



RIPARIAN SETBACK MATRIX MODEL FOR OLDMAN RIVER REGIONAL SERVICES COMMISSION



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- Jay is the principal researcher and founder of *Aquality* Environmental Consulting Ltd.
- certified Alberta Professional Biologist and Interim Wetland Science Practitioner (IWSP)
- earned his M.Sc. degree from the University of Alberta, working with Ducks Unlimited Canada on Frank Lake, the largest wetland restoration project in Canada
- research associate at the University of Alberta for three years as the Land-Aquatic Program Administrator for the Sustainable Forest Management Network
- Alberta Water Council representative for the Lake Environment Conservation Sector for the past 10 years, been involved with the Provincial Water Strategy (Water for Life) since its creation in 2003
- involved with several non-profit groups such as the Alberta Lake Management Society, Inside Education, Ducks Unlimited Canada and Trout Unlimited Canada



Outline



1. Riparian Areas
2. Riparian Areas are in Declined
3. Functions of Riparian Areas
4. Legislation Affecting Riparian Areas
5. Riparian Setback Matrix Model (RSMM)
6. Case Studies
7. Legislation Affecting Watercourse and Wetlands
8. Alberta's Wetland Policy





7. Legislation Affecting Watercourses and Wetlands



Alberta *Water Act* (1999)



You don't own the water on your land!

- *Water Act* Defines “water” and a “waterbody”
- Regulates and enforces actions that affect water and water use management, the aquatic environment including wetlands
- **Does not** distinguish between wetlands in the White Zone and Green Zone
- Prohibits anyone from draining, altering or infilling wetlands on **private or public land** unless authorized to do so by the Province through an approval under the provisions of the *Act*



Alberta *Public Lands Act*



- You don't own the land under the water!
 - ***Public Lands Act:***
 - (1) Subject to subsection (2) but notwithstanding any other law, the title to the beds and shores of
 - (a) all **permanent** and naturally occurring bodies of water
 - (b) all naturally occurring rivers, streams, watercourses and lakes
- is vested in the Crown in right of Alberta



Bed and Shore



- The Crown owns the **beds and shores** of all permanent and naturally occurring bodies of water including wetlands in the White Area, and ALL the land in the Green Area, including its wetlands
- Differentiates wetlands into **White** (settled) and **Green** (forested) Zone areas





Provincial Watercourse and Waterbody Descriptions



- Watercourses are defined by QAES dealing with *Water Act* COP issues
 - QAES - Flowing water
- Waterbodies are defined by QWSP dealing with *Water Act* and *Public Lands Act* wetlands issues
 - QWSP - Wetlands and lakes



What is a *QWSP*?



Qualified Wetland Science Practitioner

- A **QWSP** is an expert with detailed knowledge of the aquatic environment, wetland soils, wetland species, wetland hydrology and wetland margin habitat and their management or assessment





Provincial Watercourse and Waterbody Descriptions



Defined by a QAES:

Watercourses			
Type	Width	Channel Characteristics	Setback Requirement²
Large Permanent ¹	> 5 m	Defined Channel	100 m
Small Permanent ¹	0.7 – 5 m	Defined Channel	45 m
Intermittent/Spring ¹	< 0.7 m	Defined Channel	45 m
Ephemeral		No Defined Channel	15 m

¹ May or may not contain continuous flow
² The setback for watercourses is measured from top of break (valley), or where undefined, from the top of the bank.



Provincial Watercourse and Waterbody Descriptions



Defined by a QWAES:

Waterbodies		
Type	Basin Characteristics	Setback Requirements ³
Lakes	Open water (> 2m depth)	100 m
Permanent Shallow Open Water Ponds (S&K V*)	Open water (> 2m depth) deep marsh margin	100 m
Semi-permanent Ponds/wetlands (S&K IV)	Emergent deep marsh throughout	100 m
Non-permanent Seasonal Wetlands (S&K III*)	Shallow marsh	45 m
Non-permanent Temporary Wetlands (S&K II*)	Wet meadow	15 m setback requirement for wellsites and pipelines
Fens	No defined channel – slow flowing	No specific setback – attempt to leave undisturbed
Bogs	Peatland – acidic wetland – no flow	No specific setback
³ The setback is from the defined bank of the waterbody or the outer margin of the last zone of vegetation that is not defined / bounded by upland vegetation communities.		



Are there Wetlands?



Look for some of the usual euphemisms (Engineers, Surveyors, Planners):

- low lying area (or low wet area)
- ephemeral draw
- seasonally wet area (or temporarily wet area)
- discharge area
- vegetation change area

What is your professional due diligence? Qualified people, experience and trust...nothing is typical, everything is unique

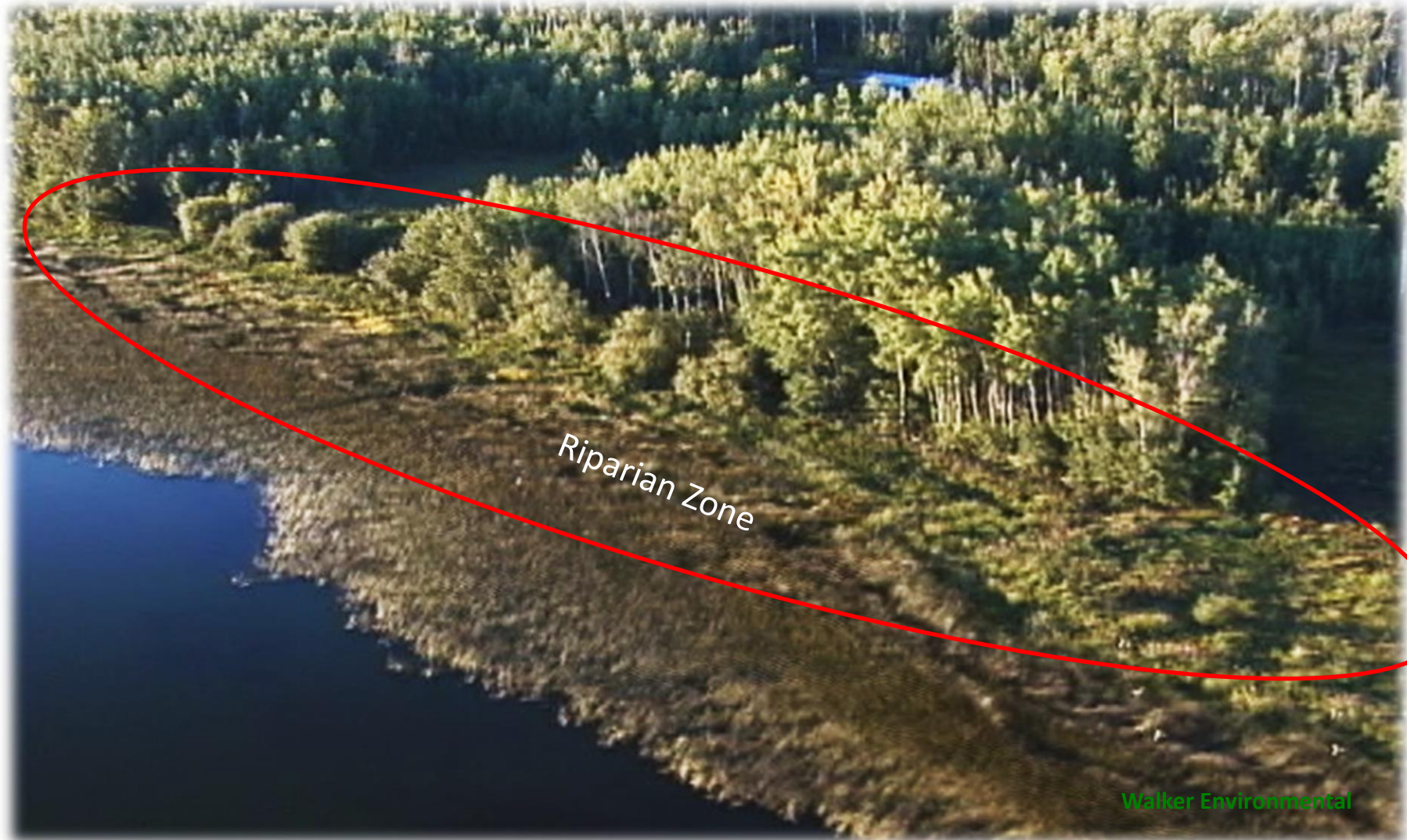


1. Riparian Areas





What are Riparian Areas?



Riparian Areas Defined



“Riparian areas are plant communities contiguous to and **affected by surface and subsurface hydrologic features** of perennial or intermittent lotic and lentic water bodies (rivers, streams, lakes, or drainage ways). Riparian areas have one or both of the following characteristics:

- (1) distinctly different **vegetative species** than adjacent areas
- (2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms. Riparian areas are usually **transitional** between wetland and upland”

-United States Fish and Wildlife Service (1997)



Riparian Areas Defined



- The **highly productive** land immediately adjacent to a body of water that supports high biodiversity
- **Critical** for reducing the negative effects of various land-uses on adjacent waters
- Characterized by **hydrophytic vegetation, hydric soils,** and are affected by and adapted to fluctuating water levels or otherwise persistent hydrological factors and the complex interactions occurring between these and the biota dependant on them



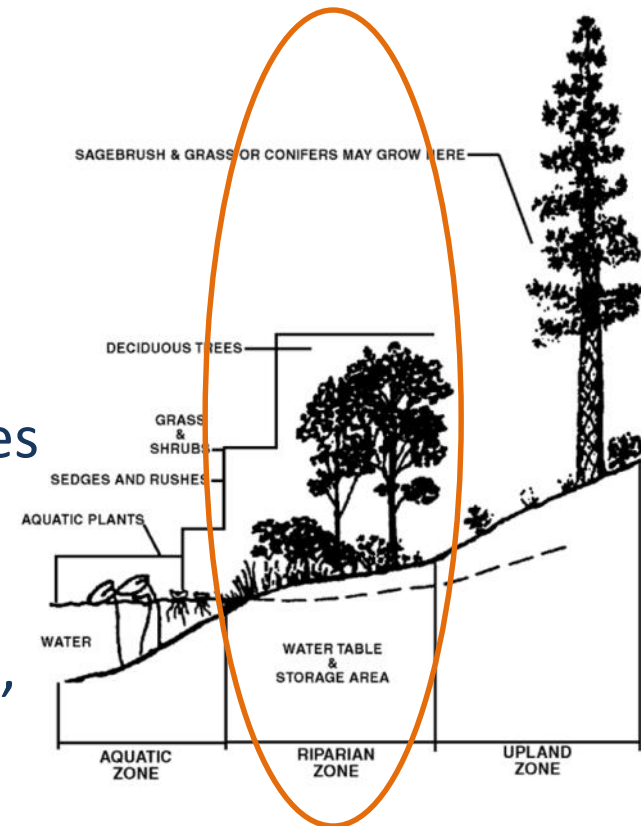
Riparian Areas Defined



Alberta Water Council Definition:

“Riparian lands are:

- **transitional areas** between upland and aquatic ecosystems.
- Have variable width and extend both above and below ground.
- **Influenced by and/or exert an influence** on associated water bodies, which includes alluvial aquifers and floodplains, when present.
- Riparian lands usually have soil, biological, and other physical characteristics that reflect the influence of water and/or hydrological processes.”





Where do you find Riparian Areas?



**Lakes, Streams, Rivers, Swamps,
Marshes, Bogs, Fens and Estuaries**

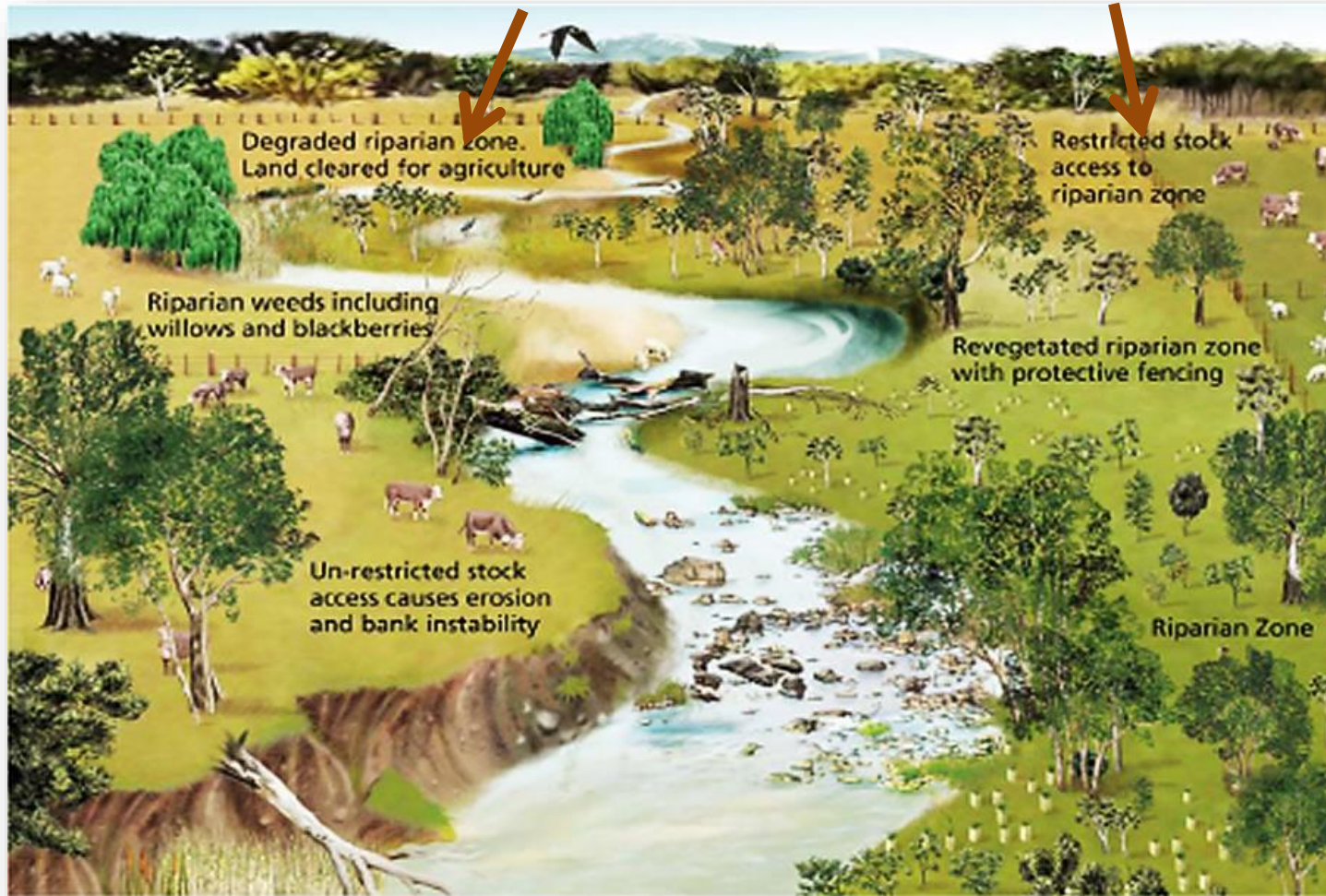




Riparian Areas



Riparian Areas can be Degraded (unhealthy) or Intact (healthy)



Healthy Riparian Areas



Unhealthy Riparian Areas





Unhealthy Riparian Areas





Where is the Riparian Area?





Where is the Riparian Area?



How do you determine the extent of the riparian area?



Riparian zones are characterized by water-loving and upland vegetation. The identification of these plants allows you to delineate riparian zones.



Carex atherodes (Awned Sedge)



Typha latifolia (Cattail)



Sparganium eurycarpum (Giant Burrhead)



Betula spp. (Birch)



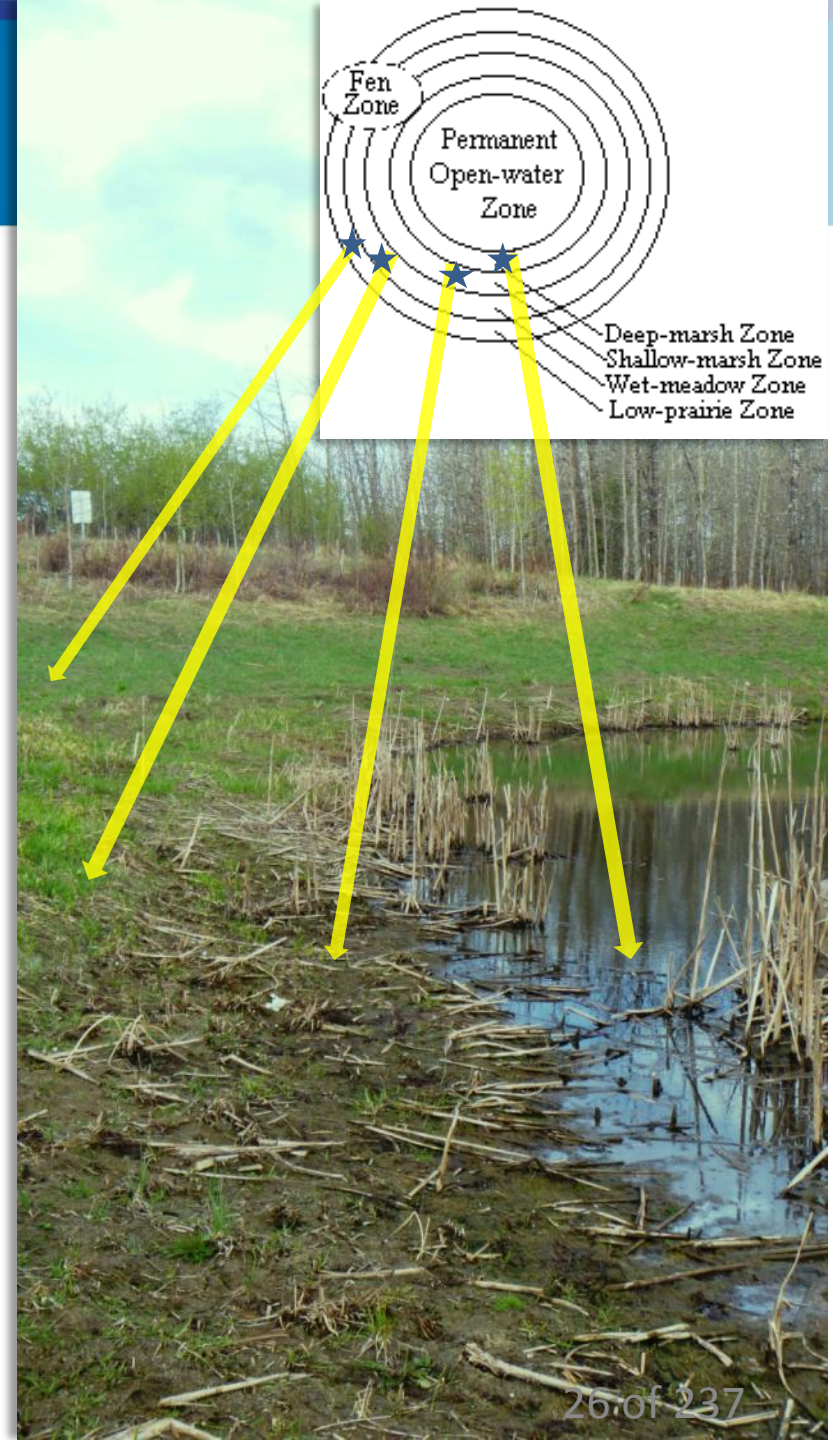
Salix spp. (Willow)



Where does the Riparian Area end?



According to the Stewart and Kantrud Wetland Classification System (1971):
the transition zone is at the end of Zone 2 (wet-meadow) and the start of Zone 1 (low-prairie)



Where does the Riparian Area end?



Upland species that indicate the end of the riparian area:

- Bebb's Willow
- Kentucky Bluegrass
- Buckbrush
- Wheatgrass spp.
- Tall Goldenrod
- Common Wild Rose
- Canada Anemone
- Fleabanes
- Prairie Sage
- Some Aspen and Poplar spp.





