



WESTLAKE INTEGRATED
WATERSHED MANAGEMENT PLAN

3	INTRODUCTION
4	WESTLAKE WATERSHED
8	POINTS OF VIEW
16	SURFACE WATER MANAGEMENT
24	DRINKING WATER PROTECTION
27	SURFACE WATER QUALITY
28	FISH AND WILDLIFE HABITAT
30	IMPLEMENTATION
31	REFERENCES





INTRODUCTION

The park-like landscape of the Westlake Watershed is a source of pride for local residents. Cattle and grain fields scattered among forests and wetlands blur the lines between farms and nature, reinforcing the need to protect the land and water that support the health and prosperity of Westlake residents.

In the Westlake Watershed, gently-sloped streams and drains carry water eastward towards Lake Manitoba. Any activity that affects water quality, quantity, or rate of flow at one location within the watershed will affect locations downstream. For this reason, resource managers in the Westlake Watershed employ watershed-based decision-making. The watershed approach provides an opportunity to address water quality, water quantity, community, and habitat issues beyond the jurisdictional boundaries of municipalities. It also helps decision-makers to consider the cumulative impacts of land use practices in the watershed.

The Westlake Integrated Watershed Management Plan is a tool that can be used to guide how we treat our land and water resources for the benefit of all watershed residents. Inspired by the values and experiences of local residents, this plan outlines tasks for residents, government agents, and other stakeholders to conserve and restore the land and water resources of the Westlake Watershed.

WATERSHED CHALLENGES

To identify local land and water challenges, watershed residents, community leaders, and technical experts were invited to provide input into the development of this plan. Public meetings were held in Toutes Aides, Eddystone, Amaranth, and Alonsa, and a watershed team meeting was held in Eddystone.

Comments gathered at the public meetings focused on four dominant themes: surface water management, drinking water quality, fish and wildlife habitat, and permanent cover. At the watershed team meeting, a group of local and technical experts provided guidance on how to address these challenges, and the project management team relied on their familiarity with the area to determine what actions would most likely succeed in this watershed.

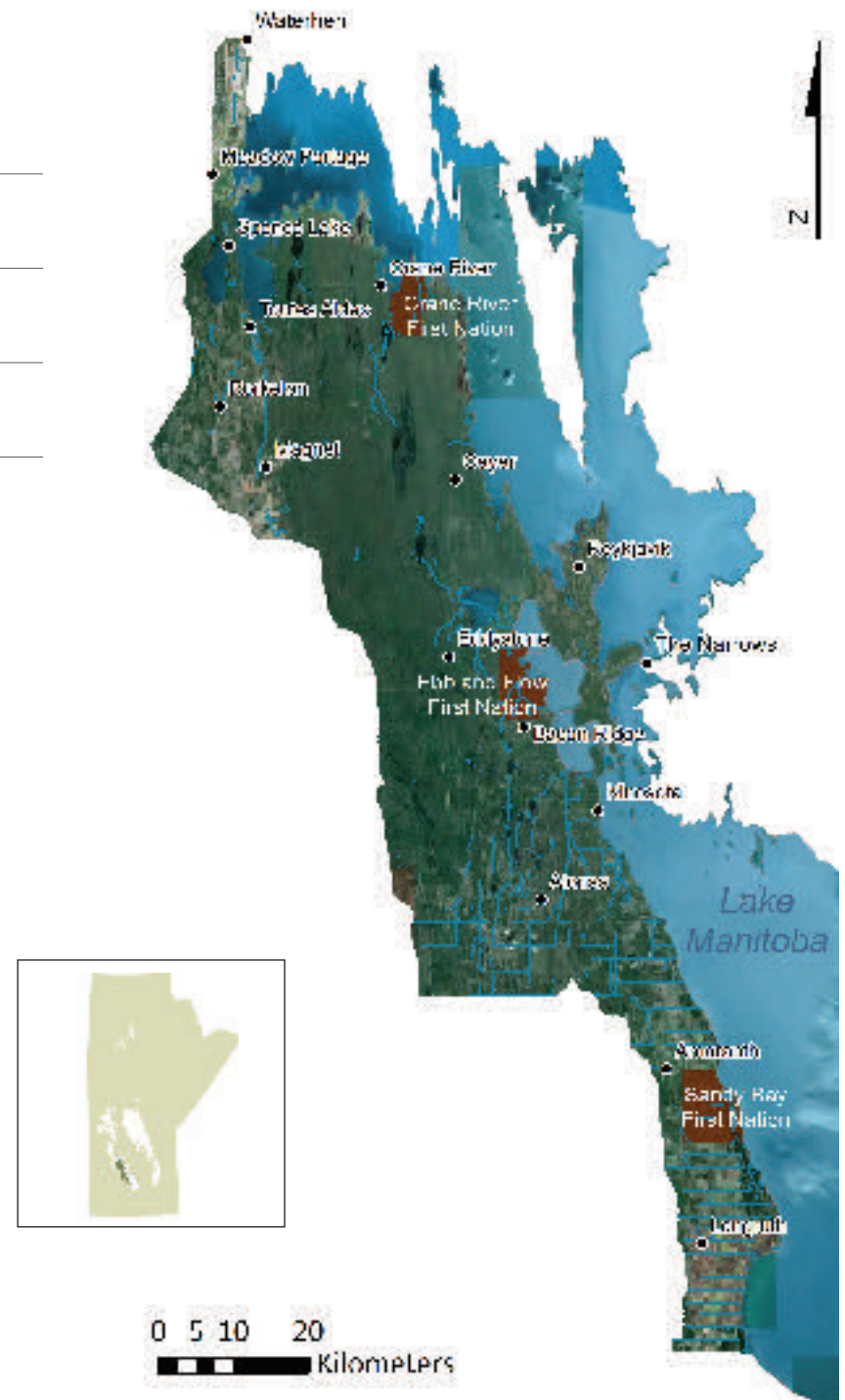
The first section of this plan characterizes the Westlake landscape through technical information and conversations with a variety of watershed residents. These interviews expand on the comments gathered at the public meetings and provide context for the action plan that follows.

WESTLAKE WATERSHED CHARACTERISTICS

AREA	4,073 square kilometres
LOCATION	West side of Lake Manitoba
LANDSCAPE	Very flat lowlands with numerous ridges, shallow lakes, and marshes
LAND COVER	Predominately trees, grasslands and wetlands
LAND COVER TRENDS	Increase in tree cover, forages, and annual cropland; decrease in grasslands

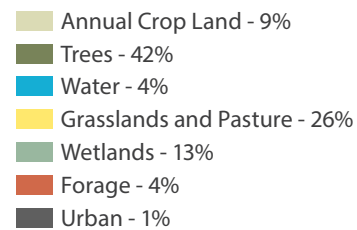
WESTLAKE COMMUNITIES

- Over 65 percent of Westlake residents live in Crane River First Nation, Ebb and Flow First Nation, and Sandy Bay First Nation
- Approximately seven percent of Westlake residents live in the four Northern Affairs communities of Crane River, Meadow Portage, Spence Lake, and Waterhen in the northern portion of the watershed
- Cottage development along Lake Manitoba has slowed since the flood of 2011, which damaged large portions of Lake Manitoba shoreline
- The remaining population is primarily rural, with small clusters in the communities of Alonsa, Amaranth, Bacon Ridge, Cayer, Eddystone, Kinross, Langruth, Magnet, Reykjavik, Rorketon, and Toutes Aides



AGRICULTURE PROFILE

- Cattle production is the dominant agricultural activity throughout the watershed
- Hay and forage (primarily alfalfa) production is very important; farms in the watershed produce approximately 10 percent of the feed requirements for Manitoba cattle
- Cereals and oilseeds are grown throughout the watershed, but are much more dominant in north and eastern portions of the watershed
- Census data indicates that over time, farms are being consolidated into fewer, larger farms
- Decreases in grasslands are attributed to forest encroachment, forest rejuvenation and conversion to cropland

