neighbours' property, as well as on the surface of the water. Light bounces off the water, which can severely limit the night vision of boaters. Light pollution is excessive amounts of light and undirected light. If the light source is more apparent than what it is illuminating, your lighting methods could be improved.

Six Easy Steps to Responsible Lighting

1. Determine what lighting is needed to illuminate targeted areas. Instead of a beacon, use the configuration of lighted windows as a signature for your cottage. Mark the end of the dock with a small solar powered light and two reflective trailer markers on its corners.
2. Use the right amount of light. More is usually not better. Too much light wastes energy and reduces visibility by creating glare and forming dark shadows. By creating smooth transitions from light to dark areas, one's eyes can adjust more easily.
3. Place lights closer to their intended use (for instance, solar lights placed in the ground)
4. Avoid letting the light shine sideways or upwards. Use full cut-off, shielded fixtures and aim light to the area where you need it (not at the lake or the sky).
5. Turn off lights when you don't need them to reduce electricity consumption. Consider solar powered lights, timers, and infrared and motion detectors.
6. Use efficient lamps: remember, shielded fixtures with good reflectors waste little light, so you can use lower wattage bulbs.



Noise Pollution

A loon's call, leaves rustling in the breeze, and chirping crickets are classic sounds of cottage life, but too often, this peace and tranquility is disrupted by noise. We should all recognize that sounds are carried beyond our own property to our neighbours. Noise pollution is excessive sound that harms the environment and wildlife. Noise pollution comes from human activities involving aircraft, motor boats, and heavy machinery

Noise pollution can harm wildlife by causing:

- Physiological responses (increase in heart rate, damage metabolism, and hormone balance)
- Excessive stimulation of the nervous system which damages reproductive fitness
- Behavioural responses (panicked and escape behaviour, energy loss, decrease in food intake, habitat avoidance, abandonment, reproductive losses, and hearing loss)
- Changes in life history characteristics
- Changes in habitat type

Boating

Green Boating

There are a number of things that boaters can do to become “Green Boaters”.

- **On the Water**
 - Always use personal flotation devices (PFD)
 - Keep paddles on hand in case of engine failure
 - Even if unmarked, always drive at a “no-wake” speed near the shoreline
- **Keeping Your Boat Clean**
 - Pump sewage and greywater at appropriate facilities away from the water
 - Replace chemical cleaners or bleach with environmentally-friendly cleaners, like the EcoLogo certified products from Captain Phab and Lord & Partners Ltd., to clean your holding tanks
 - Clean your boat away from the shore using non-toxic cleaners and dropsheets
 - Wash your boat after removing it from a waterbody to prevent the spread of non-native plants or animals, like the Zebra mussel which range from only 0.5 to 4 cm (0.25 to 1.5 in) in size.
- **Fuelling Up**
 - Avoid fuel spills as even small ones add up
 - Fuel up your boat away from the water whenever possible
 - Have fuel absorbent materials, like kitty litter, and spill kits on hand
 - Check fuel lines and fittings for leaks
- **Pumping the Bilge**
 - Pump oily bilge water into closed containers, not overboard
 - Use an oil absorbent pad and install a filtration system in your bilge
 - To clean your bilge, pump out uncontaminated water and then use an environmentally-friendly cleaner to wipe out the rest
 - Use drip trays under your engine to catch leaks
- **Maintaining your Boat**
 - Get your engine serviced regularly and inspect and fix leaks and drips
 - Keep oil-absorbent pads to wipe up spills
 - Use antifreeze only when necessary
 - Safely dispose of oil, filters, and contaminated absorbent pads
 - Use biodegradable oil when possible
 - Use 4-stroke or direct injected 2-stroke engines instead of conventional 2-strokes (2-stroke engines can discharge up to 25% of their fuel/oil mixture straight into the water)

One litre (¼ gallon) of oil can contaminate one million litres (260 000 gallons) of fresh water

Note: A list of drop-off centers for used oil, oil filters, and containers is available at www.usedoilrecycling.com

Boating in Riding Mountain National Park

To protect waters within Riding Mountain National Park, all internal combustion marine outboard motors used within the park must be 4-stroke or direct injected 2-stroke engines. This move toward cleaner marine motors benefits boaters with less fuel consumption while keeping park waters healthy for aquatic habitats and clean for drinking and recreation. Those with non-compliant engines found on park waters are subject to immediate removal of the watercraft and continued non-compliance may result in charges.

Docks

Your dock impacts the lake. Before building a dock, it is important that you choose one that is environmentally friendly to reduce your impact on the waterbody. If done improperly, docks can severely impact important habitats for many organisms by covering spawning areas, removing shelter, increasing erosion and sedimentation, and introducing toxic chemicals.

If the following conditions are met, a dock project can continue without review from the Department of Fisheries and Oceans:

- It is a new, repair, or rebuild of a floating, cantilever, or post/pipe dock
- It is a new, repair, or rebuild of an open-faced crib dock built entirely on natural bedrock or sand bottom with a total combined footprint of 15 m² (161 ft²) or less
- The total surface area for the entire dock, which occurs in a location below the ordinary high water mark, including both existing and proposed structures combined, does not exceed 50 m² (538 ft²), unless the structure is built entirely over natural bedrock or sand bottom (not supporting aquatic vegetation)
- It is not made of concrete or steel sheeting or any other skirting that isolates the inside of the crib from the rest of water
- It does not require any dredging, blasting, or infilling in the waterbody
- The combined width for all existing and proposed shoreline works on land and in water (docks, boathouses and beaches) is less than 25% of the property's riparian area width (shoreline frontage width)
- You incorporate the Measures to Protect Fish and Fish Habitat when Building your Dock and Boathouse (accessible at www.gov.mb.ca/conservation/parks/pdf/dock_boathouse_construction.pdf)

Environmentally Friendly Docks

Cantilever Docks

A cantilever dock stretches from the shore out over the water. These docks are the least disruptive to the water and floors of the waterbodies as they have no contact with the water. Though they do not disturb fish habitat and water movement, these docks disturb the shoreline and result in some shading of the aquatic environment below.

Advantages
<ul style="list-style-type: none">• More protection from winter ice which increases the dock's lifespan• No disruption to the water or waterbody floor• Can be used in shallow water
Disadvantages
<ul style="list-style-type: none">• May need steel reinforcement in areas with heavy wave action• May be expensive to build or buy• Unsuitable for fluctuating water levels



Floating Docks

These adaptable docks are considered to be some of the easier and more economical docks to build. Because the dock is in constant contact with the surface of the water, the dock can be used in waterbodies of varying depths. These docks cause minimal disruption to submerged lands but they can still shade the aquatic environment. These docks may also cause erosion of the shoreline if the dock is not completely resting on the water.

Advantages
<ul style="list-style-type: none">• Usually accepted by regulatory agencies• Distance between the top of the deck and the water surface remains constant• Adaptable to varying types of shorelines
Disadvantages
<ul style="list-style-type: none">• Higher maintenance cost• Shorter lifespan than most due to constant contact with water• Small docks lack stability so it is recommended to have a minimum of 2 m x 6 m (6 ft x 18 ft)



Post or Pipe Docks

These docks are easy to build and the least disruptive to the aquatic environment. Because the dock remains elevated above the water, there is less contact with the water, which reduces damage, and it minimizes shading of aquatic vegetation.



Advantages
<ul style="list-style-type: none">• Usually accepted by regulatory agencies• Usually the least costly and easiest to build• Least environmental impact with minimal damage to submerged lands• Can be easily removed for winter
Disadvantages
<ul style="list-style-type: none">• Maximum water depth is 2 m (6 ft)• Very sensitive to ice pressures• Affected by fluctuating water levels (may be able to purchase adjustable legs)• Vulnerable to wave action damage on unprotected shorelines

Approval Process

If you need to replace your existing dock or install one for the first time and your dock did not meet the aforementioned requirements, you will require approval prior to construction. You are more likely to get permission if the type of dock you want to install is environmentally friendly and located away from wetlands and fish spawning grounds. Depending on the nature of the dock, different departments and organizations need to be contacted to obtain the necessary approvals and permits. For more contact information, please consult the “Contact List” section.