2. Riparian Areas in Decline





Riparian Areas in Decline

- Despite the list of benefits and services provided by wetlands and riparian areas, they continue to be drained and degraded
- Alberta has seen losses of about 64% of the total wetlands in the settled areas (white zone)
 - Some areas as high as 90% lost
- Riparian health continues to degrade:

Health Status	Early 19 th Century	Present (2002)
Healthy	70%	11%
Healthy w/ problems	20%	49%
Unhealthy	10%	40%

Table information courtesy of Cows and Fish Riparian Areas: A User's Guide to Health



Riparian Areas in Decline



- Where riparian areas are compromised, ability to perform some or all key functions is lost
- The watershed may experience:
 - Reduced water quality
 - Increased runoff, erosion and sedimentation
 - Reduced groundwater storage
 - Higher peak flows and lower base flows
 - Increased flood and drought frequency
 - Reduced habitat quality and food supplies
 - Declined recreation and aesthetic value





3.Functions of Riparian Areas





Importance and Function



- 1. Water Quality:** Filters and absorbs excess nutrients, sediments and pollutants from surface runoff and subsurface flow.
- 2. Water Storage and Flood Control:** Recharges aquifers through slow release during dry periods. Stores flood water and energy to attenuate flood waters.
- 3. Bank Stabilization:** Roots of plants stabilize the soils and protect shorelines from erosion caused by waves and boat wakes by reducing and dissipating wave energy.
- 4. Aquatic and Terrestrial Habitat:** Provides vital wetland habitat and biodiversity. Feeding, spawning and rearing habitat for fish (emergent riparian vegetation).
- 5. Peatland Carbon Storage and Use:** Peatlands are natural carbon sinks and globally store at least 550 Gigatonnes of carbon in their organic soils (x2 the world's forests).

1. Water Quality



- Trap and store sediment
 - Builds soil on banks and shores
 - Traps contaminants and excess nutrients attached to soil particles
 - Reduces turbidity
 - Increases habitat quality

The effect of wetlands on water quality is so dramatic that artificial wetlands are sometimes created specifically to treat domestic, municipal, and industrial wastewater where no wetlands were originally present.

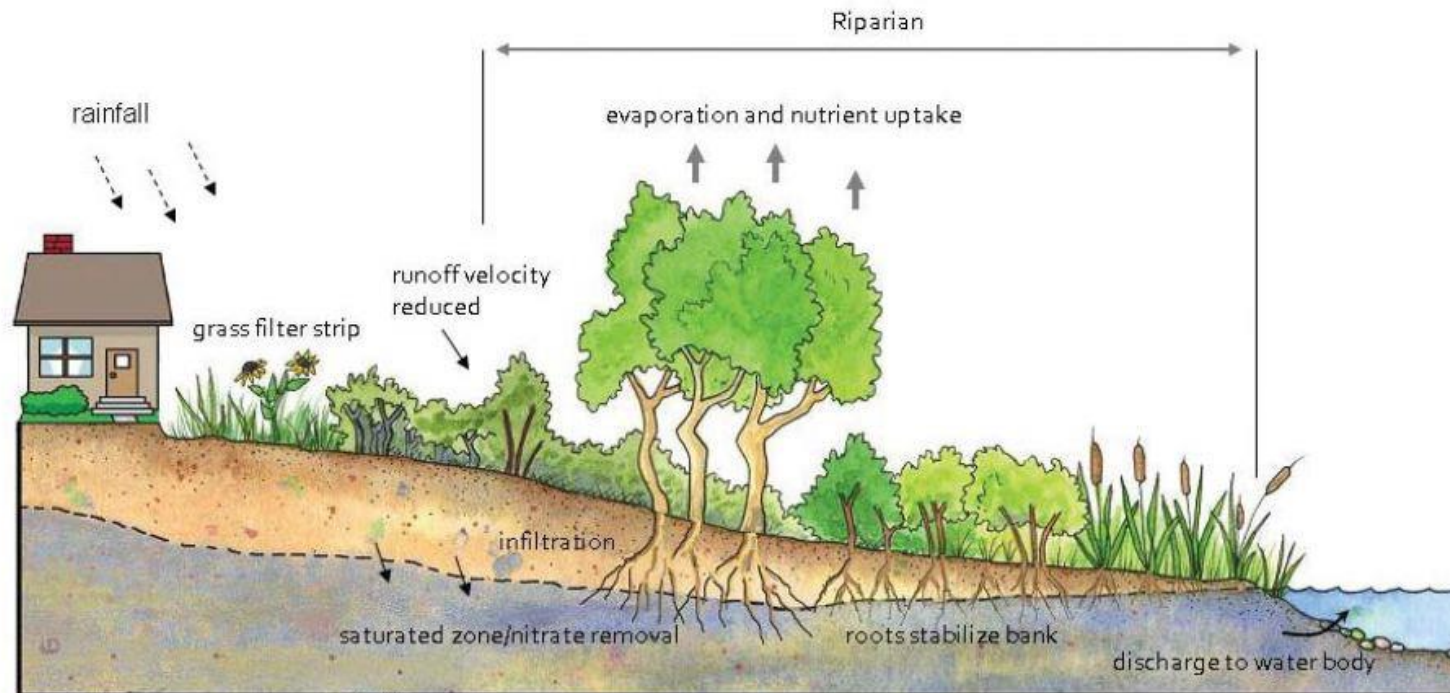


Cottonwoods on a floodplain

Water Quality



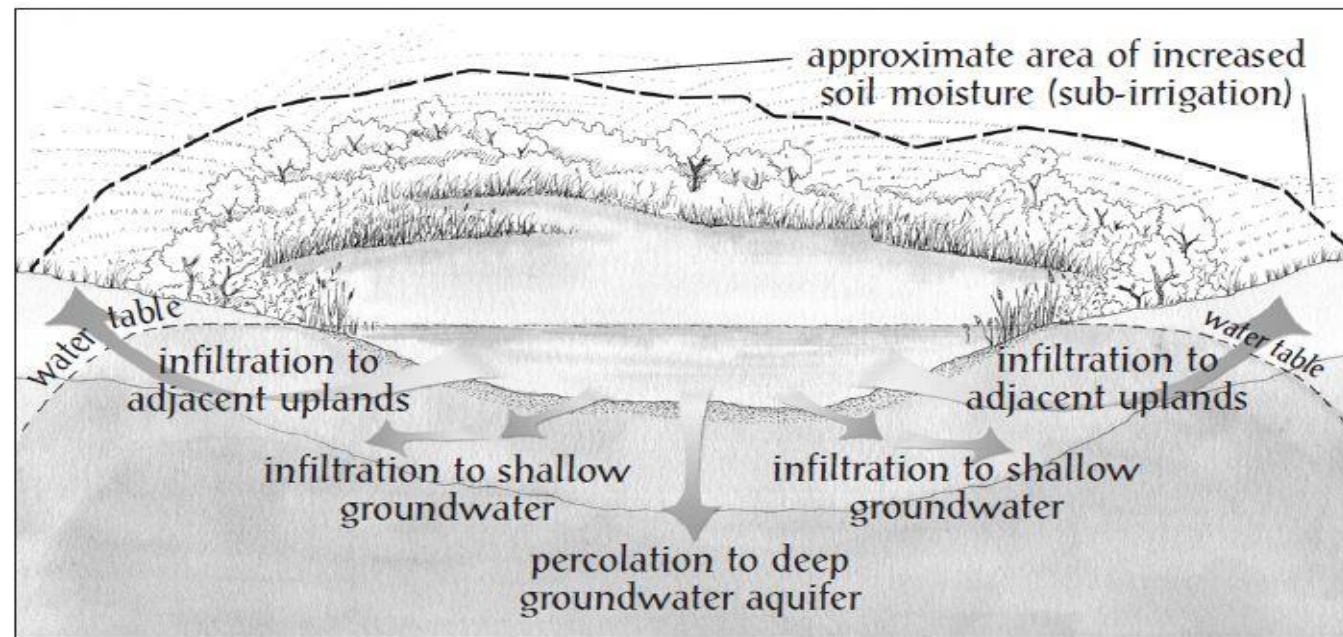
- Filter and buffer water
 - Plant roots take up nutrients and contaminants in the water
 - Broken down in the plant to less harmful forms
 - More vegetation will increase the water bodies ability to react to and buffer any changes in chemistry



2. Water Storage and Flood Control



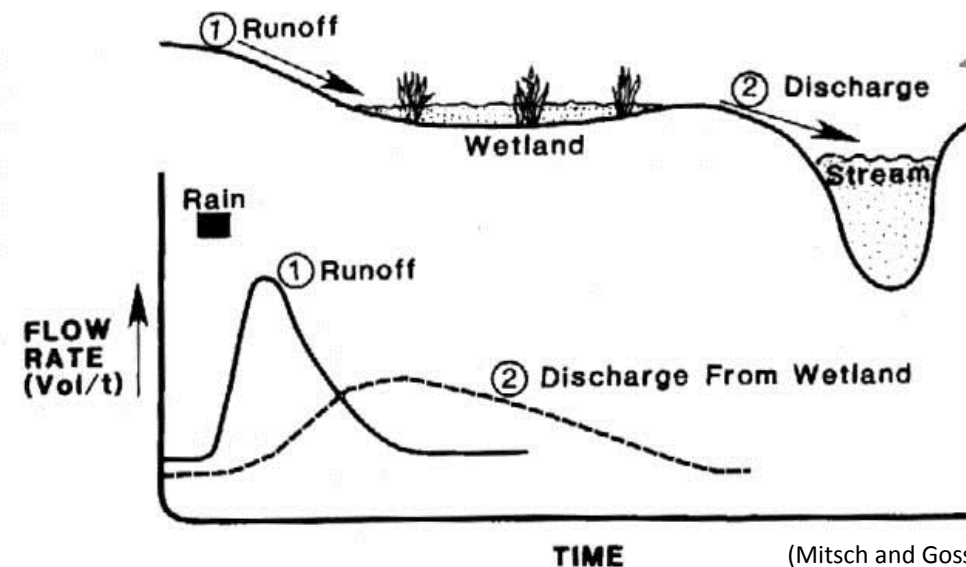
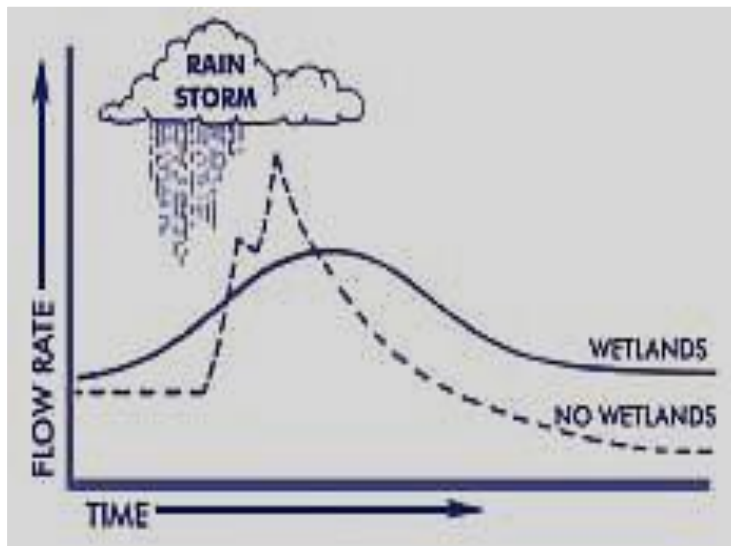
- Store water and energy
 - Slows water for increased infiltration into soil and groundwater sources
 - Stores excess water and releases slowly into surrounding area as needed
 - Utilizes floodplain in times of flood events
 - Reduces peak flows and maintains base flows



Flood Mitigation



- Wetlands and riparian areas act as “**natural sponges**” store water during periods of drought and help to buffer floods during high precipitation events
- Wetlands are nature’s major flood-control agents
- In “giant floods”, they may only reduce flood height
- With river alterations and development in floodplains, the bottom line is that you will pay so

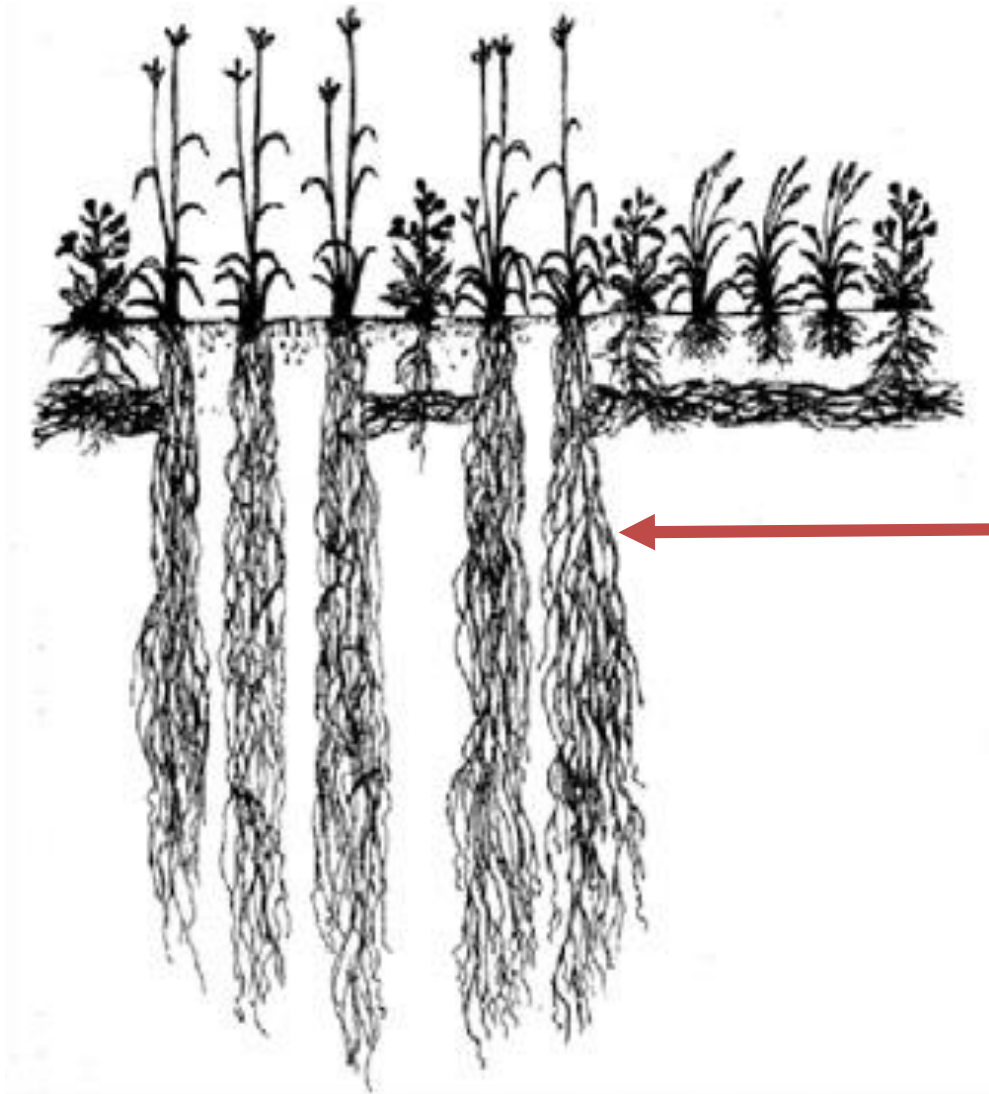


(Mitsch and Gosselink, 1993)

Figure 15-7 The general effect of wetlands on streamflow.

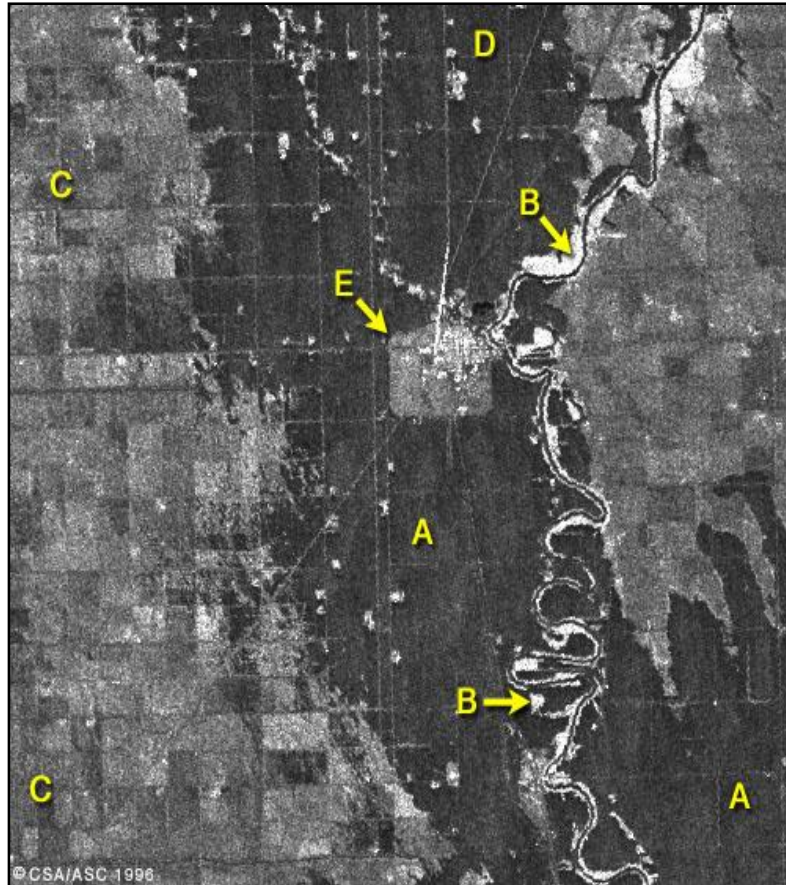


Flood Mitigation



Native grasses and plants have deep root systems which are more effective at preventing erosion and preventing the spread of laterally rooted invasive plants like Canada thistle