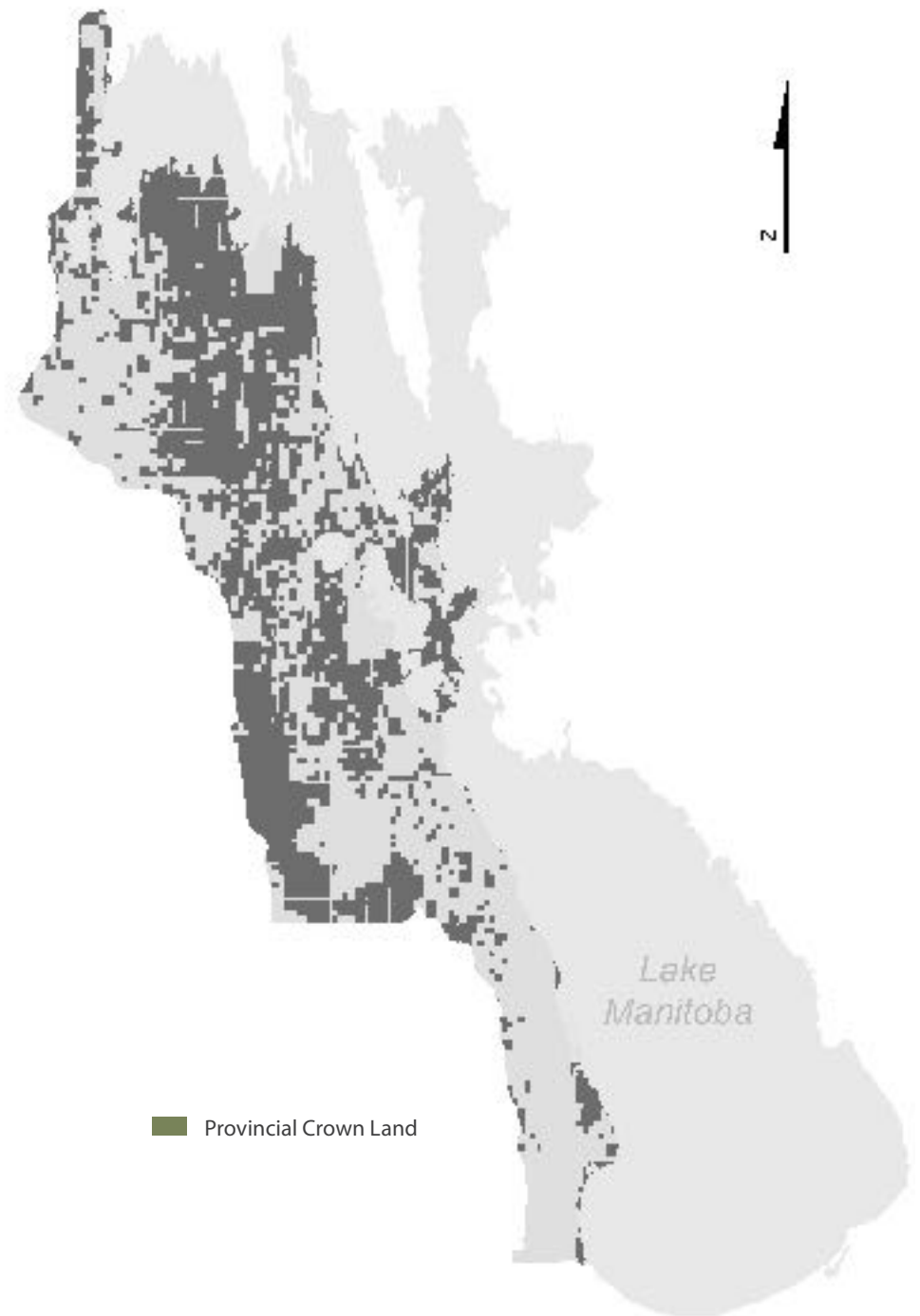


CROWN LAND

- Provincial Crown lands account for approximately 47 percent of the land base in the watershed
- Nearly 80 percent of Crown land in the watershed is intended for agricultural use through leases and yearly permits, and another 11 percent is designated as Community Pastures
- 70 percent of agricultural Crown land in the watershed has Class 4 and 5 soils, which are most suitable for perennial forage; annual crop production is limited
- Seven percent of agricultural Crown land in the watershed has Class 6 and 7 soils, which are important for grazing
- Eight percent of Crown land in the watershed is designated for wildlife and recreation
- Three percent is uncoded and unavailable for agricultural use



Crown lands help protect native plant species like the showy lady's slipper, which is sensitive to disturbance and habitat destruction.

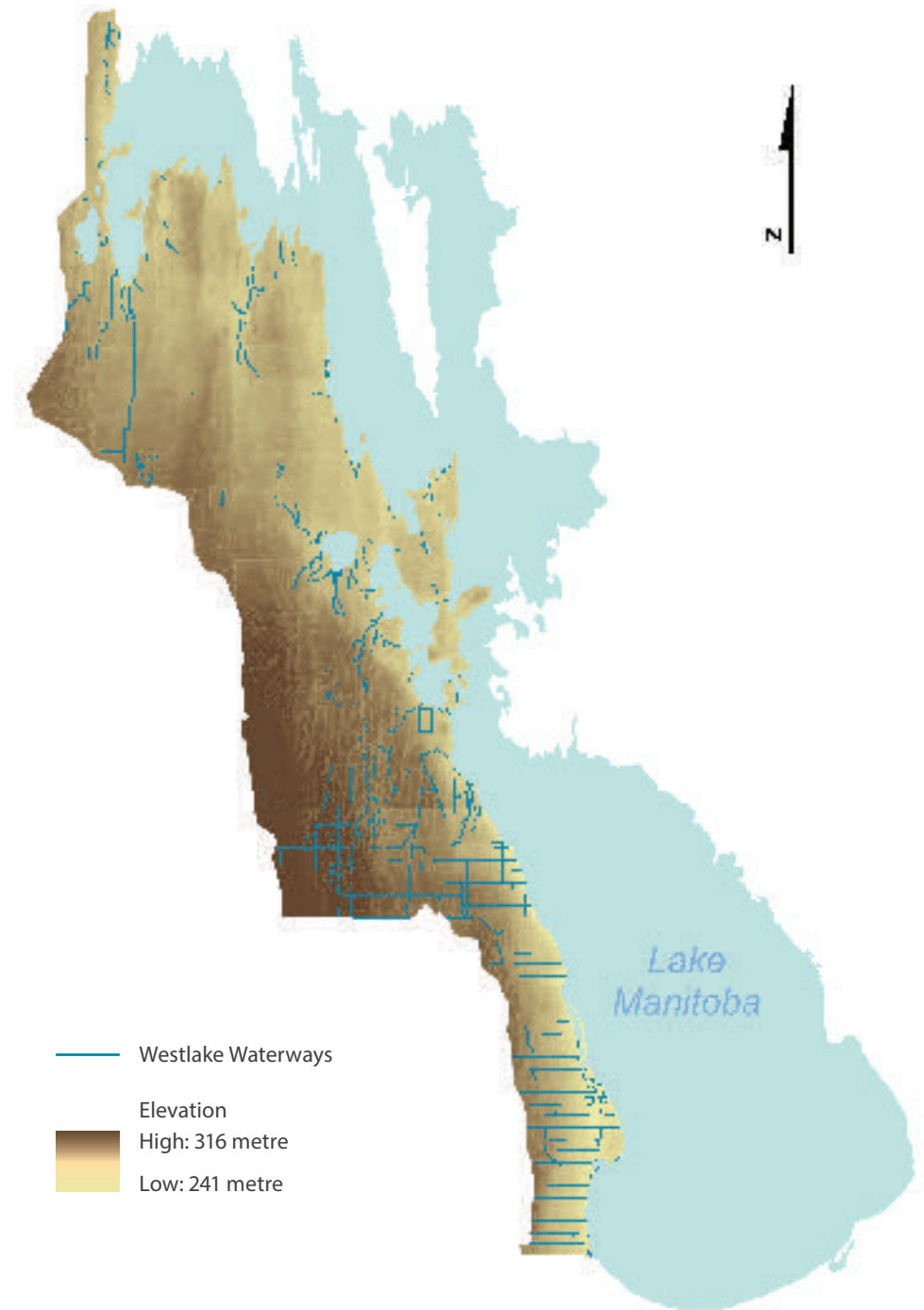


TOPOGRAPHY AND SURFACE WATER FLOW

- Elevation is highest in the southwestern portion of the watershed
- Land slopes downward in a northeasterly direction towards Lake Manitoba
- Low ridges and shallow swales extend in a north and northwesterly direction
- Some ridges are composed of sand and gravel from ancient beaches; others are composed of boulder clay
- Ridges form barriers to water flow and control the drainage pattern in the watershed
- Swales contain many natural water retention features such as lakes and marshes

WATERWAYS

- Natural and constructed waterways are important for reducing flooding and enhancing agricultural production
- Natural drainage is very poor in the Westlake Watershed; excessive vegetative growth and beaver dams often reduce drain conveyance capacity
- Local municipalities manage the smaller waterways in the watershed and the Alonsa Conservation District manages larger waterways and drains



POINTS OF VIEW - FISHING

ARNOLD JENKS SHARES HIS EXPERIENCE AS A COMMERCIAL FISHER IN THE WESTLAKE WATERSHED AND DESCRIBES CHANGES HE HAS NOTICED ON LAKE MANITOBA

How long have you been fishing on Lake Manitoba?

I've been fishing on Lake Manitoba for 45 years. I actually started helping my dad when I was about 14 years old, but he fished on Lake Ebb & Flow.

Without giving away your secrets, can you tell me where you fish?

I fish mostly in the north basin of Lake Manitoba, around Peonan Point and Cherry Island. I used to fish with a guy in the south basin, from the Narrows right down to Kinostota.

What is a typical day on the lake?