Type of Dock	Please Contact
Docks with a foundation or cribs below the high-water level or are supported on posts, stilts, or poles	Fisheries and Oceans Canada - Habitat management and Manitoba Conservation District Office
Floating or cantilever docks that are above the high water mark	Manitoba Conservation District Office
Docks in a Provincial Park	Manitoba Conservation District Office or Parks and Natural Areas Branch, Winnipeg
Docks in Riding Mountain National Park	Riding Mountain National Park Administration Office



Wildlife

Living with Wildlife

Wildlife can benefit you and your property. However, some species can cause problems if proper precautions are not taken. To minimize these problems we recommend the following:

Block Access

- Ensure all wildlife has left before sealing up entrances (fall is a good time for pest-proofing)
- Block access for insects, rodents, and bats. Potential access points include foundations, porches, steps, doors, windows, holes or cracks and through access points for wire and pipes
- Seal with caulk, weather-stripping, expandable foam, crumpled heavy-duty aluminum foil, metal flashing and/or steel wool
- Use fine wire mesh screens on all doors, opening windows, and vents including attic and underfloor vents

Discourage Contact

- Trim tree limbs that reach your roof or the walls of your home or buildings
- Store firewood and lumber away from main buildings, or in a special shelter
- Minimize outdoor light use and use yellow light bulbs outside to reduce the number of flying insects attracted to the house light

Dispose of Food

- Use animal-proof garbage cans and containers and if feasible, store garbage cans in a shed or garage until removal
- Clean your barbeque and barbeque equipment and store in a secure area
- Remove food scraps from outdoors, including pet food
- Fence orchards or berry bushes and harvest fruit
- Turn your compost regularly and if possible, cover it with dirt or leaves or compost inside
- Use bird feeders with large trays or higher lips to prevent spillage and keep feeders away from decks where it can be hard to clean up spilled seeds



Fisheries

Fish in the Riding Mountain Biosphere Reserve

Fishing is a popular activity in the Riding Mountain Biosphere Reserve due to its plentiful lakes and fish species. However, to support this industry, many popular fishing locations are stocked. Over twenty five lakes in the Biosphere Reserve are stocked with Rainbow Trout, Tiger Trout, Walleye, or Yellow perch.

To sustain fish populations, proper water quality must be maintained and if this is not achieved, the fish population can be severely affected. Work conducted in the water, regardless of the scale of the project, can impact fish habitat and potentially disrupt it. For example, the introduction of silt from stream alterations can destroy the habitats of both Brook and Rainbow Trout. Therefore, it is not only our responsibility to limit our impact on the shoreline, but to limit our impact in the water as well.

For more information on fish species in Manitoba, please visit the Manitoba Water Stewardship website at www.gov.mb.ca/waterstewardship/fish or the the Fish and Lake Improvement Program for the Parkland Region website at www.flippr.ca

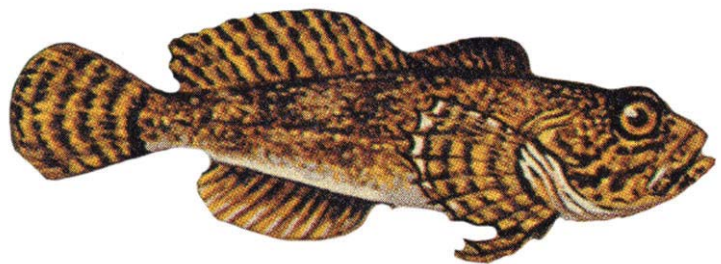
Fish Surveys of Clear Lake

As part of Parks Canada's research in Riding Mountain National Park, fish surveys have been conducted to help evaluate water quality in the Park's lakes. Throughout Riding Mountain National Park, twenty-seven of the eighty-four fish species found in Manitoba can be found. Fourteen of the species found in the Park are found in Clear Lake, including:

- Lake Trout (*Salvelinus Namaycush*)
- Cisco (*Coregonus artedii*)
- Lake Whitefish (*Coregonus clupeaformis*)
- Northern Pike (*Esox Lucius*)
- Blacknose Dace (*Rhinichthys atratulus*)
- Fathead Minnow (*Pimephales promelas*)
- Spottail Shiner (*Notropis hudsonius*)
- Blacknose Shiner (*Notropis heterolepis*)
- White Sucker (*Catostomus commersoni*)
- Trout-Perch (*Percopsis omiscomaycus*)
- Yellow Perch (*Perca flavescens*)
- Walleye (*Stizostedion vitreum*)
- Johnny Darter (*Etheostoma nigrum*)
- Slimy Sculpin (*Cottus cognatus*)

While not a sport fish species, the presence of Slimy Sculpin in Clear Lake is being used to analyze the lake's health. By monitoring the Sculpin population along with water quality analysis, Parks Canada is analyzing whether this species can serve as a natural indicator of the water quality.

North Pike populations in Clear Lake and South Lake were also monitored to observe the migration between the two lakes as well as to observe any potential impact from the installation of the new wastewater treatment facilities.



Slimy Sculpin

Local Species at Risk

Manitoba is home to countless varieties of plants and animals species but this does not mean that these organisms will always be here. In the last one hundred years, Manitoba has lost a number of species including the Plains Grizzly, the Pronghorn Antelope, and the Greater Prairie Chicken.

Currently, a number of species in the Riding Mountain Biosphere Reserve have been labeled “Species at Risk”. These species are simply defined as plants or animals that are in danger of disappearing from their natural range in the province. With the passing of Manitoba’s Endangered Species Act in 1990 and Canada’s Species at Risk Act in 2003, activities or practices that destroy, disturb, or interfere with these species and their habitats have become prohibited. In Manitoba, four categories are used to determine the risk level:

- **Extinct:** Species that have completely disappeared from the earth
- **Extirpated:** Species that were native to Manitoba but have disappeared from their former range. However, these species may be found in captivity or in other regions
- **Endangered:** Species that are at risk of disappearing from all, or most of, their Manitoba range
- **Threatened:** Species that are at risk of becoming endangered due to low or declining numbers

Why Are Species Becoming at Risk?

The vast majority of species no longer found in the province is the direct result of human interference. Chemical poisoning, excessive hunting, industrial pollution, and recreational overuse have all taken their toll on Manitoba’s diverse species. However, the most common factor that contributes to a species becoming at risk is a loss of habitat due to activities like clearing of land for agricultural purposes, overgrazing, overharvesting, pesticides, and invasive species. These human-caused factors, combined with natural factors like disease, small geographic range, large territory size, and rarity of habitat have severely reduced the populations of these species.

What You Can Do

Though we are the cause of the problem, we can also be the solution. As a landowner, you can play a significant role in protecting these species. Some things you can do include maintaining wildlife habitat on your property, conducting work outside of breeding season, and moving work away from sensitive habitats.

Extirpated Species in the Riding Mountain Biosphere Reserve

Trumpeter Swan

Trumpeter Swans are large birds with white feathers and black bills, legs, and feet. During the summer they spend their time on large ponds or shallow lakes where they feed upon leaves, tuber, and roots of aquatic plants.

Once found throughout western North America, substantial hunting reduced the Trumpeter Swan population close to extinction. Only three sightings of Trumpeter swans in Manitoba were reported from 1900 to 1970 but reports of sightings have increased. In 2003, it was confirmed that Trumpeter Swans had naturally returned to Riding Mountain National Park and recent studies have found that forty-nine swans have been observed in the park.



Endangered Species in the Riding Mountain Biosphere Reserve

Loggerhead Shrike

Loggerhead shrikes are most likely found near open, grassy sites with scattered trees and shrubs. Primarily insect feeders, these birds will also feed on voles, mice, snakes, frogs, and small birds.