Case Study: Red River Flood, Manitoba major events in 1950, 1997, 2009, 2011



- A – flooded area
- B – non-flooded, near the Red River
- C – non-flooded, agricultural fields
- D – flooded area
- E – town of Morris, levee-protected

http://www.ccrs.nrcan.gc.ca/ccrs/data/satsens/radarsat/images/man/rman01_e.html



Grand Forks, MN



City of Calgary and Area – June 2013



High River



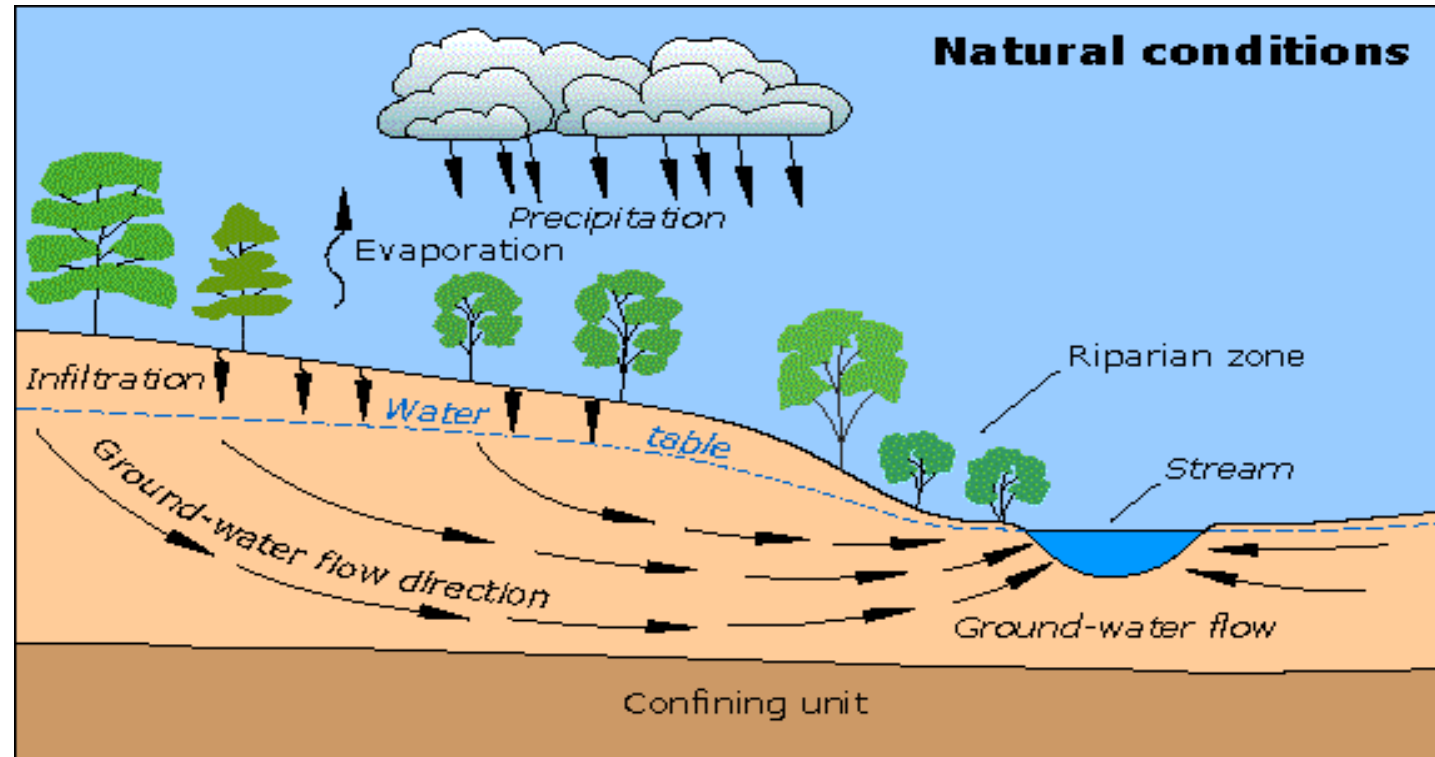
Canmore



Water Storage



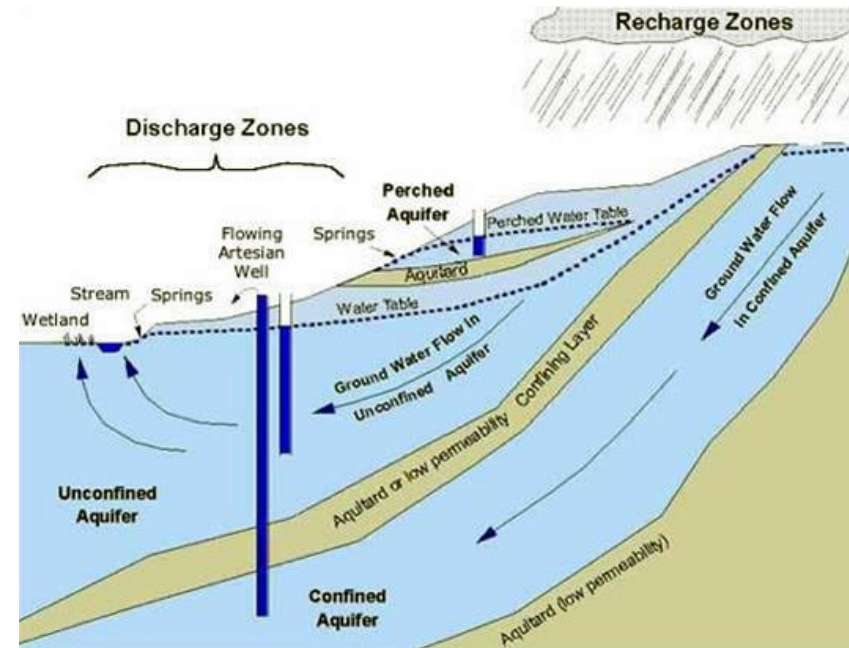
- Recharge aquifers
 - Reduced velocity of water allows time to percolate to below ground storage
 - Maintains surface flows and drinking water availability



Groundwater Recharge



- The process by which water is added to underground aquifers
- Aquifers are bodies of rock or sediment that are water-saturated
- Without recharge, aquifers can become depleted



<http://environment.alberta.ca/images/SOE-Water-groundwater-main-a-full.jpg>

Groundwater Recharge



- Wetlands promote recharge by holding water
- Allows water time to percolate down
- Groundwater depletion causes wells to dry up
- Subsistence of land (sinkholes)



Reduce Contaminants



- Wetlands slow the spread of contaminants
- Contaminants are taken up by plants, degraded by microbes (fungi and bacteria), or are incorporated into the sediment

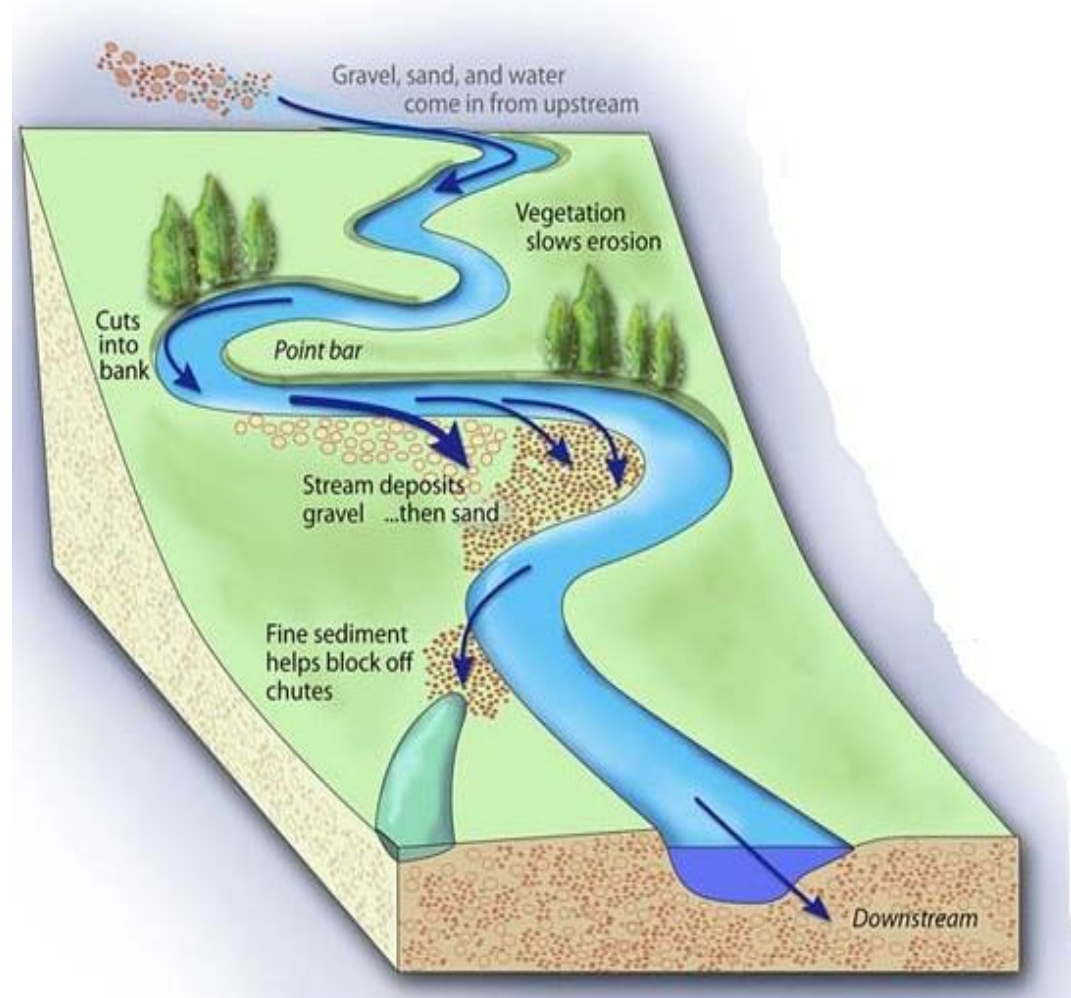


Wabamun Lake

3. Bank Stabilization



- Build and maintain banks and shores
 - Streams tend to erode on outside edges of bends and meanders and deposit on the inside edges
 - Stream channel will continuously change over time; the slower the better
 - In flood events sediment is deposited on floodplain, leading to nutrient rich soil development
 - Preferred vegetation binds soil and reduces erosion

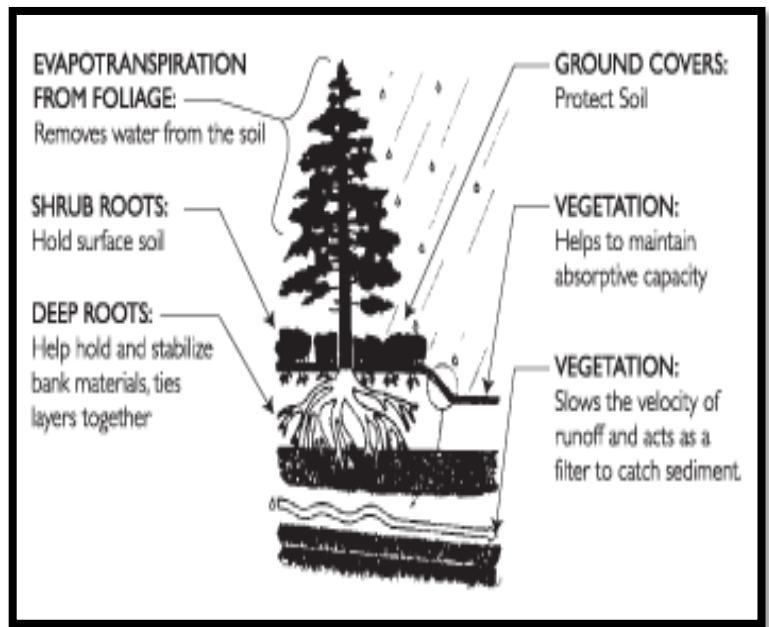




Bank Stabilization



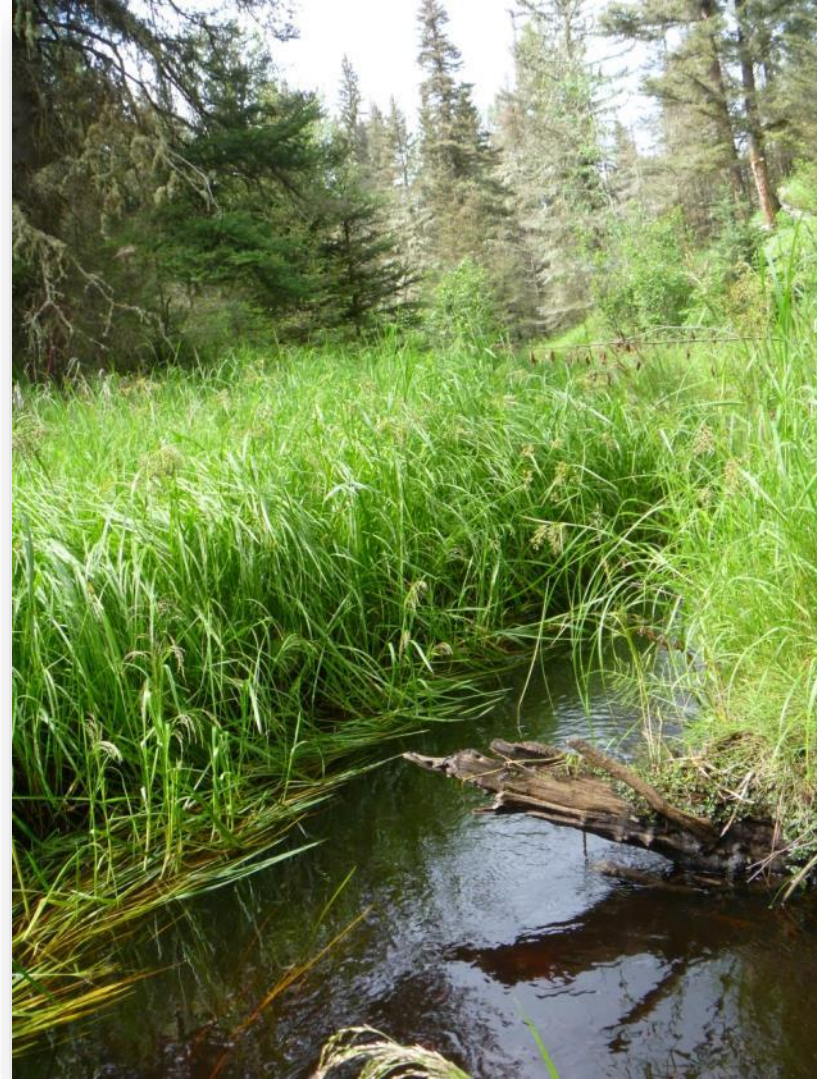
- Reduce and dissipate energy
 - Reduced velocity means reduced energy potential of the water
 - Less energy expended will result in lower rates of erosion



4. Aquatic and Terrestrial Habitat



- Provides vital wildlife habitat and biodiversity
 - Provides shelter for fish species for feeding, spawning, and rearing of young
 - Protection from predators





Aquatic and Terrestrial Habitat



- Depending on the size of the wetland, different riparian species/growth forms may be more desirable

Legend:

E=Excellent - these species have all the necessary properties of deep, binding and large root mass appropriate to riparian type or size.

G=Good - species meet most of the requirements for holding bank and shore materials together.

F=Fair - plants have marginal ability to perform stabilizing function.

P=Poor - vegetation unable to hold banks or shore together under normal circumstances.

		<i>Vegetation Type</i>						
		Trees	Preferred Shrubs	Other Shrubs	Native Grasses Forbs	Introduced Grass	Disturbance Species	Weeds
<i>Riparian System</i>	Large River	E	G	P	P	P	P	P
	Small River	E	E/G	F/P	F/P	P	P	P
	Large Stream	E	E	F	F	P	P	P
	Small Stream	E	E	G	G	P	P	P
	Intermittent Stream	E	E	E	E	G/F	P	P
	Lake	E	E	G	G/F	P	P	P
	Wetlands	E	E	E	E	F/P	P	P

Maintain Biodiversity



- Water provides a more stable thermal environment than typical terrestrial ecosystems
- Aquatic and riparian vegetation acts as habitat and food source for a wide variety of organisms
- Vegetation provides shade and cover for organisms, particularly important for fish and invertebrates
- Act as movement corridors and breeding grounds, extremely important for migrating birds
- Many species at risk reside in wetlands
- Over 80% of wildlife depend on wetlands and riparian areas for food, cover, nesting and breeding sites, movement corridors, or resting sites at least once during their life cycle

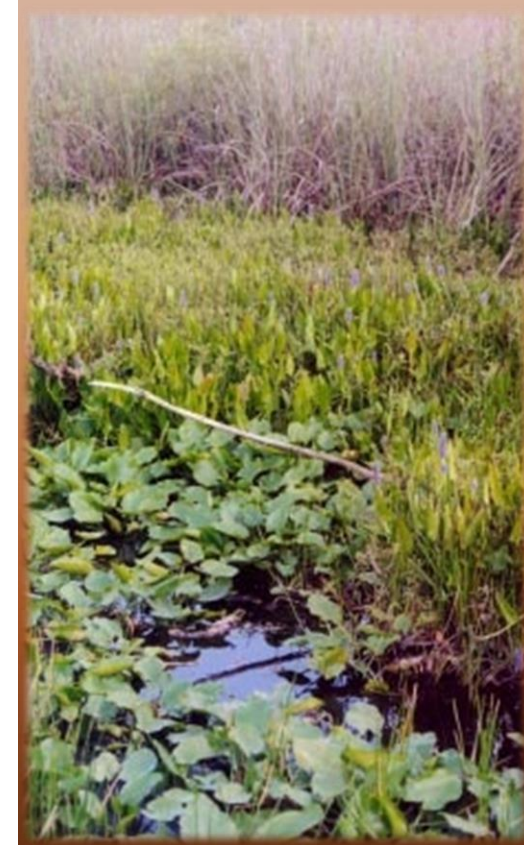


Fisheries Biodiversity



Freshwater marshes:

- Non-tidal marshes typically are dominated by floating plants, such as water lilies and duckweed, or soft-stemmed plants, such as cattails, arrowheads, reeds, and sedges
- As a general rule, the deeper the water in the marsh and the more of its hydrology is connected with lakes and rivers, the more likely the marsh is to support fish
- Freshwater marshes that fringe large water bodies, (i.e. Lac La Biche); provides spawning areas and a food source for other fish, such as Walleye, Northern Pike, and Yellow Perch





4. Legislation Affecting Riparian Areas





- ***Fisheries Act***

Includes provisions for the protection of fish and their habitat (including riparian areas), where any harmful alteration, disruption or destruction will require authorization from Fisheries and Oceans Canada



- ***Migratory Bird Act***

The Act would apply to species at risk and their habitat which occurs within a riparian area of interest.



Federal Legislation and Riparian Areas



- ***Navigable Waters Protection Act***

“navigable water” included a canal and any other body of water created or altered as a result of the construction of any work



- ***Species at Risk Act***

Creates prohibitions to protect species critical habitat





- ***Alberta Land Stewardship Act***

enables the development of new conservation and stewardship tools to protect heritage landscapes

- ***Surveys Act***

defines the location of the legal bank and the extent of the bed and shore of a water body.

Municipal Government Act (1998)



Municipal Government Act

➤ Section 60(1) of the MGA states:

“Subject to any other enactment, a municipality has the direction, control and management of the rivers, streams, watercourses, lakes and other natural bodies of water within the municipality, including the air space above and the ground below.”

Section 664:

- A municipal government can take the entirety of ravines, floodplains, or unstable ground as ER
- A buffer around any body of water to allow access or prevent pollution



Photo Credit: Julie robinson



Municipal Government Act



The **MGA** defines **Environmental Reserve** as follows:

664(1) Subject to section 663, a subdivision authority may require the owner of a parcel of land that is the subject of a proposed subdivision to provide part of that parcel of land as environmental reserve if it consists of:

- a) *a swamp, gully, ravine, coulee or natural drainage course*
- b) *land that is subject to flooding or is, in the opinion of the subdivision authority, unstable, or*
- c) *a strip of land, not less than 6 metres in width, abutting the bed and shore of any lake, river, stream or other body of water for the purpose of*
 - i) **preventing pollution**, or
 - ii) *providing public access to and beside the bed and shore* [emphasis added]

Municipal Legislation – Environmental Reserve



Municipal Government Act – Environmental Reserve

- Land may instead be determined as essential to the protection and enhancement of the environment
- Register the land as an environmental reserve easement
 - The land must remain in its natural state



Municipal Legislation – Conservation Easements



Municipal Government Act – Conservation Easements

- Municipality accepts grants to keep the natural state of an area and allows for negotiable land uses and public access
- Ownership remains with the landowner who may get tax benefits or lowered taxes due to the reduction in assessment value related to the reduced potential for development

Municipal Legislation



- The *Municipal Government Act* governs *how* municipalities can deal with their lands
 - The municipality owns land containing wetlands, particularly in environmental reserves or other reserves
 - The municipality must develop Area Structure Plans which provide guidelines for setbacks

HOWEVER: Natural wetlands are still crown property





5. RIPARIAN SETBACK MATRIX MODEL (RSMM)



Riparian Setback Matrix Model (RSMM)

- Was designed to help delineate development or environmental reserve and easement setbacks for riparian areas
- It is a scientifically and legally defensible model that can be used to establish setbacks for development, determine the size of environmental reserves, and the size of environmental reserve and conservation easements

<http://www.municipalaffairs.gov.ab.ca/cfml/boardorders/pdf/MGB%20153-07.pdf>





Model Development



Most important factors to consider when preserving a healthy riparian ecosystem are:

- Vegetation type and density
- Soils
- Slope
- Ground water influence
- Bank height
- Preliminary setback distance set at 6 meters – minimum required under MGA (Provincial Legislation)
- Each category adds additional distance to the preliminary setback based on the characteristics of the individual site