Well it's all winter fishing, eh? So it's all on ice. On Lake Manitoba there's no summer fishing. I have a helper or two with me all the time, and we get around with a snow machine and a caboose. We fish with gill nets and power jiggers.

Have you noticed any changes in the lake over the years?

We noticed about three years after they stopped the small net season in the north basin that the fish stocks picked up a little bit to a bigger size. They've been fishing with small mesh nets in the south basin for quite a few years compared to the north basin, and I noticed that the fish stock

down there is a lot smaller.

The perch have declined quite a bit in the south basin. In the north basin we've found more northern pike coming in, and I think the problem is high water levels. There's also a lot of carp taking over. The carp are killing out a lot of the pickerel spawning areas. I see it in the north basin, and fishermen in the south basin are having the same problem.

I also noticed that the water quality was not near the same in the south basin as it is in the north basin. When I fish in the north basin and I've opened a clean hole, I can take a drink of water right out of the lake. But I tried it in the south basin and I couldn't drink it. It was just awful.

What do you believe is the cause of these changes?

All the chemicals and fertilizers going into the lake will definitely affect the quality of water. Especially with the high water, the Portage Diversion and the Whitemud River contribute to the decreasing water quality in the south basin. There's a lot of water that comes through the Whitemud. In the RM of Alonsa we really don't have as many big runs coming into the lake, but there is definitely a concern that chemicals

are running into the lake up here. The Lake Manitoba Narrows bridge seems to be a dividing line.

Do you think the commercial fishery will be affected by cottage development along Lake Manitoba?

There is some concern. There is no bank along the lake and it's not a sandy beach, it's a mud bottom, so there's nothing to stop anything from flowing into the lake. There is some alfalfa along there that people are fertilizing, but if you get cottage development there will be more stuff going into the waterways. Where these cottage developments are being put up is low land to start with, so they're going to have to make sure they do not disturb the lakeshore.

CHALLENGES

- Nutrients in the lake have increased algae blooms.
- Invasive species like carp have decimated pickerel spawning habitat.
- Fish populations have been disturbed.

SUCCESS MEANS

- There is a stable fishery that can sustain the current number of fishers.
- Nutrient loading decreases and reduces the number of algal blooms.
- Carp are eliminated, or at least reduced.
- Cottage residents are respectful of the lakeshore.

POINTS OF VIEW - COMMERCIAL FISHING + RANCHING

BOBBY CAMPBELL, A VETERAN FISHER AND RANCHER FROM THE KINOSOTA AREA, DISCUSSES WATER QUALITY AND FLOODING ON LAKE MANITOBA

LAKE MANITOBA FISHERY

- Local fishers rely on the Lake Manitoba fishery to supplement their income.
- There has been an average of 403 licensed commercial fishers on Lake Manitoba each year since 2002.
- The average annual value of the Lake Manitoba fishery is \$1.7 million.

*Based on data from 2002 to 2012

How did you get into commercial fishing on Lake Manitoba?

I've been fishing for 72 years so far. My father fished since 1918, and every chance I got I'd go out on the lake with him. I was 10 years old when I got my first fishing license, and now I fish with my son. We had a ranch right along the lake, north of Kinosota. We lived off fishing some years when cattle prices were down.

Is fishing on Lake Manitoba today any different than it was years ago?

Well, people aren't fishing as much these days. The cost of fuel and wages make it hard. I pretty well always had people fishing with me, but now you won't make anything for yourself if you have a crew.

I haven't noticed many changes in the fishing, though. The fish population seems to be stable. I fished mostly around Kinosota; as far south as Amaranth and as far north as the Narrows. We're seeing some algae around there, but not as bad as Lake Winnipeg.

What do you think is causing the algae growth in the lake?

Well, it's caused by fertilizer. I was involved with the fish hatchery on Lonely Lake, and all of a sudden we started having trouble with the eggs. The eggs were dying the

day after they were collected, and we realized it was the creek water we were using in the hatchery. They had the same problem using creek water at the hatchery near Lundar. But when we started using well water in the hatchery, the fish would hatch and then they'd survive in the creeks.

There is some cottage development along the lake, but I think the fertilizer comes from local farms and from the Portage Diversion. The diversion puts a lot of water into the lake, and we've had lots of problems since it's been in.

What problems have you noticed since the Portage Diversion was built?

Mostly flooding. I haven't noticed much of a change in the fish. We were flooded out in the 50s and there was still good fishing after the flood. I don't think the 2011 flood will affect winter fishing. After a bad storm we get more sediment, but it always settles out. Flooding helps carp spawning, though, and the carp population is increasing.

Our old hay land right along the lake is all flooded now. There has been a lot of flooding.

Bobby and Arnold know Lake Manitoba better than most. Bobby's extensive hatchery experience on Lonely Lake and their combined fishing experience on Lake Manitoba have earned them respect for their values and observations.

To carry their concerns forward, Alonsa Conservation District (ACD) will ask federal and provincial fisheries authorities to continue to pursue measures to reduce carp populations in Lake Manitoba, and recommend that the Alonsa and upstream conservation districts offer nutrient management programs to landowners.

ACD will also talk to water quality experts to see what can be done about reducing nutrient inputs from the Portage Diversion, and suggest realistic objectives for the future.

TAKING ACTION

See pages 27 for a list of practices that will reduce nutrient contributions from farming practices.

POINTS OF VIEW - RANCHING + CLIMATE VARIABILITY

FLORA PRECOURT DISCUSSES CLIMATE VARIABILITY IN THE WESTLAKE WATERSHED AND THE IMPORTANCE OF SURFACE WATER MANAGEMENT FOR RANCHING.

CHALLENGES

- Excessive rain in the last few years has flooded farm land.
- Vegetation build-up in drains and grassed runways slows the flow of water.
- Beaver dams block water flow.
- Farmers are facing successive years of reduced productivity.

How long have you been ranching in the area?

I've been ranching here in Cayer since 1974. I moved here from my parents' farm near Rorketon.

Can you tell me a bit about your farm?

I run a cow-calf operation, with 100 cows. I own 1,400 acres and lease another 1,400. It's all bush, swamp, and hay land.

Has ranching changed since you began?

It's changed dramatically in the last three or four years because of heavy rains. It's been too wet to clean out the drains, so the cattails, black reeds, and moss have built up. Four years ago the water would run, but now it just sits. It's stagnant.

I mean, BSE put us down and calf prices put us down years before, but we still had hay to back us up. This year I didn't touch half of my land. Last year I didn't touch half. The year before I didn't touch any. There's a place where I made 400 to 500 bales, and I haven't made a bale there in four years.

Before the heavy rains of the last few years, were the existing drains working?

Yes, they were working because we

didn't get the moisture that we're now getting. But now, after that many years of vegetation coming up, the water doesn't flow. If you can go in there and cut it in the spring or the summer the water will flow. But if you can't cut it, it dies. And now it's going to lay there and the new growth will come through that. It just keeps building and building, and then you've got a drain bottom that's two feet high.

What do you believe would be a solution to these problems?

Drains are the mainstay of the farm. If the drains aren't cleaned out and the water doesn't run off the land, we can't hay our land. We can't get on our land without drains.

Despite these challenges you've stayed with it. What do you enjoy about ranching? What keeps you going?

I guess the biggest thing is I like what I do. I can walk out in the morning and look around and say, "wow, this is great country." You see a cow and a calf, and you say, "what an accomplishment." It feels good to do what you like to do. And I like what I do.

SUCCESS MEANS

- Drainage network is maintained to support the existing farming community.



POINTS OF VIEW - DRINKING WATER PROTECTION

BOB BETCHER, A FORMER PROVINCIAL HYDROGEOLOGIST, DESCRIBES WESTLAKE WATERSHED GROUNDWATER SOURCES AND DRINKING WATER PROTECTION.

Over half of the drinking water wells in the Westlake Watershed are classified as shallow wells. Can you explain why?

In parts of the Westlake Watershed there are shallow sand aquifers. Shallow, large diameter wells in these areas provide a reliable source of drinking water. Deeper drilling in this watershed will intersect more saline aquifers that aren't potable.

How does the depth of a well affect water quality?

The shallow wells in the Westlake Watershed are a good source of water, but they are susceptible to drought and contamination—

particularly from bacteria and nitrates originating from the surface. Shallow wells draw upon local surface water sources to replenish supply, and the small areas they draw upon mean the water sources are more easily affected by changes to the environment. However, because water moves slowly through these aquifers, it's unlikely that contamination will spread.

How can local residents protect their groundwater and wells from contamination?

Shallow wells are designed to maximize water flowing in, but they are often sealed improperly. This leaves the aquifer more susceptible to contamination. Sometimes the cap isn't water-tight, and sometimes there is just a board on top of the well. It's not terribly uncommon for birds and animals to fall in. Land should slope away from a well so that water will flow away from the well. And the driller should make sure there is at least several feet of low permeable material, like clay, around the well annulus. Landowners should store chemicals and keep potential contaminants away from wells so that if there is an accident, it won't be as likely to contaminate the well.

