A Watershed Stewardship Society's Experience with a Cumulative Effects Management System Pilot Project

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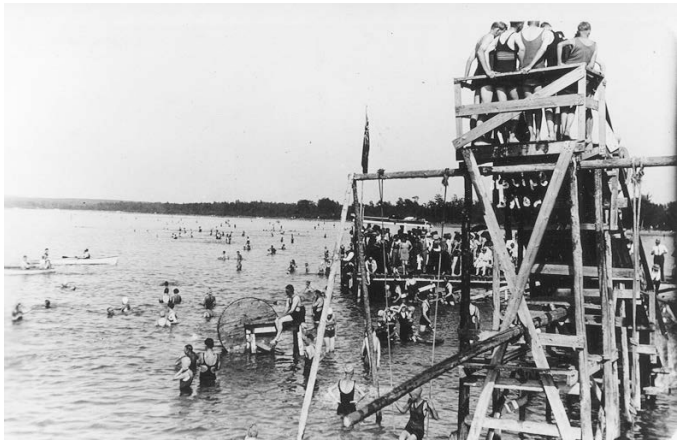
Sylvan Lake's 100 Year History



An Alberta Crown and Recreational Asset

Environmental tradition to uphold

Mr. Speedy brought up the subject of possible contamination of the spring on account of Martin's hogs running at large in his pasture.

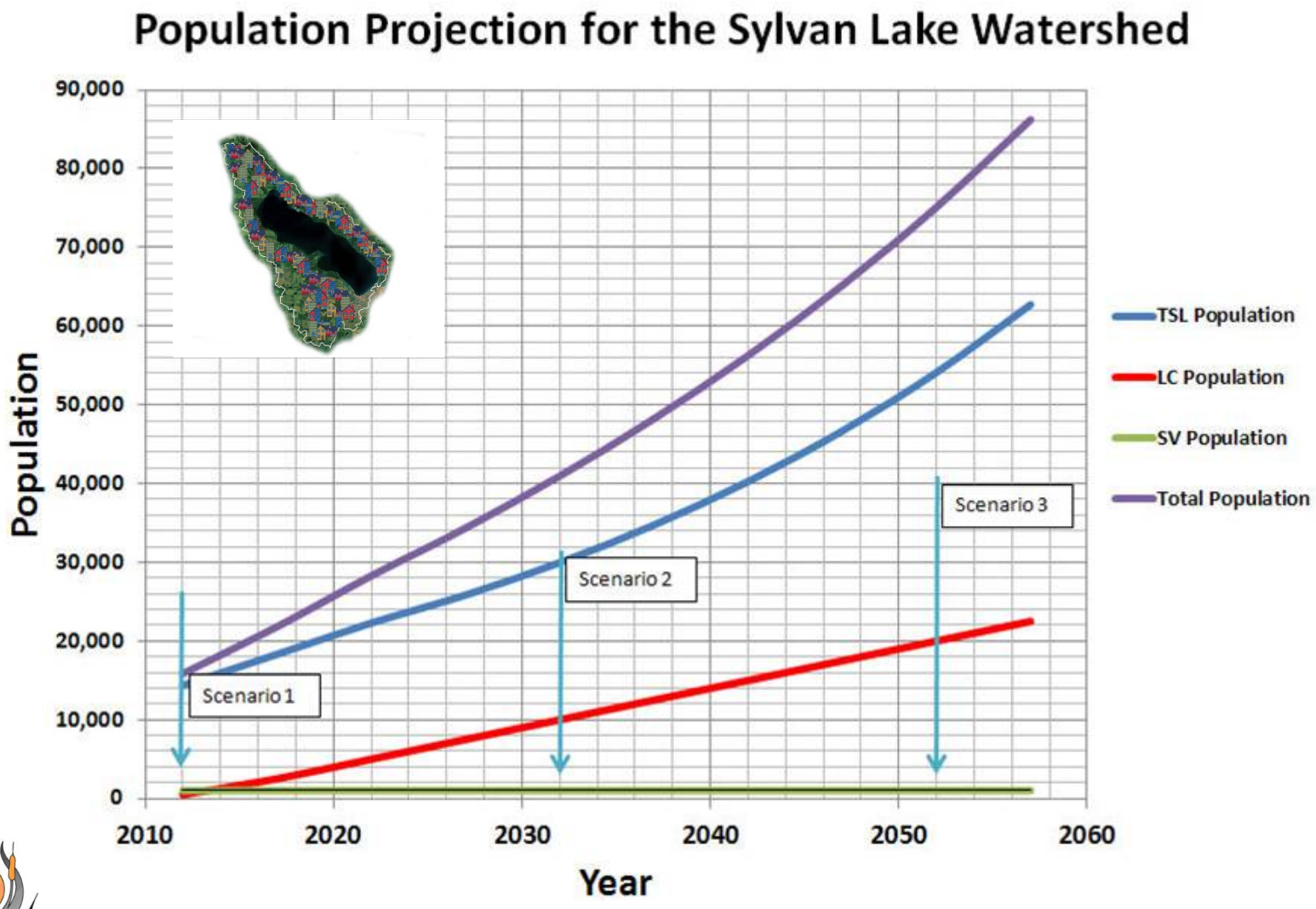
Mr. Speedy was instructed to see Mr. Martin regarding same.