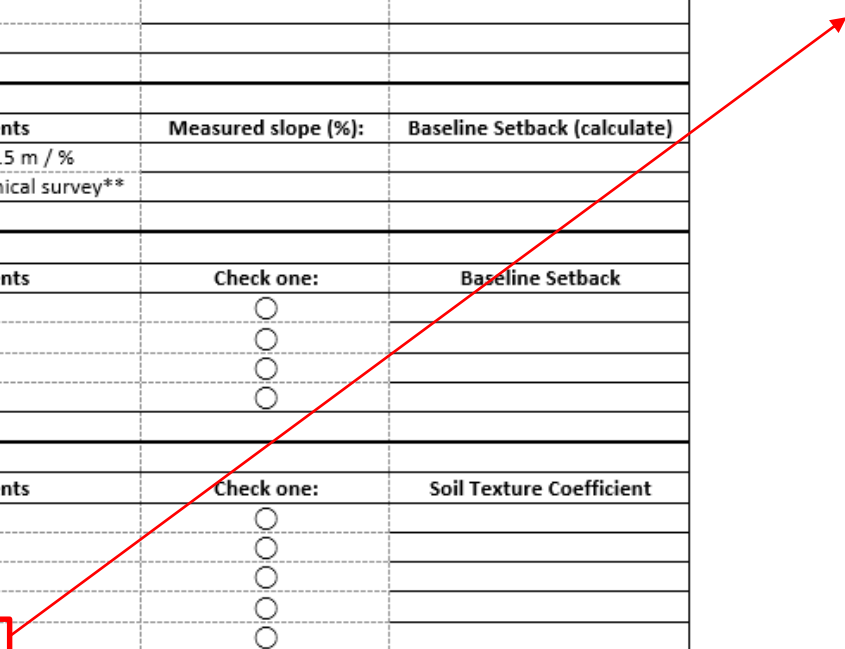


Model Development



Water Body Name:			
Location (1/4 – Sec – Rng – Twp – Mer):			
Setback point location (UTM Coordinates):			
Land Owner:			
Field Personnel:			
Date and Time:			
1. VEGETATION			
Cover Type (% cover)	Coefficients	Vegetation cover (%)	Baseline Setback (calculate)
Forest	0.10		
Shrub	0.15		
Herb/graminoid	0.20		
Bare ground	0.35		
TOTAL			
2. SLOPE SETBACK			
Slope Category (%)	Coefficients	Measured slope (%)	Baseline Setback (calculate)
0 - 15%	10 m + 1.5 m / %		
>15%	geotechnical survey**		
TOTAL			
3. GROUNDWATER RISK			
Groundwater risk class	Coefficients	Check one:	Baseline Setback
Low	10	<input type="radio"/>	
Moderate	20	<input type="radio"/>	
High	30	<input type="radio"/>	
Very High	40	<input type="radio"/>	
TOTAL			
4. SOIL SETBACK			
Soil Texture***	Coefficients	Check one:	Soil Texture Coefficient
Peat	1.00	<input type="radio"/>	
Highly organic mineral soils	1.10	<input type="radio"/>	
Clayey soils	1.15	<input type="radio"/>	
Sandy soils	1.25	<input type="radio"/>	
Silty soils	1.50	<input type="radio"/>	
TOTAL			
OVERALL SETBACK			
Baseline Setback	Largest from #1-3:	a)	
Soil texture coefficient	Value from #4:	b)	
Total Setback		Multiply a and b:	

For Example:
 If you have Silty Soils
 (poor soils) multiply by
 co-efficient 1.5 = much
 bigger setback





Model Development



Parameter	Riparian Vegetation	Recommended Setback (m)	Notes
Nitrogen	Grass	50+	-Will remove ~90% of nitrate from surface and subsurface runoff.
	Grass/Shrub or Forest	30+	
	Forest	30+	
Phosphorus	Grass	20+	-Will reduce soluble phosphorus by ~90%. -See recommendations for sediment for the removal of total phosphorus (most phosphorus enters a buffer attached to the sediments).
	Grass/Shrub or Forest	20+	
	Forested	20+	
Sediment	Grass	30+	-Will remove ~90% of sand and silt particles. -100m is required for the effective removal of clay particles. - For long term retention of sediments the setback should be 30 – 100m.
	Grass/Shrub or Forest	30+	
	Forested	25+	

Steps



1. Establish the number and location of setback points required
2. Determine the slope of the land
3. Determine bank height
4. Determine depth to water table
5. Determine vegetation type





Setback point will start here





PROPERTY BOUNDARY

DEVELOPABLE
AREA

PROPERTY BOUNDARY

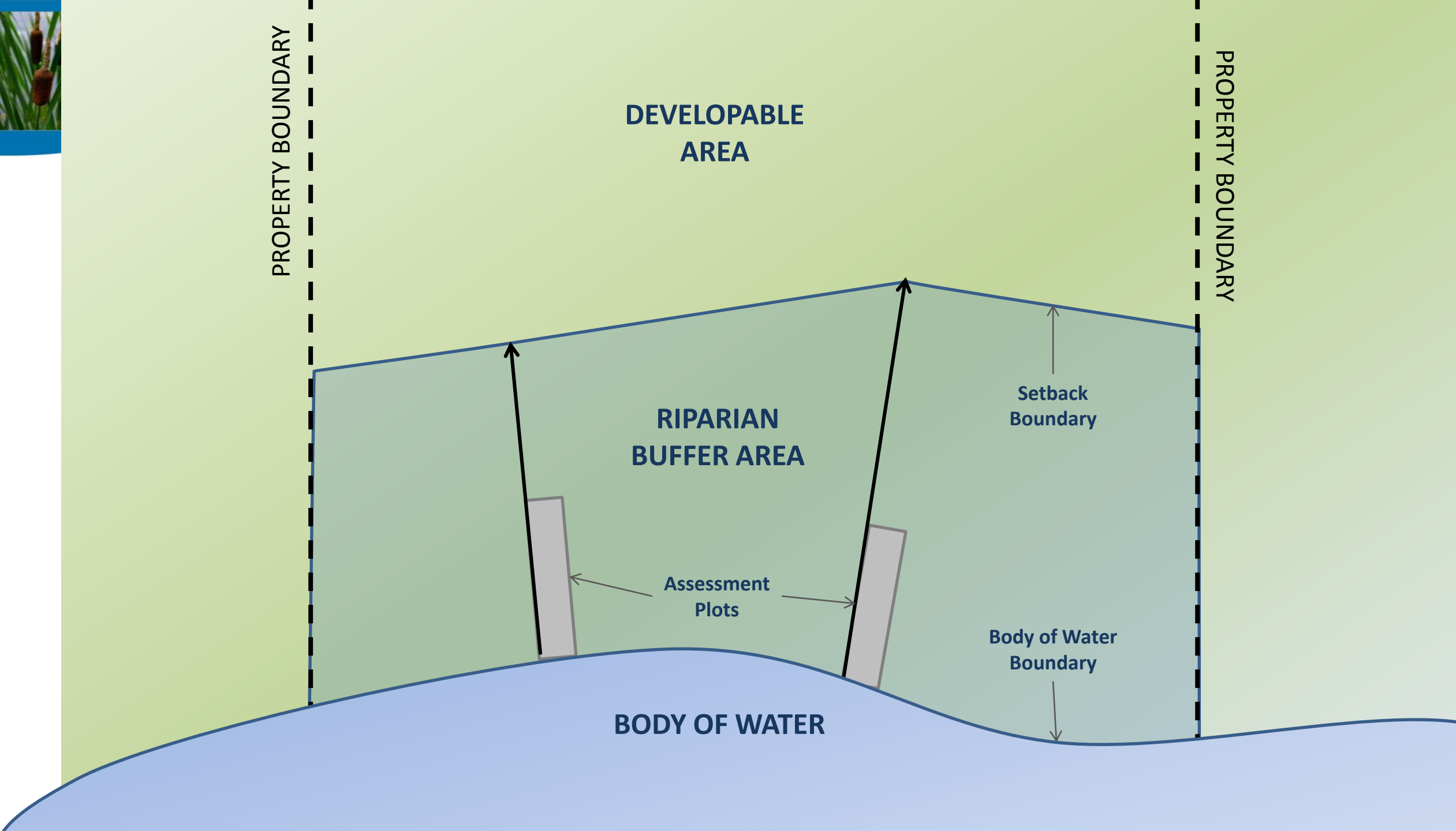
RIPARIAN
BUFFER AREA

Setback
Boundary

Assessment
Plots

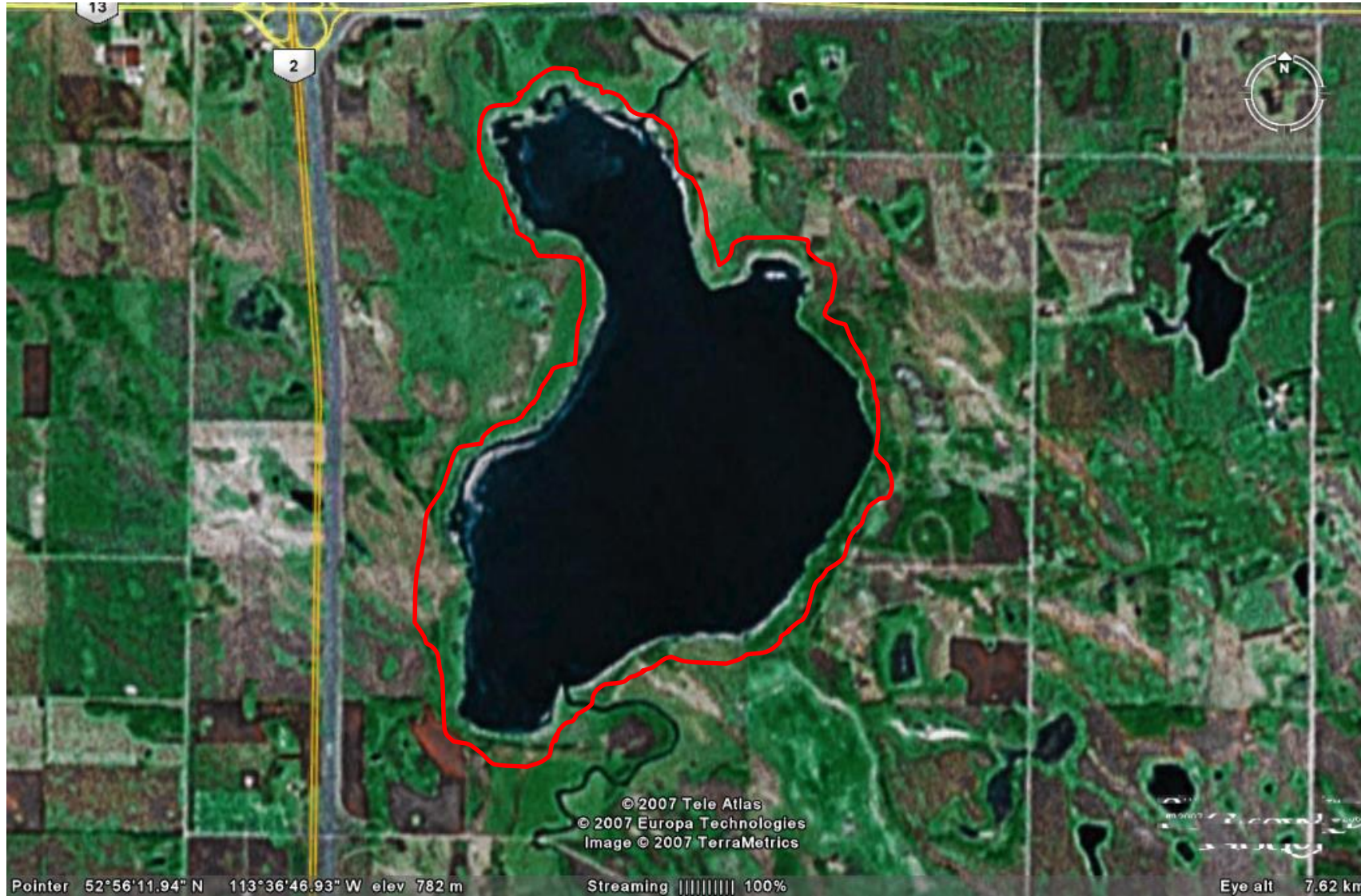
Body of Water
Boundary

BODY OF WATER





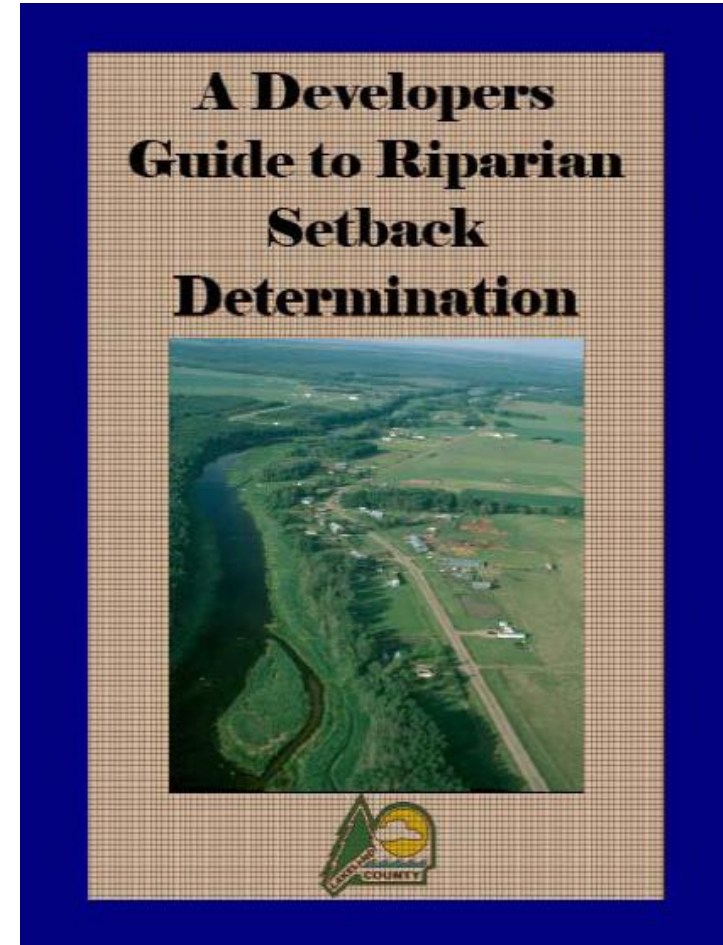
What your setback might look like



Developers Guide



- Companion guide to the RSMM
- Written to assist developers with the application of the RSMM
- Specifies who is qualified to complete the site assessment – must be a qualified professional, registered in Alberta (i.e. surveyor, engineer, hydrologist, biologist, etc.)



What you need to do...



- Hire a registered professional surveyor, engineer, hydrologist or hydrogeologist
- Complete a geophysical assessment of the site following the guidelines provided
- Map out the calculated riparian area
- Refrain from any vegetation clearing, development or other alterations within this area





Aquality's Experience



Aquality has also developed detailed Riparian Policies for:

- Rocky View County
- Town of Strathmore

When the RSMM is incorporated into such policies at the municipal level, they form a comprehensive tool for managing and protecting riparian habitats within the context of growing development pressures.

Other tips and tricks



Establish a grading policy to protect riparian lands

1. Subdivision is granted, land surveyed but because no conditions exist, clearing of land occurs as site is prepared for development and sub-contractor bulldozes right through the ER. This kind of encroachment happens even though site is flagged (or even posted).





Other tips and tricks



2. Developer buys quarter section of land next to lake with intent to have land rezoned to country residential or residential, and subdivided as cottage properties. Current zoning is agricultural. There is no bar to clearing land within this zoning provision as it is consistent with preparing land for agricultural use (unless some kind of additional authority is required to begin site preparation and grading).

Developer knows they would likely be subject to ER provisions especially if a natural buffer currently exists. Developer clears land right down to lake and then makes argument there is no need for ER as there is no longer the conditions (natural state) to provide for pollution control, access, etc. Even if minimum ER is eventually taken, it has virtually no value as a buffer to development.

Other tips and tricks





Other tips and tricks



Some form of grading permit would place conditions on site preparation including timing, drainage from site, often general requirements for erosion and silt control, and possibly vegetation management:

- *Fisheries Act*
- *Environmental Protection and Enhancement Act*
- *Water Act*
- *Public Lands Act*
- *Municipal Government Act*

Enforcement Example



March 12, 2013

- Dale Andrew Mather fined **\$20,000**
- Charged under the *Water Act* for willfully altering the shoreline of Gull Lake
 - Removed aquatic vegetation to “improve the view” from his property
- Creative sentencing:
 - \$ 15,000 paid to the Gull Lake Water Quality Management Society to fund their Streambed Improvement Project

Enforcement Example



Update: September 2, 2014

- Dale Mather and his son Kayle Mather who owned the neighboring property and participated in some of the alteration activity, were ordered to pay the Village of Gull Lake's \$300,000 in legal costs over the dispute.
 - Civil case; the Village of Gull Lake had to cover the costs of the cleanup for the damages done by the Mather's.



Bulldozing lake weeds costs men \$2,000 fine

JOURNAL STAFF

Edmonton

Two Edmontonians who bulldozed a section of cottage-front beach at Wabamun Lake last fall to get rid of weeds were fined \$2,000 in Stony Plain district court last week.

Development Officer



R. Gary Elliott and C. Gordon Wilson



Mayor

had pleaded guilty to charges under the Fisheries Act for the "harmful alteration, disruption or destruction of fish habitat" at Point Allison at the northeast end of the lake.

At the request of the two men, \$1,500 of the fine will go towards a shoreline conservation education program run by the Alberta Conservation Association.

They were also required to reclaim the area but it appears to be growing back in on its own, said Dave Ealey, a spokesperson for Alberta Environment.

Both walleye and pike, two fish species in decline in Alberta, rely significantly on shallow water habitats along lakeshores, Ealey said Wednesday.

It's not just too much fishing, it's removal of habitat that threatens fish populations, he said. Waterfowl also rely on shoreline habitat.

"People need to be aware of this as much as possible."

Elliott and Wilson aren't alone in trying to remove weeds from beaches in cottage country but few people go as far as using a bulldozer, Ealey added.

Cottagers can obtain permits allowing vegetation removal in an appropriate way, he said.

What is an Environmental Reserve



- A buffer of natural land that lies between developed/developable land and environmentally sensitive areas such as lakes, wetlands, streams, rivers and creeks
- May be classified as undevelopable if protected in municipal bylaws
- Must be left in natural state or used as a public park or public access point



What is an Environmental Reserve



What is the purpose of a environmental reserve:

- To prevent pollution
- To provide public access to the bed and shore

Pollution can be nutrients, pesticides, chemicals, etc. that find their way into watercourses via point and non point sources

Protects source waters



What is an Environmental Reserve?



- An environmental reserve owned by the landowner
- Landowner must abide by municipal regulations regarding development and use
- Exclusive, private use of reserves and easements is generally not allowed



What is an Municipal Reserve?



Municipally owned parcels of land meant for public use

Examples:

- Parks
- Recreation facilities
- Public buildings
- Schools
- Natural Areas
- Horticultural/agricultural land



A portion of all subdivisions must be provided for this with no compensation required

Who Could Use the RSMM?



