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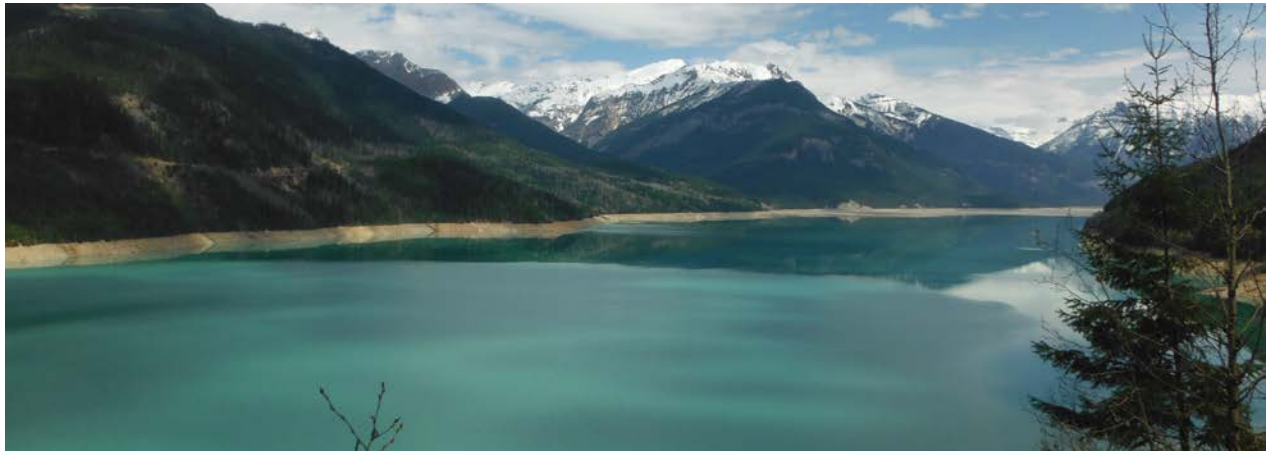



In-Lake and Watershed Management - How does one fit with the other?

Dörte Köster, Ph.D.