-TSL Minutes, June 1940

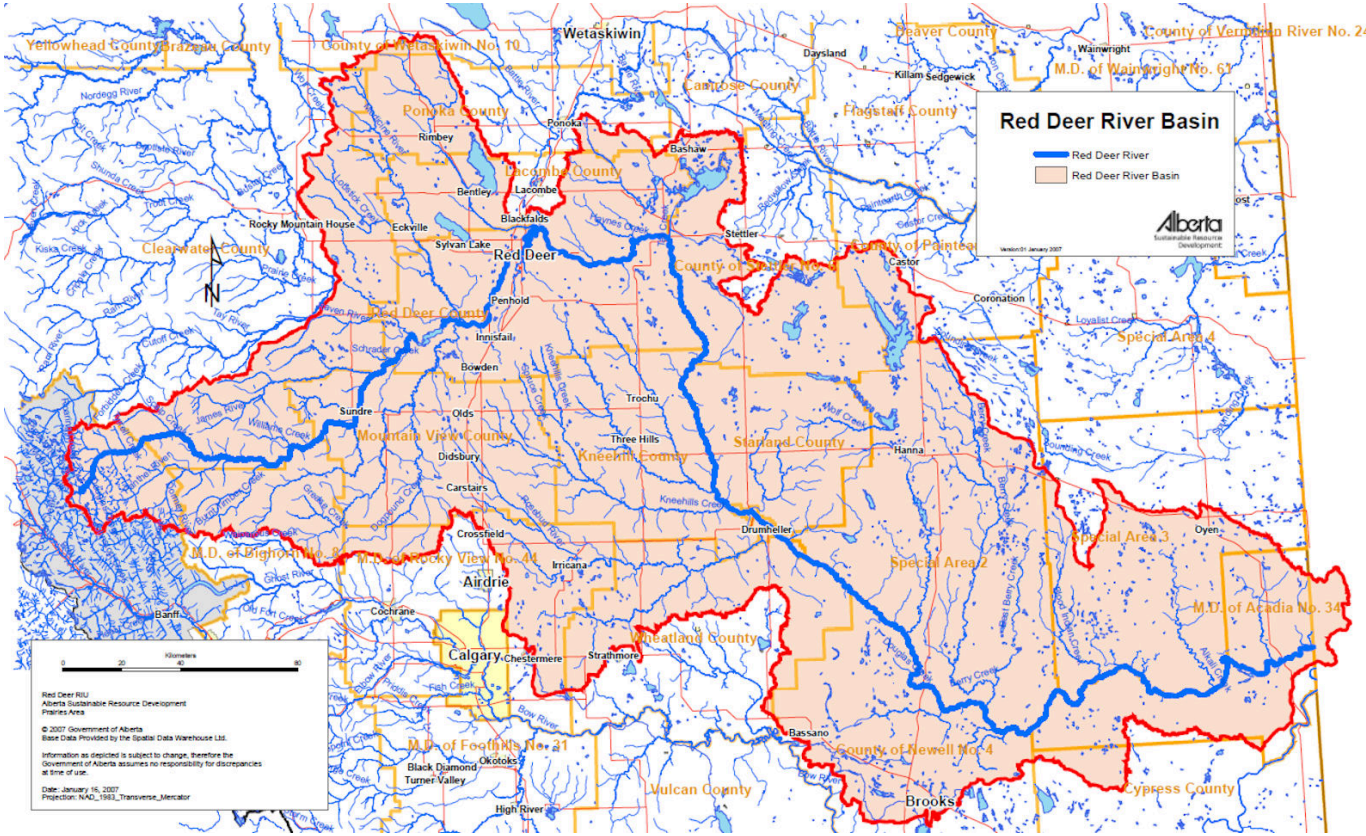
Sylvan Lake – The Stewardship Society Vision

Sylvan Lake – The Competing Municipal Vision

Sylvan Lake – The Municipal Vision



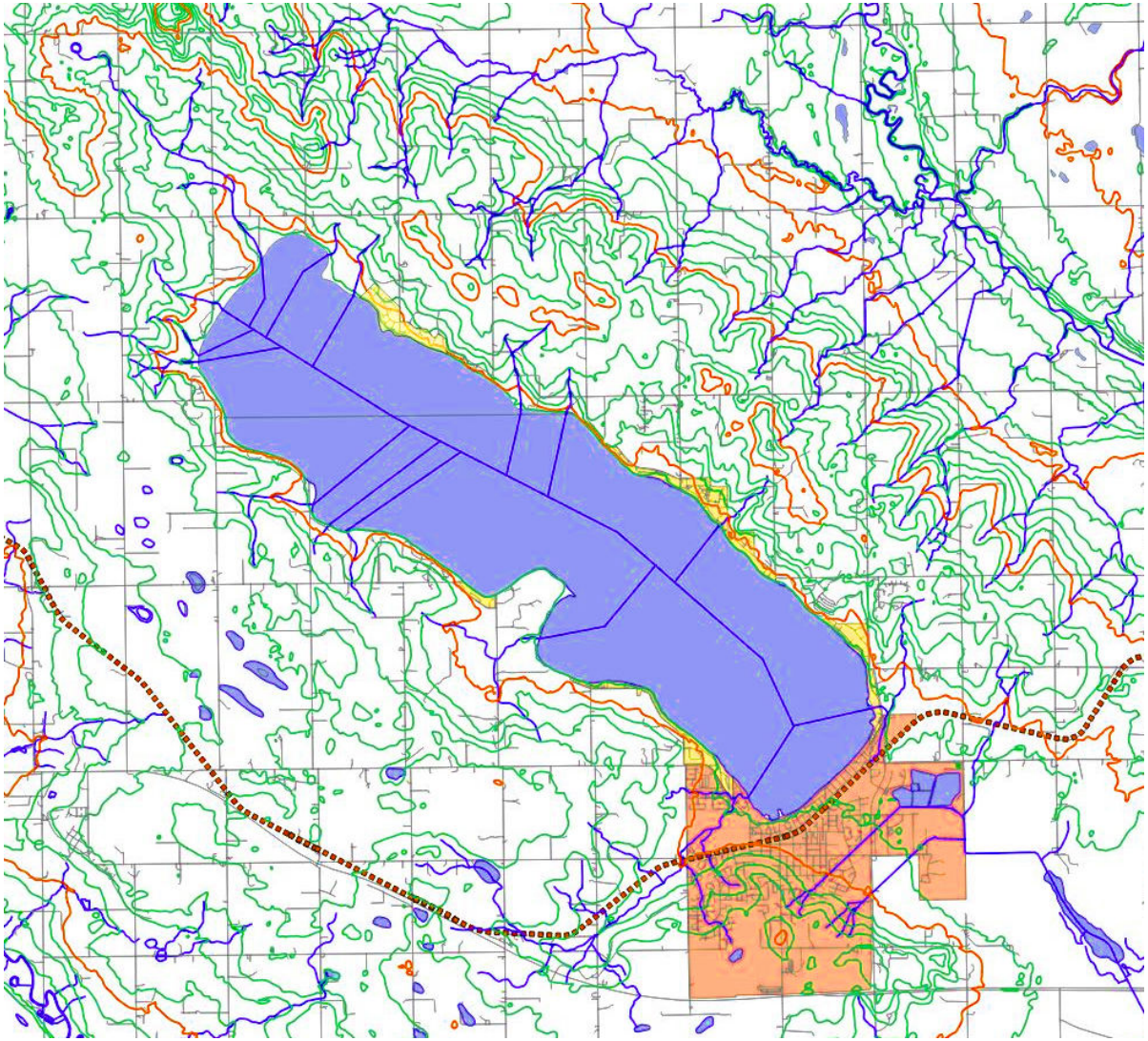
Sylvan Lake is in the Red Deer River Watershed



