

Central Alberta Recreational Lakes Science & Regulation 101

November 2010

Introduction

- The purpose of the presentation:
 - To create a more widespread awareness and understanding of the science and regulations that are relevant to recreational lakes in Central Alberta
 - To foster behaviours that improve lake and watershed health

The Issues

- There is an increasing pressure on lakes due to shoreline development, intensive land-use and increased recreational use
- This increase in human activity has caused a decrease in water quality
- Climatic variability also affects water quantity and quality



Changing Behaviours

- Changing how we live or recreate around lakes is important as good practices will:
 - Safeguard water supplies
 - Maintain recreational opportunities
 - Reduce water borne health issues
 - Conserve habitat for plants and animals
 - Enhance value of property & overall enjoyment of lake

Activities that could impact water quality

- Agriculture
- Industry
- Cottage/acreage development
- Shoreline modification & treatments
- Sewage disposal systems
- Recreational activities
- Contributions to climate change



Science and Legislation

- The scientific study of lakes helps us assess lake conditions and monitor changes over time (Part 1 of presentation)
- Legislation helps us to manage activities around lakes in an agreed upon, legally binding way (Part 2 of presentation)

Part 1: Understanding the Science of Lakes



Water Quality

- There are many measures of lake water quality
 - the most common being trophic status (the biological productivity of a lake)
- We can monitor:
 - Physical indicators (e.g. water clarity, temperature, conductivity, dissolved oxygen)
 - Chemical indicators (e.g. salinity, alkalinity, pH, metals, pesticides, other organics, major ions)
 - Biological indicators (e.g. bacteria, algae, plants, aquatic invertebrates, fish)
 - Trophic Status (i.e. productivity, nutrients, major ions)

Physical measurements

- Water clarity - is an important factor as plants need light to grow
- Murky water is usually related to high nutrient levels and high algae growth or excessive erosion or disturbance
- Most lakes in Central Alberta range from moderately clear to murky depending on season



Physical measurements

- Water temperature – changes with season & depth and can affect aquatic communities and the metabolic activity of biological organisms
- Dissolved oxygen – used by fish & aquatic organisms. Decomposition of algae or plant material can reduce O₂ levels to those that may cause fish kills.
- As temperature increases the ability of water to retain oxygen decreases

Chemical measurements

- pH (acidic/basic) – refers to the presence of hydrogen ions in the water – a healthy lake has a pH of 6.5 to 9
- Alkalinity – refers to the amount of calcium carbonate in water – relates to the capacity of the lake to neutralize acid
- Conductivity/Salinity – a measure of dissolved ions in water and lake fertility where changes may be associated with alterations to lake water quantity and nutrient balances

State of Lakes - Physical/Chemical measurements

- Relative to these measurements, most of the lakes in Central Alberta are shallow, turbid, warm, alkaline, productive and capable of supporting a variety of aquatic animals and plants.



Biological Measurements

- Occasionally Alberta Environment evaluates sediment and aquatic invertebrates in lakes to assess aquatic ecosystem health
- AENV evaluates fish tissue contaminants in terms of possible effects to the growth and reproduction of the fish species
- Risk to human health as a result of consumption of tainted fish tissue is evaluated by the local health authority or Environment Canada

Biological Measurements

- Fish population statistics are evaluated by Sustainable Resource Development
- Fish habitat requirements are assessed by the Department of Fisheries and Oceans
- Recreational health concerns are monitored by Alberta Health (i.e. fecal coliforms and E.coli)
- Water used for livestock watering and irrigation is evaluated by Alberta Agriculture

State of Lakes – Biological measurements

- Relative to human health factors, lakes in Central Alberta are generally safe for human recreational uses
- Bacteria, pesticides and metals are not routinely sampled in lakes and occur infrequently and at low concentrations where they have been measured
- Information on fish contaminates is not sufficient to assess trends or patterns.
- Lake beach closures are rare occurrences in Central Alberta



Trophic Status

- Water quality is affected by both human activities and the natural attributes of a lake
- One measure of lake productivity or a lakes ability to support life is the trophic status:
 - Low productivity = oligotrophic lake
 - Moderate productivity = mesotrophic
 - High productivity = eutrophic
 - Very high productivity = hypereutrophic