Surface water management is a major concern in this watershed. How can we manage surface water in a way that protects groundwater?

Surface water won't have much of an impact on groundwater quality in this watershed because there is little fractured bedrock at the surface. The only sinkholes or fractured bedrock in this watershed are near the Amaranth gypsum mine. In most parts of the watershed there is a significant thickness of overburden lying over the aquifers, so direct impacts on groundwater quality from surface water are unlikely. There are a few parts of the watershed, though, where bedrock aquifers are at or close to surface, and in these areas there is the potential for runoff to enter the aquifers directly through cracks or sinkholes. This may cause local groundwater quality impacts. In these areas, care is needed to try to ensure that surface waters aren't directed toward sinkholes or exposed bedrock, such as by ditch construction.

Water tables are very high right now, and more surface water means more aquifer recharge. But if a well is constructed properly it will be on higher land so it shouldn't be affected by surface water.

WESTLAKE AQUIFERS

There are three main aquifers used for water supply in the Westlake Watershed. One is a limestone and dolomite aquifer, the second is a sand and gravel drift aquifer, and the third is a sandstone and shale aquifer.

In the Amaranth area, local residents have expressed concern over rust in the water. And in the Rorketon area, residents have commented on the saltiness of their well water. What are the causes of rust and salt in well water? Is there any way to fix it?

Iron causes the rust in the Amaranth area. Iron occurs naturally—typically in deeper wells—because it is more soluble with less dissolved oxygen. It is largely unpredictable, and simply has to be dealt with through treatment. A water softener will handle it to a certain degree, but it will eventually clog the filter. A specific iron removal system is a better idea. Some people have iron bacteria, which is most easily handled through chlorination. As for salty water, the best thing to do is find a different water source. The local driller can collect a water sample when he intersects water. Looking at the water quality closer to the surface might be better than going lower and increasing yield.

TAKING ACTION

See pages 24 and 25 for a list of practices that protect drinking water quality

POINTS OF VIEW - MANAGING SURFACE WATER

ED ZDAN, FORMER CHAIRMAN OF ALONSA CONSERVATION DISTRICT, IS VERY FAMILIAR WITH SURFACE WATER MANAGEMENT CHALLENGES IN WESTLAKE.

CHALLENGES

- The Alonsa Conservation District manages approximately 650 kilometres of agricultural drains.
- Recent years have brought excessive rain to the Westlake Watershed.

How long have you been on the Alonsa Conservation District Board?

Thirty-three years—I've been a board member since the district was formed in 1978.

Has the task of managing surface water in the Westlake Watershed changed over the years?

Not really. In the past we did some backflood projects to retain water, but they aren't functional these days because there is too much water to hold back. In this part of the country, everyone's living comes off the land; there are few other jobs. It's a constant effort to keep all of the drains maintained, to prevent water from sitting on people's land. We mostly maintain what already exists, and our drains are in bad shape.

I recently stumbled and nearly fell in a dry drain because the bottom was covered with a foot of moss. Lots of our drains have vegetation buildup like that. It's impeding the flow of the water.

Over the years, I'm sure you've talked to a lot of local residents about surface water management. What are the issues people bring up again and again?

Managing water, cleaning drains, and removing beavers. Improvements have to be made. People are also concerned about water quality in streams—especially siltation.

What are the persistent challenges you face?

Funding to support drain maintenance is limited. Infrastructure deteriorates over time and it is very hard to keep up with drain maintenance. It's not going to get easier.

Another challenge is flooding from fluctuating wetlands and high lake levels. Flooding in the last few years has really destroyed a lot of land. I have land two miles from Lake Manitoba that stays flooded until fall. Water also backs up from Spence Lake into the Rorketon area. Flooded pasture and hay land has to be reseeded. Fences are ruined and cattle get out; those have to be repaired. There is still a lot of damage.

Two big rains and we're flooded out—that's the kind of country we live in.



SUCCESS MEANS

- The Alonsa Conservation District works with the Municipalities of Alonsa and Lawrence to prioritize and coordinate drain maintenance activities to ensure that limited funding is spent in a cost-effective manner.
- Agricultural community is supported by effective agricultural drainage.

POINTS OF VIEW - LAND COVER AND WILDLIFE

ROBERT TAYLOR REFLECTS ON LAND COVER AND WILDLIFE IN THE RORKETON AREA.

How would you describe the wildlife habitat in your area?

We have a lot of marginal land that can't produce a crop, and when that land is left alone as bush land it attracts deer and birds. We also have a lot of coyotes, and lots of hunters come here for the waterfowl.

Have you noticed any changes in the local wildlife over the years?

When land gets cleared for farming we see fewer prairie chickens and other birds. The areas where they used to nest aren't there anymore. Partridges used to be plentiful in the bush land, but I don't see many now. We have fewer killdeer, too.

A lot of our marshes are full of cattails. There isn't much wildlife in them these days. We have more Canada geese, though. Maybe due to the wet years we've had. We also have a lot more beaver, but I think they're just coming back. I've seen signs of old dams in the water—with trees one foot in diameter growing up through them. It might have been 100 years ago that they were here, but I think the beavers are just coming back.

I've seen a lot more black bears and timber wolves lately. And there never used to be ravens around here, but now I see a lot of them. Ravens are one of our biggest predators. They hunt a lot of mice. I think the coyotes are starting to look for larger prey, too, because the ravens are so good at hunting mice.

What are your thoughts on preserving land for wildlife habitat?

There is a lot of marginal land in this area, and people drain marshes to increase their productive cropland. But in a lot of cases that land can never support crops. They'd be better off just using it as hay land in dry years.

WESTLAKE WILDLIFE HABITAT

- According to 2006 land cover data, 55% of the watershed is forests and wetlands.
- Hunting and trapping is supported by many local residents.
- The Alonsa Conservation District has a long history of providing incentives to Westlake residents to establish permanent land cover.

CHALLENGES

- Clearing land destroys bird nesting habitat
- Insufficient incentives to protect private land for wildlife habitat

SUCCESS MEANS

- Nesting habitat creation
- Wildlife habitat protection

TAKING ACTION

See pages 23 and 28 for a list of wetland and wildlife habitat projects



POINTS OF VIEW - SHORELINE HEALTH

PERCY HOULE, AN ELDER FROM EBB AND FLOW FIRST NATION, TALKS ABOUT THE ERODING SHORELINE AND HIS GROWING COMMUNITY.

OBSERVATIONS

Percy is passionate about his community and about providing education for its growing population. Although he has witnessed a startling rise in lake levels in recent years, he isn't concerned about lasting effects on the local ecosystem. He sees the same animals today that he saw as a child, and he boasts about the community's excellent drinking water quality.

To reinforce the importance Percy places on educating the growing number of youth in Ebb and Flow First Nation, the Alonsa Conservation District will continue their environmental education initiatives and partnerships with local First Nations.

Have you always lived in Ebb and Flow?

Yes, nearly. My grandfather was a councilor in Ebb and Flow. I grew up just outside the reserve in a Métis community, but I got my status in the early 50s.

Our house was close to Ebb and Flow Lake, but when the water level rose in the 1950s the community moved up to where it is today, next to the highway.

Have you noticed any changes in the community throughout your life?

I just turned 78, so I have seen a lot. Our population is growing a lot, and it took a while to understand that education is important.

When I was in school we had a log schoolhouse for about 20 or 25 students. The school went up to grade five, and it was named after Father Comeau.

About 40 years ago I worked with our chief and the provincial government to get a 200-student school built. But now they have huts to make the school bigger. **We have about 600 kids in that school right now; in a school built for 200. Some of our people move away for university and for jobs, but people mostly stay here to live.**

What about changes on the land, or changes in the lake?

Well I used to be a commercial fisherman in the winter. I tried for three years to fish on Lake Ebb and Flow, but I had to leave it. Everyone was fishing the lake and there were very few fish left. **As a kid there were a lot more fish, but you can't make a living fishing now.**

I used to hunt, too. Mostly deer. And if an elk ever came by, well too bad for him! The deer are still here, and once in a while moose and elk. We still have a lot of animals. The deer population is down. Not from over-hunting, though—from starving in deep snow. The weather has a lot to do with it. In deep snow the deer can't survive.

Do you have any concerns about the land or water around your home?

My biggest concern is water levels. There is no shoreline now. Where we used to live by the lake, the water has moved up to the bush. It came up in the early 50s for one year, but now it won't go away.

Chemicals get in the water, we hear about that. But I'm not too concerned about the environment here. We have a community

well for drinking water, and a pump house with lines to houses in the community. We have the best drinking water around and haven't had any boil water advisories.



POINTS OF VIEW - LIVING ON THE LAKE

**STEVE KINDZERSKI,
A FORMER
RORKETON-AREA
RANCHER, CROP
FARMER, REEVE,
AND CONSERVATION
DISTRICT BOARD
MEMBER, DISCUSSES
THE CHALLENGES OF
BUILDING A CABIN
ON LAKE MANITOBA
IN THE AFTERMATH
OF THE 2011 FLOOD.**

Why did you choose to build a cabin on Lake Manitoba?