- Municipalities
- Policy makers
- Developers
- Private landowners
- Federal and Provincial Governments





6. Case Studies





3 Case studies:

1. Margaret Lakes
2. Lee Creek
3. Studhorse Lake

Parameters:

1. Ground water risk
2. Landcover
3. Slope
4. Soil texture

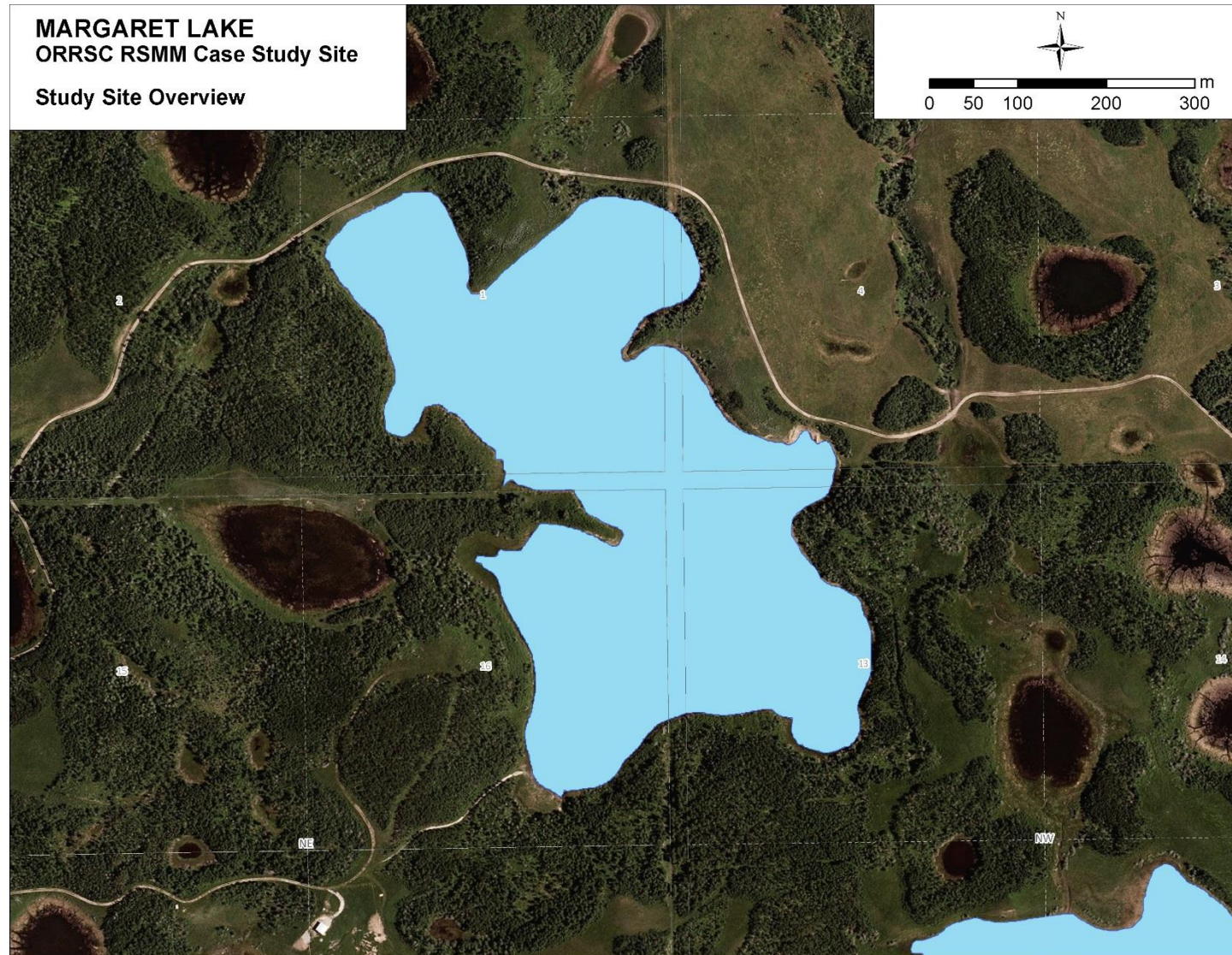




Margaret Lakes

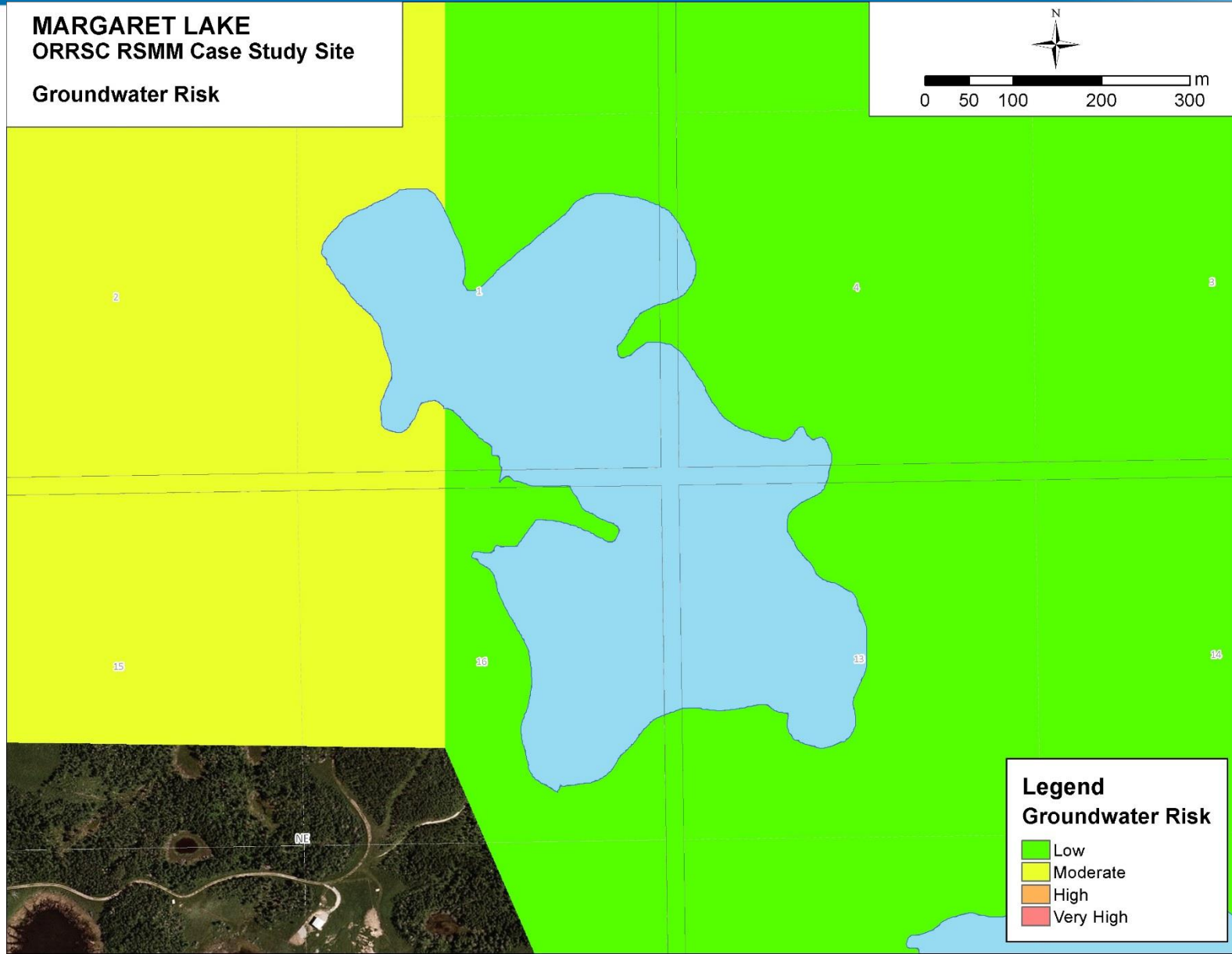


Margaret Lakes



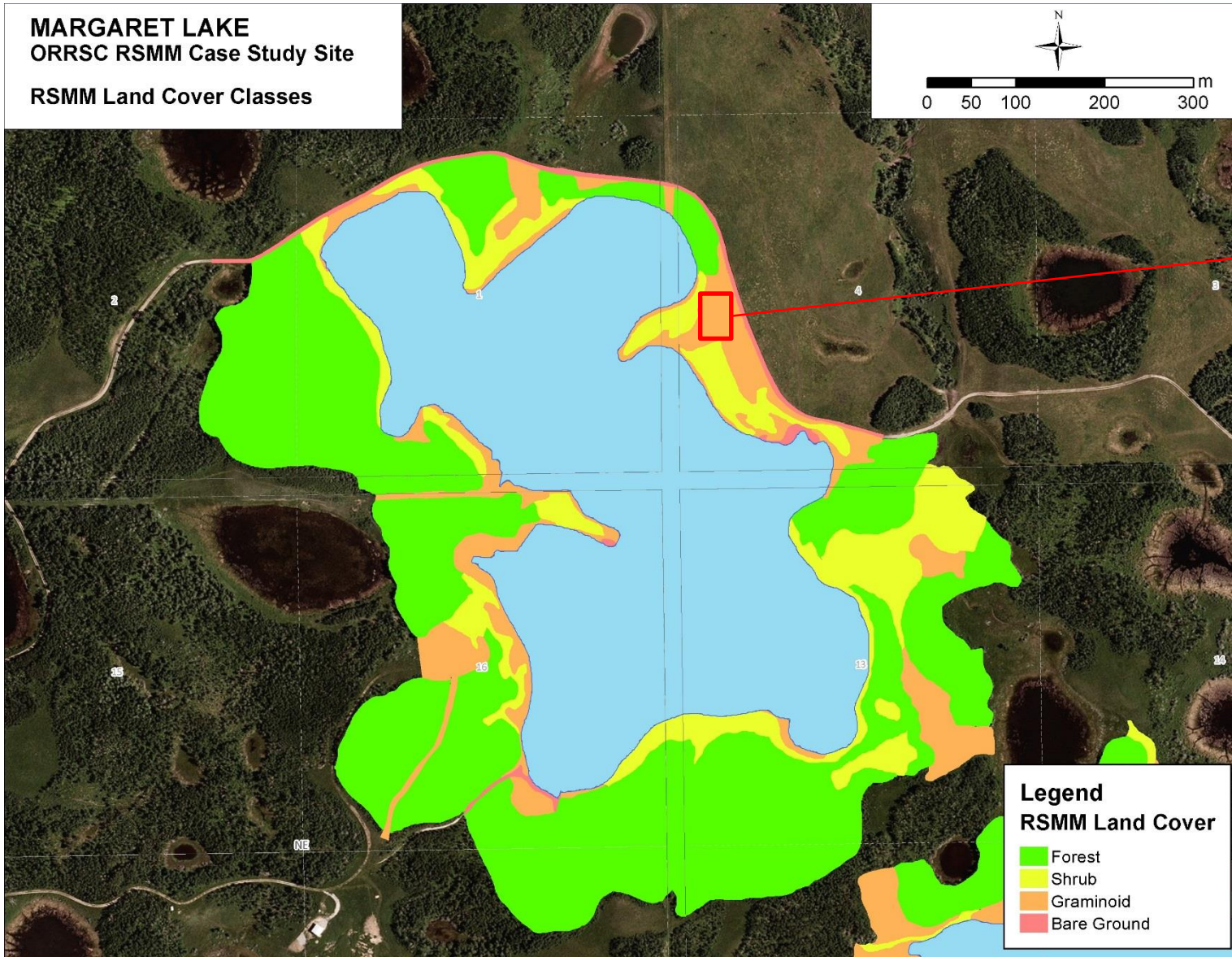


Margaret Lakes





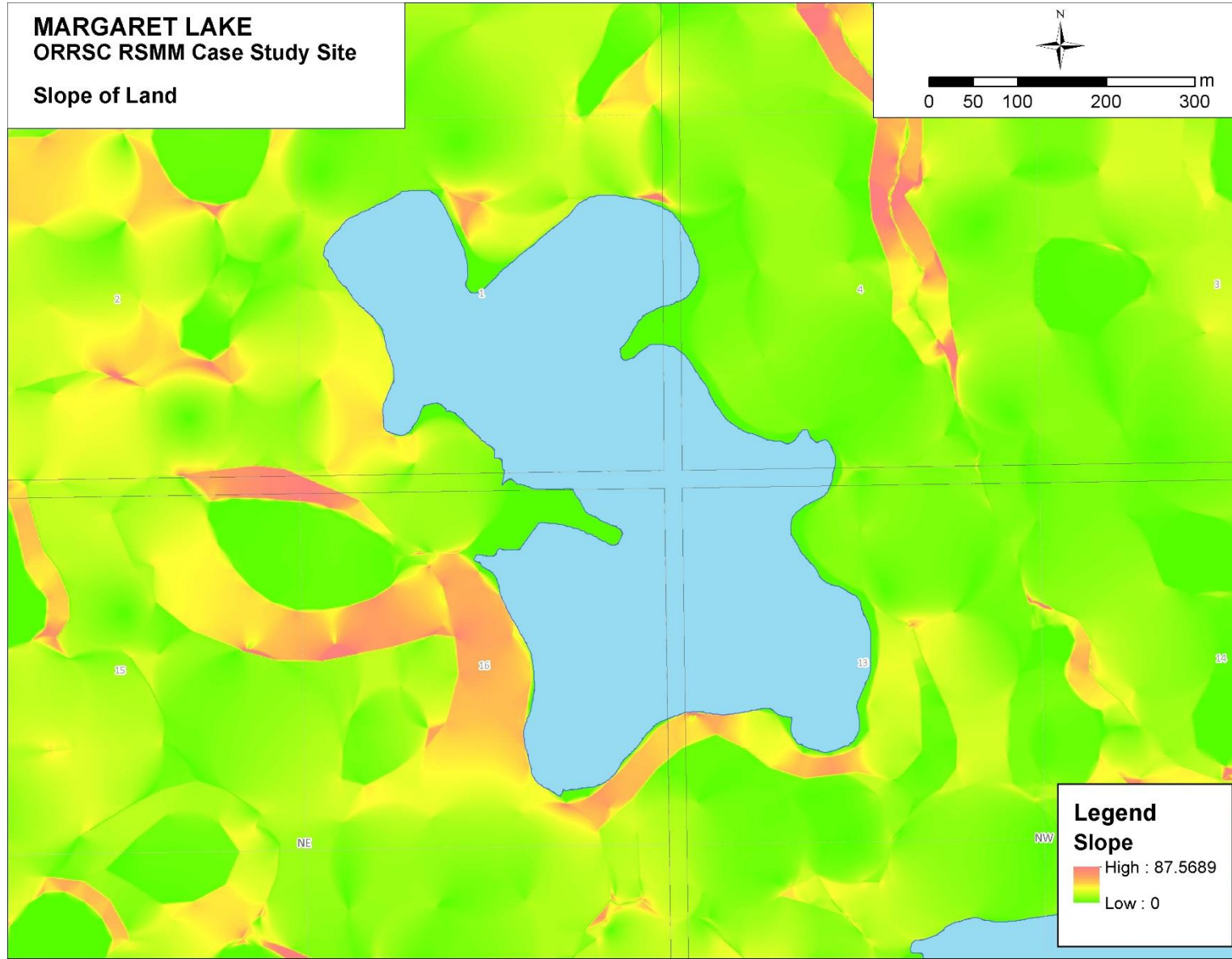
Margaret Lakes



For example:
Graminoid X
0.20

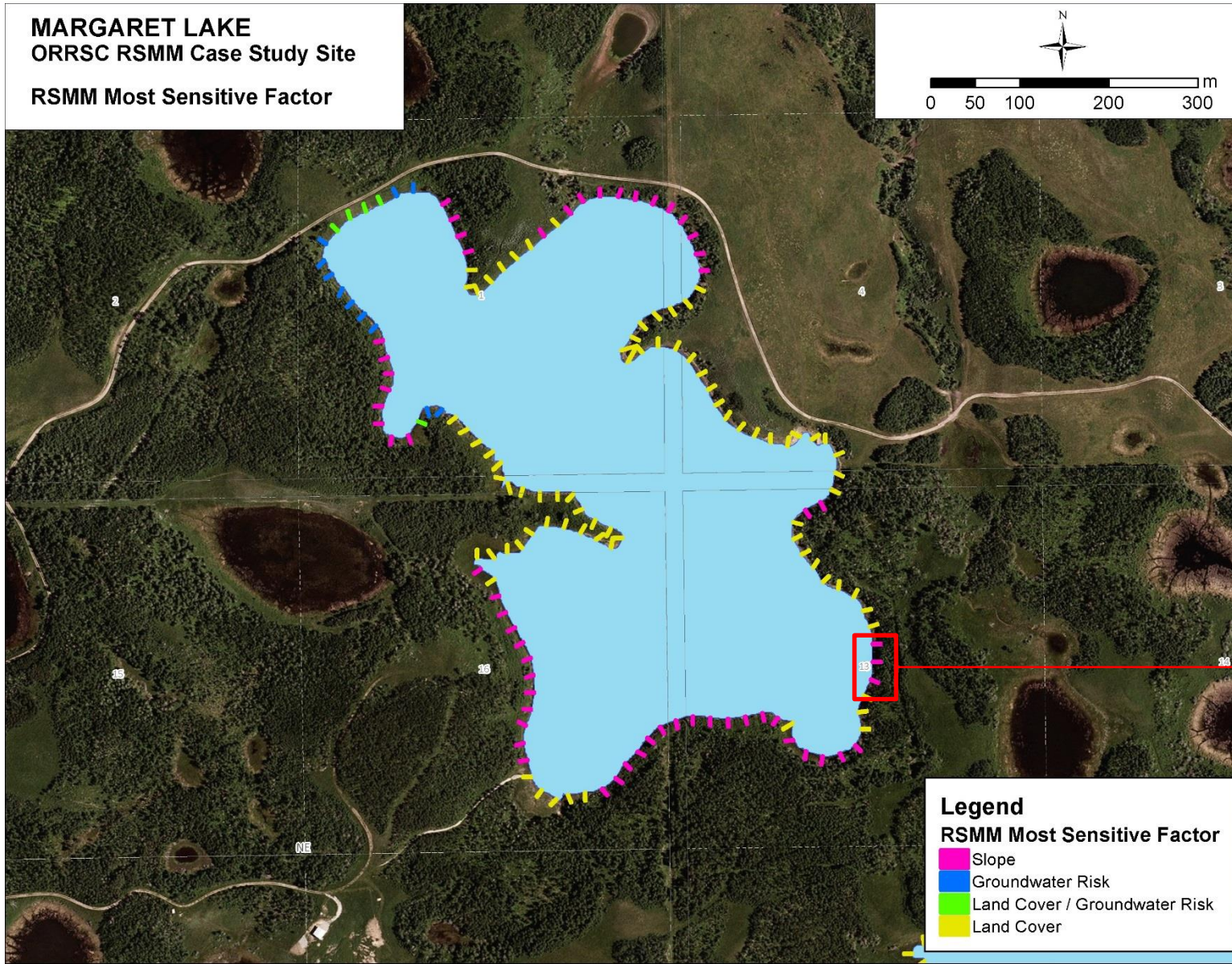


Margaret Lakes





Margaret Lakes

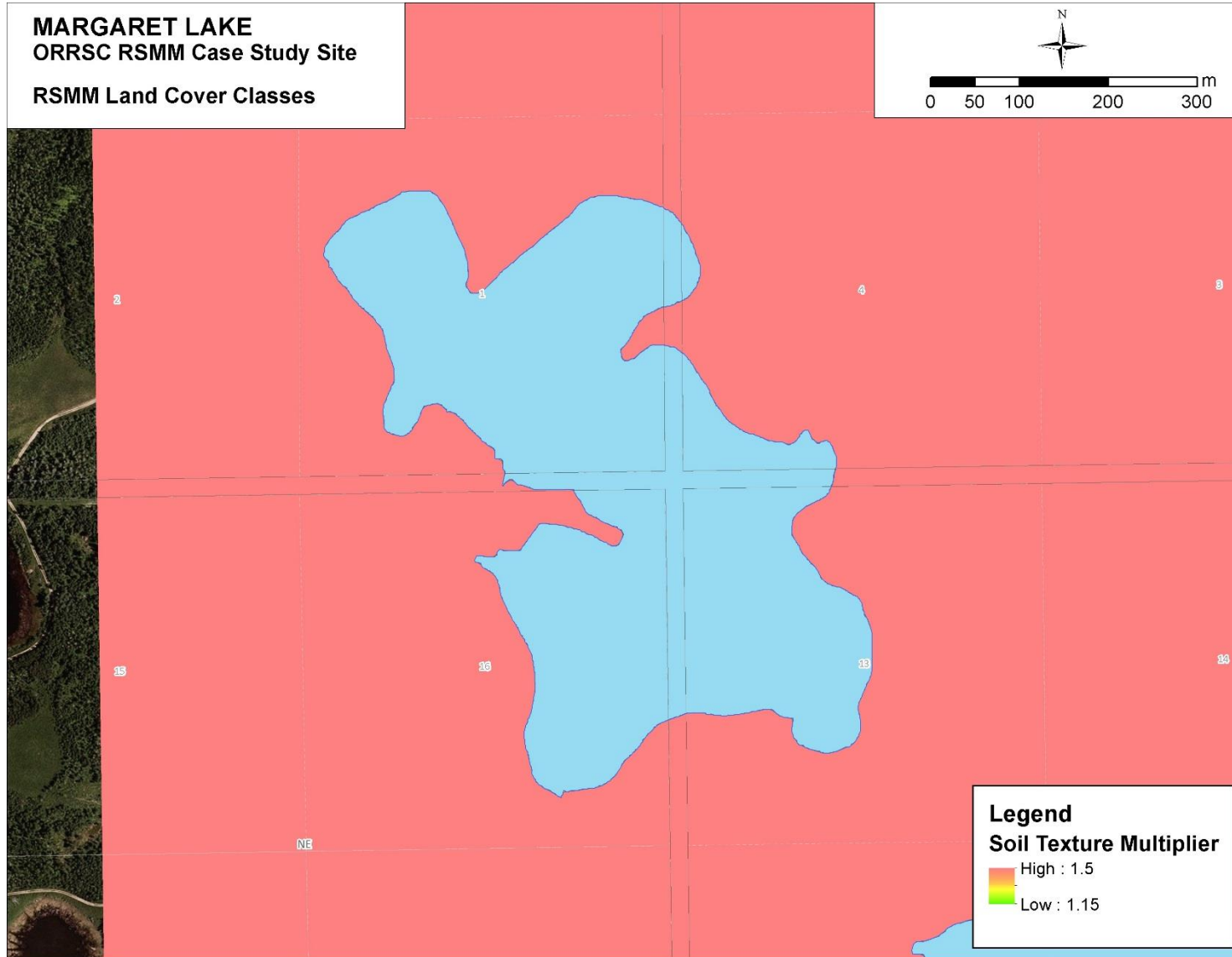


Most Sensitive Factor will determine the setback for the area.