Canada is the northern range of the Loggerhead Shrike and today they are primarily found in southwestern Manitoba. Occasionally, this species has also been seen in the Riding Mountain area. This bird was once found as far north as Swan River but due to the loss and degradation of grasslands, increased predation, inclement weather, and insect shortages due to pesticide use, this species has declined significantly.



Burrowing Owl

This nationally endangered grassland bird has an unusual habit of nesting below ground. Nesting in abandoned squirrel, fox, and badger burrows, burrowing owls prefer flat to gently rolling pastures, prairies, and grasslands.

Today this bird is confined to the extreme southwestern corner of Manitoba but they could once be found throughout the southern portion of the province. In the last one hundred years, the number of reported breeding pairs in the province has been reduced from hundreds to less than ten.



Baird's Sparrow

These birds are smaller than the common sparrow species and have fine black streaks on its breast. They prefer mixed grass prairies or lightly grazed pastures and feed upon grass seeds and insects.



Once found throughout southwestern Manitoba, the Baird's Sparrow's range has been significantly reduced to the extreme southwestern corner of the province. This is largely due to the conversion of natural prairies and grasslands to agriculture in the past century but insecticide use has also played a role. Habitat changes have brought about new species of predators that have contributed to the Baird Sparrow's decline.

Piping Plover

This stock shorebird has a white breast, abdomen, and rump with a pale brown to grey back, head, and wings. Commonly found on lakeshores and sandbars, it nests on gravelly or sandy lake shorelines that have little to no vegetation.

These birds can be found throughout southern Manitoba but their population here has decreased in the last twenty years from an estimated 100 pairs down to twenty. This drop has been largely attributed to increased human use of beaches, all-terrain vehicles, and pets. Varying water levels also play a role as they can flood feeding areas or allow for increased vegetation.



Threatened Species in the Riding Mountain Biosphere Reserve



Ferruginous Hawk

The largest soaring hawk in North America, the Ferruginous hawk can have a wingspan up to 135 cm (53 in). These hawks have a light underside with reddish-brown markings on their legs and underside of their wings. Ferruginous hawks prefer open areas of native grasses with scattered trees or shrubs as these areas are home to large numbers of ground squirrels.

Though Ferruginous hawks were once found throughout much of North America, their range has been reduced by almost half. This is largely the result of the loss of native prairies due to human settlement and agricultural expansion. These birds are very vulnerable to human disturbance so that adult birds will often abandon their nests and offspring if disturbed during the nesting season. Increased predation and the consumption of poisoned ground squirrels have also been attributed to their reduced numbers. In recent years, the populations have stabilized and this species was re-established in southern Manitoba.

Sprague's Pipit

This small, ground-nesting songbird is native to a region stretching from the foothills of the Rocky Mountains in southern and central Alberta to central and southern Manitoba. Resembling a sparrow, this bird has brown plumage and a thin bill. These birds are most commonly found in native grasslands but they are relatively secretive and are rarely seen in the open. They are rarely found in cultivated areas or where large numbers of livestock are present.

It is estimated that three quarters of the Canadian prairies has been lost to cultivation, resulting in a severe loss of the Pipit's natural habitat. This bird was believed to have been one of the most common grassland songbirds of the prairies in the early 1900s. Today, populations have been steadily declining for the last fifteen years.



Mule Deer

More common to Western North America, the mule deer has reached a threatened species status in Manitoba. It differs from its cousin, the white-tailed deer, by its larger ears, antler configuration, and, the most noticeable, their black-tipped tail. Mule deer prefer to stay in areas near grazing zones and waterbodies.

The primary cause of decline of Manitoba's mule deer population is the result of habitat destruction, urban sprawl, and highway construction.



If you have spotted one of the following species at risk or to learn more, contact Manitoba Conservation at 1-800-214-6497 or visit their website at www.gov.mb.ca/conservation/wildlife

Habitat Conservation

Wildlife Habitat

All species – humans, plants and animals – need food, water, shelter, and space. The following features on your property can help provide crucial habitat for wildlife:

- **Cavity Trees**
 - Large trees with hollow cavities are a vital source of food, shelter, and safety. In Manitoba, many species (including pileated woodpeckers and barred owls) depend on cavity trees for nesting, rearing young, roosting, feeding, storing food, escaping predators, and hibernating.
- **Fallen Logs**
 - Fallen logs are essential habitat for small mammals, woodpeckers, toads, and many insects. As the log rots, the trunk becomes damp and spongy encouraging the growth of fungi (such as mushrooms) and mosses. Reptiles and amphibians will lay their eggs in the moist wood.
- **Cedar Stands**
 - Cedar Stands provide potential habitat for deer yards. Deer yards consist of a core area of mainly coniferous trees (pines, hemlock, cedar, spruce) with a canopy closure of more than 60% which provide shelter, ease of movement, and protection from predators. The land surrounding the core area is usually mixed or deciduous forest.
- **Dense Coniferous Forests**
 - These forests provide winter habitat for wild turkeys because they offer minimal snow accumulation on the ground and protection from cold and predators. Coniferous stands used by turkeys are usually on valley floors or lower slopes.
- **Mast Producing Trees**
 - Mast is fruit and seeds produced by maple, elm and ash, and nuts from oak, black walnut and beech. Mast is the primary fall and winter food for most forest wildlife species for building fat reserves for hibernation.
- **Vernal Pools**
 - These are temporary wetlands formed in depressions by rain and melting spring snow. Short-lived, they last anywhere from a few days to three to four months before drying up. They are an important breeding habitat for amphibians since they lack predators such as fish and reptiles found in permanent waterbodies. Fairy shrimp and water striders also use vernal pools.
- **Reptile Hibernacula**
 - These sites have rocky outcrops with crevasses. An ideal habitat site has a forested corridor adjacent to the rocky site. Rocky habitats also provide nesting, den sites and cover for many other species of wildlife, including birds, amphibians, snakes, and small mammals. A male ruffed grouse may also find this an attractive drumming site.
- **Brush Piles**
 - Brush piles can be constructed with the cut materials from trail clearing or woodlot management (pruning). Pile the brush, approximately waist-high, on a stump, log, boulder, or along fence rows. These provide habitat for snowshoe hare, cottontail rabbits, and others. For added benefit, train climbing vines, such as Virginia creeper, onto the brush pile.
- **Leave Dying Material in Place**
 - When safe, you can help attract wildlife by leaving dead standing trees, fallen logs, and mast on your property. However, remove dead elm trees to help prevent the spread of Dutch Elm Disease.

What You Can Do

To help preserve areas of rich, natural habitat in Manitoba, a number of organizations have introduced conservation agreements. While the list below is not complete, these organizations are among those working with landowners in the Riding Mountain Biosphere Reserve.

Manitoba Habitat Heritage Corporation Conservation Agreement

For landowners who want to protect natural areas on their property, the Manitoba Habitat Heritage Corporation (MHHC) offers a Conservation Agreement to ensure that these areas will remain protected. A conservation agreement is a legal contract that is registered on the land's title and is designed to provide long-term protection of the area. The landowner is responsible for following a set of management practices but receives financial compensation through a tax receipt or cash payment. The MHHC, due to cost restrictions, sets the minimum size of a protected area to approximately forty acres (sixteen hectares). To learn more, visit their website at www.mhhc.mb.ca or contact them by phone at 204-729-3502.

Nature Conservancy of Canada Conservation Agreement

The Nature Conservancy of Canada's (NCC) conservation agreements help protect the natural value of properties while still allowing for the landowners to own, use, and sell or pass it down to heirs. These voluntary, legal agreements are custom-tailored to individual properties and are intended to protect valuable areas including wetlands, forests, prairies, and wildlife habitat. The NCC is committed to monitoring the conservation agreement to ensure that the lands are being maintained properly in order to protect their value. For more information you can visit their website at www.natureconservancy.ca or contact the Manitoba office at 204-942-1016.