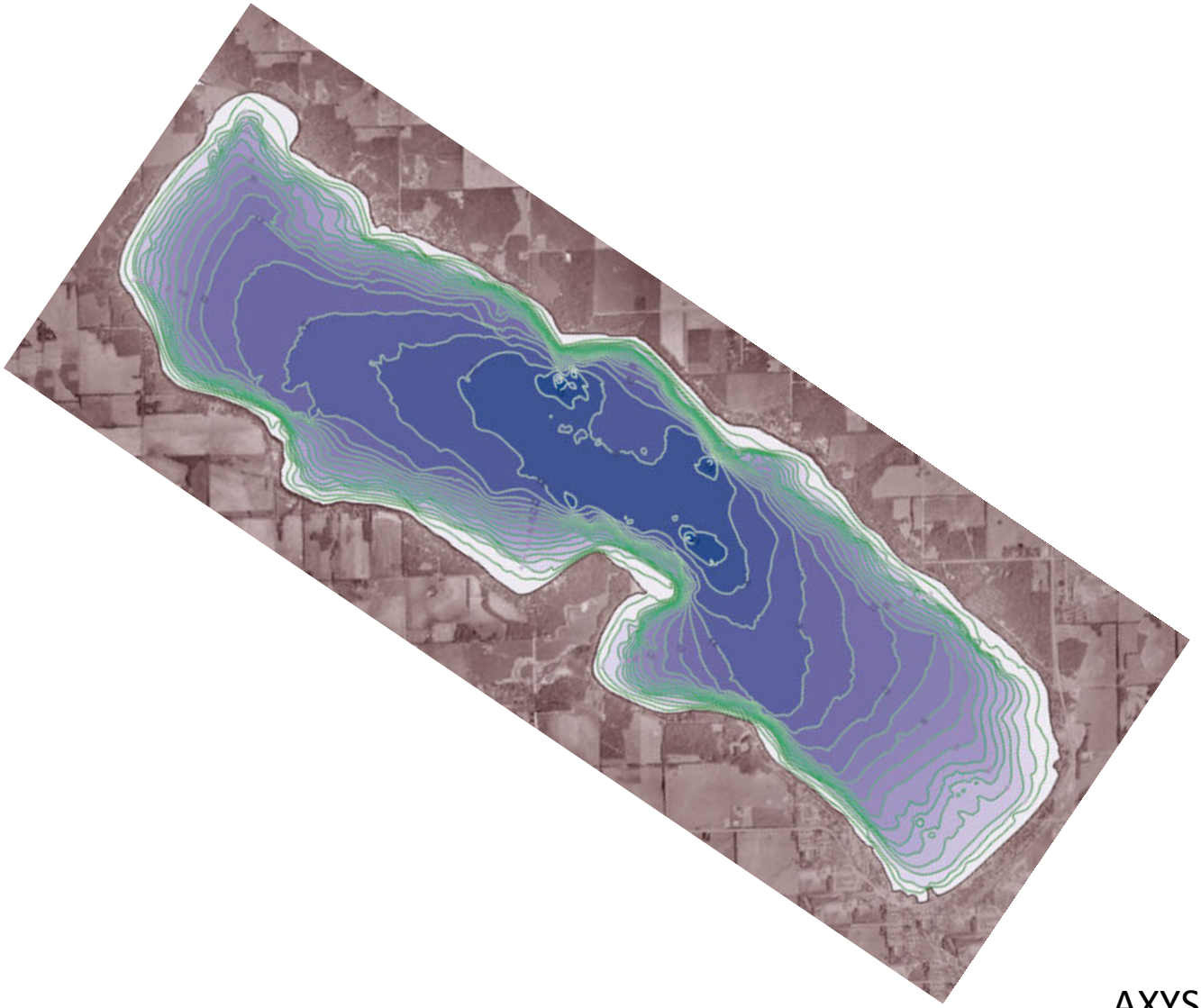
The RDRWA has completed a SoW

We are an ALMS LakeWatch lake

Watershed Topography and Hydrology



Sylvan Lake Bathymetry



AXYS 2005

Why did we  participate in the CEMS project?

1. Cumulative
2. Effects
3. Management
4. System

CEMS Project Phase 1

Who was who. And what was what.