For Example: Slope will determine the setback in this area



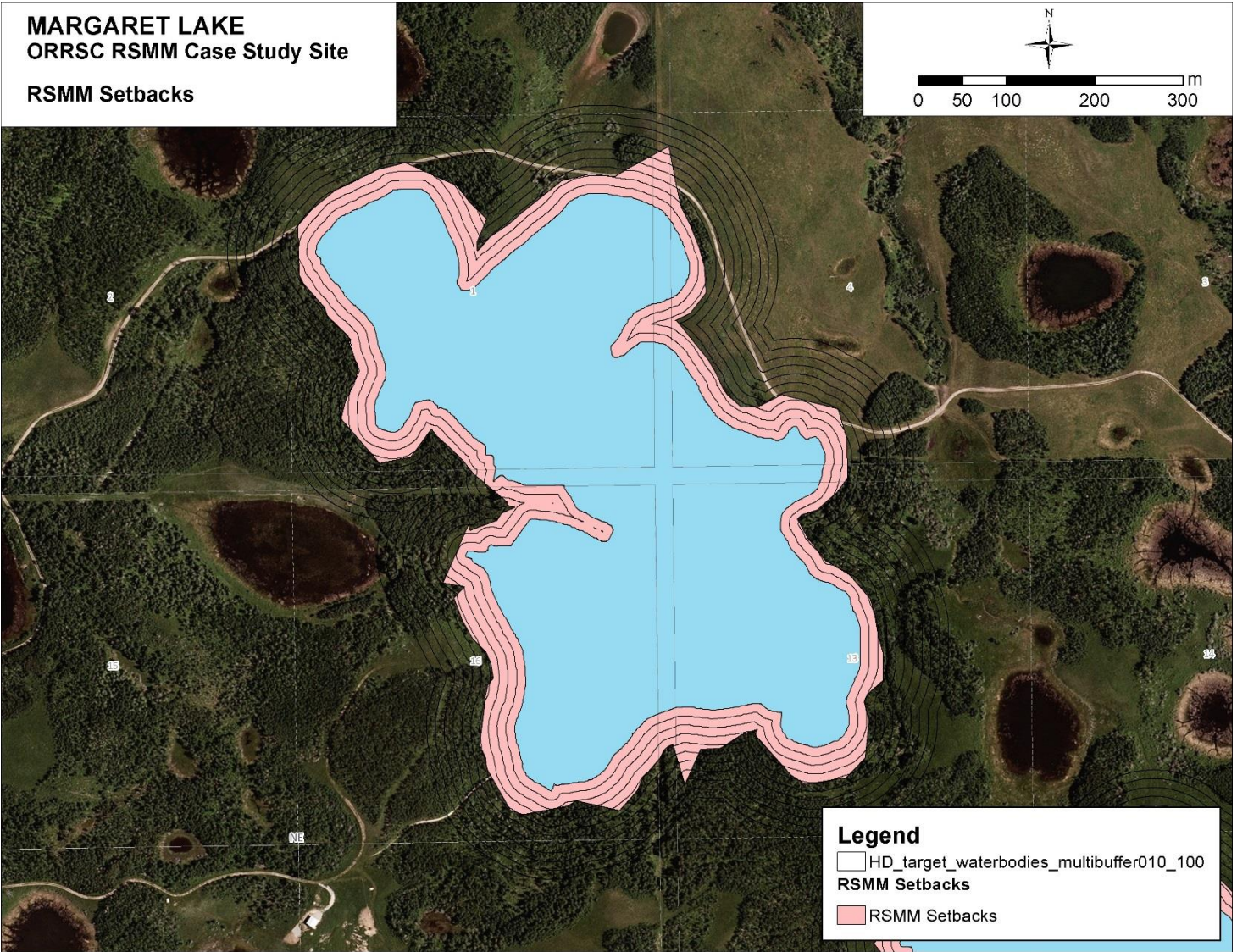
Margaret Lakes



Silty Soils- High Multiplier



Margaret Lakes



Overview of
Setback



Lee Creek

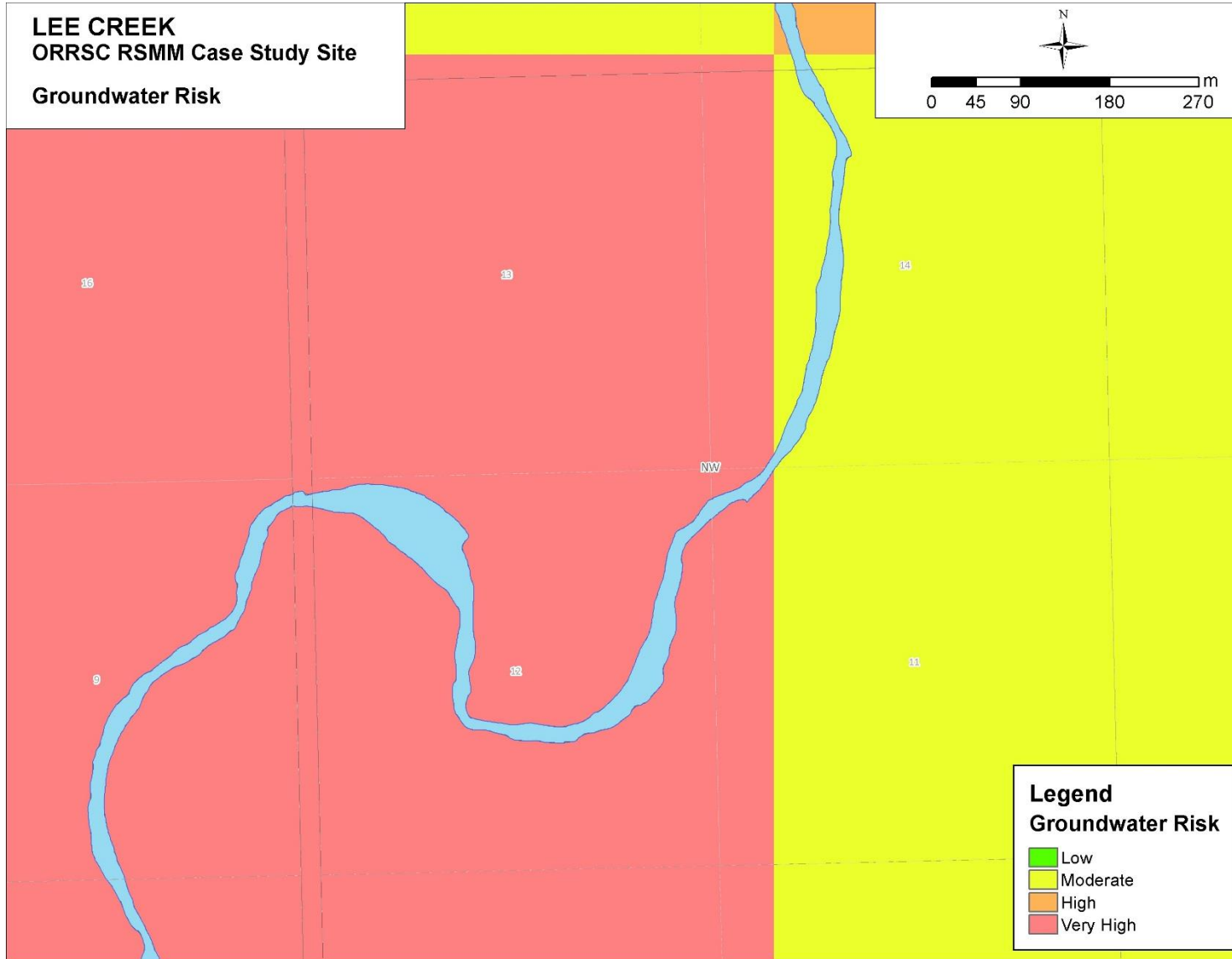


Lee Creek



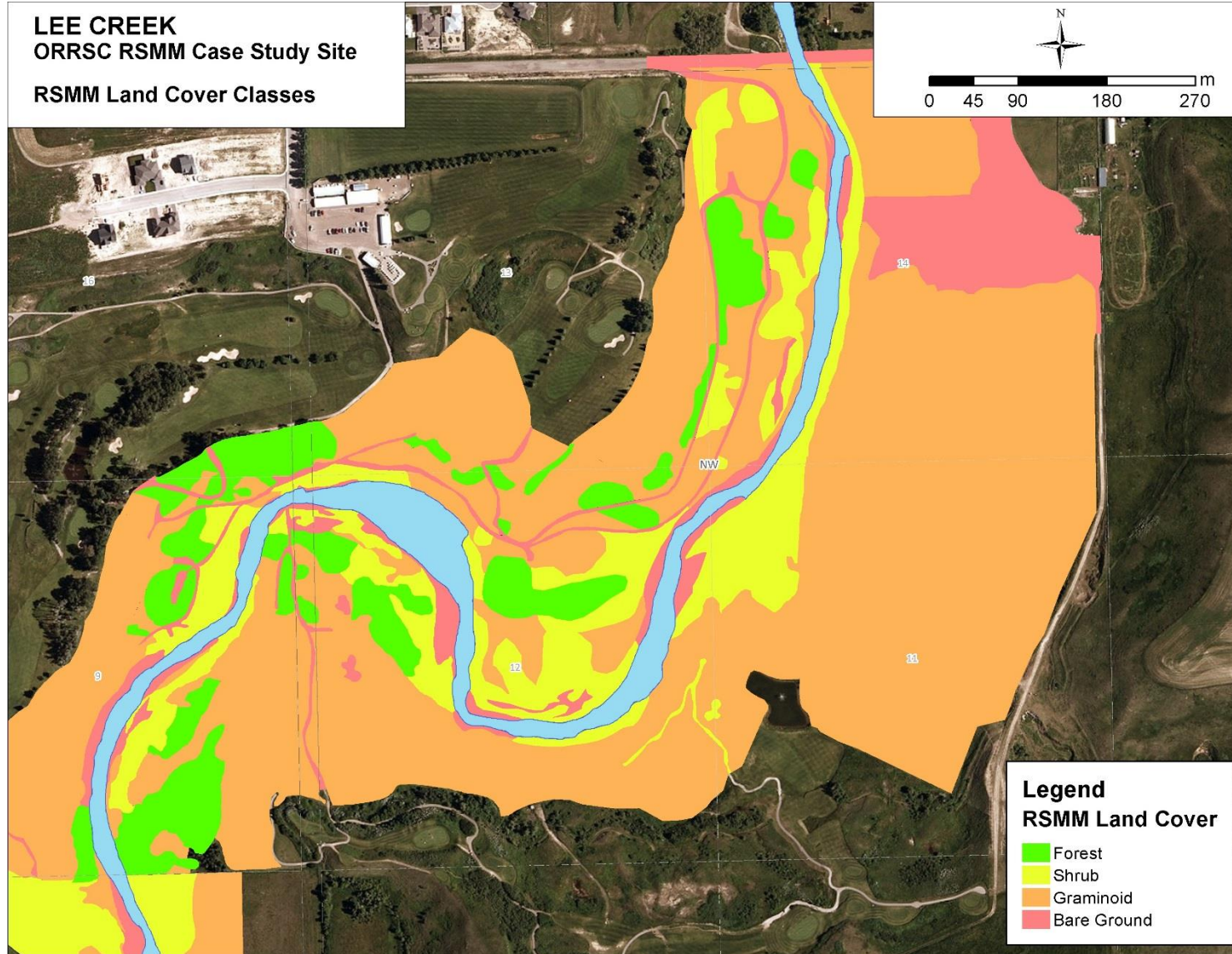


Lee Creek



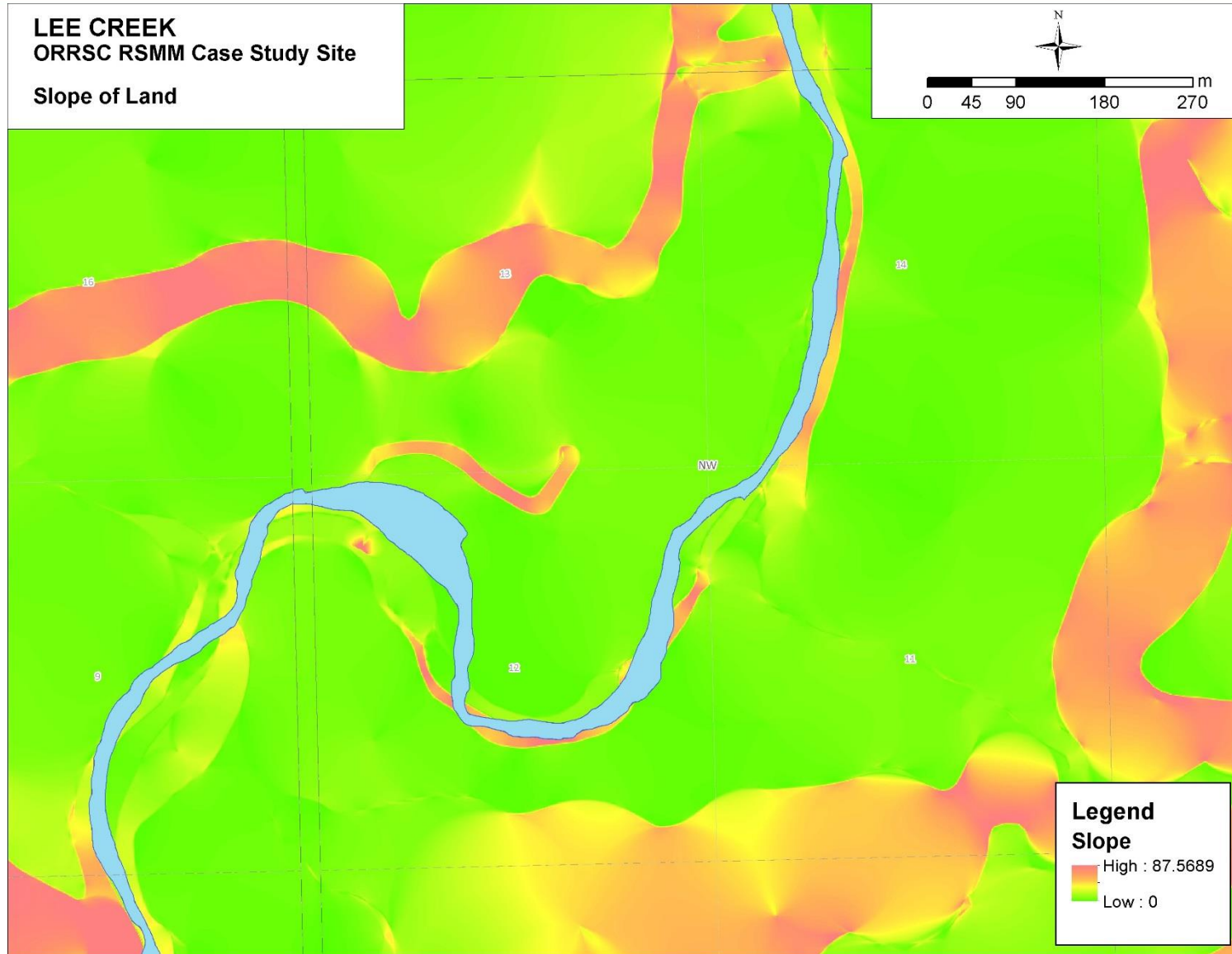