ALMS Workshop, September 28, 2018

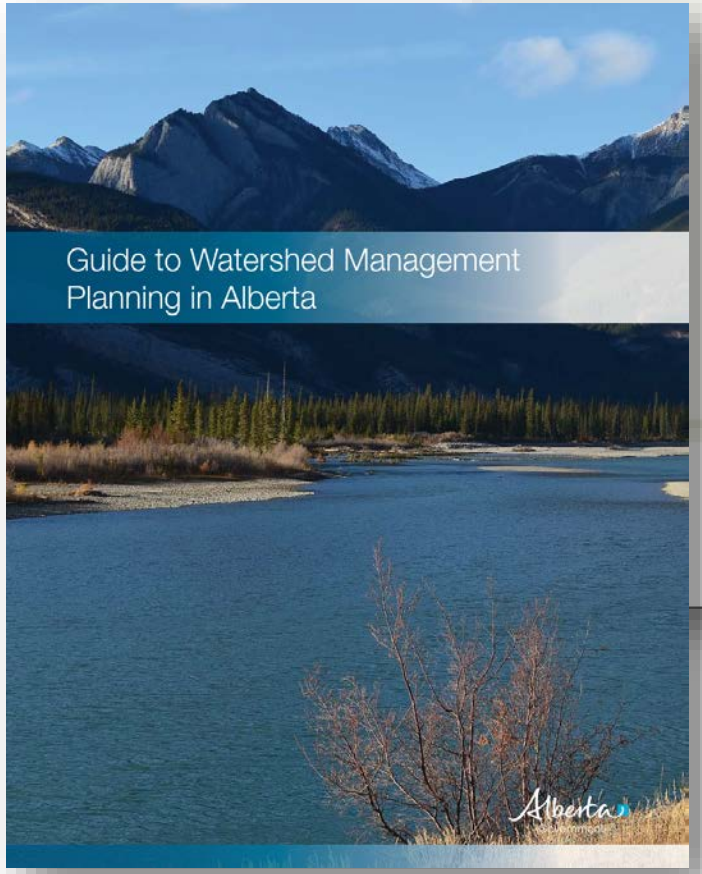
Questions

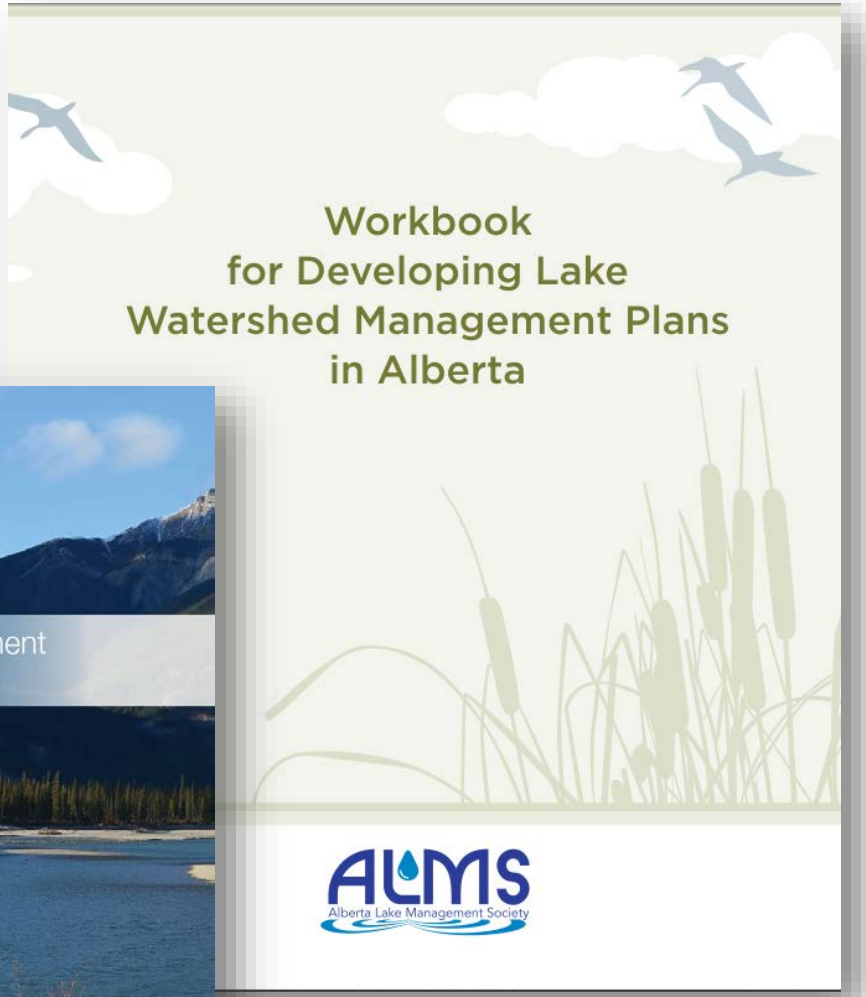
- What does Watershed Management do?
- What does In-Lake Management do?
- How does one fit with the other?

Lake Watershed Management in AB

Lake Watershed Management
Overview

- Goal: Maintain or improve lake ecosystems
- Guidance and provincial support available
- What does it entail?
- How does it work in AB?