Alberta Environment

Two Counties

One Town

Five Summer Villages

One Stewardship Society

The CEMS Template

Municipal Government Act

Environmental Protection and Enhancement Act

Water Act

CEMS Project Phase 1

Cumulative Effects: Indicators and Triggers

Environmentally Healthy Watershed and Lake

Water Quality

Water Quantity

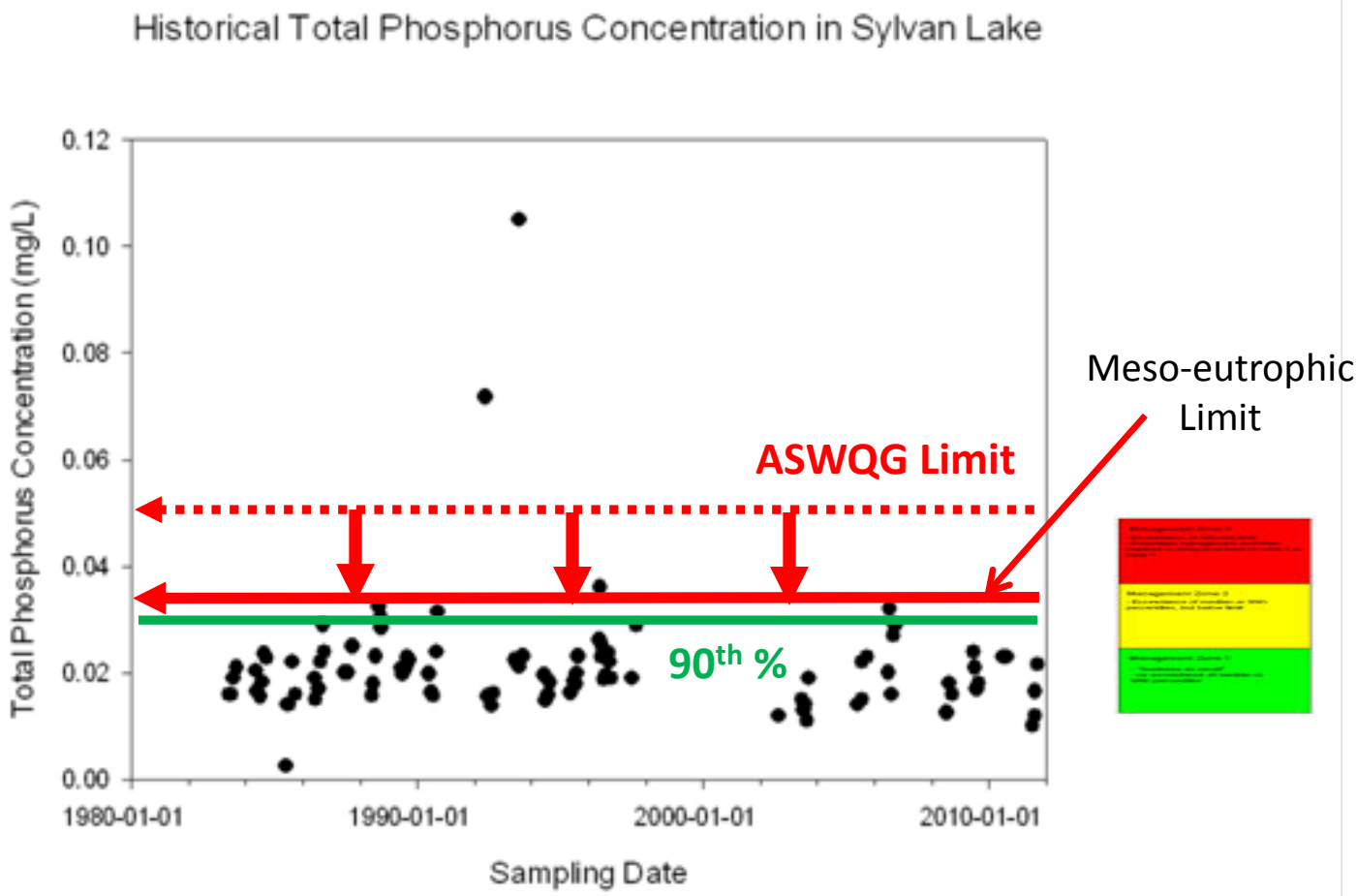
Bio-Indicators

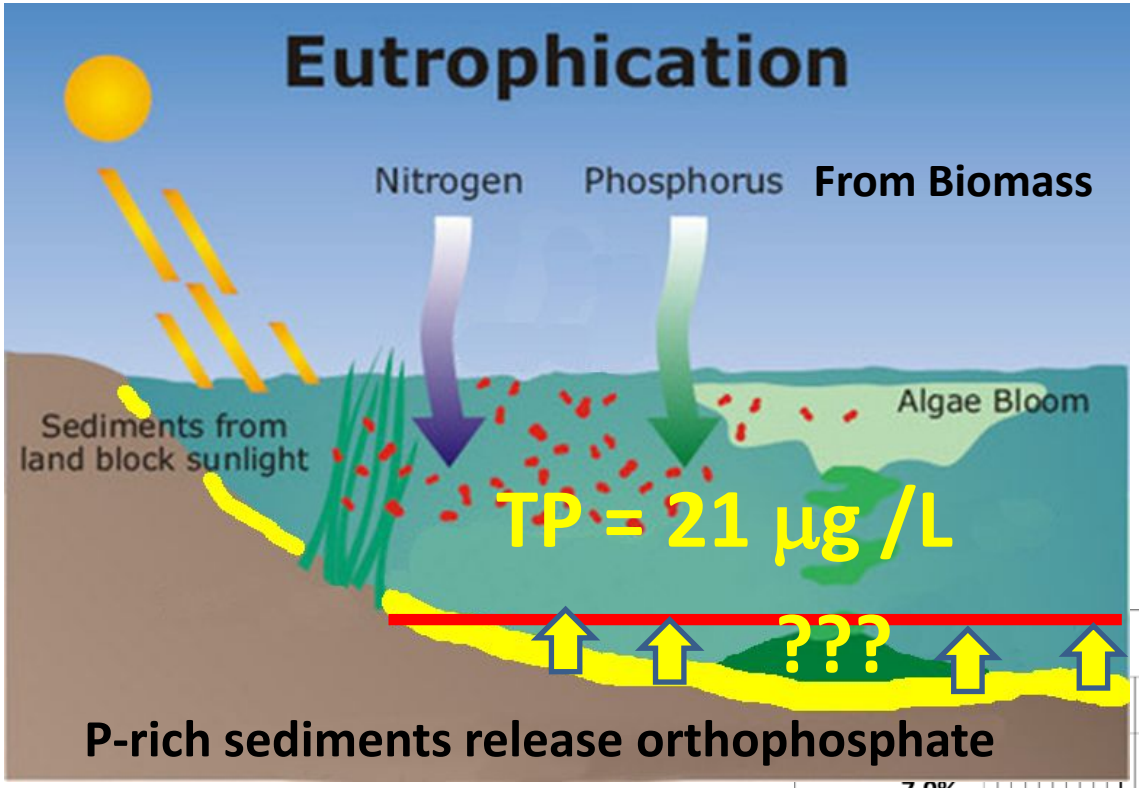
Diverse Planned Recreation

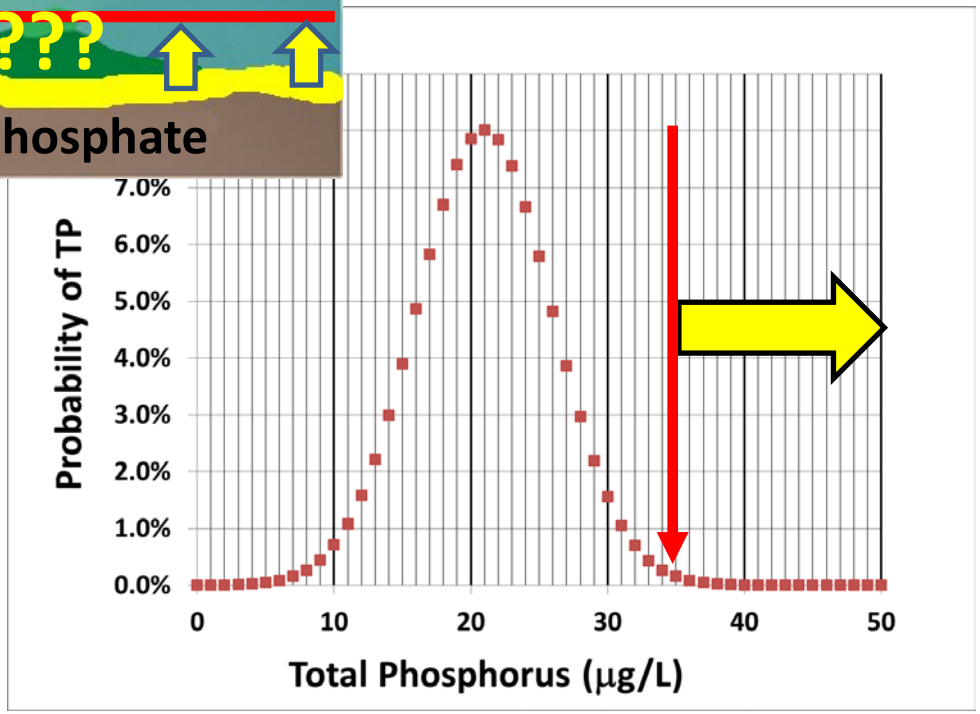
Cooperative Planning

CEMS Phase 1 – Indicators and Triggers

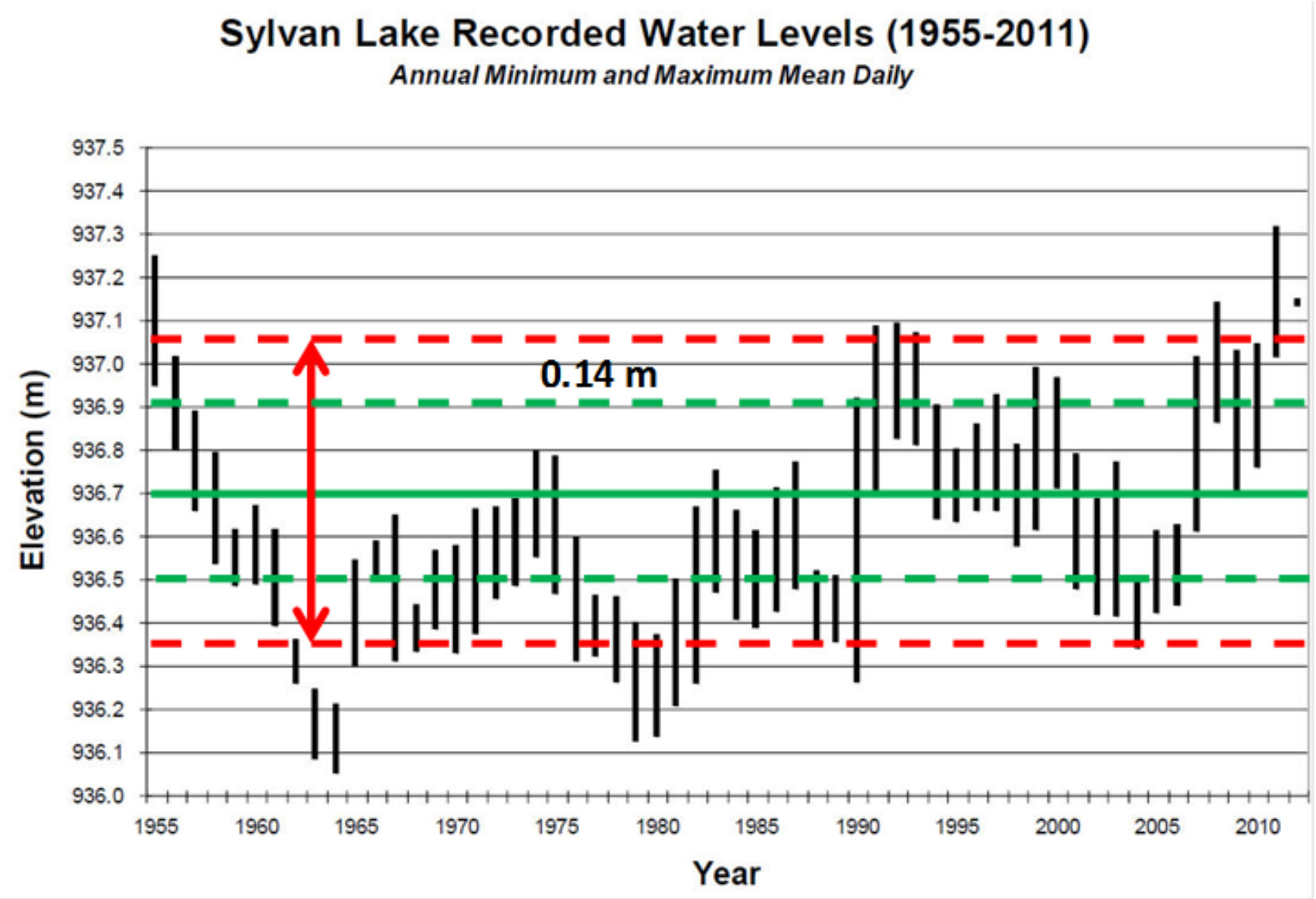