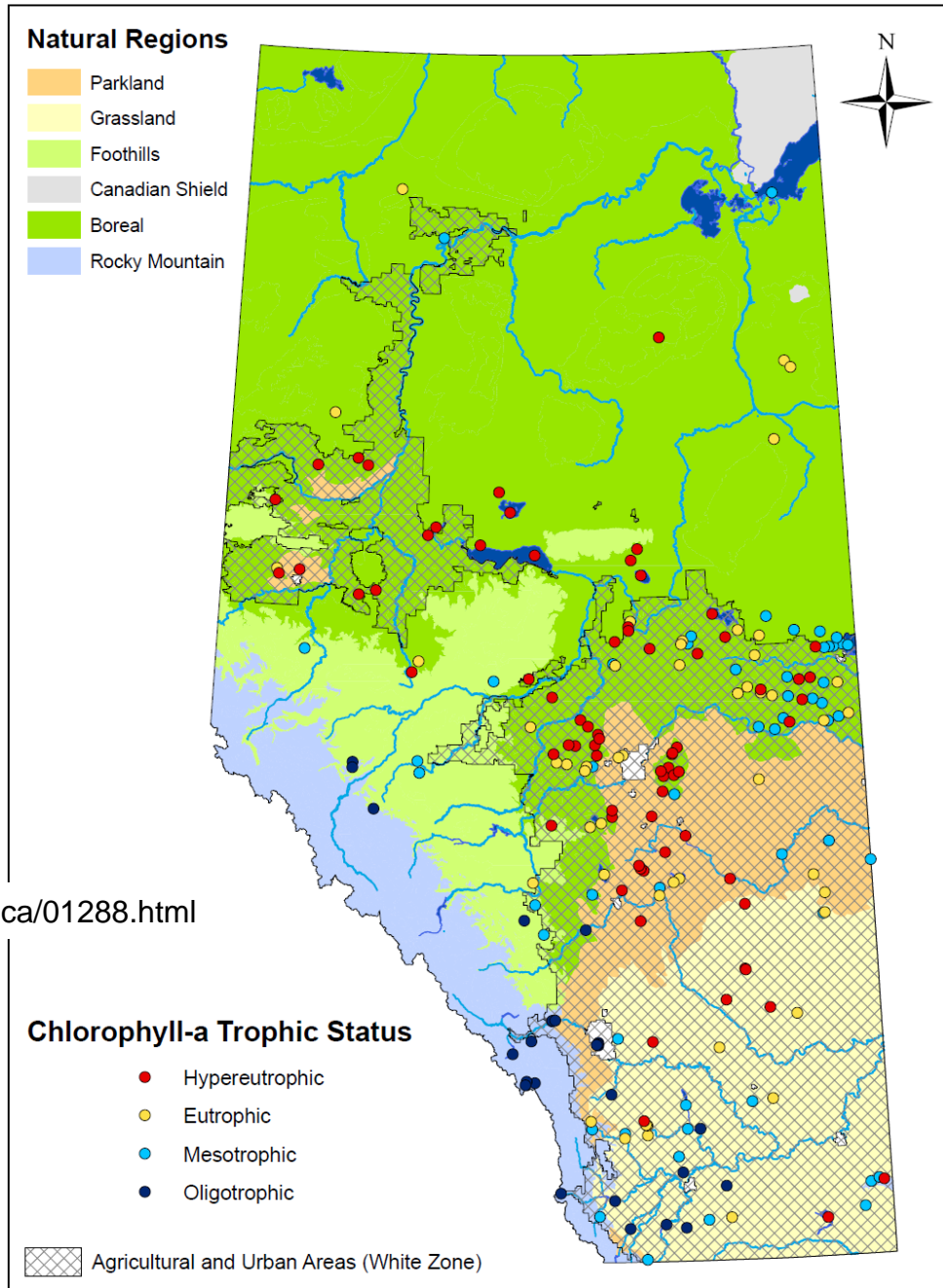
Nutrients

- While nutrients are needed by aquatic life, very high levels can negatively affect aquatic health and other uses or users of a specific lake
- Most common nutrients and indicators of lake productivity include:
 - Phosphorus: an essential nutrient that can limit the growth of algae and plants
 - Chlorophyll *a* – is a light gathering pigment that is common to all algae and plants – lakes with high nutrient levels can support increased densities of plants in the water column and shoreline
 - Secchi depth – measures the depth of light penetration



TROPIC STATE OF ALBERTA LAKES

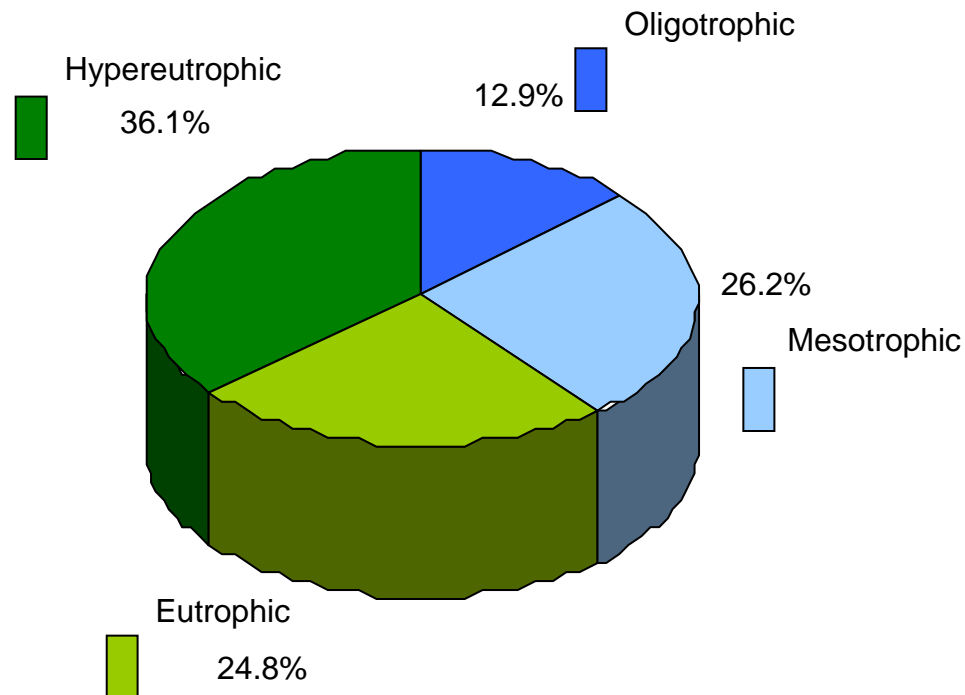
Based on Average Summer (May-September) Total Chlorophyll-a Concentrations (2009)