I wanted to retire here because my mother was born and raised on this property. There's nothing like having your own home on the lake. I like the peaceful tranquility, and I like to take my daughters and grandkids out on the lake.

Lake Manitoba suffered a serious flood in 2011. How did the high water affect your property?

The flood mostly affected us mentally. I questioned whether I should have even bought the place. We're in a bay here, and our shore is mostly stone, cattails, and reeds. We also have trees, though, and I was worried that the high water and waves would wash out my trees. I tried to stabilize the shore with more stones to save the trees. Losing my trees along the lakeshore would be the worst thing. We like the trees because they provide shelter.

Have you noticed a lot of erosion and washed out trees along the shore?

Yes. There are lots of people that can't stand trees blocking the lake view, so they clear the land. Or they clear the rocks along the shore so they can mow right up to the lake. But then the shore gets ruined by the water and ice.

Have you noticed any other practices that might harm the shoreline or water quality in the lake? Do you have any other concerns about Lake Manitoba?

I've seen septic mounds leaking into the lake. People still pump water from the lake, though. People dump effluent into the lake, and their grandchildren take swimming lessons there.

From my experience you don't get good drinking water from Lake Manitoba, though. It has either high salt or high iron. We will haul water for drinking and cooking, and let Mother Nature take care of the rest. We've run eavestroughs into an old tank and we'll use soft water for washing clothes and for toilets.

Water is getting to the lake much faster than it used to because of bigger drains, and often there's no thought to what's happening downstream. Our climate is changing so much, they have to take a better look at how to handle the water.

WESTLAKE SHORELINE

- The Westlake Watershed contains 340 kilometres of Lake Manitoba shoreline.
- In recent years, high water levels have resulted in severe erosion of the Lake Manitoba shoreline.



SURFACE WATER MANAGEMENT

BACKGROUND

The current agricultural drainage network in the Westlake Watershed does not meet local expectations. Westlake is typically wet due to the gentle slope of the natural ridge and swale topography, and heavy rains and floods add further stress to the local drainage network. Water will not flow downstream to the lake until surface water levels downstream are low enough for gravity to draw down the upstream surface water levels. In some cases, high water in Lake Manitoba may back up water in upstream drains, stressing an already overtaxed system.

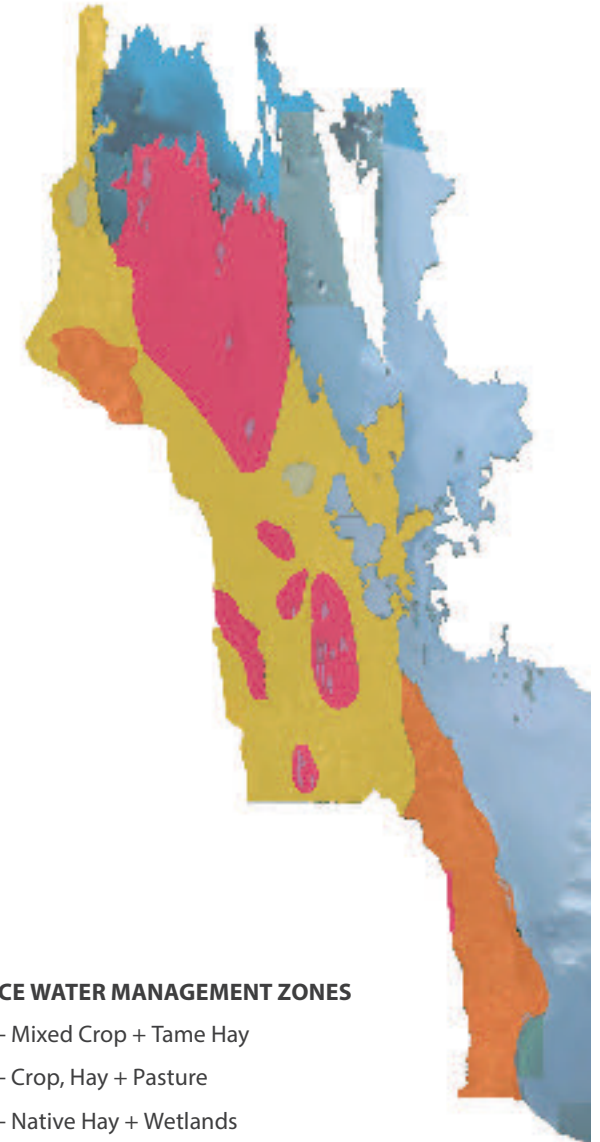
It is unrealistic to expect no crop damage from abnormally heavy rainfall and flooding in the growing season. However, adopting a watershed-based approach to drain improvement and maintenance will ensure that fixing a problem upstream does not create a new problem downstream.

ADOPTING A WATERSHED APPROACH

Decision-making about agricultural drainage must take into account the connectivity between upstream and downstream portions of the watershed. The process should also recognize that portions of the drainage network in the Westlake Watershed were constructed in areas that contain marginal or poor quality soils, only marginally suitable for agriculture. The table on the following page identifies important factors to consider when prioritizing surface water management projects in the Westlake Watershed.

It is also important to recognize alternative methods for reducing crop losses following heavy summer and autumn rainfall. Before any projects are considered, water managers should determine if it is feasible and practical to reduce flow volumes and the frequency and intensity of flood events by: retaining water in areas suitable for holding back water, protecting and utilizing existing wetlands for further water storage, and by restricting further drain development in areas of the watershed unsuitable for farming.

The pages that follow contain information on the three surface water management zones in this watershed, examples of appropriate surface water management tools, and a list of priority projects for each zone.



SURFACE WATER MANAGEMENT ZONE CHARACTERISTICS

ZONE	NAME	TOPOGRAPHY	NATURAL DRAINAGE	AGRICULTURAL DRAINAGE REQUIRED?	AGRICULTURAL DRAINAGE STANDARD ¹	CONVEYANCE REQUIRED ²	CONVEYANCE IMPORTANCE	SURFACE STORAGE POTENTIAL	ANTICIPATED BENEFIT / COST OF AGRICULTURAL DRAINAGE	POTENTIAL INFLUENCE ON DOWNSTREAM AREAS
1	Mixed Crop + Tame Hay	Flat	Imperfect	Yes	Cereal	No	--	Low	High	High
2	Crop, Hay + Pasture	Flat	Imperfect	Maybe	Forage	Yes	High	Medium	Medium	Medium
3	Native Hay + Wetlands	Flat	Imperfect	No	Pioneer-Forage	Maybe	Varies	High	Low	Low

¹ Westlake Watershed Agricultural Drainage Standards;

Cereal: Excess rainfall removed from cropland within 2 to 3 days

Forage: Excess rainfall removed from cropland within 4 to 7 days

Pioneer: Excess rainfall removed from cropland within 10 to 14 days

² Conveyance channels transfer water from one area to another. The flow may be contained within dykes above prairie elevation, often preventing drainage from adjacent land. When water is conveyed through a wetland, a control may be installed to maintain the water level of the wetland.



ZONE 1

MIXED CROP + TAME HAY

ZONE DESCRIPTION

Annual crops and tame hay are grown in the area south of Rorketon and between Amaranth and Langruth. These areas have fair agricultural capability, with very little slope and imperfect soil drainage. Drainage networks support agricultural productivity in these areas. Existing drains in this zone are fairly well-maintained.

ZONE CHARACTERISTICS

- Pockets of land classified as suitable for cereal crop production
- Flat topography with imperfect soil drainage
- Most beneficial zone for agricultural drainage
- Drainage may influence downstream areas
- Low potential for water storage



ZONE 1 GOALS

- +PROTECT AND ENHANCE CROP PRODUCTION
- +MAINTAIN EFFECTIVE DRAINAGE INFRASTRUCTURE
- +MINIMIZE IMPACTS TO THE ENVIRONMENT

All surface water management decisions in this zone should work towards achieving these goals. In the Rural Municipality of Lawrence where water flows north from Zone 1 into Zone 2, drainage activities should not cause flooding downstream.

Examples of surface water management tools appropriate for this zone:

- Gradient control structures (such as staged riffle structures and low level weirs)
- Rock armouring and bioengineering to protect drains and support fish habitat
- Facilitate cooperative consultation on drainage
- Drain maintenance and reconstruction
- Discouraging unlicensed drainage

● Hamlin Drain

The Hamlin Drain is the primary drainage artery (Class V) for the major crop production area around Magnet and East Bay. It runs for 10 miles north of Magnet through Class four and five agricultural lands before emptying into Toutes Aides Bay on Lake Manitoba. The water quality is characterized by high nitrate runoff at the south end and high salinity at the north end. This constructed waterway has been around in some form since the early 1920s, and requires constant maintenance and occasional upgrading.