Water Quality



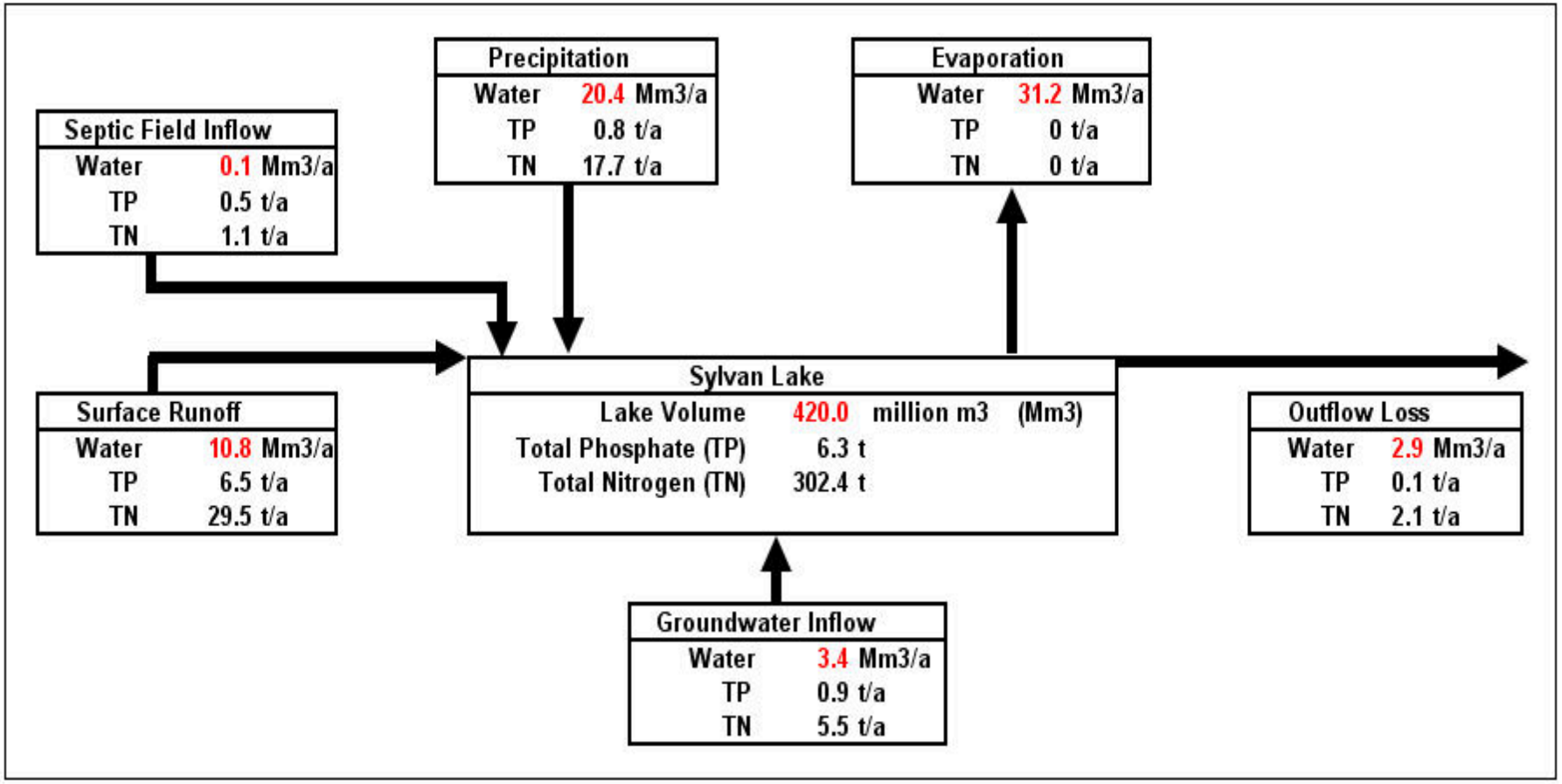

Eutrophication
Nitrogen
Phosphorus
From Biomass
Algae Bloom
Sediments from land block sunlight
TP = 21 µg /L
???
P-rich sediments release orthophosphate


Probability of TP
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0
10
20
30
40
50
Total Phosphorus (µg/L)

CEMS Phase 1 – Indicators and Triggers
Water Quantity and Balance



Sylvan Lake Water and Nutrient Balance



AXYS 2005

Bio-Indicators

- Spawning habitat for Pike
- Emergent vegetation
- Wetland health
- Forested areas
- Native grassland
- Riparian health