<http://environment.alberta.ca/01288.html>

Trophic State of Alberta Lakes

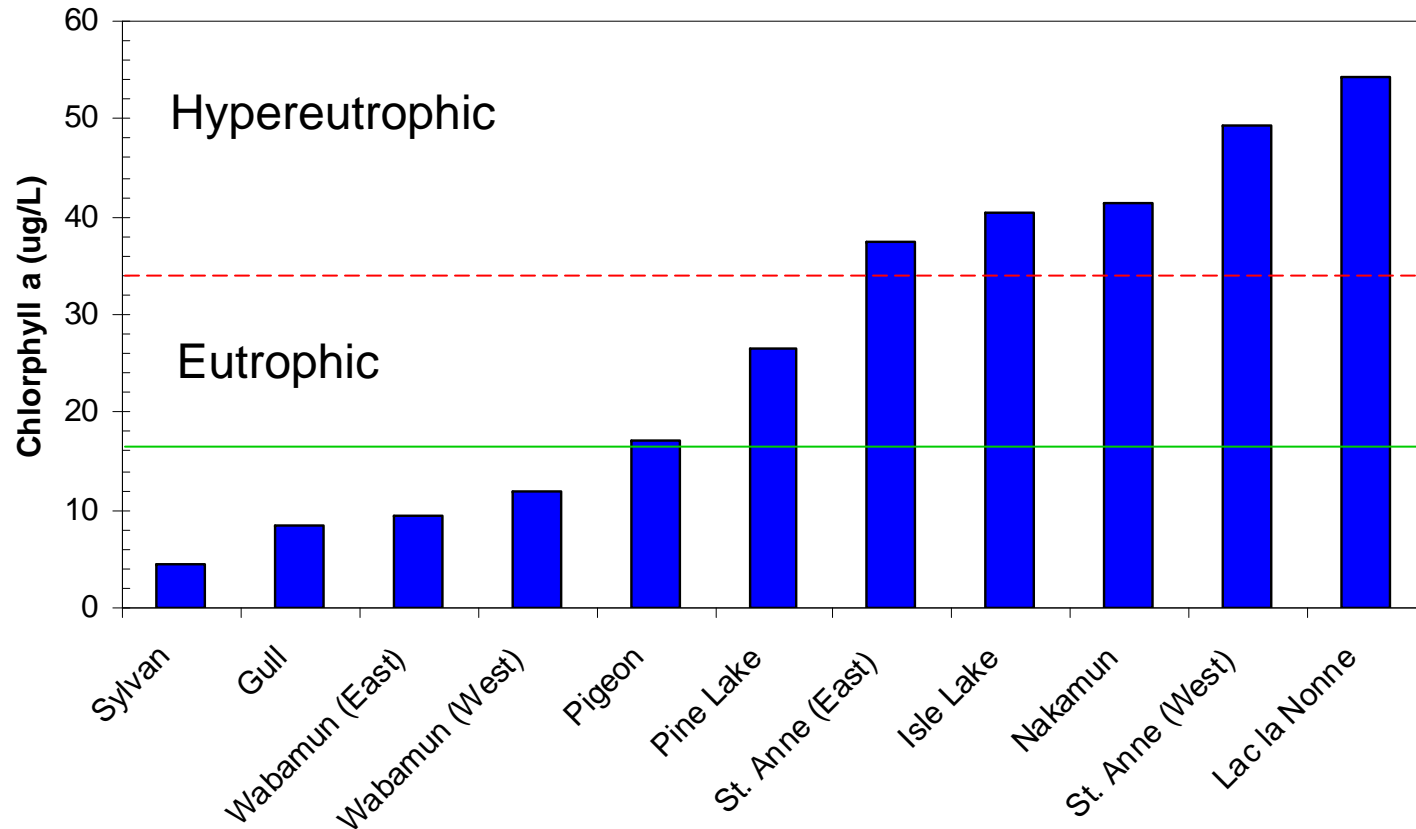
Chlorophyll-a



Preliminary data

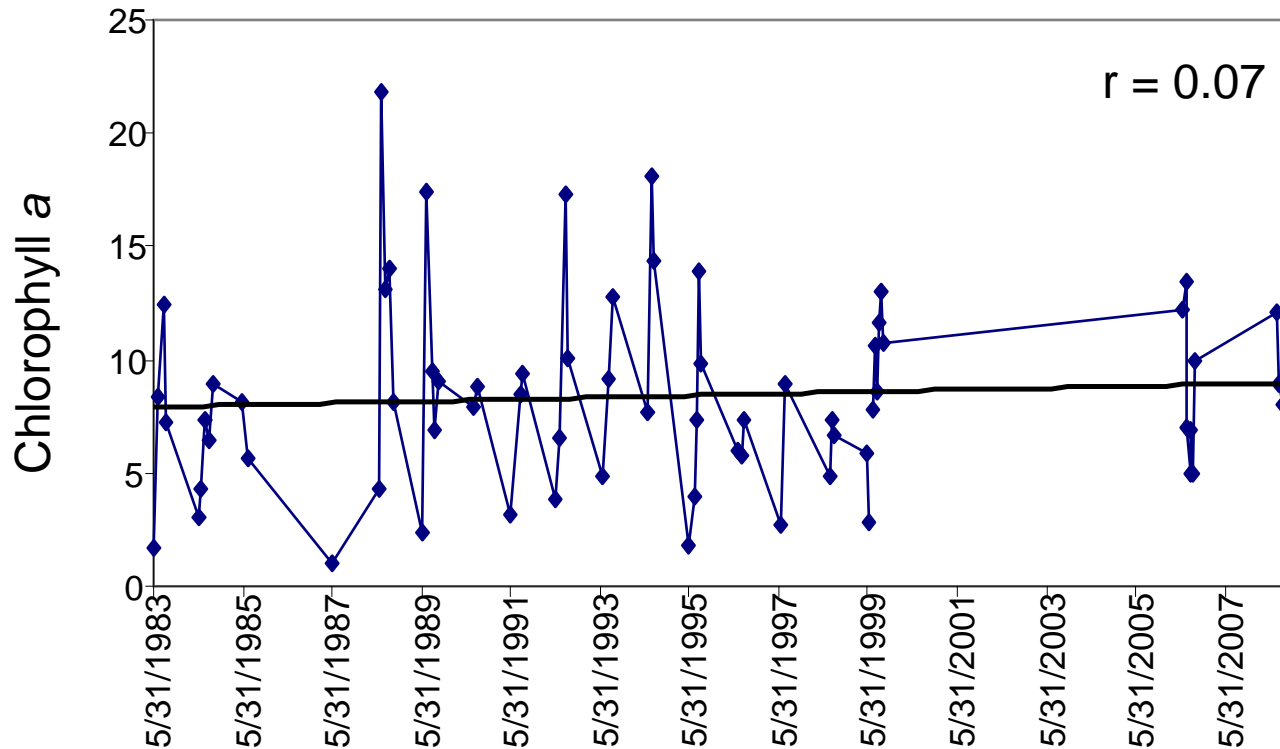
Recreational Lake Productivity

Mean Chl a Concentration over monitoring record



- lake productivity varies in time and space
- difficult to separate between natural and human contributions

Gull Lake Trend Data



No change in lake productivity over the available monitoring record has been shown

Blue dots are the monitoring values
Black line is the monitoring trend line

Historic reconstructions of lake productivity

- Reconstructions of lake productivity in Central Alberta demonstrate that human settlement and land-use conversion have increased nutrient and contaminant loading to lakes
- To date, these studies have been conducted on Isle Lake, St. Anne, Pine, Pigeon, Nakamun and Wabamun by the academic and research community
- Biodiversity of aquatic communities is also known to decrease as lake become more productive

<http://environment.gov.ab.ca/info/library/7868.pdf>



Changes in land cover, agriculture intensity, shoreline development, and vegetation removal can all affect the nutrient balance of a lake

State of Lakes – Trophic Status

- Majority of our lakes are naturally productive (eutrophic) due to soil chemistry and geographical location:
 - Our lakes are naturally nutrient-rich, which means that they are biologically productive and respond quickly to external nutrient inputs (i.e. agriculture, urban, sewage, atmospheric deposition)
 - Changes to a lake trophic state can alter the water quality and aquatic communities to less ecologically desirable states and in turn decrease biodiversity (i.e. aquatic plant to algae dominated or clear to turbid states)