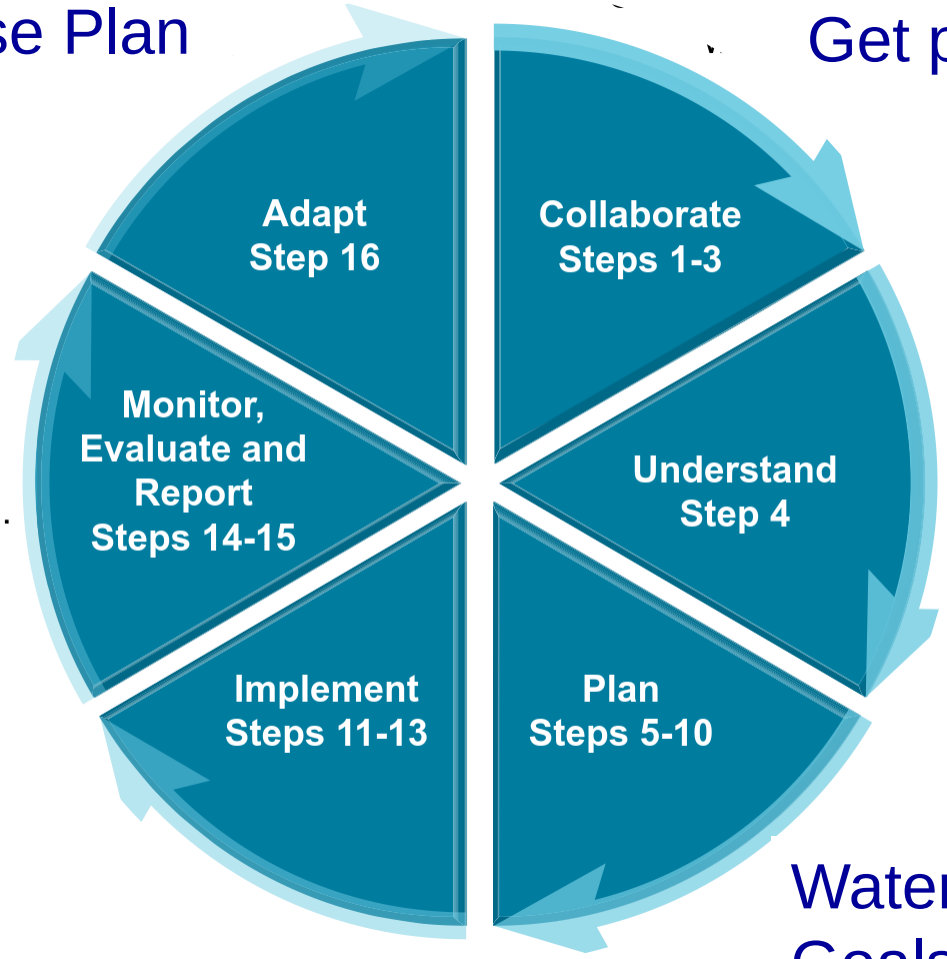




Watershed Management
Main Steps

Revise Plan

Get people together



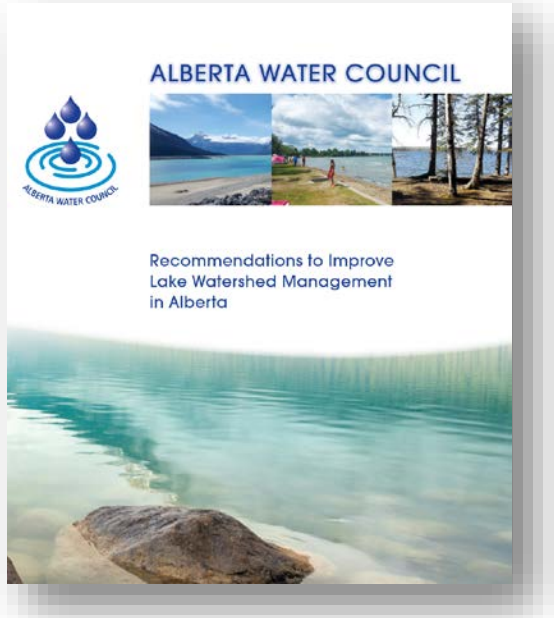
Verify Success

State of the Watershed

Take Action, e.g.,
reduce phosphorus load
from watershed to lake

Watershed Management Plan:
Goals, Options, Priorities

Lake Watershed Management
In Practice



AWC (2017) Lake Watershed Management in AB

- 16 Lake Watershed Management Plans
- Identified successes and gaps
- Recommended:
    - Clarify and harmonize approach
    - Provincial criteria for lake health, access to data
    - Encourage WMPs, identify lead for implementation
    - Strengthen legislative tools

In-Lake Management in AB

In-Lake Management

Overview

- Goal: improve lake water quality
- Lots of examples, no provincial guidance
- Methods to reduce phosphorus in the lake