- Walleye population structure
- Whitefish population structure
- Eagle population
- Colonial water bird population structure

CEMS Phase 1 – Indicators and Triggers

Cumulative Effects Management

1. Cumulative:	**Big picture, over time**
2. Effects:	**Process Actions and Outcomes**
3. Management:	**Goals and Control**

CEMS Phase 2. The Implementation Plan

Cumulative Effects Management

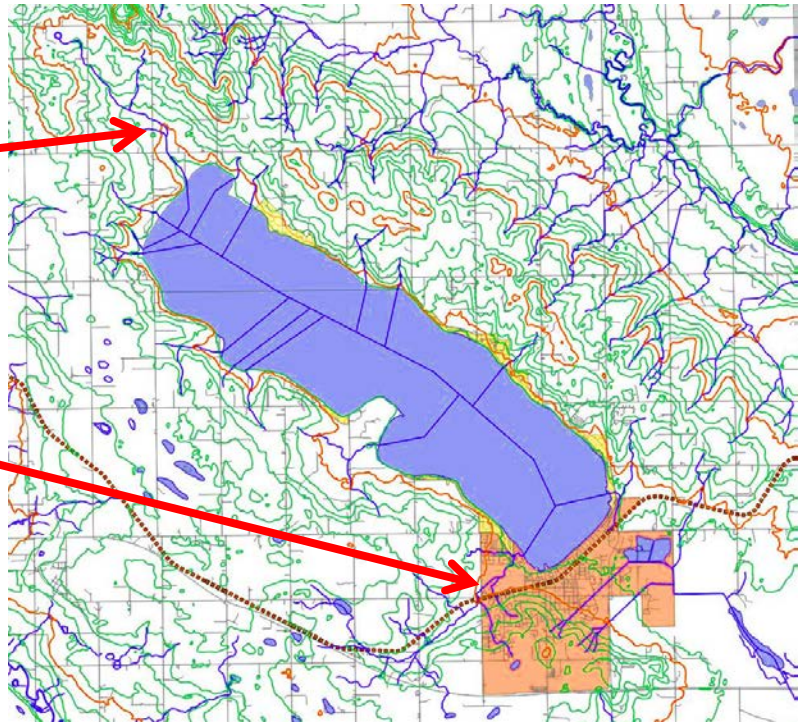
Homer Simpson's control panel

- Nutrients in Lake
- Natural Variables
- Nutrients on Land
- Habitat Cover and Health
- Wildlife Biodiversity
- Controllable Variables
- Others