Manitoba Wildlife Federation Habitat Foundation Cooperators Program

The Manitoba Wildlife Federation (MWF) Habitat Foundation offers a voluntary program to landowners to recognize the importance of native species on their properties. This program includes the landowner's commitment to protect the habitats from clearing or development. For more information you can visit their website at www.manitobahabitattrust.com.

Trees for Tomorrow

The province of Manitoba introduced the Trees for Tomorrow program to help reduce greenhouse gas emissions. Partnering with the Manitoba Forestry Association, the province plans on planting six million trees by the end of 2012. Whether landowners are interested in small-scale or large-scale plantings, the Trees for Tomorrow program seeks to reduce greenhouse gases in the air while reducing erosion, creating wildlife habitat, and enhancing properties. Trees will be provided to landowners for free and are all native species (including pine, white spruce, black spruce, and poplar). Trees for Tomorrow also provides a free program including a site inspection, site plan development, preparation, and follow-ups. For those interested, the land to be used for planting must not have been forested for at least twenty years and landowners are required to sign an agreement to ensure the land remains forested for the duration of the agreement. For more information or to apply, visit the Manitoba Forestry Association's website at www.thinktrees.org or call 204-453-3182.

Invasive Species

Invasive species are plants, animals, or other organisms that are not native to the region and are threatening native species. These species have distinct advantages over native species because, having come from other parts of the world, these invasive species have no natural enemies. As such, they are able to thrive, quickly reproducing and overwhelming native species. Prevention, early detection, and rapid response are extremely important in preventing the spread of these species. Any sightings of invasive species should be reported to the Invasive Species Council of Manitoba at 204-232-6021, info@invasivespeciesmanitoba.com or www.invasivespeciesmanitoba.com. Aquatic invasive species should also be reported to the Water Quality Management Section of Manitoba Water Stewardship at 204-945-7100.

Top Ten Invasive Species in the Riding Mountain Biosphere Reserve

Purple Loosestrife (*Lythrum salicaria*)

This species was imported for flower gardens and was present in soils used for ballast in ships. It degrades wetland habitats, chokes out fish-spawning grounds and competes with native species such as wild rice (a valuable food plant for wildlife). It is very difficult to eradicate. To help control its spread, remove the flower spikes prior to seed set and cut stems off at ground level. Bag and burn any cuttings. Purple loosestrife is currently found throughout Southern Manitoba.



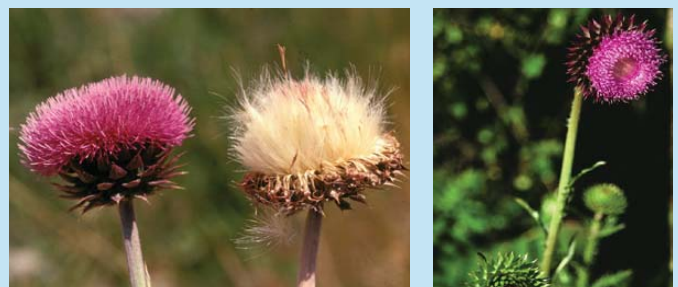
Leafy Spurge (*Euphorbia esula*)

Introduced to North America from ships or as a seed contaminant in the 1800s, this perennial spreads rapidly by seed production and vegetative reproduction. Leafy Spurge dominates a variety of habitats and it also contains a poisonous sap that can be fatal to cattle and cause skin problems for humans. Leafy Spurge is heavily concentrated in Southwestern Manitoba.



Nodding Thistle (*Carduus nutans*)

Introduced into Canada in the 1800s as an ornamental plant, Nodding Thistle has established itself as an aggressive and invasive species. It overwhelms native plants and can take over pastures, reducing their productivity. This plant has spread into Manitoba from North Dakota.



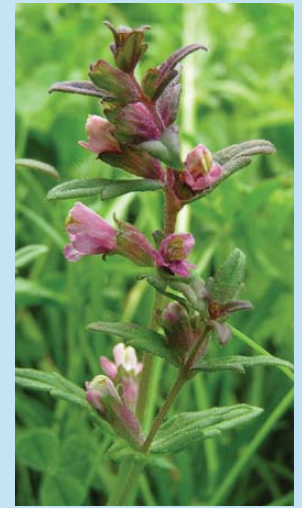
Houndstongue (*Cynoglossum officinale*)

Native to Europe, Houndstongue was brought to North America in contaminated crop seed. Houndstongue is a weak competitor, preferring to grow in disturbed areas, like cattle loafing areas and wallows. Once mature, its heavily barbed seeds cling to clothing and animal hair and fur, further dispersing it. For some animals, this species is extremely poisonous if ingested.



Red Bartsia (*Odontites serotina*)

Red Bartsia first arrived in Manitoba in the 1950s through crates shipped from Germany to Gimli. While the spread of this species was originally confined to the Interlake, it has recently spread to areas around the province. Found primarily in pastures, hayfields, and roadsides, Red Bartsia outcompetes native species and poses a serious threat for pastures and hayland.



Yellow Toadflax (*Linaria vulgaris*)

Originally introduced as an ornamental plant, Yellow Toadflax has become a serious problem across the continent. This species can quickly reproduce through its extensive, creeping root system and can therefore form large colonies that outcompete native species. Adaptable to a wide range of growing conditions, this species has been found in the area.



Common Tansy (*Tanacetum vulgare*)

Common Tansy was an important horticultural and medicine plant in Europe but with its arrival in Canada, it has been designated as a noxious weed. This species forms dense stands, suffocating native vegetation and it also produces alkaloids that are toxic to both animals and humans. This plant can be found in Manitoba in pastures, roadsides, river banks, abandoned fields, and natural areas.



Dalmatian Toadflax (*Linaria dalmatica*)

Also known as “Wild Snapdragon” due to its snapdragon like flowers, this species was introduced to North America as an ornamental. Dalmatian Toadflax can adapt to a wide range of environmental conditions and it is also tolerant to low temperatures. Commonly found in disturbed sites, cultivated fields, and grasslands, this species will reproduce through seed dispersal and its horizontal roots.



Oxeye Daisy (*Leucanthemum vulgare*)

Oxeye Daisy was introduced in the early 1800s from Europe and was spread as an ornamental plant. Oxeye daisy has become a serious problem in pastures and natural areas as it quickly reproduces. Both Oxeye Daisy and the similarly-flowering Scentless Chamomile can easily be identified as there are no white flowering daisies that are native to the Canadian prairies.



Scentless Chamomile (*Matricaria perforata*)

First introduced to Canada in the 1930s, this species has spread to Manitoba where it has had a significant impact on Manitoba crops. Scentless Chamomile is most often found along fence lines, roadways, and fields where it outcompetes both fields crops and native species. In these areas, it invades important habitats and decreases diversity.



To learn more about the invasive species in your area, visit the Invasive Species Council of Manitoba’s website at www.invasivespeciesmanitoba.com or visit Prairie Region Invasive Plant Species Inventory and Map Display website at www.crerl.usask.ca/prips



Invasive Species in Manitoba



Flowering Rush (*Butomus umbellatus*)

Brought to Canada for use in gardens, Flowering Rush forms dense stands that suffocate native plants, fish, and wildlife. In addition, these dense stands can also interfere with recreation lake use as it is commonly found along the shoreline. This species can be found throughout Canada, including Manitoba and its seeds and roots can be moved by water currents.

Himalayan Balsam (*Impatiens glandulifera*)

Himalayan Balsam was brought to Canada by foreign trade and for use in ornamental gardens but has since spread rapidly. This species' seeds are ejected into rivers and streams, contributing to its rapid spread. This plant is extremely competitive and like other invasive species, tends to suffocate native vegetation.