State of Lakes – Trophic Status

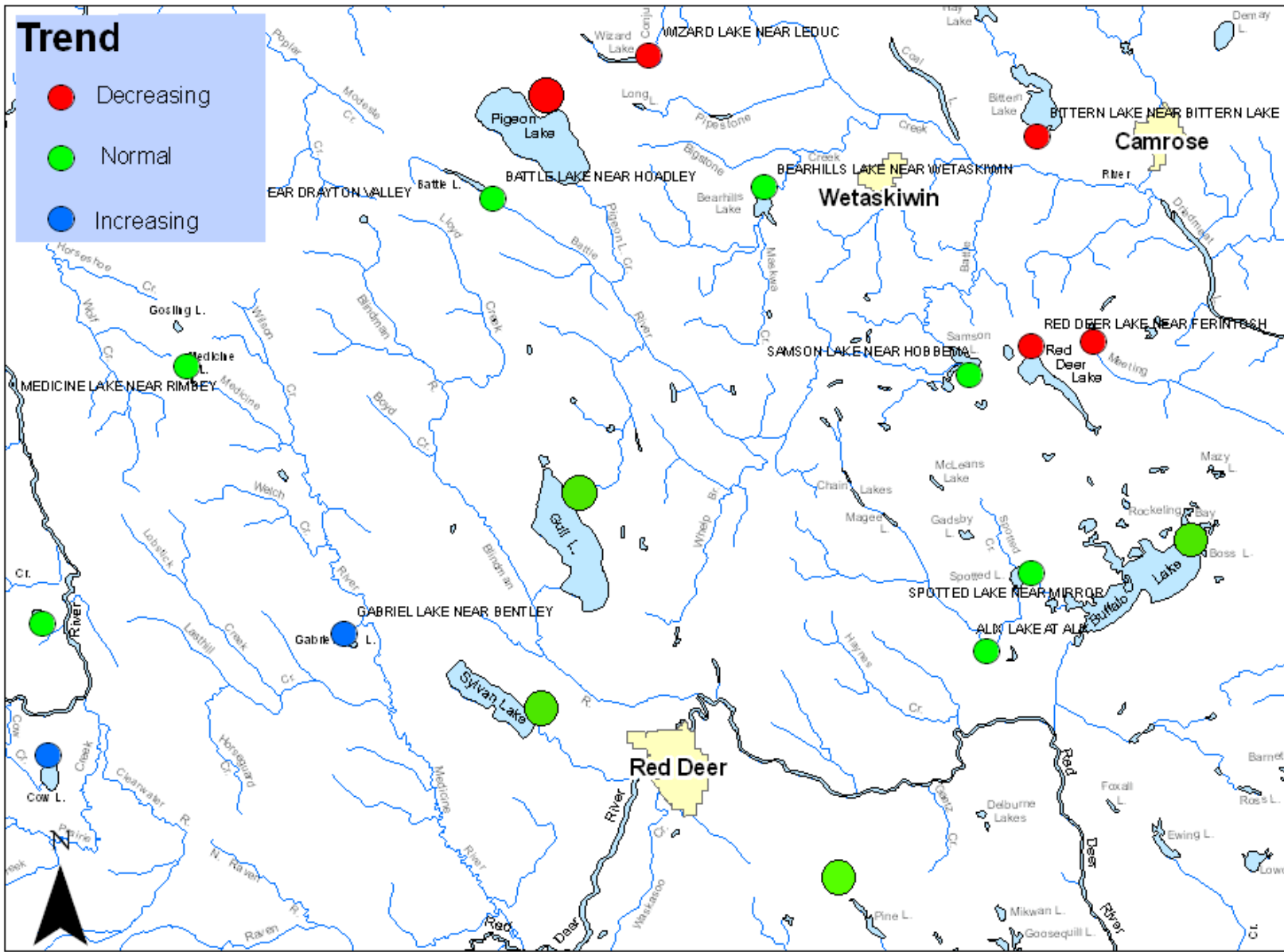
- The most pronounced changes in water quality in central Alberta recreational lakes have already occurred (1950-1970s) due to altered land-uses and increased land settlement
- Recent changes or trends in water quality deterioration are less pronounced and largely absent (1980-present)
- Suggest adopting a “maintain or improve” philosophical approach to lake management



Water quantity

- Water levels have historically varied considerably due to fluctuations in precipitation (rain/snow) and evaporation
- Lakes in Central Alberta are generally experiencing stable or decreasing water levels
- Of the 41 lakes evaluated in Central Alberta, 44% had no trend, 51% had a decreasing trend, 5% had an increasing trend in water level.





Lake Specific Information

- AENV has produced a series of posters that summarize available information for the main recreational lakes in Central Alberta.
- See contact information at the end of this presentation to obtain a copy.

Part 2: Understanding the Legislation of Lakes



Respect Our Lakes

An education & extension program about lake & lakeshore values and regulatory requirements:

- A partnership program between AENV & ASRD
- Promotes and encourages best management practices
- Increases knowledge of lake environments
- Increases awareness and understanding of the regulatory requirements and shared stewardship of Alberta lakes