Lee Creek





Lee Creek

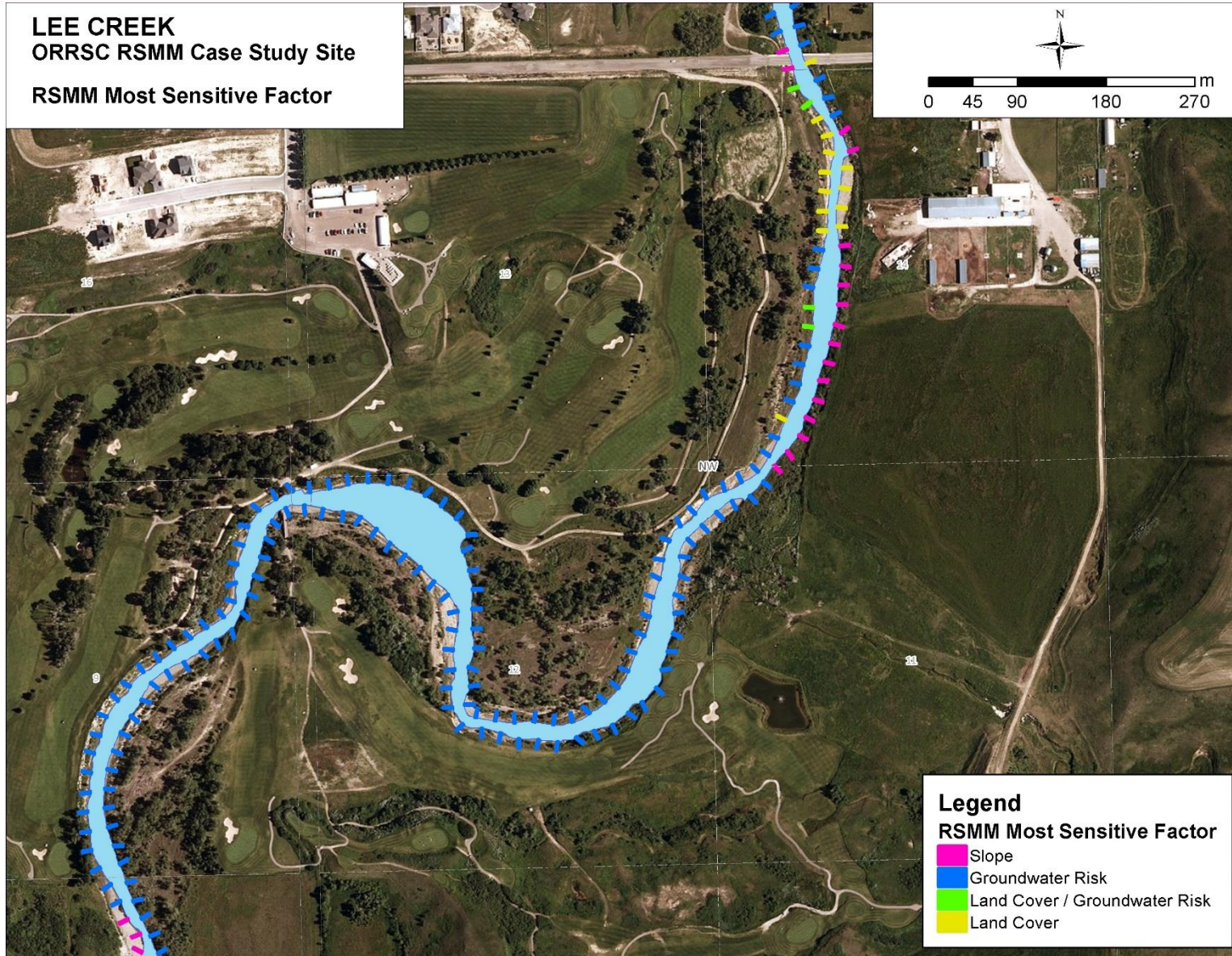




Lee Creek

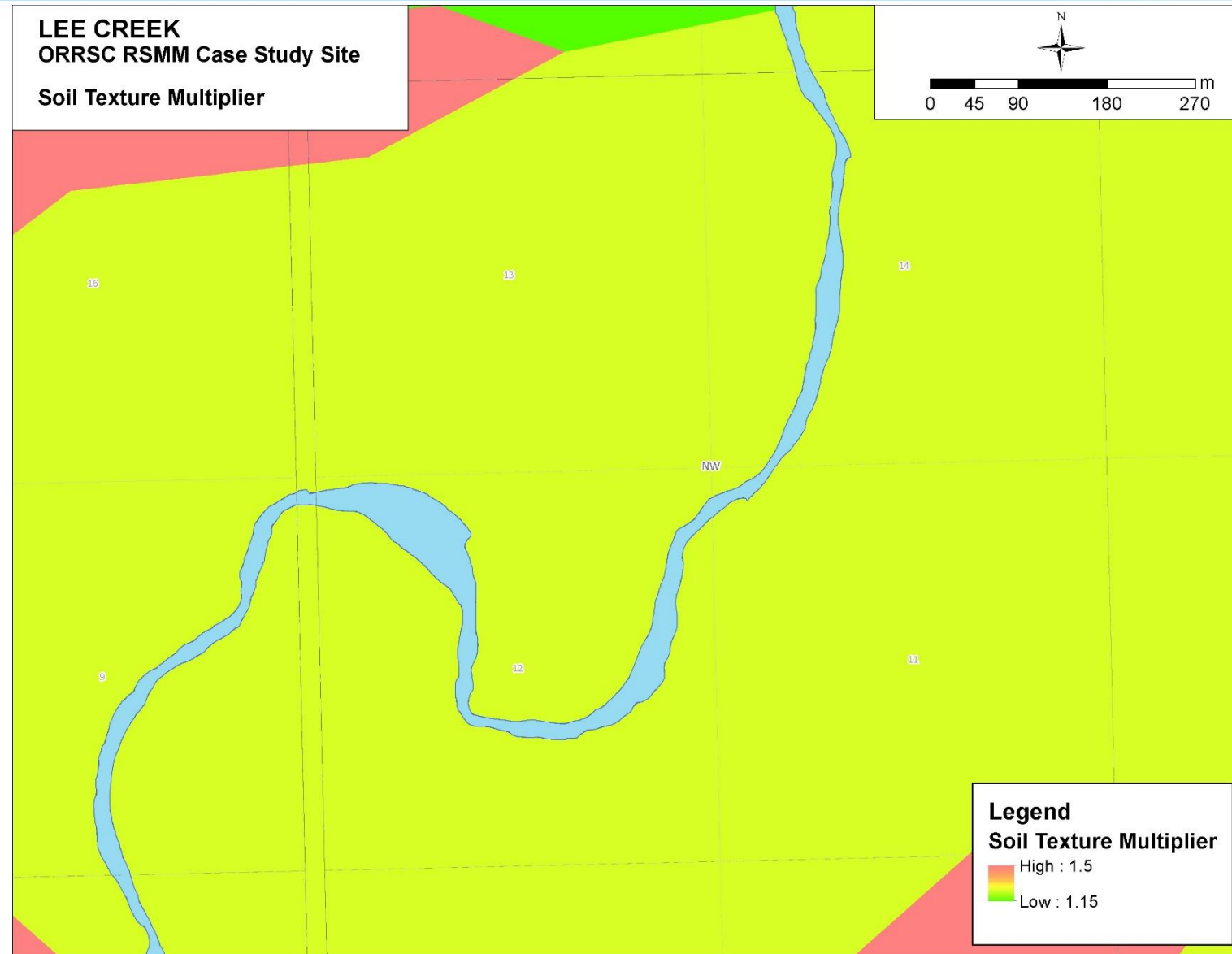


LEE CREEK
ORRSC RSMM Case Study Site
RSMM Most Sensitive Factor



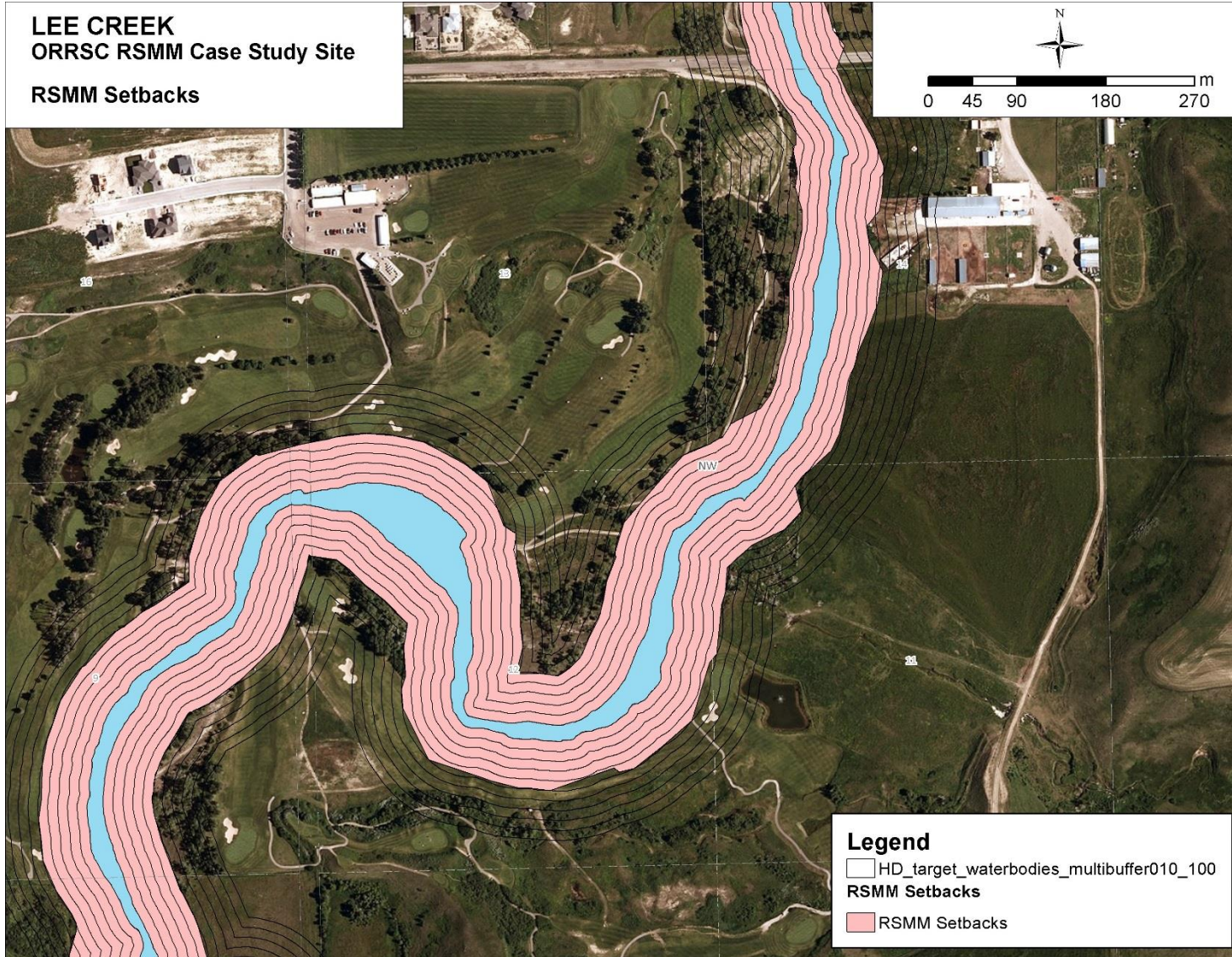


Lee Creek





Lee Creek





Studhorse Lake

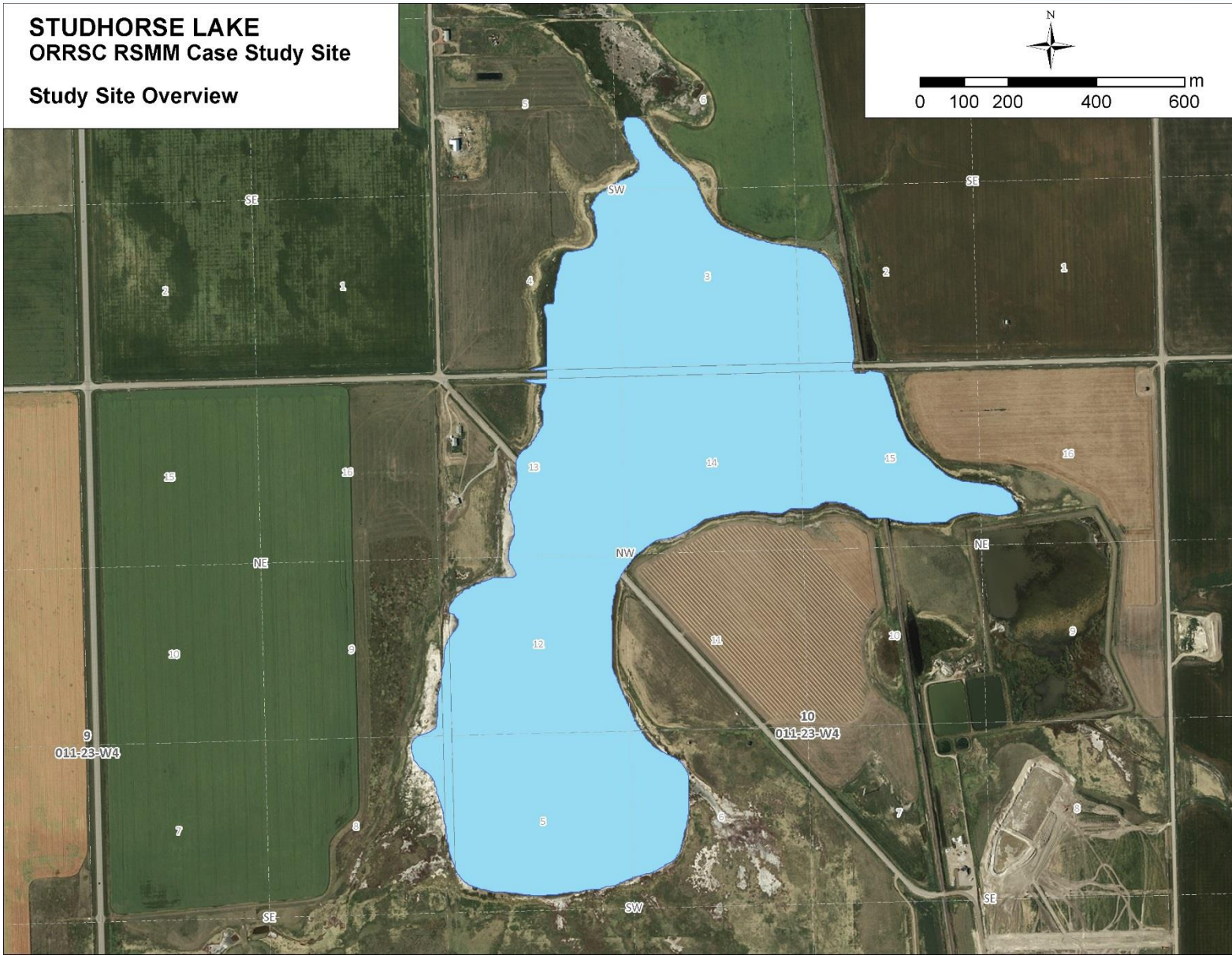
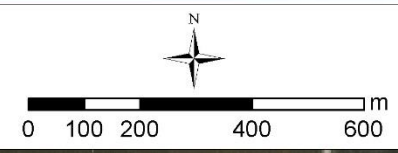