European Buckthorn (*Rhamnus cathartica*)

Introduced as an ornamental shrub, this species' adaptability to a wide range of moisture and light conditions allows it to be successful in a variety of environments. This shrub's thorns can be harmful to humans and animals but this plant also produces dense shade that reduces biodiversity. This plant is a problem in Winnipeg.



Familiarizing yourself with the different types of invasive species is the first step in preventing its spread. Any sighting of invasive species, even if only a few are spotted, is cause for concern as each of these species has the potential to quickly reproduce.

Many invasive species are spread by seeds and plant clippings. However, some invasive species are still sold to unsuspecting gardeners so ensure that you are familiar with the species you are purchasing. If you come across invasive species, remove the plants to prevent its spread. Make sure that the discarded plant materials are dead before disposing and if possible, dry the plant material for at least one week and then burn.

For alternatives to invasive species, please refer to the Invasive Species Council of Manitoba's "Grow Me Instead" brochure at www.invasivespeciesmanitoba.com/site/uploads/pdf/grow%20me%20instead.pdf

Common Burdock (*Arctium minus*)

Accidentally introduced to North America, this species has become widespread. Its large leaves can reduce the light available to smaller plants while its burs bother and can lower the health of livestock. In addition, this plant can act as a secondary host for pathogens that affect native species and agriculture.



Yellow Flag Iris (*Iris pseudacorus*)

Yellow Iris is effective at removing nutrients and trapping sediments so it was introduced to North America to control erosion and to remove metals at sewage treatment facilities. However, this species colonizes in large numbers, forming dense stands that displace native species. This plant is also poisonous and its seeds can be spread by water.



Curly Leaf Pondweed (*Potamogeton crispus*)

Brought into the United States in the 1800s, this water species has spread across much of North America. This species forms dense colonies that can restrict dock access and fishing areas during the spring and early summer. In addition, these colonies suffocate native aquatic plants, reducing biodiversity. Curly Leaf Pondweed is spread by waterfowl, planting, and recreational activities.



Reed Canary Grass (*Phalaris arundinacea*)

Though reed canary grass is native to North America, it has hybridized with European species that can form dense and persistent stands in wetlands, meadows, and riverbanks. This species displaces native plants and animals and also poses issues to waterways and irrigation as they increase silt deposition.



Invasive Phragmites (*Phragmites australis subspecies australis*)

Phragmites are native to North America but an invasive subspecies introduced from Europe has spread from the East coast. These plants form dense stands that outcompete native plants, alter wildlife habitats, and change nutrient cycling. Found primarily in wetland areas, some Invasive Phragmites stands were discovered in and around Winnipeg.



Invasive Species on Their Way to Manitoba

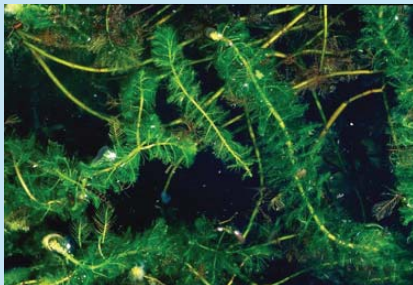
European Frog-bit (*Hydrocharis morsus-ranae*)

This free-floating aquatic plant prefers calm, open waters and uses its root system to form dense floating masses. These floating mats suffocate native aquatic species, destroying habitats for native aquatic animals. Though it is not yet found in Manitoba, there are risks of it spreading from the Great Lakes due to recreational activities and waterfowl migration.



Eurasian Watermilfoil (*Myriophyllum spicatum*)

This submersed perennial establishes itself at the bottom of the waterbody and grow towards the surface, leaving behind dense growth. This growth suffocates native species and can impact fish spawning and recreational use of waterbodies. Not yet found in Manitoba, this species has been found in the neighboring provinces and states.



Salt Cedar (*Tamarix spp.*)

Salt Cedars are deciduous shrubs or small trees commonly found on streambanks, lake shores, and wetlands. Growing in dense thickets, this species suffocates native plants and disturbs the habitats of native animals. In addition, salt cedar has a high water usage which creates salt deposits, reduces water tables, and drains wetlands. Though it has not yet been naturalized in Manitoba, it has been found in North Dakota.



Hydrilla (*Hydrilla verticillata*)

Introduced to North America in the 1960s, this submersed, rooted aquatic plant grows in dense masses from depths of six meters or more. These masses suffocate and outcompete native species but also interfere with recreational activities. This species has not yet been found in Manitoba, but spread from the United States by water flow, waterfowl, and recreational activities poses a significant risk.

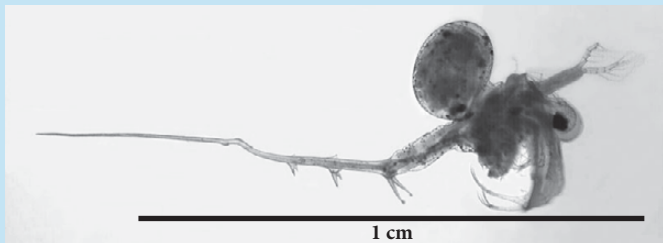


To prevent the spread of Aquatic Invasive Species, make sure to always inspect your boat, trailer, and equipment before and after use. Ensure that you remove any foreign material (e.g. plants and animals) and drain all tanks before leaving. Wash everything that may have come into contact with the water with hot water, spray your boat and trailer with high pressure water, and let your boat and trailer dry in direct sunlight for at least five days before moving to another waterbody.

Non-Plant Invasive Species

Spiny Water Flea (*Bythotrephes longimanus*)

Introduced to North America through ballast water in 1982, this species has a high reproductive rate and has few native predators due to a long, barbed tail. The eggs, which are resistant to drying and freezing, can be easily transported through bilge water, bait buckets, and livewells. These animals outcompete native zooplankton but also pose problems to fishing as large numbers can attach to fishing lines, ropes, and nets. Though they prefer cold, deep lakes, the spiny water flea has been found in Manitoba's Winnipeg River.



Rusty Crayfish (*Orconectes rusticus*)

Native to the Ohio River Basin, this crayfish has made its way northward in the last forty years. Rusty Crayfish and the damage they cause to the aquatic environments has been paralleled to the damage done by clear cutting forests. This species feeds heavily on aquatic plants, small fish, and water insects, placing strain on food sources for native species. Rusty Crayfish were first found in Falcon Lake in 2007.



grafting, Dutch Elm Disease threatens all elms native to North America. This fungus spreads rapidly throughout elm trees, causing gum to form within the water conducting vessels, which ultimately prevent water movement in the tree. This disease is a major problem in Manitoba and can be avoided by properly disposing of dead elm trees and not using elm firewood.

Round Goby (*Neogobius melanostomus*)

This aggressive fish species first arrived in the Great Lakes region in the 1980s and has since spread. Round Goby outcompete native fish species by using their habitats, having multiple spawning times, and eating the eggs of native species. Currently, there is no known method to remove Round Goby following their introduction. This species is expected to enter the southeastern portion of the province in the near future.



Zebra Mussels (*Dreissena polymorpha*)

Zebra Mussels are infamously known for colonizing and restricting water flow through water supply pipes. In addition, this species significantly reduces the amount of food available for native species, resulting in a severe reduction of native mussel populations. Though they have not yet been found in Manitoba, Zebra Mussels are expanding their range in Minnesota and Ontario.



Dutch Elm Disease (*Ophiostoma spp.*)

Caused by a fungus spread by elm bark beetles and root



Permits and Approvals

The information contained below relates to properties in the Riding Mountain Biosphere Reserve and is provided for guidance only. We strongly recommend you contact the appropriate authorities to get current, accurate information. The information below is applicable as of Spring 2012.

When do You Need a permit?

Depending on the nature, work in the water, on the shoreline and near the shoreline, may require a permit. Work could include any new construction, repair or modification as well as filling, dredging, etc. In an attempt to conserve as much of the remaining natural shoreline as possible, the Department of Fisheries and Oceans generally stipulates that no more than one third of a shoreline be developed or maintained. If you do not obtain the proper permits and approvals you can be fined. We recommend contacting the appropriate agencies early to ensure you have sufficient time to carry out your project.