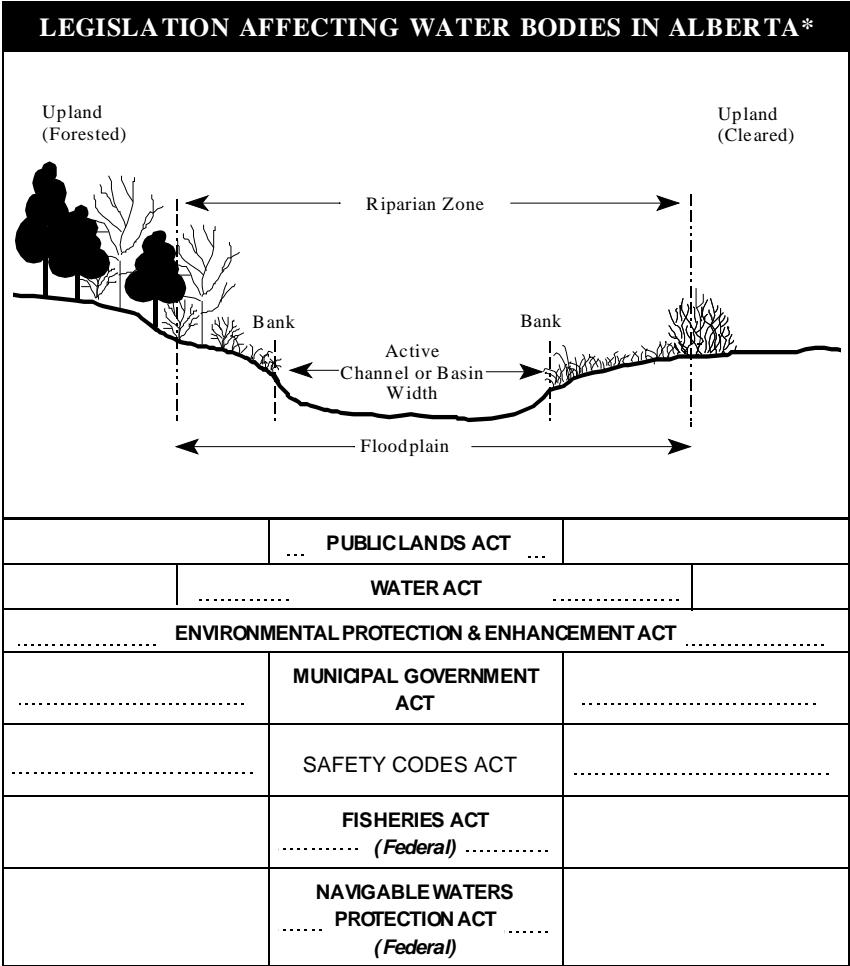
Legislation

- Federal and Provincial legislation
 - in place to manage and conserve our natural resources for the present and for the future



Legal Framework

Most commonly encountered legislation



* Not all applicable legislation is depicted in the table, only the most commonly encountered.

Legal Framework

Provincial (Alberta) Law

- *Water Act*
- *Public Lands Act*
- *Surveys Act*
- *Municipal Government Act*
- *Safety Codes Act* (Private Sewage Disposal System Reg. and Standard of Practice)
- *Environmental Protection and Enhancement Act*
- *Public Health Act*
- *Weed Control Act*
- *Fisheries (Alberta) Amendment Act*



Legal Framework

Federal Law

- *Fisheries Act*
- *Migratory Birds Convention Act*
- *Navigable Waters Protection Act*
- *Species at Risk Act*
- *Canada Shipping Act* (Boating Restrictions Regulation & Pleasure Craft Sewage Pollution Prevention Regulation)
- *Canadian Environmental Protection Act*



Water Act

- Primary legislation dealing with water and its management
- Supports and promotes the conservation and management of water, including the wise allocation and use of water



Water Act

Relates to, but is not limited to, the following water bodies:

- Lakes
- Rivers
- Creeks
- Gullies
- Floodplains
- Wetlands
- Ponds, sloughs
- Bogs
- Muskeg
- Riparian areas
- Aquifers



Water Act

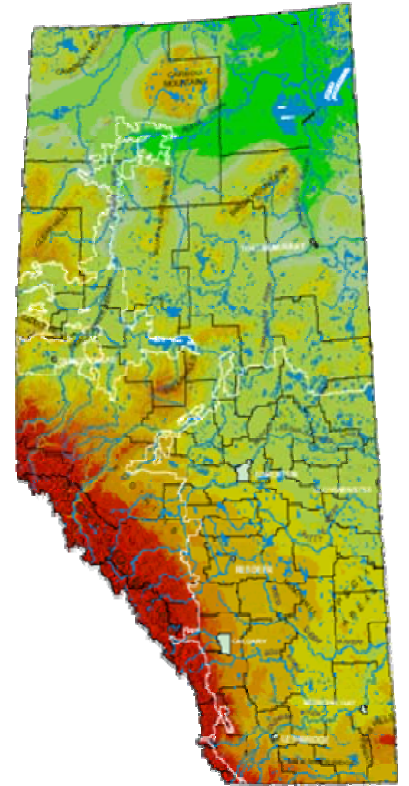
- Alberta Environment is responsible under the Water Act for water management planning and decision making with respect to all waters in Alberta, including both surface and ground water - Sec. 3(2)
- Approvals and/or licenses are required for a wide range of activities - Sec. 36 and Sec. 49
 - Water diversion
 - Alteration/modification to a water body and bed or shore
 - Storm water management works
 - Aquatic vegetation control & removal
 - Activity that causes or may cause an adverse effect on the aquatic environment

Environmental Protection & Enhancement Act (EPEA)

- Prohibits the release of substances into the environment that may cause a significant adverse affect
- Also covers:
 - Pesticide regulation
 - Fertilizer storage and application
 - Storm water drainage systems
 - Municipal wastewater treatment facilities
 - Septage disposal
 - Waste minimization and management, i.e. waste on water/ice or public lands

Public Lands Act

- Primary legislation dealing with the bed and shore of water bodies and their management
- All bed and shores are owned by the Province, including - Sec. 3:
 - Permanent and naturally occurring bodies of water (wetlands)
 - Naturally occurring rivers, streams, watercourses and lakes



Public Lands Act - Section 54 (1)

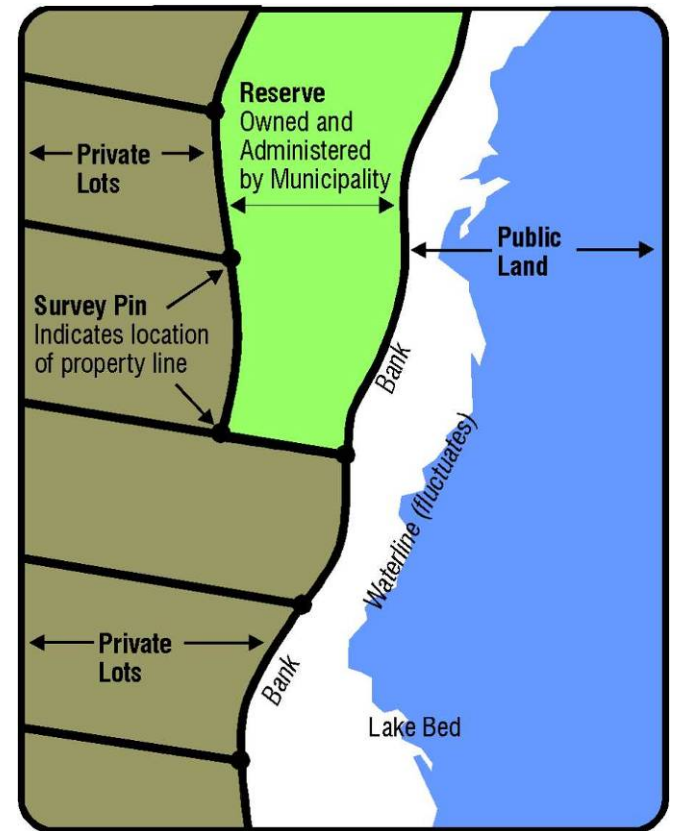
No person shall do anything on public land that:

- May injuriously affect watershed capacity
- Is likely to result in injury to:
 - bed and shore of any river,
 - stream, watercourse, lake or
 - other body of water or land in the vicinity of that public land
- Is likely to result in soil erosion



Property Boundaries

- Most lakeshore properties do not extend to the water's edge
- Usually extend only to the “bank”
- A reserve may separate the property from the lake
- Reserves are owned and administered by the local municipality
- Check land title description, lot survey plan, or subdivision plan



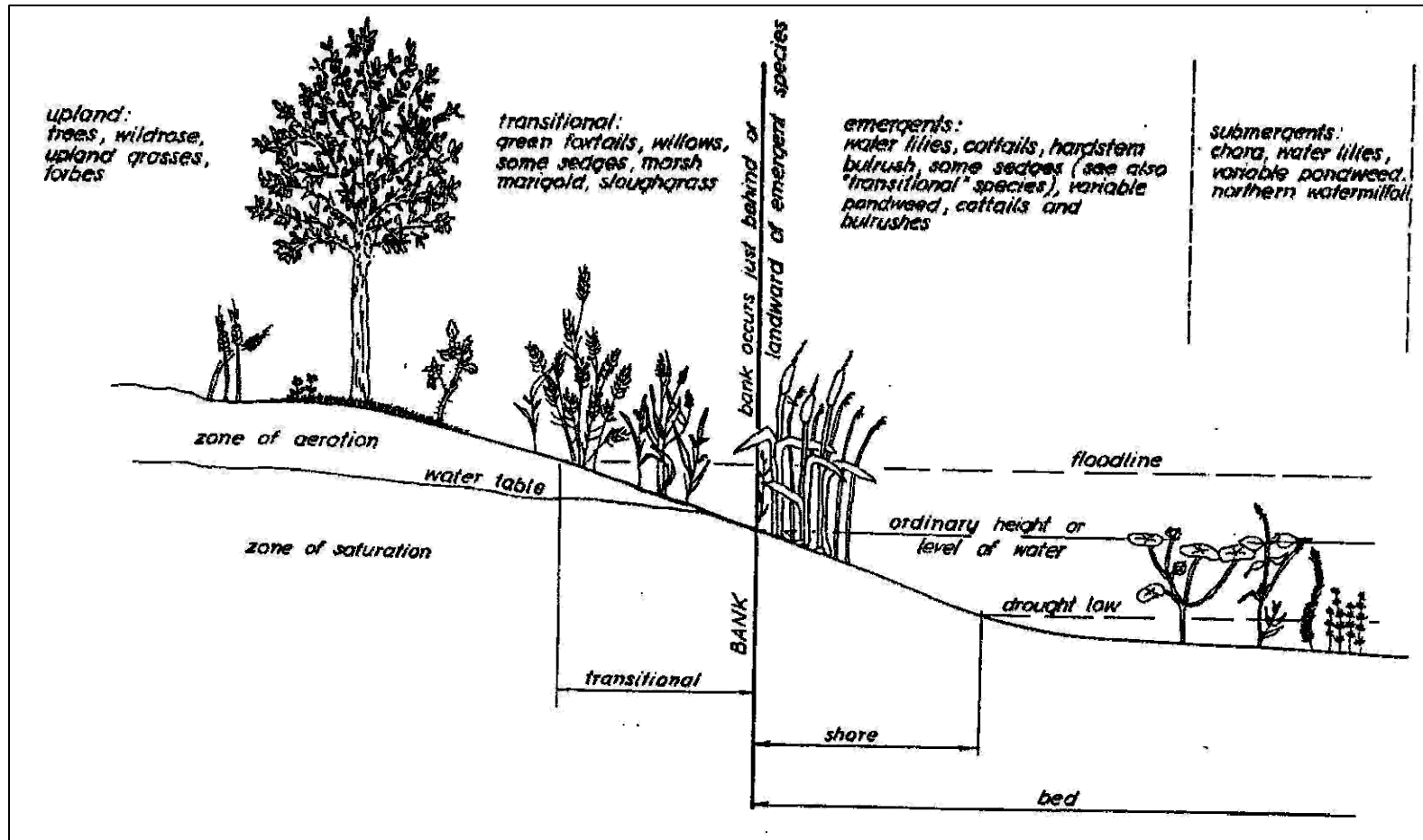
NOTE: If reserve land separates your land from the lake, check with local government before doing any shoreline modification/activity

Water Body Boundaries



OHWM = Ordinary High Water Mark

Effect of ordinary high water mark on natural vegetation



“I own the property right to the water’s edge”

- Vast majority of lakefront property owners do not
- Very few exceptions exist
- The land title and survey plan will state the extent of the property and its boundaries.
- It is the responsibility of a landowner to know where his/her property boundaries are.
- If the current location of a property boundary next to a water body needs to be established, the services of an Alberta Land Surveyor should be sought.
- Private shoreline ownership does not exempt the landowner from obtaining authorization for shoreline work



Public Access on Provincial Shorelands

- Where Albertans have legal access to a provincial water body, their right of access to and around a water body is not to be unreasonably restricted
- SRD recognizes the importance of public access/passage, while still respecting landowner common law rights
- First Nations Indian Reserve Lands – consult with First Nations before accessing shorelands



Authorization

- It is **everyone's responsibility** to be aware of the regulations before doing something that could affect the environment
- **Before starting** any project that may alter the shoreline area of a water body, you must contact the appropriate regulators for authorization

Authorization

- Written authority must be received from all applicable regulators before any activity is started
- A copy of the written authorization must be on the worksite with the contractor

Use of Shorelands

Examples of activities requiring authorization:

- Sand dumping, beach creation and/or maintenance
- Aquatic vegetation control and removal
- Boat lift, swimming dock or pier
- Septic/sewage systems
- Erosion protection works & other shoreline modifications
- Water diversion
- In-filling or re-grading
- Bottom dredging and excavation



Sand Dumping

- Can be a form of “pollution”
- Can cover and destroy fish habitat
- Often encroaches onto Crown land
- Easily eroded where there are no natural beaches, i.e. “filling in” your lake
- Promotes shoreline alteration and increases risk of erosion
- Requires constant maintenance and money



Check with AENV, ASRD, local gov, and DFO if approval is required

Beach Creation and Maintenance

- These may be permitted at public use areas:
 - beach renovation
 - on-going maintenance
 - aquatic vegetation control in designated swimming areas
- Provincial goal:
 - redirect public activity to common community areas
 - Reduce the cumulative impact of many individual shore modifications