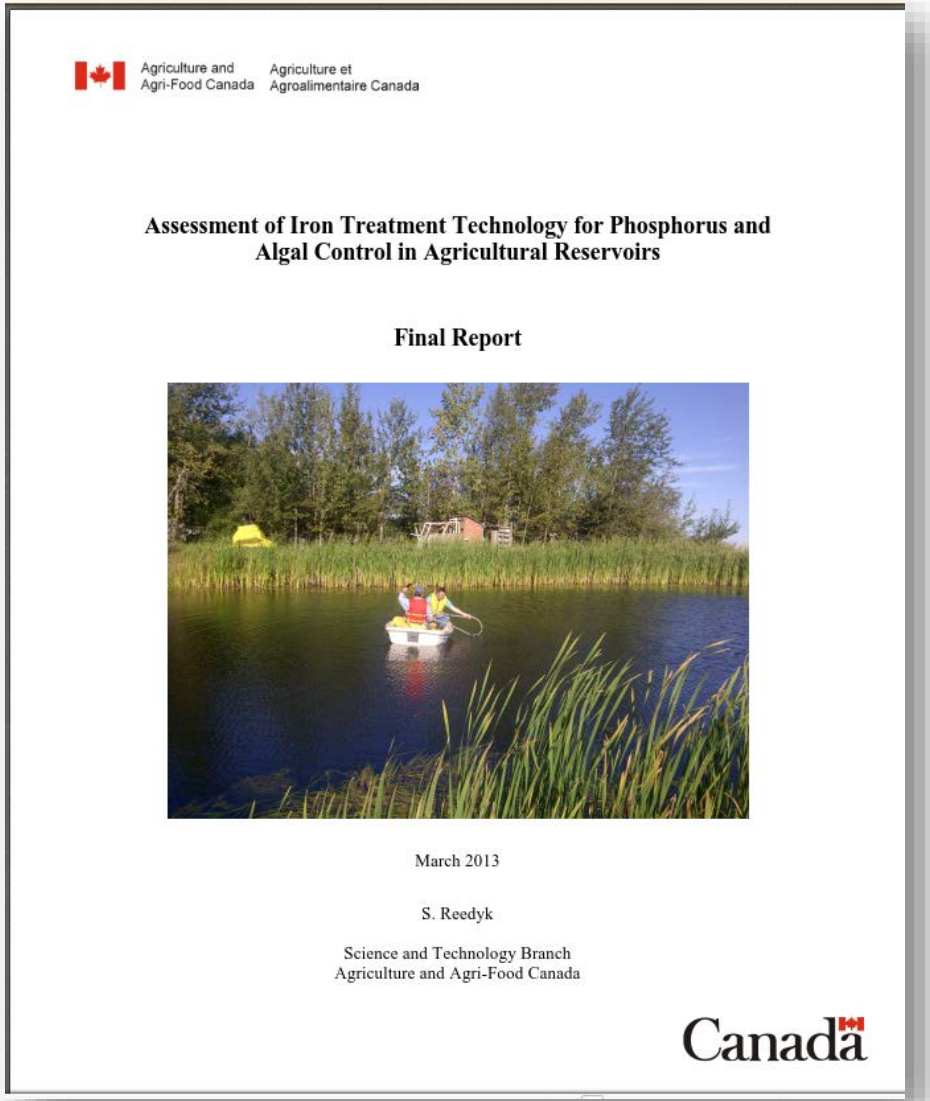
Sediment Inactivation

Aeration

In-Lake Management

Alberta Examples

- Liming in 1980s
- Hypolimnetic withdrawal Pine Lake
- Dugout work
- Phoslock sediment inactivation in Henderson Lake, Lethbridge (2017)
- ACA: aeration to enhance fish habitat



Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Assessment of Iron Treatment Technology for Phosphorus and Algal Control in Agricultural Reservoirs

Final Report

March 2013

S. Reedyk

Science and Technology Branch
Agriculture and Agri-Food Canada

Canada

In-Lake Management

Alberta Regulatory Process

- Not formalized, is evolving

1. Summarize science - Define Problem (P Budget is key)
2. Evaluate and select options
3. Implement
   - Regulatory approval
   - Monitoring

Phosphorus Sources in AB Lakes

Alberta Lake	Time Period	Runoff (%)	Atmospheric Deposition (%)	Sediments/Other (%)	Domestic Sewage (%)	Diversions (%)	Ground-water * (%)	Mean Chlorophyll-a (mg/L)
Burnstick	1995	90	6	-	4	-	-	2.6
Gull	1999-00	31	11	52	7	-	-	7.5
Isle	1996	49	2	42	7	-	-	38.6
Lesser Slave	1991-93	28	7	65	-	-	-	40.3
Lower Mann	Various	12	1	69	18	-	-	96.5
Moose	Various	61	6	32	1	-	-	20.6
Pakowki	1996	9	2	90	-	-	-	34.6
Pine	1992	36	4	55	6	-	-	22.2
Ste. Anne	1996	36	4	55	5	-	-	43.8
Sandy	Various	21	6	73	1	-	-	82.5
Sylvan	2005	32	20	11	13	-	24	4.4
Thunder	1992-96	13	8	55	-	24	-	28.8
Upper Mann	Various	21	1	55	24	-	-	37.0
Wabamun	1980-82	23	13	55	1	6	2	11.3
Wabamun	2008	3	44	43	1	3	5	11.3
Wizard	Various	35	4	46	15	-	-	22.7
Mean	-	31	8	50	8	2	-	32.9

Fitting In-Lake Management with Watershed Management

Comparison

	Lake Watershed Mgt.	In-Lake Mgt.
Goals	Improve watershed and lake health	Improve lake health
Stakeholders	All lake users, municipalities, province	All lake users, municipalities, province
Approach	Reduce P load from land	Reduce P load from lake bottom
Phase 1	State of the Watershed	State of the Lake Science
Phase 2	Watershed Management Plan (evaluate options)	Evaluate In-Lake Options
Phase 3	Implementation, Monitoring	Implementation, Monitoring
Timelines	Short & long-term	Short & long term