Who Should You Contact?

A permit from more than one government agency may be required and approval from one government agency does not guarantee approval from another. Below is a summary of the organizations you may need to contact about obtaining permits. Note this is a summary for guidance only; other agencies not listed below may be involved in the permit process.

Type of Work	Department of Fisheries and Oceans	Municipal, Town, or City Office	Manitoba Conservation and Water Stewardship
Buildings	✓	✓	
Docks and Boathouses	✓	✓	✓
Fill (ramp, beach, walls)	✓		
Dredging	✓		
Removing aquatic shoreline or vegetation	✓		
Septic Systems		✓	✓
Semi-public or public wells			✓

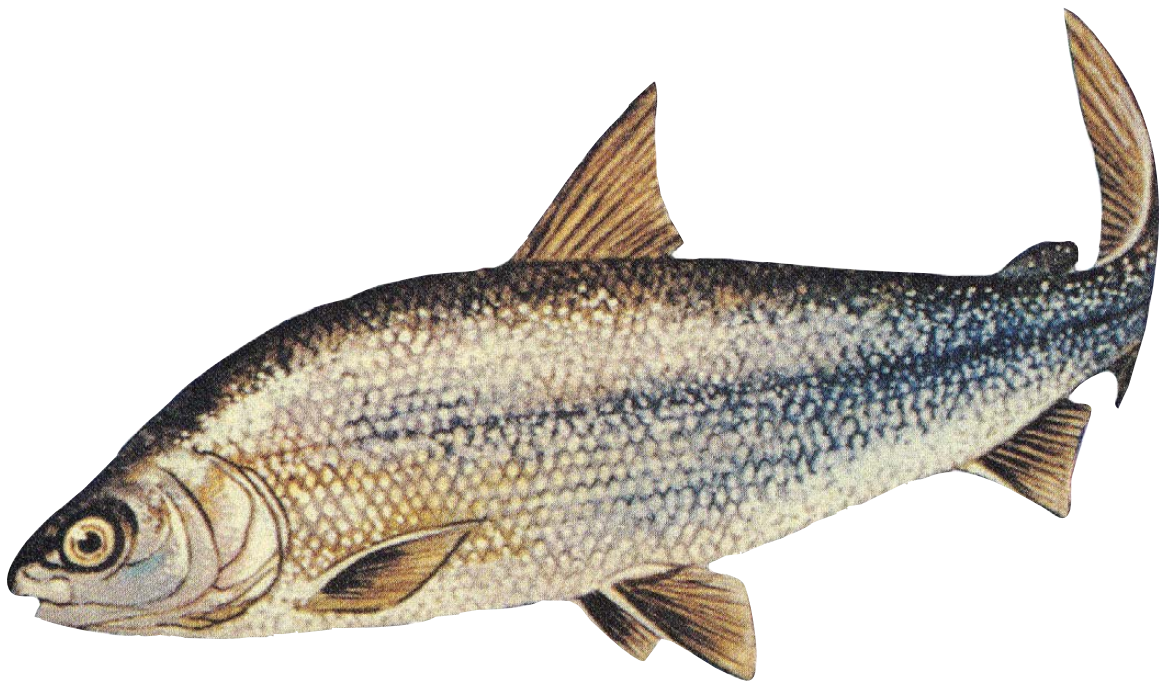


When to Work In-Water

To protect fish, eggs, and fry during spawning and incubation periods, the Department of Fisheries and Oceans has restricted in-water work to specific time periods. Outside of these periods, in-water and shoreline work is prohibited except for special exceptions. These periods vary depending on the species living in the waterbody near you.

Spawning Period	Fish Species	In-Water Work Prohibited
Spring Spawning Fish	<ul style="list-style-type: none"> Northern Pike Walleye Sauger Yellow Perch Suckers Smallmouth Bass Arctic grayling 	April 1 to June 15
Summer Spawning Fish	<ul style="list-style-type: none"> Channel Catfish Lake Sturgeon Goldeye White Bass Freshwater Drum Mooneye 	May 1 to June 30
Fall Spawning Fish	<ul style="list-style-type: none"> Brook Trout Lake Trout Arctic Char Lake Whitefish 	September 15 to April 30

If you are unsure of the fish species present near you, please contact the Dauphin Office of the Department of Fisheries and Oceans Canada at 204-622-4060.



Lake Whitefish

Living in the Riding Mountain Biosphere Reserve

Developing

For more information about developing an existing or new lot, please consult your local town, city, or rural municipality office. For assistance with project planning, contact your local conservation district to obtain ortho maps of your property.

Developing in Riding Mountain National Park

As the townsite of Wasagaming is located within the federally-governed Riding Mountain National Park, there are a number of requirements and regulations that must be followed if you are interested in developing in the cottage or cabin areas. All construction proposals have to be submitted to the Development Office and Environment Office to ensure that they meet the requirements set by Parks Canada. Applicants are also required to complete an Environmental Assessment. Once this assessment has been received, the Environmental Officer will review it and consult with the applicants to ensure that all measures have been taken to provide the least impact to the ecosystem.

For more information about developing within Riding Mountain National Park, please contact Wasagaming's Parks Canada Office at 204-848-7275 or by email at rmnp.info@pc.gc.ca.

Planting with Native Species

Planting with Native Species has gained popularity in recent years and it is easy to see why. Already adapted to living in the region, many of these native species are beautiful additions to gardens.

To learn more about species native to the Riding Mountain Biosphere Reserve, please visit our Native Species Garden section on our website at www.rnbr.ca/projects/native-species-garden. There are a number of companies that specialize in Native Species of Manitoba, including Prairie Flora (www.prairieflora.com), Prairie Habitats (www.prairiehabitats.com), and Prairie Originals (www.prairieoriginals.com).

Planting in Riding Mountain National Park

To preserve the ecological integrity of Riding Mountain National Park, there are restrictions on plant species that can be planted in the cottage and cabin areas. In addition, permission must be granted by Parks Canada before any vegetation is removed from your property.



Project Partners

Riding Mountain Biosphere Reserve

Established in 1986, the Riding Mountain Biosphere Reserve (RMBR) is a non-profit organization that seeks to balance the conservation of natural and cultural heritage with sustainable resource development in the area surrounding Riding Mountain National Park. RMBR includes the voluntary support of local business, community, educational, and government partners working cooperatively to support prosperous local economies while maintaining healthy ecological communities.



Phone: 204-636-2085

Email: rmbbr@mymts.net

Website: www.rmbbr.ca

Riding Mountain National Park

The rich wilderness of Riding Mountain National Park encompasses an area of almost 3,000 km² (1,160 mi²) of rolling hills and valleys. Located in the midst of Manitoba's prairie landscape, the park's broad forests, meadows, lakes, and lofty heights of the Manitoba Escarpment stand in stark contrast to the surrounding region. Home to numerous species of wildlife including hundreds of bird species, deer, moose, elk, wolves, lynx, black bears, and a captive bison herd, Riding Mountain National Park is an extremely diverse environment.



Phone: 204-848-7275

Email: rmnp.info@pc.gc.ca

Website: www.pc.gc.ca/riding

Friends of Riding Mountain National Park

Friends of Riding Mountain National Park is a non-profit organization, committed to increasing awareness and appreciation of the natural and cultural heritage of Riding Mountain National Park. Through innovative programming in partnership with Parks Canada and other like-minded organizations, Friends of Riding Mountain National Park provides valuable educational opportunities that inspire environmental stewardship.



Riding Mountain National Park is a unique sanctuary that provides a wide range of outdoor recreational opportunities in both developed and natural settings. It is the purpose of the Friends of Riding Mountain National Park organization, through education, to preserve this environment and promote greater involvement and commitment of visitors in the wise and proper use of the park.