● South Leifur Drain

The South Leifur Drain services a portion of the southeast part of the watershed—north of Amaranth. It is largely a Class III drain and empties directly into the south basin of Lake Manitoba. Water quality is generally good as most of the drainage area is in hay or pasture, although beaver activity leads to frequent blockage of fish passage and occasional large scale die-offs.

● North Leifur Drain

The North Leifur Drain runs parallel to, and two miles north of, the South Leifur Drain. This drain acts as an industrial outlet for the gypsum mines in the Leifur area and it's often characterized by elevated sulfate levels. It was constructed in the 1980s by the Province and most of the crossing infrastructure is still in relatively good condition.

● Kjartanson Drain

The Kjartanson Drain is the steepest gradient drain in the Alonsa Conservation District. It is classified as a Class II drain, but it presents unique challenges in terms of erosion and crossing maintenance. The drain enters a high beaver population area three miles inland from Lake Manitoba. In the last few years, a recreational cottage development has grown adjacent to the mouth of the drain. Annual repair and beaver removal costs vary widely from year to year.

● Rorketon Drain

As the name suggests, this Class III drain runs eight miles north from the Village of Rorketon to Lake Manitoba. Water quality is generally excellent but most of the infrastructure dates to the 1950s and replacements will soon be necessary. Portions of the drain are also very flat and rapidly fill with cattail growth.

ZONE 2

CROP, HAY + PASTURE



ZONE DESCRIPTION

Zone 2 is important for crop and livestock production and has considerable habitat protection potential. Crop, hay and pasture land extends from the area north of Amaranth to the northernmost tip of the watershed. In this ridge and swale topography, the stony ridges are suitable for livestock operations and the swales support productive crop land. The agricultural capability of soils ranges from marginal to productive, and much of this area is covered with poplar forest.

The hay and pasture land between Toutes Aides and Rorketon has imperfect surface drainage which leads to soil salinity. Because of the very gentle slope, water from upstream agricultural land is slow to move downstream.

Spence Lake poses opportunities and additional challenges for area residents. Some residents have proposed installing an outlet structure to reduce fluctuating water levels and enhance water retention.

ZONE CHARACTERISTICS

- Land is suitable for pasture, forage production, and some crop production
- Flat topography with imperfect soil drainage
- Drainage may influence downstream areas
- Some potential for water storage



ZONE 2 GOALS + SUPPORT CROP AND LIVESTOCK PRODUCTION + PROTECT SENSITIVE WILDLIFE AND FISH HABITAT

All surface water management decisions in this zone should work towards achieving these goals. Because water flows north from the area south of Rorketon toward Toutes Aides, consideration should be given to mitigate the resulting downstream flood events.

Examples of surface water management tools appropriate for this zone:

- Upstream water retention
- Grassed waterways
- Back-flood irrigation projects
- Beaver removal (in defined target areas)
- Rock armouring and bioengineering to protect drains and support fish habitat
- Perennial forage establishment
- Sustainable rotational grazing
- Riparian area management
- Discouraging unlicensed drainage

● Garrioch Creek

The Garrioch Creek is a large, Class IV hybrid waterway responsible for draining most of the southwest region of the watershed. Mostly a constructed drain, the outlet into Lake Manitoba consists of roughly two miles of natural streambank. This is truly a water management system containing fish spawning areas, cattle watering areas and backflood irrigation projects. The main channel requires constant maintenance and beavers are a serious issue.

● Mellonville Drain

The Mellonville Drain is responsible for most of the drainage on the west side of the watershed. Originating in the McCreary Community Pasture, the partially channelized waterway runs twenty five miles north to Lonely Lake (see below). The Alonsa Conservation District Board considers the Mellonville Drain to be an important part of any surface water management plan, and has accepted responsibility for most crossings, excluding those managed by Manitoba Infrastructure and Transportation.

● Lonely Lake Drain

The Lonely Lake Drain is a two mile long, constructed channel. It was built in the 1980s as a tripartite project between Alonsa Conservation District, Manitoba Natural Resources and Ducks Unlimited Canada. It consists of a fixed weir outlet paralleled by two stop-log control structures leading to the outlet channel. Water passes under a reinforced, single-span bridge on PTH68, and finally through a multi-culvert, low-level crossing before entering Lake Ebb & Flow. This channel is one of the most important walleye spawning runs in Lake Manitoba and has been the site of the Alonsa Conservation District's hatchery and spawning camp since 1989.

Nuisance Beavers and Beaver Dam Removal

In the past, the Alonsa Conservation District has spent up to \$40,000 annually hiring contractors to remove beaver dams and contributing to municipal beaver bounty programs. These expenses limit the conservation district's financial capacity to carryout planned infrastructure maintenance activities. The board is reluctant to maintain this costly role in beaver management, and has established policies to limit beaver dam removal costs. These policies were created at the discretion of the Alonsa Conservation District Board and are subject to revision.

ZONE 3

NATIVE HAY + WETLANDS

ZONE DESCRIPTION

Wetlands make up a large portion of the Westlake Watershed. Much of the wetland zone is interspersed with poplar forest. Wetlands provide opportunities for natural water retention and wildlife habitat protection. In dry years, the native grasses in this zone also provide supplementary forage production.

Ducks Unlimited Canada operated three water control projects in the Westlake Watershed: Woods Creek (downstream of Spence Lake), Portia Marsh, and Lonely Lake. None of these projects are currently being operated as designed. The structure at Woods Creek was removed several years ago after the landowner agreements expired in 2001. The Lonely Lake drawdown structure is no longer operated, and water runs out of the lake over an adjacent concrete weir constructed by Manitoba Natural Resources into the Lonely Lake Drain.

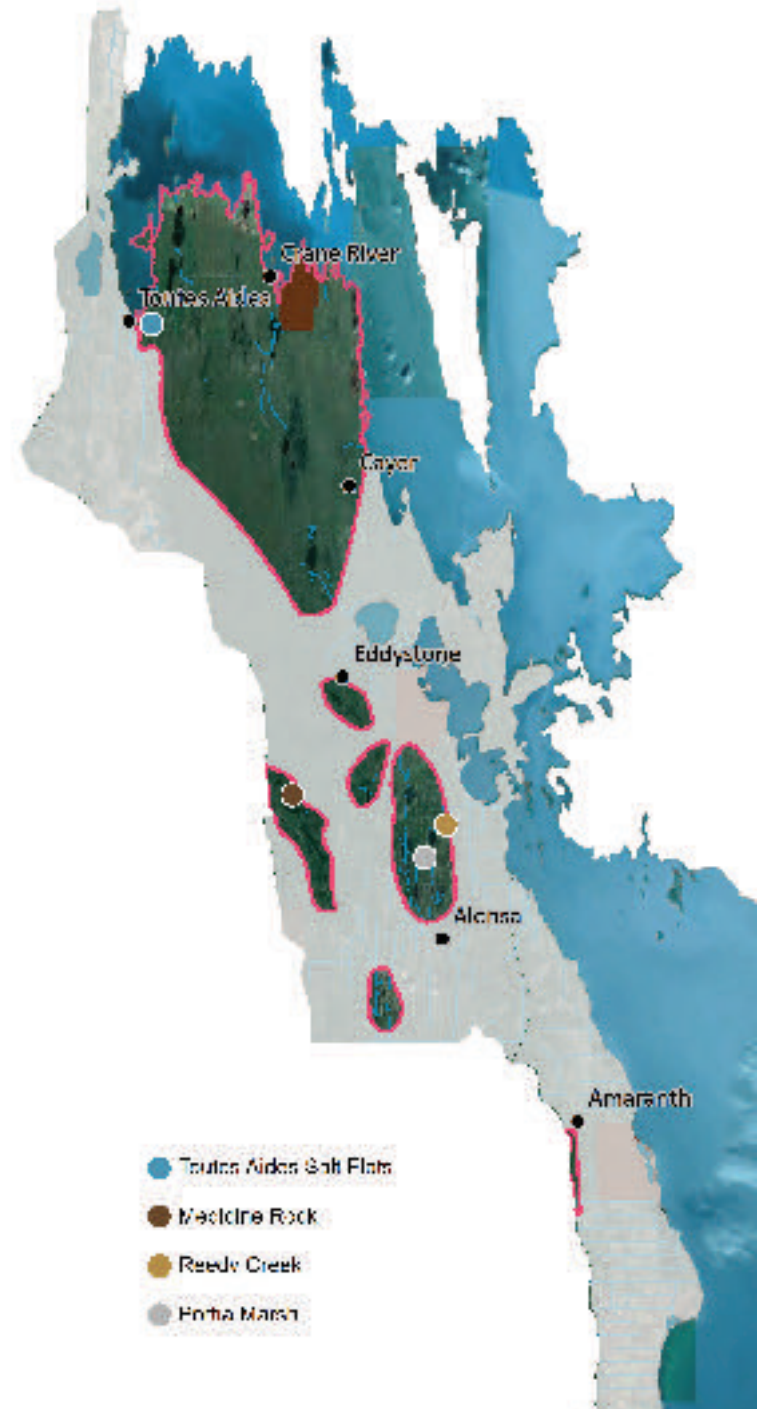
ZONE CHARACTERISTICS

- Primarily wetlands, with some native hay production
- Flat topography with imperfect soil drainage
- Affected by upstream drainage
- Potential for surface water storage

CROWN LANDS

Provincial Crown lands account for approximately 47 percent of the land base in the Westlake Watershed. Most of the productive agricultural lands drain to Crown lands, where natural watercourses tend to be blocked by beaver dams, vegetation, and debris. Water conveyance and retention are important surface water management tools, and maintaining natural watercourses on Crown lands would enable more effective surface water management.