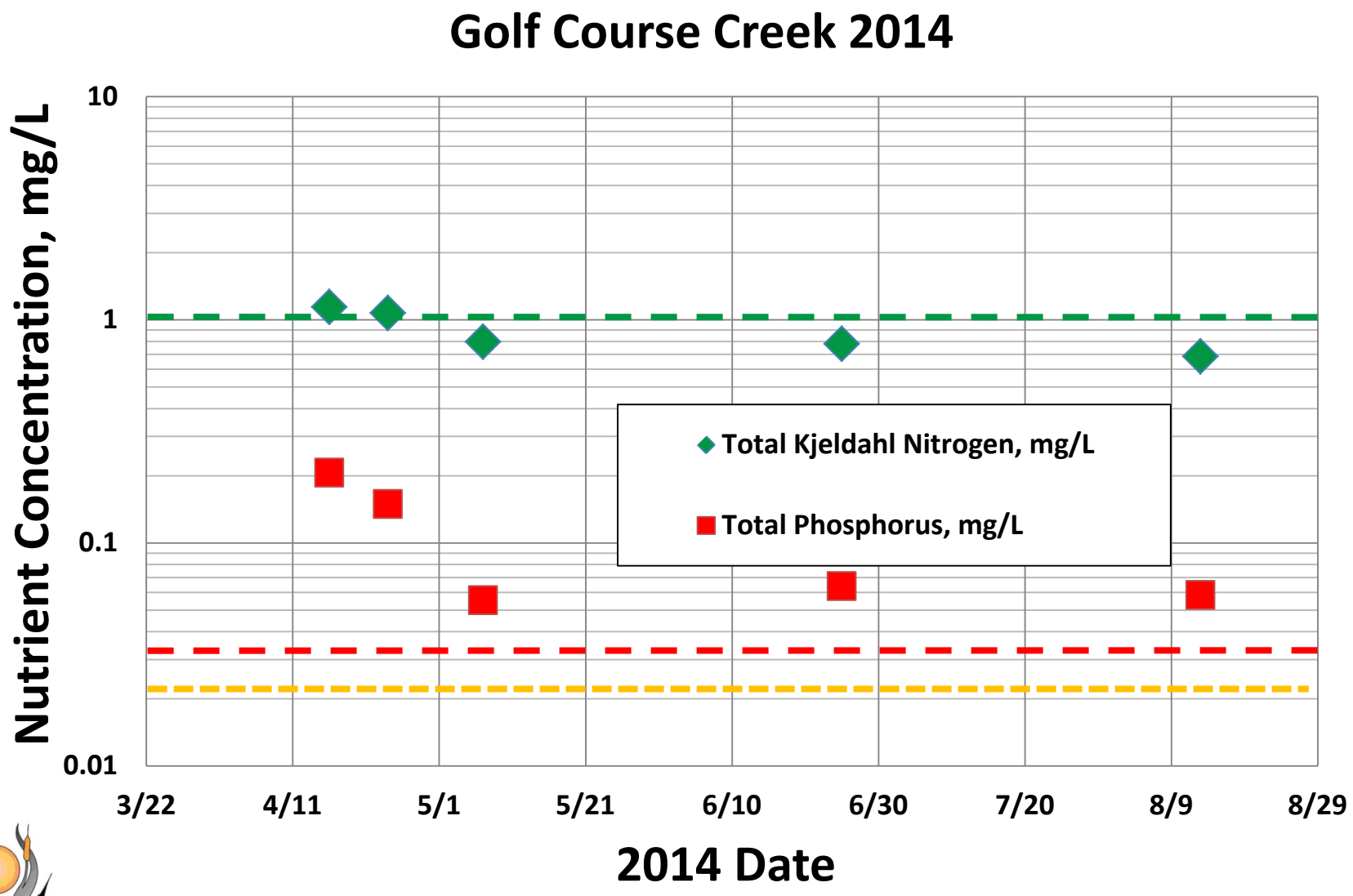
Tributary Monitoring and Nutrient Loading in 2014

- Streams and Catchments
  - Northwest Creek
    - **12.8 km²**
  - Golf Course Creek
    - **26.3 km²**
- Nutrient Loading

  Concentration x Flow Volume



Nutrient Concentrations



Critical Review and Learning Experience

1. Basic conflicts between the land development goals of the MGA and the environmental objectives of the EPEA

2. CEMS principle simple; CEMS template process too complicated.

3. Too time consuming.

4. Participant commitment deteriorated.

5. One leg of the formally Environmental-Social-Economic three-legged CEMS stool was missing.

6. As yet, no data have been accumulated.

What do we need? What should we do?

1. **Identify** a real person, other than "the Crown," to be legally accountable for protection of both surface water and groundwater in the watershed.
2. **Adapt** and adopt a modified Responsible Care program for lakes.
3. **Provide** watershed CEMS teams and local governments with environmental economics tools and protocols to support due diligence risk management and decision-making.

4. **Deliver** relevant and information for watershed land-use decision-making in a timely and transparent manner.
5. **Manage** data using well-focussed guidelines and a shared GIS database with mapping and analytical tools.
6. **Create** water quality sampling standards and protocols to support the separate and distinct goals of: (i) ALMS-like long term lake water quality monitoring; (ii) tributary monitoring to detect contaminant transport and to assess lake loading; and (iii) due diligence lake-specific research to understand environmental and valuation risks caused by changes to the eutrophic state.
7. **Train** and certify Citizen Scientists. Indemnify stewardship societies.
8. **Inform** private property owners about the state of the watershed, any changes that affect their asset values, and threat assessments of proposed urban expansion.