Example – ALMS Workbook

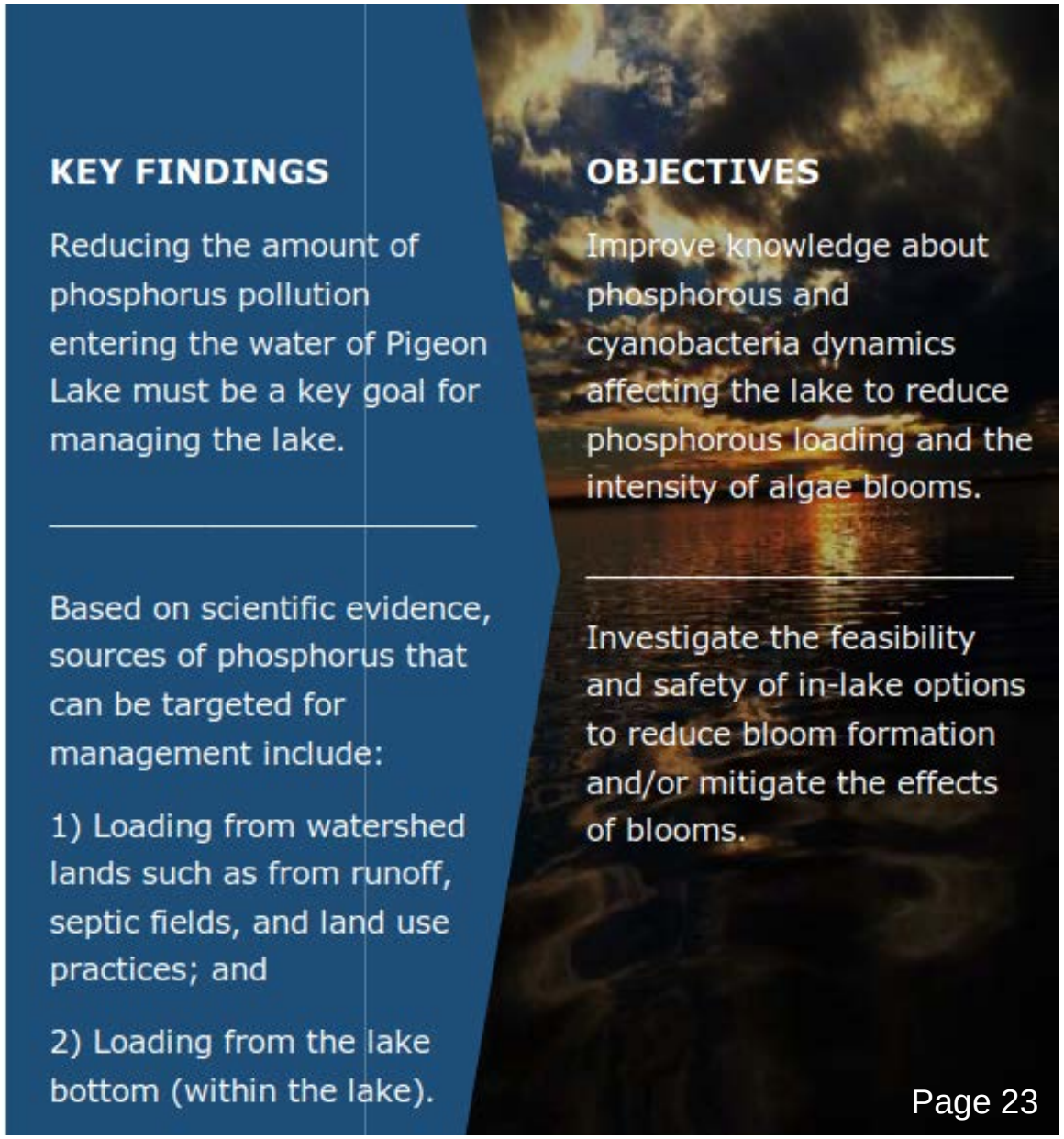
Where you want to be

Where you want to avoid being

Watershed Scale Source Activity Control	Eliminate or reduce sources which generate pollutants.	e.g. Fertilizer ban
Transport Reduction	Capture and remove or convert pollutants before they enter target resource	e.g. Treatment wetlands
Instream/Inlake Treatments	Enhancing internal processes for pollutant inactivation	e.g. Aeration
Ecosystem Restoration	Repair damage to resources when controls fail	e.g. Fish habitat restoration

Example - PLWMP

- Pigeon Lake Integrated Watershed Management Plan
- Includes Section on “The Lake”
- Consider phosphorus from watershed and lake bottom



"If you want to go fast, go alone.
If you want to go far, go together."

African Proverb

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