Phone: 204-848-4037

Email: friends.rmnp@pc.gc.ca

Website: www.friendsofridingmountain.ca

Centre for Sustainable Watersheds

Centre for Sustainable Watersheds (CSW) is an environmental, charitable organization that provides solutions to protect Canada's lakes and rivers. CSW is involved in a number of on the ground activities including watershed studies, shoreline surveys as well as personal property impact consultations. CSW also provides educational resources, information sharing and training, and gives presentations to community groups and youth on topics which include water quality, wastewater treatment and the relationship between healthy shorelines and clean water.



CSW was formally incorporated as a non-profit in 2002 and has a thirty year history that began with a local lake association. CSW's mission is to enhance the ability of groups and organizations to share information, programs and expertise that help preserve clean water.

Phone: 613-272-5136

Email: info@watersheds.ca

Website: www.watersheds.ca

Little Saskatchewan River Watershed Conservation District

Established in 1999, this conservation district covers over 4,000 km² (1,550 mi²) and encompasses the majority of the Little Saskatchewan River Watershed. This area includes the RMs of Daly, Blanshard, Saskatchewan, Harrison, Strathclair, Park, Minto, Odanah, Rosedale, and Clanwilliam and the towns of Erickson, Minnedosa, Rivers, and Rapid City.



The Little Saskatchewan River Conservation District seeks to facilitate and support integrated development and stewardship of the watershed's water and land resources to protect and preserve our natural resources. Some of their programs include nutrient management, erosion control, well sealing, and wildlife damage protection.

Phone: 204-566-2270

Email: lsrcd.admin@mts.net

Website: www.littlesaskatchewanrivercd.ca

Science Horizons

Science Horizons is a Government of Canada program aimed at the advance of research and achievements in environmental science while also providing young people with the opportunities to develop their knowledge and skills in environment-based careers. These projects can last from six months to one year and Science Horizons will provide up to \$12,000 in funding. Over the past thirteen years, Science Horizons has helped over 1,200 young men and women obtain experience in areas of importance to Environment Canada.

Email: science.horiz@ec.gc.ca.

Website: www.ec.gc.ca/scitech/default.asp?lang=En&n=B58899DC-1

Environment Canada

Environment Canada plays an essential role in protecting the environment and with programs like Science Horizons, it is committed to helping groups with similar interests. With over 7,000 employees in over 100 communities across the country, Environment Canada is committed to protect Canada's vast natural resources for future generations to come.



Phone (Manitoba Office): 204-984-6203

Email: enviroinfo@ec.gc.ca

Website: www.ec.gc.ca

TD Friends of the Environment Foundation

Working with Canadians that are committed to protecting the environment, the TD Friends of the Environment Foundation has a grassroots focus that funds local projects. Since 1990, this Foundation has provided support to over 20,000 projects to the amount of over \$57,000,000.



**TD Friends of the
Environment
Foundation**

Phone: 800-361-5333

Email: tdfef@td.com

Website: www.fef.td.com

Other Project Partners

Conservation Districts

The Little Saskatchewan River, Upper Assiniboine River, Lake of the Prairies, Intermountain, Turtle River Watershed, and Whitemud Watershed Conservation Districts (CD) are all located within the boundaries of the Riding Mountain Biosphere Reserve. These non-profit, grass roots organizations all share the same vision of sustainable watershed management and conduct various programs to achieve this goal. To learn more about the programs offered by these conservation districts, please contact your local CD office.

- Intermountain CD: 204-742-3764, imcdadm@mts.net, or www.intermountaincd.com
- Lake of the Prairies CD: 204-564-2388, lpcd@mymts.net, or www.lpcd.mb.ca
- Little Saskatchewan River CD: 204-566-2270, lsrcd.admin@mts.net, or www.littlesaskatchewanrivercd.ca
- Turtle River Watershed CD: 204-447-2139, trwcd@mts.net, or www.trwcd.com
- Upper Assiniboine River CD: 204-567-3554, uarc@mts.net, or www.uarc.com
- Whitemud Watershed CD: 204-476-5019, whitemud@mts.net, or www.mts.net/~whitemud

Get Involved

What you do on your own property has a huge impact on the health of waterbodies and wildlife within the Riding Mountain Biosphere Reserve. There are a number of local groups who need volunteers including:

Riding Mountain Biosphere Reserve

Phone: 204-636-2085
Email: rmbr@mymts.net
Website: www.rmbr.ca



Friends of Riding Mountain National Park

Phone: 204-848-4037
Email: friends.rmnp@pc.gc.ca
Website: www.friendsofridingmountain.ca



Contact List

Federal and Provincial Government Departments

- **Department of Fisheries and Oceans (Dauphin Office):** 204-622-4060 or www.dfo-mpo.gc.ca
- **Environment Canada (Manitoba Office):** 800-263-0595 or www.ec.gc.ca
- **Manitoba Agriculture, Food, and Rural Initiatives:** 866-626-4862 or www.gov.mb.ca/agriculture
- **Manitoba Conservation:** 800-214-6497 or www.gov.mb.ca/conservation
- **Manitoba Water Services Board:** 204-726-6706 or dmenon@gov.mb.ca
- **Manitoba Water Stewardship:** 204-945-6398 or www.gov.mb.ca/waterstewardship
- **Natural Resources Canada:** 613-995-094 or www.nrcan.gc.ca
- **Parks Canada:** www.pc.gc.ca
- **Riding Mountain National Park:** 204-848-7275 or www.pc.gc.ca/riding
- **Transport Canada:** 866-995-9737 or www.tc.gc.ca

Federal and Provincial Agencies

- **Manitoba Habitat Heritage Corporation:** 204-784-4350 or www.mhhc.mb.ca
- **Manitoba Wildlife Federation:** 204-633-5967 or www.mwf.mb.ca
- **Nature Conservancy Canada:** 204-942-6156 or www.natureconservancy.ca

Conservation Districts

- **Intermountain CD:** 204-742-3764, imcdadm@mts.net, or www.intermountaincd.com
- **Lake of the Prairies CD:** 204-564-2388, lpcd@mymts.net, or www.lpcd.mb.ca
- **Little Saskatchewan River Watershed CD:** 204-566-2270, lsrcd.admin@mts.net, or www.littlesaskatchewanrivercd.ca
- **Turtle River Watershed CD:** 204-447-2139, trwcd@mts.net, or www.trwcd.com
- **Upper Assiniboine River CD:** 204-567-3554, uarcd@mts.net, or www.uarcd.com
- **Whitemud Watershed CD:** 204-476-5019, whitemud@mts.net, or www.mts.net/~whitemud

Municipality, Village, Town, and City Offices

- **R.M. of Clanwilliam:** 204-636-2431, erikclan@mts.net, or www.townerickson.ca
- **City of Dauphin:** 204-622-3200, cao@dauphin.ca, or www.dauphin.ca
- **R.M. of Dauphin:** 204-638-4531 or rmofdphn@mts.net
- **Town of Erickson:** 204-636-2516, erikclan@mts.net, or www.townerickson.ca
- **R.M. of Gilbert Plains:** 204-548-2326, rmofgilbertplains@mts.net, or www.gilbertplains.com
- **Town of Gilbert Plains:** 204-548-2761, townofgp@mts.net, or www.gilbertplains.com
- **R.M. of Grandview:** 204-546-5080, rmgra@inetlink.ca, or www.rmofgrandview.ca
- **Town of Grandview:** 204-546-5250, townofgv@mts.net, or www.grandviewmanitoba.net
- **R.M. of Harrison:** 204-849-2107, rmharris@inetbiz.ca, or www.rmharrison.com
- **R.M. of McCreary:** 204-835-2309, rmmccreary@inetlink.ca, or www.exploremccreary.com
- **Village of McCreary:** 204-835-2341, mccreary@mts.net, or www.exploremccreary.com
- **R.M. of Ochre River:** 204-733-2423, rmochre@mts.net, or www.mts.net/~rmochre
- **R.M. of Park:** 204-848-7614, admin@rmofpark.ca, or www.rmofpark.ca
- **R.M. of Rosedale:** 204-476-5414 or rosedale@mts.net