Check with AENV, ASRD, local gov, and DFO if approval is required

Aquatic Vegetation Control & Removal

- Cumulative impact contributes to loss of fish and bird habitat, loss of fish productivity, increased erosion potential, and increase in nutrients = more algae
- Generally approvals are limited to mechanical cutting, to a max. 4m width, and stands that cover less than 75% must remain intact
- Larger areas may be approved for public use areas (e.g. common beach & swimming areas)



Check with AENV, ASRD, local gov, and DFO if approval is required

Boat lift, Swimming raft, Dock, or Pier

- Seasonal & Temporary

- Exempted from SRD and AENV approval if:

- Removed completely from lake by end of the open water season
 - Non-commercial use
 - Water can flow freely underneath
 - Does not interfere with the public's right of access
 - Not restricted by local or federal government environmentally sensitive areas or management plans, and
 - Does not increase probability of shore erosion



Check with AENV, ASRD, local gov, DFO, and Transport Canada if approval is required

Boat lift, Swimming raft, Dock, or Pier

- Commercial and/or Permanent
 - Requires an approval
 - not issued to individuals
 - may be issued to commercial or government groups



Check with AENV, ASRD, local gov, DFO, and Transport Canada if approval is required

Septic/Sewage Systems

- If your home is not connected to a municipal sewer system, you must have a private sewage disposal system
- The system must be installed and maintained to the standard set by Alberta Municipal Affairs
- **Routine Maintenance is required!**
- Distance setbacks apply from the property line, building, and from water sources/courses, e.g.:
 - Water-tight septic tanks – 10m
 - Sub-surface treatment fields – 15m
 - Treatment mounds – 15m
 - Open discharge systems – 45-50m
 - Sewage lagoon (single dwelling) – 90m



Contact your local government and Alberta Municipal Affairs for permits

Erosion Protection Works

- Naturally occurring vegetation found on the shoreline dampens wave energy and can even protect against ice scouring.
- When riparian vegetation is cut or removed, erosion increases.

“Soft” armoring
(e.g. plants)
maintains wildlife
habitat, reduces
sediment, filters
run-off, and
protects water
quality



Courtesy of Living by Water Program

“Hard” armoring
(e.g. rocks)
is only approved
in situations
where erosion risk
is very high

Check with AENV, ASRD, local gov, DFO and Transport Canada if approval is required

Water Diversion

- Landowners adjacent to (bordering) a water body are exempt from approval to divert up to:
 - 1250 m³/year for household purposes
 - 6250 m³/year for agricultural purposes (if owned prior to 1999)
- Diversion over this limit requires a license
- If a water supply line and/or pump disturbs the bed and shore of a water body, approval must be obtained prior to installation



Check with AENV and ASRD if approval is required

Off Highway Vehicles on Shorelands

- Cause nuisance/noise, public safety, erosion, wildlife/livestock harassment, habitat loss, etc.
- Is a “community” issue too as lakeshore ATV users are often local residents
- **Need for residents to apply peer pressure**
- SRD promotes responsible use, consideration of neighbors, safety, and conservation of shoreland resources
- Generally occurs on vacant Crown land – currently can only enforce traffic violations or damages if caught in act
- Current SRD legislation is under review
- Some seasonal sanctuaries exist to protect and assist in recovery of Endangered Species (e.g. Piping plover nesting areas)



Approval Process

- AENV & ASRD Joint Application form
- Submit a copy to both:
 - Regional Approvals Center for AENV and
 - Local SRD office
- Need to submit background information, e.g. plan location and cross-section drawing of land, etc.
- if a lakeshore activity has the potential to impact a FN's Indian reserve lands, then AENV will work with the applicant to notify the appropriate FN's and provide direction and guidance on how to proceed.

L1002 (Rev. 2009)

Alberta Application for Shore Line / Water Body Modification Under the *Public Lands Act* and the *Water Act*
Documents or information provided to Alberta Environment pursuant to section 15(1)(a) of the *Water (Industrial) Regulation* are public records which are accessible by the public.

Purpose

Aquatic Vegetation Control Bank Stabilization Beach Construction Domestic Waterline
 Erosion Protection Outfall Construction Permanent Boat Launch Permanent Pier Site
 Reservoir Construction Other _____

Applicant information

1. Name of Regional Company Name 5. Home Telephone: () ()
 2. Address (Street, PO Box, etc.), Floor, Province, Postal Code 6. Fax Telephone: () ()
 4. Mailing Address (if different than above) 7. Fax: () ()

8. Is the applicant the riparian landowner? Yes No → If no, PROVIDE and ATTACH written consent from the riparian landowner. 9. Consent Attached? Yes No
 10. Is the applicant a Canadian citizen? Yes No 11. Has the applicant attained the age of 18 years? Yes No
 12. Is the applicant an employee of the Government of Alberta or member of the Legislature? Yes → No 13. Dept. _____

14. Authorized Representative (if not the same as Applicant)

15. Signature of Authorized Representative I hereby authorize the below named person to act in my behalf in the granting of this application. Signature of Applicant
 Name of Company Name Home Telephone: () () Bus. Telephone: () ()
 Address (Street, PO Box, etc.) Floor, Province: Field Code: Fax: () ()

Project Location

16. Location of Proposed Works 17. Name of Water Body 18. Name of Subdivision 19. Area No. Block Lot Parcel

1/4	1/2	3/4	1/2	1/4	1/4

 20. Proposed Date of Commencement: 21. Proposed Date of Completion:

22. Required Information to Accompany Application Form

22.1. Alternative and site plan of proposed activity. See department's "Control Requirements for Aquatic Plant and "Control Plans" Attachments.
 A. Attachments that must show:
 • Proposed works in relation to property lines and banks of water body
 • If applicable, show any municipal source lands, reserve lands, riparian property and the water body
 • Location of proposed works and the present, highest, and lowest known water levels
 • Dimensions of the site (e.g. meter boundaries of the site) required to describe the conditions
 • Minimum plot size: 21.5m x 28.0m
 • Cross sections must show:
 • Existing site conditions and proposed modifications
 • All relevant measurements
 • Minimum plot size 21.5m x 28.0m
 B. Minimum plot size 21.5m x 28.0m
 22.2. A written description of the proposed project and why the works are required. Attached? Yes No
 22.3. A photograph, or copy of a photograph showing the existing shoreline to facilitate project review. Attached? Yes No

23. NOTE: 1. A discharge permit may be required from the local authority if the proposed activity may involve the use or disturbance of municipal source lands.
 2. An Inland Fisheries Act license or Municipal Water Protection Act (MWP) approval may be required from the Government of Canada if the proposed works may impact fish habitat or outfalls in the water body.