Provincial Crown lands are coded for specific land use and management. Depending on this coding, Crown land lessees may be authorized to make improvements on the land they hold under agricultural lease and request changes to Crown land coding.



ZONE 3 GOALS

+ ENHANCE ECOLOGICAL SERVICES
+ PROTECT WATER QUALITY

+ SUPPORT ECOTOURISM

+ PROTECT SENSITIVE WILDLIFE AND FISH HABITAT

All surface water management decisions in this zone should work towards achieving these goals.

Examples of surface water management tools appropriate for this zone:

- Ensure naturally fluctuating water levels
- Improve access to natural areas to encourage wetland appreciation in Westlake Watershed
- Ensure residential and cottage development around waterways considers naturally fluctuating water levels
- Perennial forage establishment
- Riparian area management

Unsuitable activities for this zone:

- Drainage (not including conveyance and residential flood protection)
- Deforestation (clearing marginal land for agricultural production)

● Portia Marsh

The Portia Marsh is a \$1.8 million wetland complex developed in the 1980s by Ducks Unlimited Canada to the north and west of the Village of Alonsa. There are two water outlets on the system: one through Jarvie Lake into Reedy Creek, and the other through Pedro Lake into Sucker Creek. From 1990 to 1992, the Alonsa Conservation District built an extensive network of marsh boardwalks, forest trails, picnic facilities and interpretive signage at the Jarvie Lake unit. This is now the primary outdoor educational facility in the watershed, and is widely used by schools within and outside the watershed.

● Medicine Rock

Assin Ka Micha Bikisit (Medicine Rock) is a 9,600 acre site located entirely within the Alonsa Wildlife Management Area. It contains one site of recreational significance and one site of spiritual significance to local First Nations. This site was developed in 1997 at the request of local Elders, based on the success of the earlier Thunderbird Nest initiative. The project initially included only interpretation of the petroform site and trail access. At the request of the World Wildlife Fund, the project was later expanded to afford a significant level of protection from development for important wildlife habitat. The area is used extensively on an annual basis by large numbers of First Nation persons, though several consecutive wet years have limited the usefulness of the cross-country trail.

● Toutes Aides Salt Flats

Near the mouth of Bretecher Creek, adjacent to the tiny Village of Toutes Aides, flat terrain, poor surface drainage and high water table have conspired to create a unique—if somewhat harsh—landscape. The resulting salt flats and shallow ponds provide habitat for tiny salt shrimp, which in turn provide enough food for several pairs of American Avocets to nest here annually. This species is by no means endangered, but at the edge of its range in central Manitoba it still provides an unusual and colourful spectacle. By sheer coincidence, a pair of Ospreys nest on a power line immediately adjacent to this site. The Alonsa Conservation District intends to seek an external partner to develop this site for ecotourism. The site is already adjacent to a major tourist-utilized route, and the agricultural potential is limited, at best.

● Reedy Creek

Land in the Reedy Creek area has poor surface drainage and floods regularly, leading to high salinity in the soil profile. The Alonsa Conservation District will establish a test plot to determine the most suitable forage options for this site and provide more resilient permanent cover.

Conveyance Through Agricultural Crown Lands

In areas where higher classed agricultural land drains into Crown land, the Alonsa Conservation District will work with the provincial government to identify priority sites for changes to Crown land coding and seek opportunities to move water efficiently and effectively through these natural areas.

DRINKING WATER PROTECTION

With the exception of First Nations and Aboriginal and Northern Affairs communities in the Westlake Watershed, most watershed residents access their drinking water from private wells. Well owners are responsible for the safety of their wells, and can take steps to protect the safety of their drinking water. Because wells in this watershed are typically shallow, contaminants on the surface can readily enter the groundwater aquifer and deteriorate water supply. Fortunately, potential contamination sources are not common in the Westlake Watershed. The most significant risks come from human and animal waste and overland flooding. Actions such as establishing vegetative groundcover around wells, regular well inspection and maintenance, and improving storage and use of potential contaminants such as fertilizer, fuel and pesticides will help to prevent contamination of Westlake drinking water sources.

FIRST NATION DRINKING WATER SOURCES

A 2011 assessment of First Nations water systems across Canada classified the three First Nation drinking water sources in the Westlake Watershed as high risk due to source contamination. Ebb and Flow First Nation's drinking water comes from a groundwater well. Sandy Bay First Nation and O-Chi-Chak-Ko-Sipi First Nation's drinking water comes from surface water. The deficiencies of these drinking water sources pose a high risk to the quality of drinking water produced by the treatment systems, which may lead to potential health and safety or environmental concerns.

The drinking water protection actions recommended in this plan will help reduce risk to these drinking water sources.

DRINKING WATER PROTECTION PROJECTS

RECOMMENDATION	LEAD AND SUPPORT ORGANIZATIONS	TARGET AREAS	EVALUATION OF SUCCESS
Encourage private well sampling to detect nutrients and bacteria and identify potential sources of contamination	ACD , landowners	Watershed	100 wells are inventoried and sampled by 2019
Implement beneficial management practices to reduce groundwater contamination	ACD, MAFRD	Watershed	10 projects are implemented by 2024
Seal abandoned wells	ACD, landowners	Watershed	30 wells are sealed by 2024

PROTECTING YOUR DRINKING WATER AT HOME

There are several things well owners can do to protect the quality of their groundwater:

- + **Protect well from sources of contamination.** Ensure surface water drains away from the well site. Maintain vegetative groundcover around well. Store potential contaminants away from the well.
- + **Visually inspect well regularly.** Well casing should be intact and the well annulus sealed with grout. Maintain as needed.
- + **Test well water regularly.** Address contamination promptly.
- + **Hire a licensed and reputable water well contractor to drill and install new wells and hook up water distribution systems.** Before operating a well, ensure the well, pump, and water distribution system have been disinfected to kill any bacteria.
- + **Seal abandoned wells.** Wells no longer in use should be properly sealed according to the standards set out in Manitoba's Guide for Sealing Abandoned Water Wells.

» If you have an unsealed abandoned well on your property the Alonsa Conservation District can help you seal it. For more information, please contact the office at (204) 767-2101.

» If you require information about drilling a new well, please contact the Manitoba Well Drilling Liaison Officer at (204) 945-7418.



RECOMMENDATIONS FOR PUBLIC DRINKING WATER SYSTEMS

There are four provincially-regulated public drinking water systems in the Westlake watershed. In Manitoba, public water systems are drinking water systems that have 15 or more service connections. The Manipogo system has a groundwater source, the Waterhen system treats water from Waterhen River, the Crane River system treats water from Lake Manitoba, and the Langruth system treats water from a surface slough.

Each system was assessed in 2012 by a drinking water officer and representative from the project management team. The assessments identified potential sources of contamination, and led to the development of recommendations for addressing potential risks. Recommended actions are listed in the table below.

PUBLIC SYSTEM	RECOMMENDED ACTION
WATERHEN	Ensure an emergency response plan is in place should upstream wastewater treatment systems discharge effluent into Waterhen Lake that does not meet water quality standards.
MANIPOGO	Extend well casing to at least 16 inches above ground surface for all wells.
CRANE RIVER	Ensure an emergency response plan is in place should upstream wastewater treatment systems discharge effluent into Waterhen River or Manipogo Bay that does not meet water quality standards.
LANGRUTH	Maintain a 400 metre vegetated buffer between the public drinking water source and pasture land.



SURFACE WATER QUALITY

Because there are no major streams in the Westlake Watershed, the Province of Manitoba has not established a long-term water quality monitoring site in the watershed and has insufficient data to calculate the Water Quality Index for this area.

For seven years between 2006 and 2012, the Alonsa Conservation District monitored water quality at 20 sites in the Westlake Watershed. The purpose of this water quality sampling program was to observe water quality trends in the watershed. The results of these tests cannot be used to provide conclusive water quality analysis. They can, however, indicate general water quality patterns in the watershed.

The highest nitrate concentrations appeared in Garrioch, Hamelin and Rorketon Drains, which are primarily crop areas. Although the concentrations fell below the objective values for health and nuisance plant growth, surface water quality projects should be focused in these areas to ensure nutrient concentrations remain below objective values. Beneficial management practices that would help reduce nutrient and bacteria loading in the Westlake Watershed include: cover crop and perennial forage establishment, sustainable rotational grazing, manure management, livestock exclusion fencing, alternate livestock watering systems, and permanent vegetation establishment along watercourses.