- **R.M. of Rossburn:** 204-859-2779 or rsbrm@mts.net
- **Town of Rossburn:** 204-859-2022, town.rsb@mts.net, or www.town.rossburn.mb.ca
- **R.M. of Shellmouth-Boulton:** 204-564-2589, rmosb@mts.net, or www.inglismanitoba.com/rmsb
- **Municipality of Shoal Lake:** 204-759-2565, shoalake@goinet.ca, or www.shoallake.ca
- **R.M. of Silver Creek:** 204-773-2449 or silvercreek@wificountry.ca
- **Town of Ste. Rose du Lac:** 204-447-2229, sterose@mts.net, or www.sterose.ca
- **R.M. of Ste. Rose:** 204-447-2633, rmstrose@inetlink.ca, or www.sterose.ca
- **R.M. of Strathclair:** 204-365-2196, strathrm@inetbiz.ca, or www.strathclair.ca

Well Testing

- **ALS Laboratory Group:** 800-607-7555
- **Maxxam Analytics:** 204-772-7276

Invasive species:

- **Aquatic Invasive Species (Manitoba Water Stewardship):** 204-945-7100
- **Invasive Species of Manitoba:** 204-232-6201 or www.invasivespeciesmanitoba.com

Community Based Environmental Monitoring

- **Bird Studies Canada:** 888-448-2473 or www.bsc-eoc.org
- **Invading Species Watch:** 800-563-7711 or www.invadingspecies.com
- **Marsh Monitoring Program:** 888-448-2473 or www.bsc-eoc.org/mmpmain.html
- **Project Feeder Watch:** 888-448-2473 or www.birds.cornell.edu/pfw

Other Environmental Groups

- **Canadian Parks and Wilderness Society (Manitoba):** www.cpawsemb.org
- **Canadian Wildlife Federation (CWF):** 800-563-WILD (9453) or www.cwf-fcf.org
- **Ducks Unlimited Canada (DUC):** 800-665-DUCK (3825) or www.ducks.ca

Miscellaneous

- **Erosion Control Blanket:** 866-280-7327, mark@erosioncontrolblanket.com, or www.erosioncontrolblanket.com

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- **Importance of Healthy Shorelines, Shoreline Buffers, Erosion, Household Products, Docks, and Permits and Approvals,**
 - Courtesy of the Department of Fisheries and Oceans Canada, www.dfo-mpo.gc.ca
- **Private On-Site Septic Systems**
 - Adapted from the Regional District of Nanaimo, www.rdn.bc.ca
- **Light and Noise Pollution**
 - Data courtesy Marc Imhoff of NASA GSFC and Christopher Elvidge of NOAA NGDC. Image by Craig Mayhew and Robert Simmon, NASA GSFC
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 - All images are entries from the 2011 Riding Mountain Biosphere Reserve Photo Contest (Frances Gauthier, Brent Dureau, Robin O’Hagan, Campbell Moss, and Sheila Theissen)
- **Fisheries**
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 - **Trumpeter Swan:** Dick Daniels, Wikimedia Commons, www.commonswikimedia.org
- **Invasive Species**
 - **Common Burdock:** John M. Randall, The Nature Conservancy, Bugwood.org
 - **Common Tansy:** Michael Shephard, USDA Forest Service, Bugwood.org
 - **Curly Leaf Pondweed:** Richard Old, XID Services, Inc., Bugwood.org; Chris Evans, River to River CWMA, Bugwood.org
 - **Dalmatian Toadflax:** Bob Nowierski, Montana State University, Bugwood.org
 - **Dutch Elm Disease:** Edward L. Barnard, Florida Department of Agriculture and Consumer Services, Bugwood.org
 - **Eurasian Waltermilfoil:** Barry Rice, sarracenia.com, Bugwood.org; Richard Old, XID Services, Inc., Bugwood.org
 - **European Buckthorn:** Robert Vidéki, Doronicum Kft., Bugwood.org; Jan Samanek, State Phytosanitary Administration, Bugwood.org; Paul Wray, Iowa State University, Bugwood.org
 - **European Frogbit:** Leslie J. Mehrhoff, University of Connecticut, Bugwood.org
 - **Flowering Rush:** Leslie J. Mehrhoff, University of Connecticut, Bugwood.org
 - **Himalayan Balsam:** Jan Samanek, State Phytosanitary Administration, Bugwood.org
 - **Houndstongue:** Steve Dewey, Utah State University, Bugwood.org; Mary Ellen (Mel) Harte, Bugwood.org

- **Hydrilla:** Robert Vidéki, Doronicum Kft., Bugwood.org
- **Invasive Phragmites:** Leslie J. Mehrhoff, University of Connecticut, Bugwood.org; Richard Old, XID Services, Inc., Bugwood.org
- **Leafy Spurge:** William M. Ciesla, Forest Health Management International, Bugwood.org; Chris Evans, River to River CWMA, Bugwood.org
- **Nodding Thistle:** James R. Allison, Georgia Department of Natural Resources, Bugwood.org; Steve Dewey, Utah State University, Bugwood.org
- **Ox-Eyed Daisy:** Steve Dewey, Utah State University, Bugwood.org; Mary Ellen (Mel) Harte, Bugwood.org
- **Purple Loosestrife:** Linda Wilson, University of Idaho, Bugwood.org; Norman E. Rees, USDA Agricultural Research Service - Retired, Bugwood.org
- **Red Bartsia:** sannse, Wikimedia Commons, www.commonswikimedia.org; Bernd Haynold, Wikimedia Commons, www.commonswikimedia.org
- **Reed Canary Grass:** Chris Evans, River to River CWMA, Bugwood.org; Richard Old, XID Services, Inc., Bugwood.org
- **Round Goby:** Center for Great Lakes and Aquatic Sciences Archive, University of Michigan, Bugwood.org
- **Rusty Crayfish:** Department of Fisheries and Oceans Canada
- **Salt Cedar:** Steve Dewey, Utah State University, Bugwood.org; Joseph M. DiTomaso, University of California - Davis, Bugwood.org
- **Scentless Chamomile:** Richard Old, XID Services, Inc., Bugwood.org; Bruce Ackley, The Ohio State University, Bugwood.org
- **Spiny Water Flea:** NOAA, Great Lakes Environmental Research Laboratory
- **Yellow Flag Iris:** Nancy Loewenstein, Auburn University, Bugwood.org; Todd Pfeiffer, Klamath County Weed Control, Bugwood.org
- **Yellow Toadflax:** Wendy VanDyk Evans, Bugwood.org; Dave Powell, USDA Forest Service, Bugwood.org
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- **Wild Red Columbine:** Nelson DeBarros @ USDA-NRCS PLANTS Database
- **Meadow Blazing Star:** Thomas G. Barnes @ USDA-NRCS PLANTS Database
- **Gaillardia:** www.callutheran.edu/cr
- **Wild Bergamot:** www.callutheran.edu/cr
- **Prairie Crocus:** Thomas G. Barnes @ USDA-NRCS PLANTS Database

All other images courtesy of the Riding Mountain Biosphere Reserve.

Sources

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- Centre for Sustainable Watersheds (www.watersheds.ca)
- Department of Fisheries and Oceans (www.dfo-mpo.gc.ca)
- EcoLogo (www.ecologo.org)
- Fish and Lake Improvement Program for the Parkland Region (www.flippr.ca)
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- Invasive Species Council of Manitoba (www.invasivespeciesmanitoba.com)
- Manitoba Conservation and Waterstewardship (www.gov.mb.ca/conservation)
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- Nature Conservancy of Canada (www.natureconservancy.ca)
- Riding Mountain National Park (www.pc.gc.ca/riding)





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