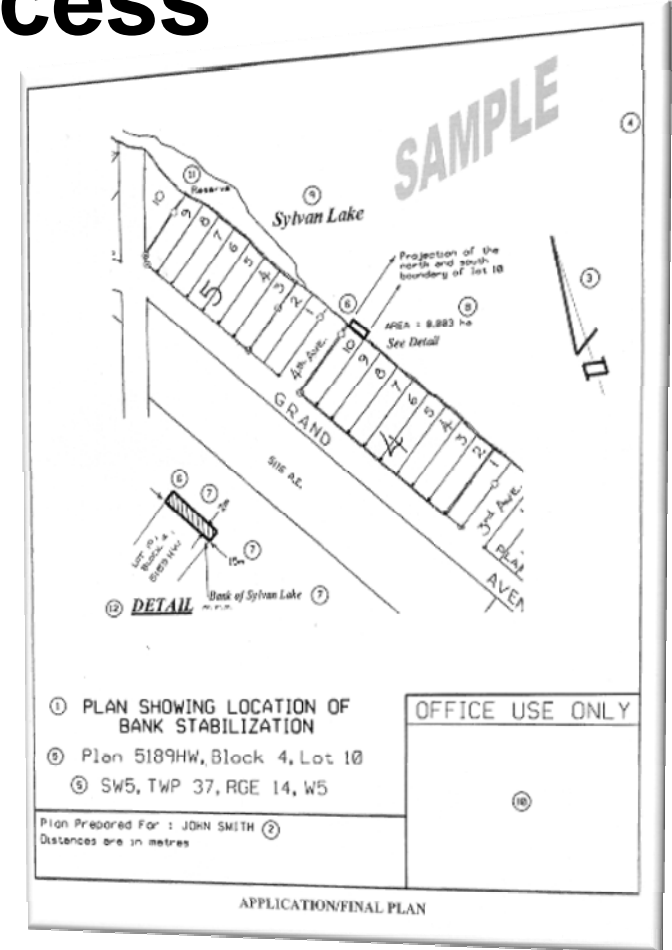
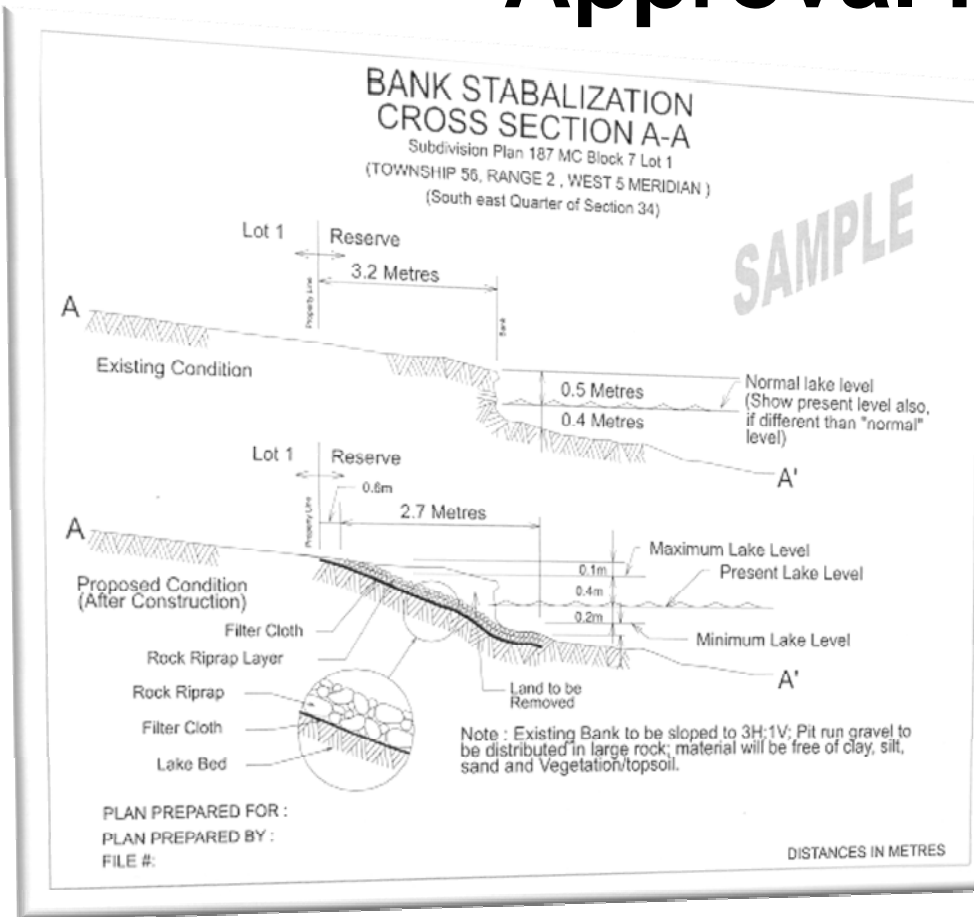
Date: _____ Signature: _____ Print Name: _____ Title: _____

Departmental Use Only

Authority under the *Water Act* Authority under the *Public Lands Act* / Land Administration / Public Lands

Waiting notice of Application: _____
 Notice of Decision: _____
 Approval Issue Date: _____
 File Number: _____ Client I.D. Number: _____ File Number: _____
 Approval Number: _____

Approval Process



Compliance

- Regulators assess non-compliance
- Aim to work with those in non-compliance to achieve compliance
- Under the *Public Lands Act* and *Water Act*
 - Failure to obtain approval is subject to administrative penalties
 - Administrative penalties for unauthorized use (\$5,000 for each day or part day)
 - Activities that cause or have potential to cause injury or an adverse effect to the bed and shore and/or water are offences
 - Enforcements could include prosecution
 - Court penalties for offences:
 - PLA (\$25,000 for individual, \$100,000 for corporation)
 - WA (\$50,000 for individual, \$500,000 for corporation)
 - Compensation for loss of Crown's property

For more information:

- AENV web site: <http://environment.alberta.ca>
- Respect Our Lakes site:
<http://environment.alberta.ca/03036.html>
- Alberta Environment Information Centre:
1-780-427-2700
- Alberta Environmental Hotline:
1-800-222-6514

You can also contact:

- Spruce Grove Office
 - Suite 1, 250 Diamond Avenue
 - Main Switchboard: (780) 960-8600
- Red Deer Office
 - 304, 4920 – 51 Street
 - Main Switchboard: (403) 340-7052