SURFACE WATER QUALITY PROJECTS

RECOMMENDATION	LEAD AND SUPPORT ORGANIZATIONS	TARGET AREAS	EVALUATION OF SUCCESS
<i>Provide Manitoba's Water Protection Handbook – Everyone's Responsibility</i> to property owners along Lake Manitoba	ACD	Lake Manitoba property owners	Handbook is distributed
Promote the adoption of beneficial management practices for livestock and cropping systems that assist in reducing nutrient loss to surface water bodies	ACD, AAFC, MAFRD, Alonsa Grassland Management Association, Lawrence Cattleman's Co-op, Westlake Grazing Club	Watershed, with focus on livestock and cropped lands	10 projects are implemented by 2024
Encourage agro-environmental educational initiatives on Community Pastures and Crown lands to demonstrate the benefits of implementing beneficial management practices and support better surface water management, water quality, and wildlife habitat	ACD, AAFC, MAFRD, Alonsa Grassland Management Association, Lawrence Cattleman's Co-op, Westlake Grazing Club, Manitoba Conservation Districts Association	Watershed	Three demonstrations are held by 2024

FISH AND WILDLIFE HABITAT

Westlake Watershed residents value the recreational and commercial fishery on Lake Manitoba. Addressing barriers to fish passage, eroding stream banks, poor water quality, and straightened drainage channels will help to support healthy fish habitat and spawning grounds.

The Westlake Watershed provides habitat for some unique and rare wildlife species, including the piping plover (endangered), red-headed woodpecker (rare to uncommon), and foxtail muhly grass (very rare).

In particular, the shoreline and marsh habitat adjacent to and along Lake Manitoba and Winnipegosis are biologically important and sensitive. Four large Wildlife Management Areas (Cayer, Westlake, Alonsa, and Langruth) have been set aside for wildlife and recreation, and two small provincial parks (Manipogo Provincial Park and Margaret Bruce Provincial Park) provide recreation opportunities and shoreline protection by retaining vegetative cover along the lakeshore.

The extensive Crown lands in this watershed provide the opportunity to establish intact protected areas. Using habitat corridors to link existing designated Crown lands will benefit the biodiversity of the watershed and counteract habitat fragmentation. The Protected Areas Initiative and MAFRD are also reviewing haying and grazing coded Crown lands for potential inclusion in the Protected Areas Network.

Additionally, the provincial government is reviewing the proposed Reykjavik Game Bird Refuge, McCreary Pasture Area of Special Interest, and Alonsa Pasture Area of Special Interest for potential inclusion in the Protected Areas Network.

RECOMMENDATION	LEAD AND SUPPORT ORGANIZATIONS	TARGET AREAS	EVALUATION OF SUCCESS
● Protect McCreary Community Pasture under a conservation agreement to ensure continued grazing of the land.	ACD, MAFRD, MCWS, MHHC	McCreary Community Pasture	Conservation agreement is established
Support Ducks Unlimited Canada education programs in local schools	ACD, DUC	Watershed	One education program is run each year
● Assess walleye spawning habitat and water quality upstream of the Lonely Lake Fish Hatchery to determine if the hatchery is necessary for successful spawning	ACD	Lonely Lake Drain	An assessment is completed
● Restore natural walleye spawning beds at the Lonely Lake Drain	ACD	Lonely Lake Drain	Project is completed
● Enhance existing spawning areas near Toutes Aides on Doufous Creek and Bretecher Creek	ACD	Doufous Creek and Bretecher Creek	Projects are completed
● Investigate the nursery potential of Steeprock Lake as a growth area for walleye fry	MANA, ACD	Steeprock Lake	Assessment is completed
● Install a fish ladder on Woods Creek and attempt restoration of commercial fishery on Spence Lake	MANA, ACD	Woods Creek and Spence Lake	Project is completed
● Improve fish passage and spawning habitat on Garrioch Creek	ACD	Garrioch Creek	Project is completed



IMPLEMENTING ACTIONS

The most important aspect of the Westlake Integrated Watershed Management Plan is implementation. Without a concerted effort to implement the recommended actions, the plan would be no more than a list of good intentions. The Alonsa Conservation District, watershed organizations, residents and all levels of government will strive to work together to ensure the recommendations outlined in this plan are implemented successfully.

Implementation progress and plan success will be assessed regularly over the next ten years. After five years of implementation the plan may be revised if watershed priorities have changed or if new actions are required. A new plan will be developed in ten years.

SUMMARY OF WATERSHED PRIORITIES AND ACTIONS

Surface Water Management Priorities – pp. 19, 21, 23

- Hamlin Drain
- South Leifur Drain
- North Leifur Drain
- Kjartanson Drain
- Rorketon Drain
- Garrioch Creek
- Mellonville Drain
- Lonely Lake Drain
- Address nuisance beavers dams
- Portia Marsh
- Medicine Rock
- Toutes Aides Salt Flats
- Reedy Creek
- Improve conveyance through Agricultural Crown land

Drinking Water Protection Priorities – p. 24

- Sample private wells
- Implement BMPs to reduce groundwater contamination
- Seal abandoned wells
- Ensure emergency response plans are in place at wastewater treatment facilities
- Protect public and private wells from contamination

Surface Water Quality Priorities – p. 27

- Distribute Manitoba's Water Protection Handbook to property owners along Lake Manitoba
- Promote BMPs to reduce nutrient loss to surface water bodies
- Encourage agro-environmental education initiatives

Fish and Wildlife Priorities – p. 28

- Protect McCreary Community Pasture
- Support education programs in local schools
- Assess Lonely Lake Fish Hatchery
- Restore natural walleye spawning beds at the Lonely Lake Drain
- Enhance spawning areas near Toutes Aides
- Investigate nursery potential on Steeprock Lake
- Install fish ladder on Woods Creek
- Improve fish passage and spawning habitat on Garrioch Creek

REFERENCES

Aboriginal Affairs and Northern Development Canada. 2011. National Assessment of First Nations Water and Wastewater Systems: Manitoba Regional Roll-Up Report. By Neegan Burnside.

Available online: https://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/enr_wtr_nawws_rurman_rurman_1315328086512_eng.pdf

Agriculture and Agri-food Canada – Agri-Environmental Service Branch and Manitoba Agriculture, Food and Rural Initiatives. 2010. Agricultural Land Use and management in the Westlake Watershed.

Manitoba Conservation. 2010. Westlake Watershed Technical Information Request, unpublished memorandum. Available online:

https://www.gov.mb.ca/conservation/waterstewardship/iwmp/west_lake/west_lake.html

Manitoba Conservation and Water Stewardship. 2013. A Profile of Manitoba's Commercial Fishery.

Available online: https://www.gov.mb.ca/waterstewardship/fisheries/commercial/pdf/mb_com_fish_profile_2013.pdf

Manitoba Water Stewardship. 2010. Water Control Systems Management in the Westlake Watershed, unpublished report. Available online:

https://www.gov.mb.ca/conservation/waterstewardship/iwmp/west_lake/west_lake.html

Manitoba Water Stewardship. 2010. Westlake Surface Water Hydrology, unpublished report.

Available online: https://www.gov.mb.ca/conservation/waterstewardship/iwmp/west_lake/west_lake.html

Manitoba Water Stewardship. 2010. Groundwater Resources of the Westlake Watershed, unpublished report. Available online:

https://www.gov.mb.ca/conservation/waterstewardship/iwmp/west_lake/west_lake.html

Manitoba Water Stewardship. 2010. Westlake Integrated Watershed Management Plan Water Quality Report, unpublished report. Available online: https://www.gov.mb.ca/conservation/waterstewardship/iwmp/west_lake/west_lake.html

Westlake Watershed Project Management Team. 2010. Westlake Integrated Watershed Management Plan Public Consultation Summary, unpublished report. Available online:

https://www.gov.mb.ca/conservation/waterstewardship/iwmp/west_lake/west_lake.html

ACKNOWLEDGEMENTS

As the Water Planning Authority for the Westlake Watershed, the Alonsa Conservation District would like to gratefully acknowledge the watershed residents and partners who supported and participated in the development of the Westlake Integrated Watershed Management Plan.

Thank you to the Rural Municipalities of Alonsa and Lawrence and the Province of Manitoba for their support through the development of this plan, and special thanks to the members of the Project Management Team: Chairman Fred Taylor, Dave Milani, Ed Zdan, Harry Harris, Lyle Finney, Derm English, and Suzanne Chiupka.

LIST OF ACRONYMS USED IN THE PLAN

AAFC – Agriculture and Agri-Food Canada

ACD – Alonsa Conservation District

MANA - Manitoba Aboriginal and Northern Affairs

MCWS – Manitoba Conservation and Water Stewardship

MAFRD – Manitoba Agriculture, Food and Rural Development



WESTLAKE INTEGRATED WATERSHED MANAGEMENT PLAN