Studhorse Lake

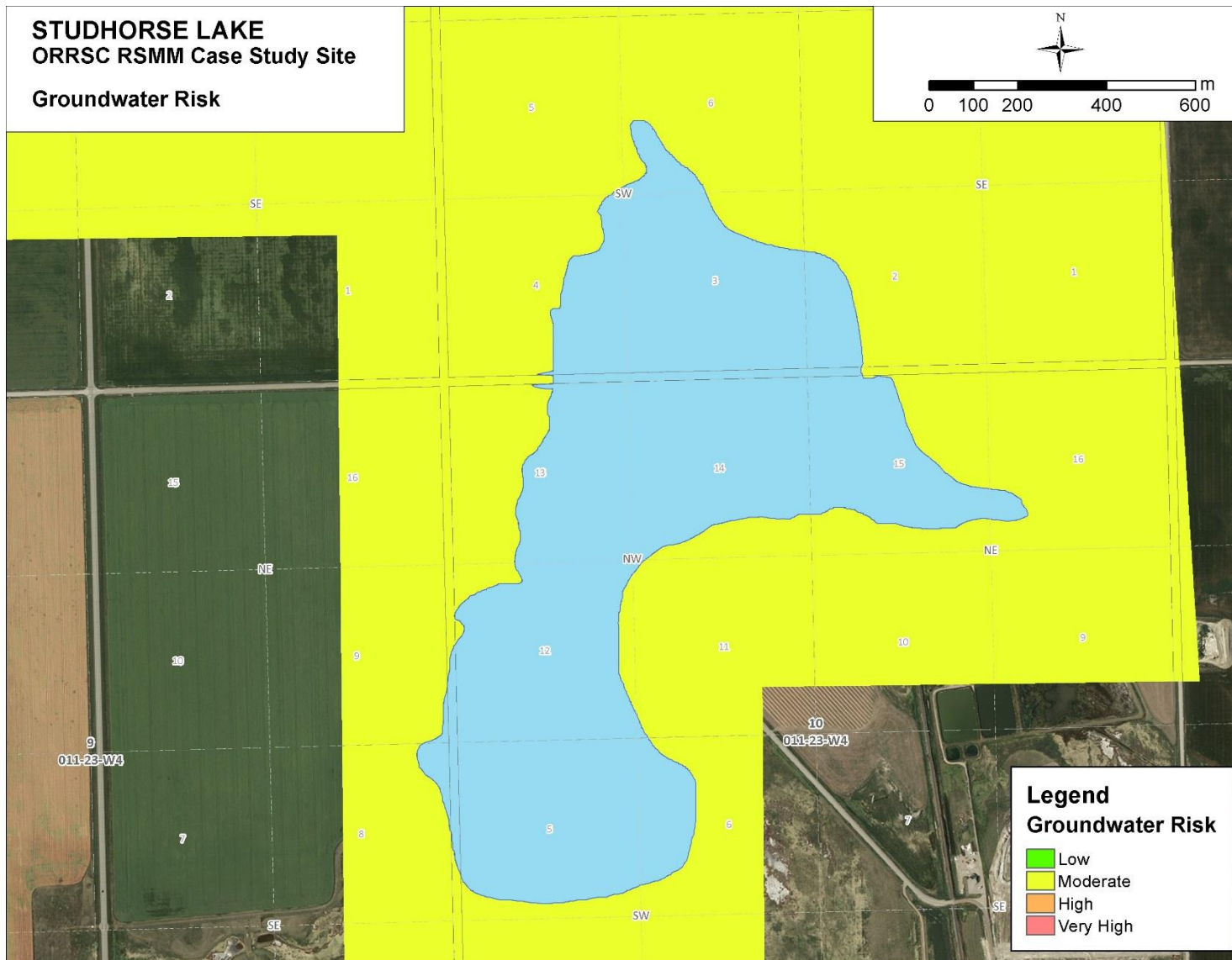


STUDHORSE LAKE
ORRSC RSM Case Study Site
Study Site Overview



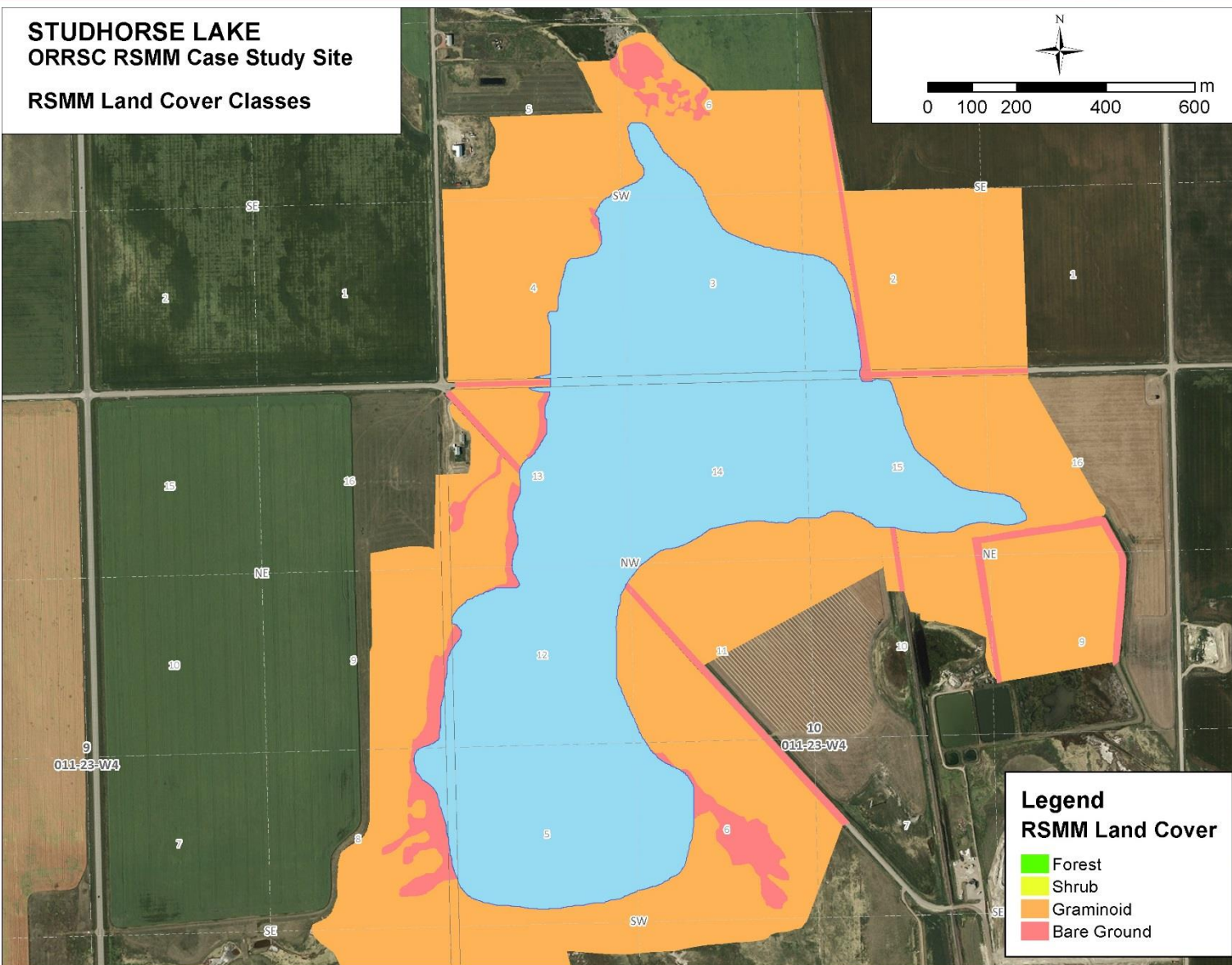


Studhorse Lake



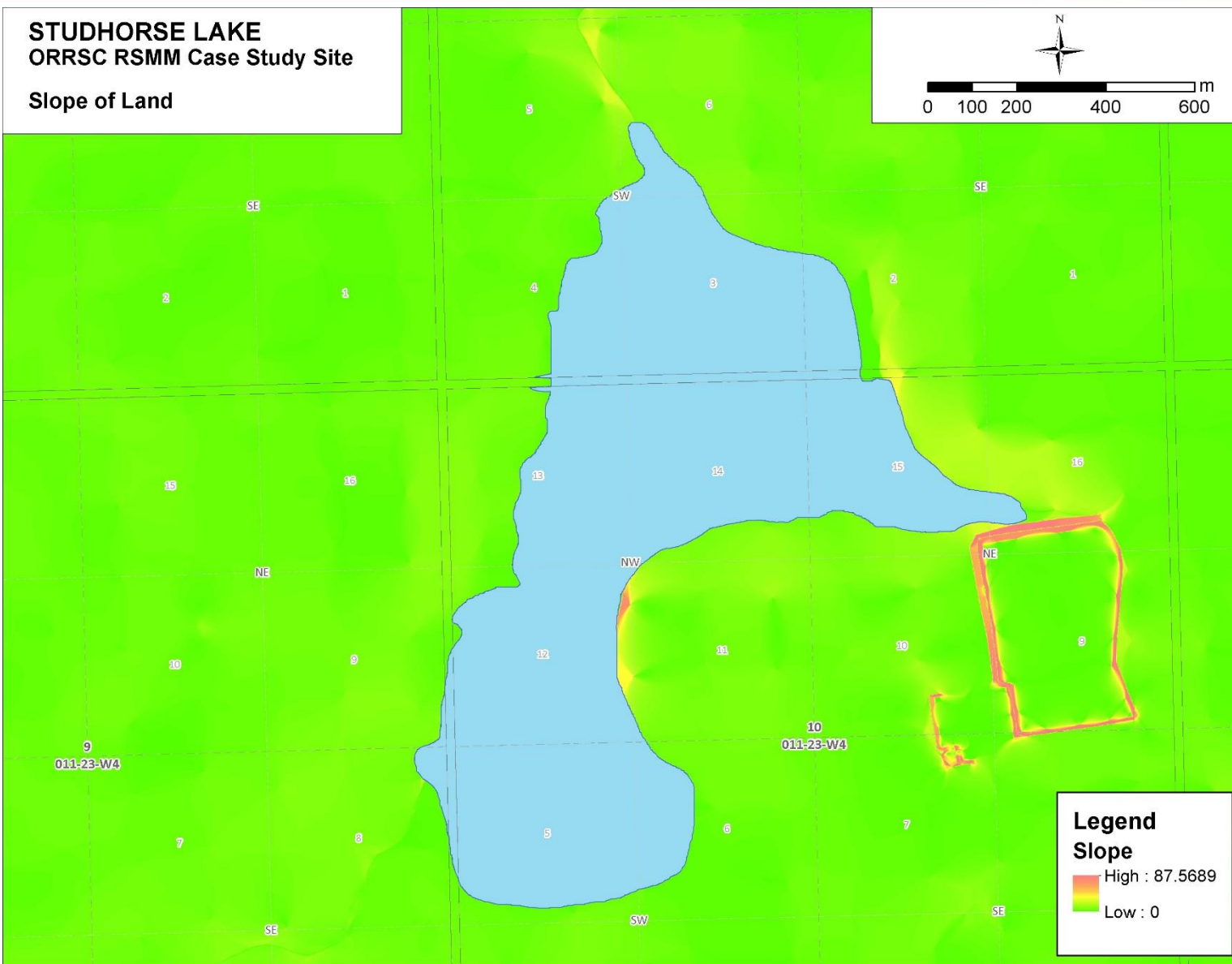


Studhorse Lake



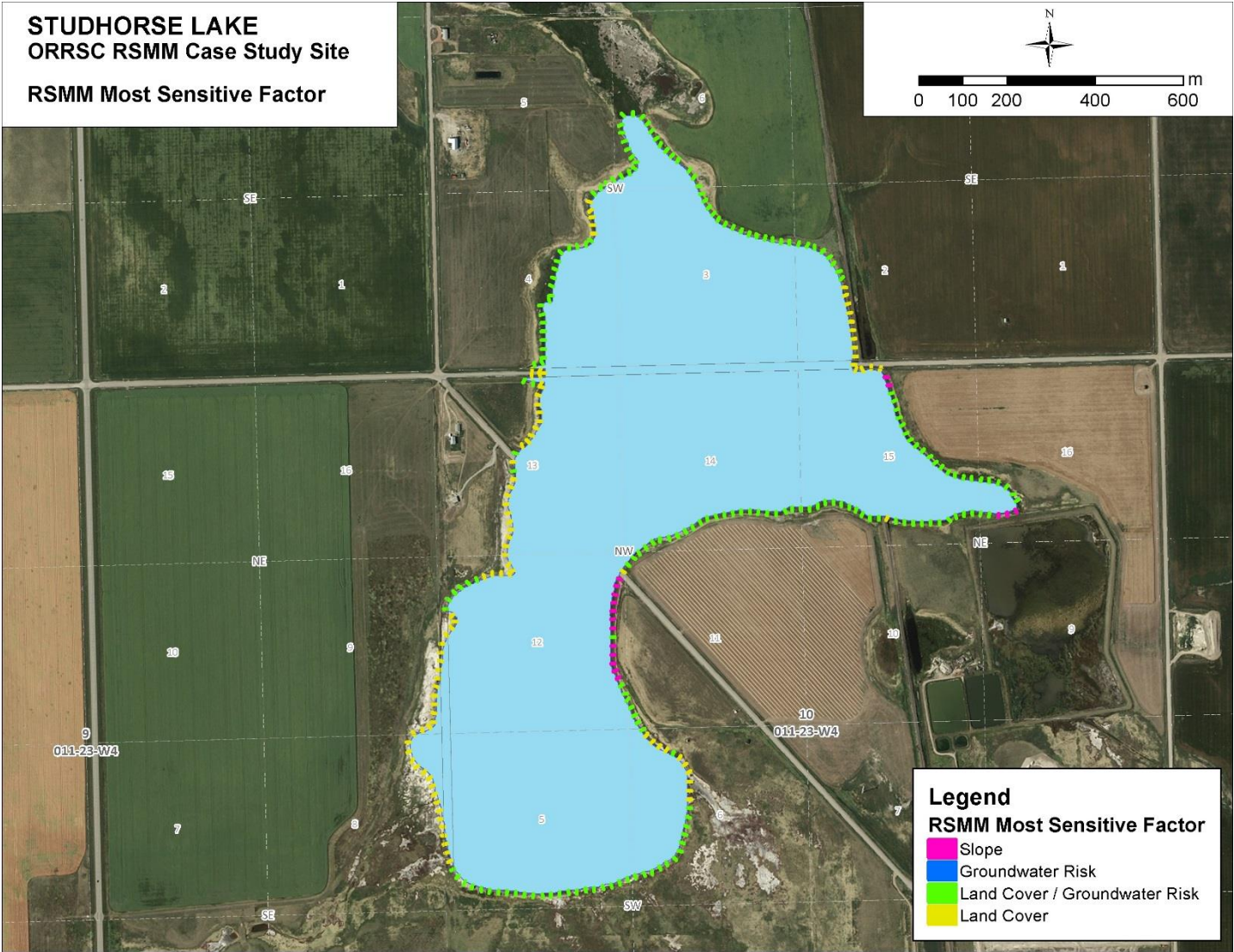


Studhorse Lake



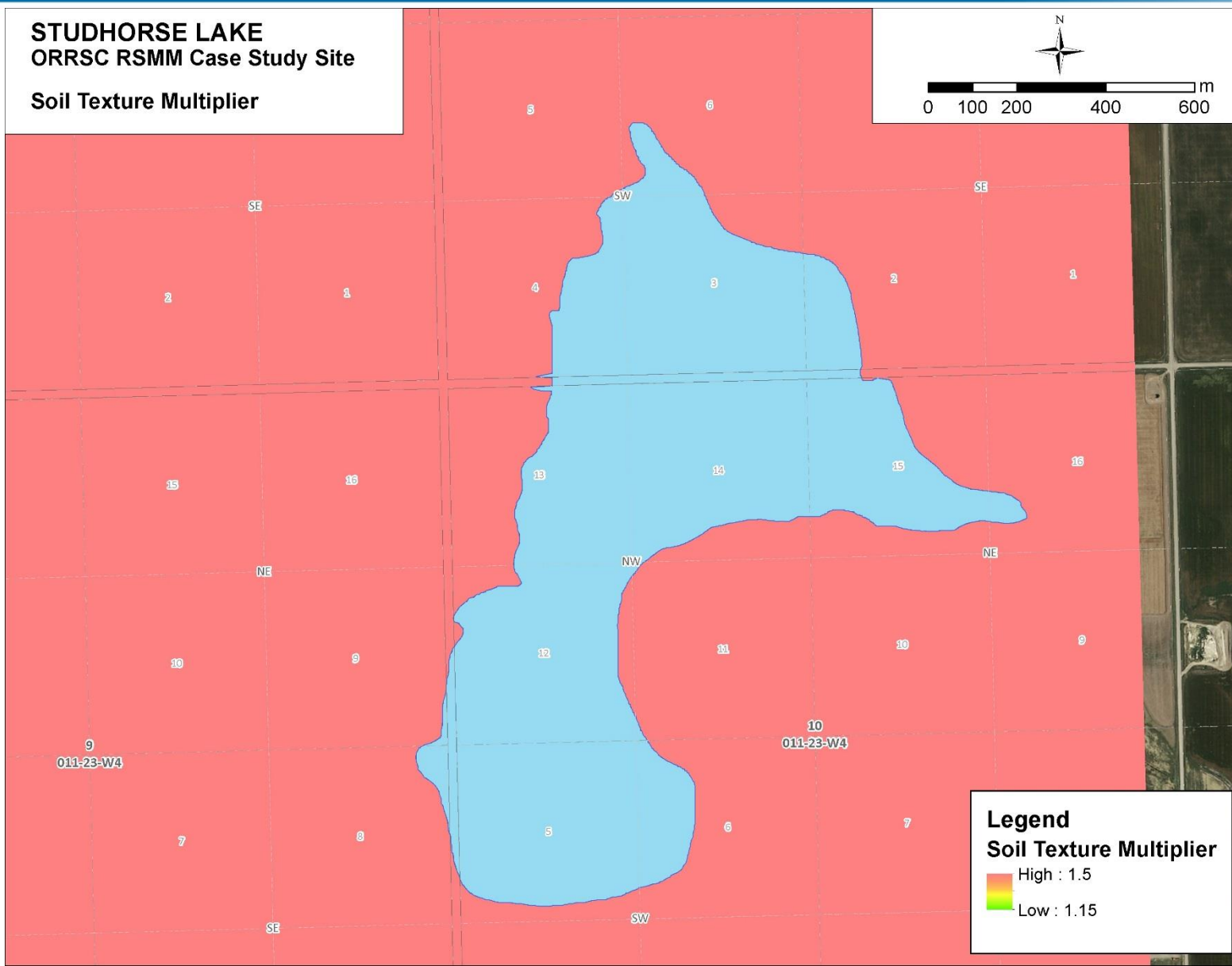


Studhorse Lake



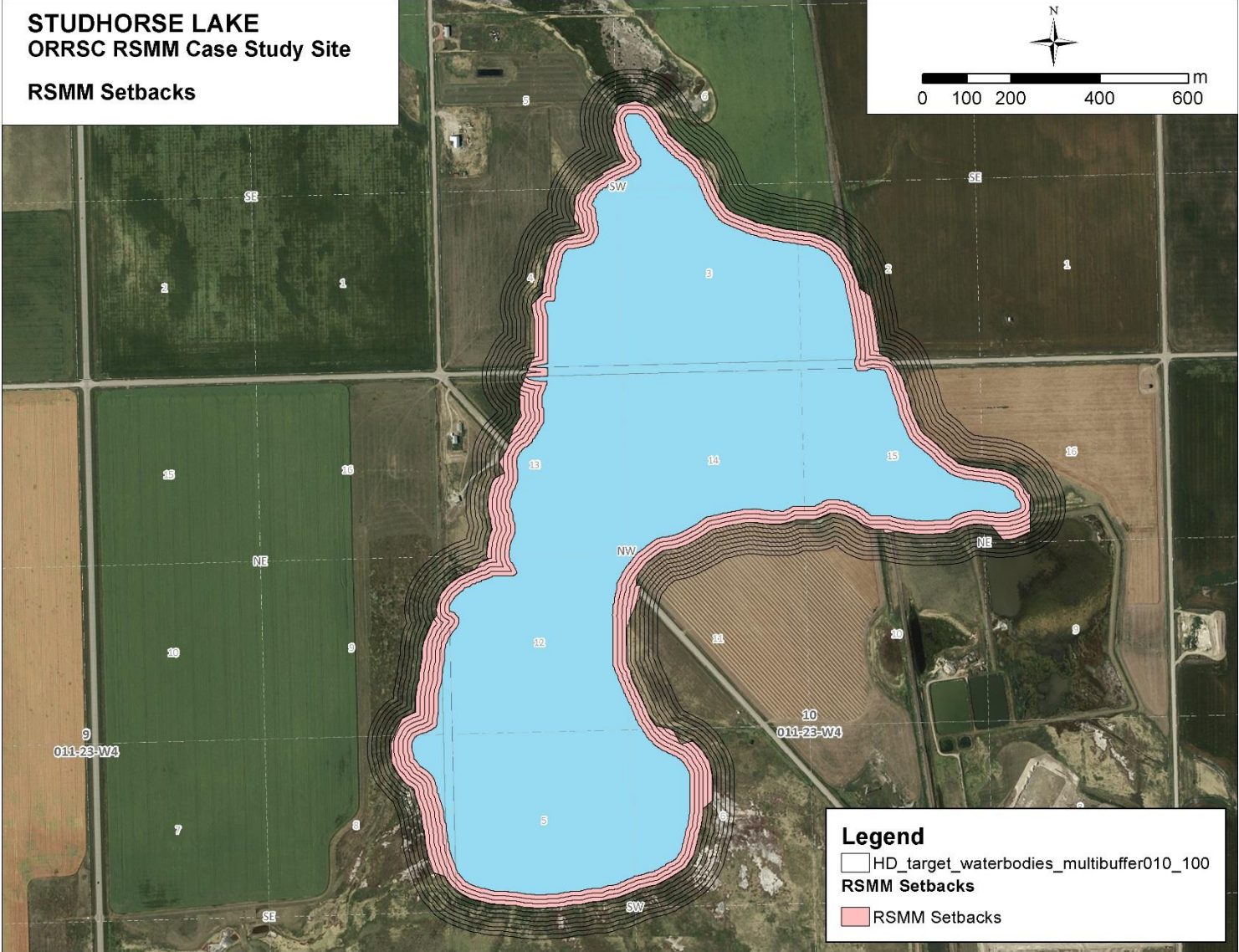


Studhorse Lake





Studhorse Lake





8. Alberta's 2013 Wetland Policy



Policy Goal



- To conserve, restore, protect, and manage Alberta's wetlands to **sustain the benefits** they provide to the environment, society and the economy



Outcomes to Achieve the Goal



- Wetlands of the **highest value** are protected for the long term
- Wetlands and their **benefits** are conserved and restored in areas where losses have been high
- Wetlands are managed by **avoiding, minimizing** and if necessary **replacing** lost wetland value
- Wetland management considers a regional context





Relative Wetland Value



- Based on the understanding that some wetlands provide **more function and benefits** than others
- Wetlands will be compared across a list of **metrics** derived from **five functional groups**



Wetland Value Functional Groups



1. Biodiversity and Ecological Health

2. Water Quality Improvement

- facilitates sediment removal and pollution filtration

3. Hydrological Function

- reduces flooding and supports groundwater discharge/recharge

4. Human Uses

- Supports activities and cultural values

5. Relative Abundance

- Are wetlands considered rare in the surrounding area



Calculating Relative Value



- Based on the **sum of the 5 metrics**, wetlands will be assigned a **relative value category**
 - From A (highest) to D (lowest)
- This in theory should reflect the **relative importance of a wetland** from an ecological and anthropogenic perspective





Relative Value Diagram



Value Criteria				Value Category
Biodiversity	+	=	Increasing Value	High – A
Water Quality Improvement				Moderate – B
Hydrologic Function				Moderately Low – C
Human Value				Low – D

Relative Wetland Value Units

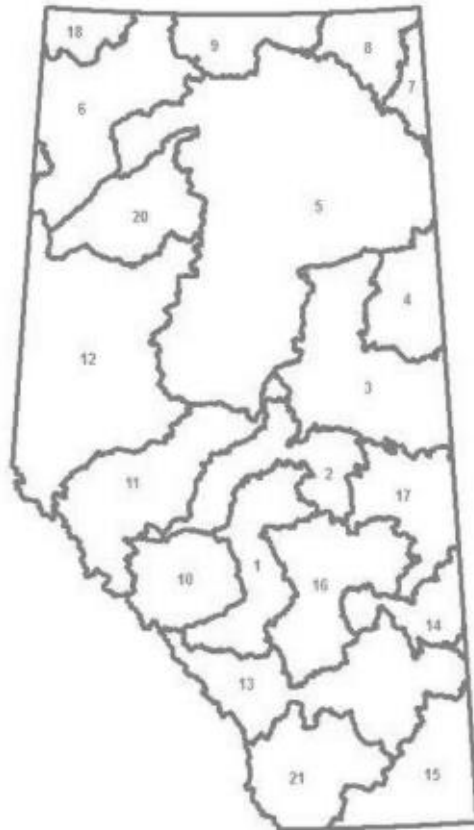


Table 2. In-lieu fee rates per hectare for 2015

Relative Wetland Value Assessment Unit – Natural Region and Basin	Relative Wetland Value Assessment Unit Number	<i>in-lieu</i> Rate (\$/ha)
Dry Mixedwood South Saskatchewan	1	\$19,139
Dry Mixedwood North Saskatchewan	2	\$19,388
Central Mixedwood North Saskatchewan	3	\$19,131
Dry Mixedwood Athabasca	12	\$18,450
Dry Mixedgrass South Saskatchewan	13	\$17,650
Northern Fescue South Saskatchewan	14	\$18,211
Dry Mixedgrass Milk	15	\$17,328
Central Parkland South Saskatchewan	16	\$18,523
Central Parkland North Saskatchewan	17	\$18,619
Dry Mixedwood Peace/Slave	20	\$18,206
Mixedgrass Milk	21	\$17,661

Figure 3. Relative Wetland Value Assessment Units (RWVAU)

ABWRET



- Alberta Wetland Rapid Evaluation Tool
- Provides a relative value (a, b, c, d) that is converted to a final A, B, C, D score. These are based on abundance modifiers
- The abundance modifier is based on +1/0/-1 at the relative wetland value assessment unit level



Wetland Directives, Guides, and Tools



- Released September 2014:
 - Alberta Merged Wetland Inventory
- Released June 2014:
 - Guide for Assessing Permanence of Wetland Basins
- Released June 5, 2015:
 - Interim Wetland Science Practitioner Program
 - Wetland Regulatory Requirements
 - Wetland Application Checklist and Regulatory Process Diagram
 - Alberta Wetland Assessment and Impact Report Directive
 - Alberta Wetland Classification System
 - Alberta Wetland Identification and Delineation Directive
 - Alberta Wetland Rapid Evaluation Tool – Actual (ABWRET-A) Manual
- Released June 19, 2015:
 - ABWRET-A Form
- Still waiting for the Alberta Wetland Mitigation Directive to be released



Replacement Ratio Matrix



Value of Lost Wetland	Value of Replacement Wetland				
		D (low)	C (mod low)	B (mod)	A (high)
A (high)		8:1	4:1	2:1	1:1
B (mod)		4:1	2:1	1:1	0.5:1
C (mod low)		2:1	1:1	0.5:1	0.25:1
D (low)		1:1	0.5:1	0.25:1	0.125:1

Replacement ratios are as high as 8:1 but as low as 0.125:1
All wetlands are valued ~ 20k/ha now for any in-lieu payments

Wetland Replacement



- As a last resort wetland replacement will be required where avoidance is not possible.
- Non restorative and restorative options for replacement will be considered.
 - Restorative replacement involved restoring, enhancing, or constructing a wetland.
 - Non restorative replacement includes research and education.



Restorative Replacement



- Activities that attempt to make up for the **permanent loss** of wetlands through restoration, enhancement or construction of a new wetland



Non-Restorative Replacement



- Does not require replacement of the wetland lost but instead is geared towards **advancing wetland science**

Examples include:

- Research of wetland restoration measures
- Provincial level wetland monitoring
- Specified wetland inventory
- Landscape wetland health assessment or modeling



Restoration: In- Lieu Fee Payment



- Approval holder pays the financial restitution for wetland loss
- Funds will be allocated to either restorative or non-restorative replacement



In-Lieu Fee Payments



Based on:

- Average cost of restoration work
- Cost of long term monitoring
- Administrative fee
- Average land value where the original wetland was located



Restoration: Permittee-Responsible Replacement



- The approval holder actively engages in restorative replacement
- Replacement must follow the GoA's criteria



Case Study



- You have a Class IV wetland around Lethbridge, Alberta

Steps:

- Needs to be assessed by an IWSP (QWSP)
- Submit a WAIR report and ABWRET
- Receive an ABWRET value with a A score (1:1 replacement)
-



Table 2. *In-lieu* fee rates per hectare for 2015

Relative Wetland Value Assessment Unit – Natural Region and Basin	Relative Wetland Value Assessment Unit Number	<i>in-lieu</i> Rate (\$/ha)
Dry Mixedwood South Saskatchewan	1	\$19,139
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Central Parkland North Saskatchewan	17	\$18,619
Dry Mixedwood Peace/Slave	20	\$18,206
Mixedgrass Milk	21	\$17,661

This wetland is worth
\$17,328/ha

What AQUALITY Can Do For You



- Wetland Assessments
 - Crown Claims Assessments
 - Compliance Monitoring
 - Regulatory Approvals
 - Erosion & Sediment Control
 - State of the Watershed Reporting
 - Fisheries Monitoring
- And more...



Other Resources



Aquality's Wetland Policy Website:

<http://wetlandpolicy.ca/>

<http://albertawetlands.ca>

Alberta Wetland Policy Implementation:

<http://aep.alberta.ca/water/programs-and-services/wetlands/alberta-wetland-policy-implementation.aspx>

Queen's Printer of Alberta:

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



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