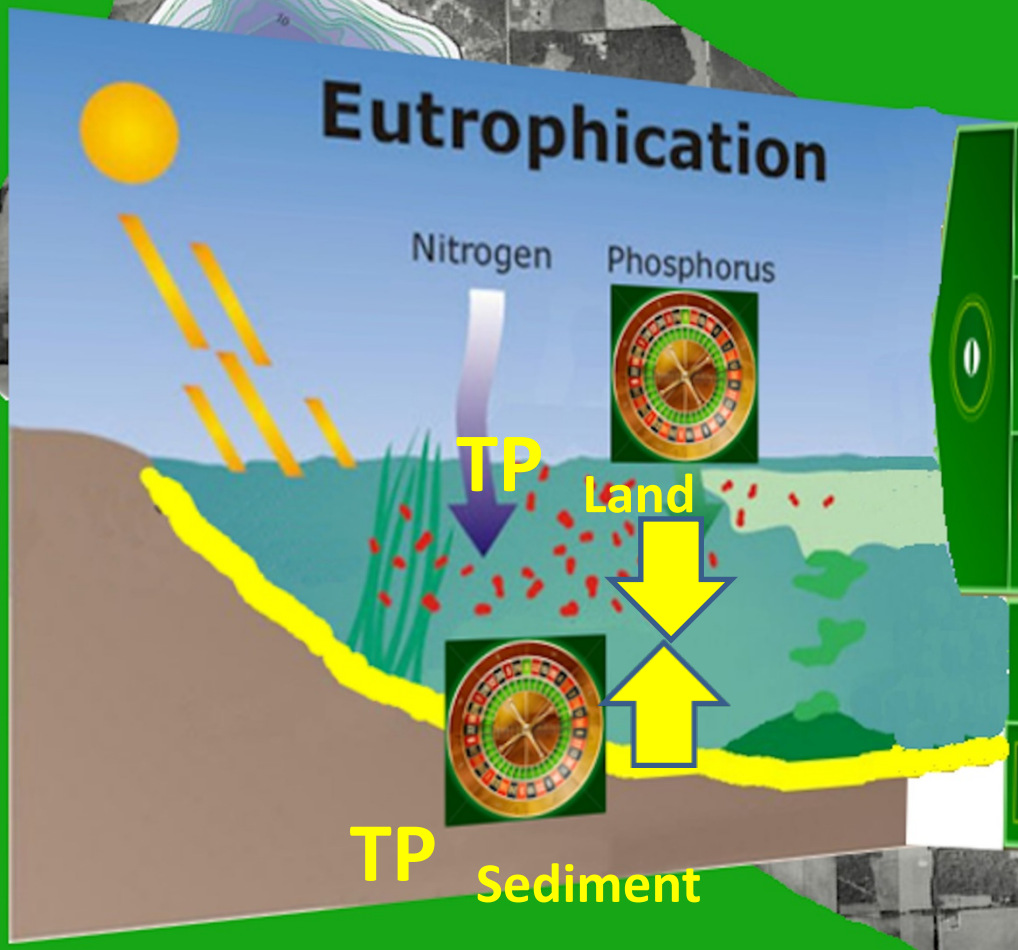
The Sylvan Lake Watershed Casino invites you to play…..

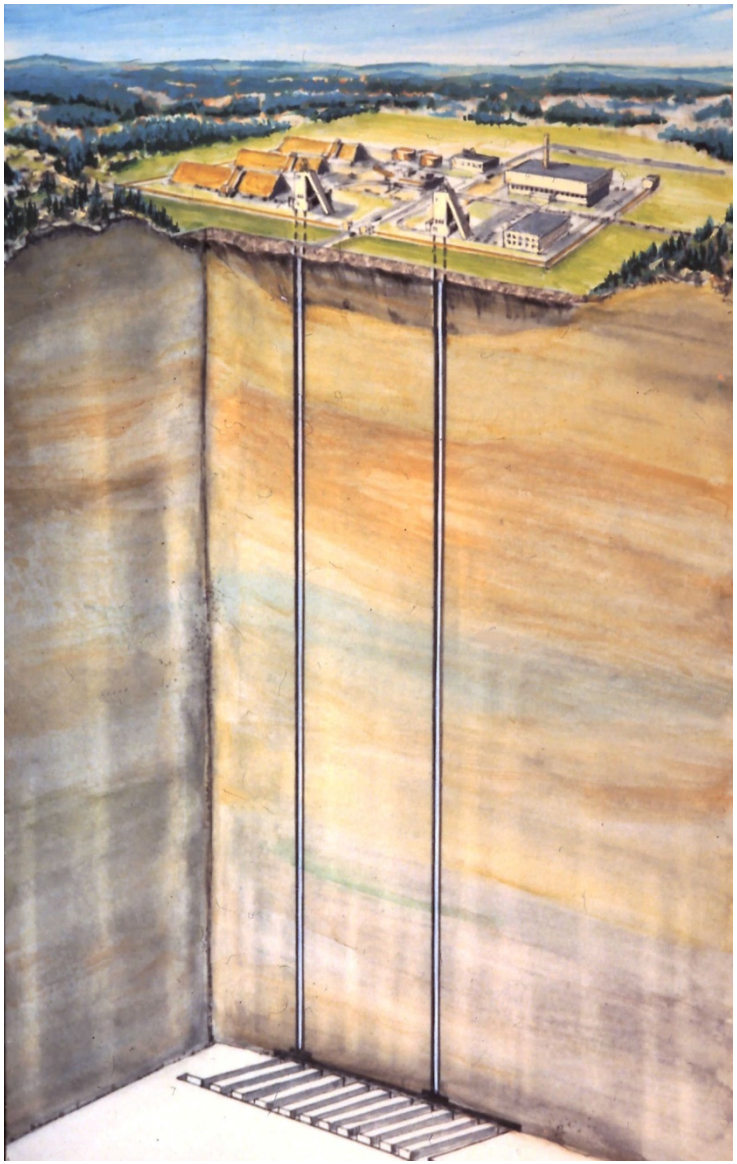
RSVP

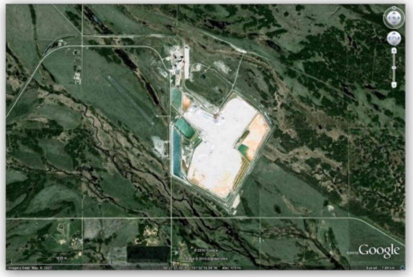
Responsible Care Fundamentals

1. A formal commitment by each government and organization within a watershed to a set of guiding principles - signed by the Chief Executive Officer.
2. A series of codes, guidance notes and checklists to help participants fulfill their commitment.
3. The development of indicators against which improvements in performance can be measured.
4. Open communication on health, safety and environmental matters with interested parties, both inside and outside the watershed.
5. Opportunities for participants to share views and exchange experiences on implementing Watershed Responsible Care.
6. Support for Watershed Responsible Care participants
7. Verify that participants have implemented the measurable or practical elements of Responsible Care.
8. A title and logo which clearly identifies and promotes the Watershed Responsible Care mission and goals.

Eutrophication Roulette



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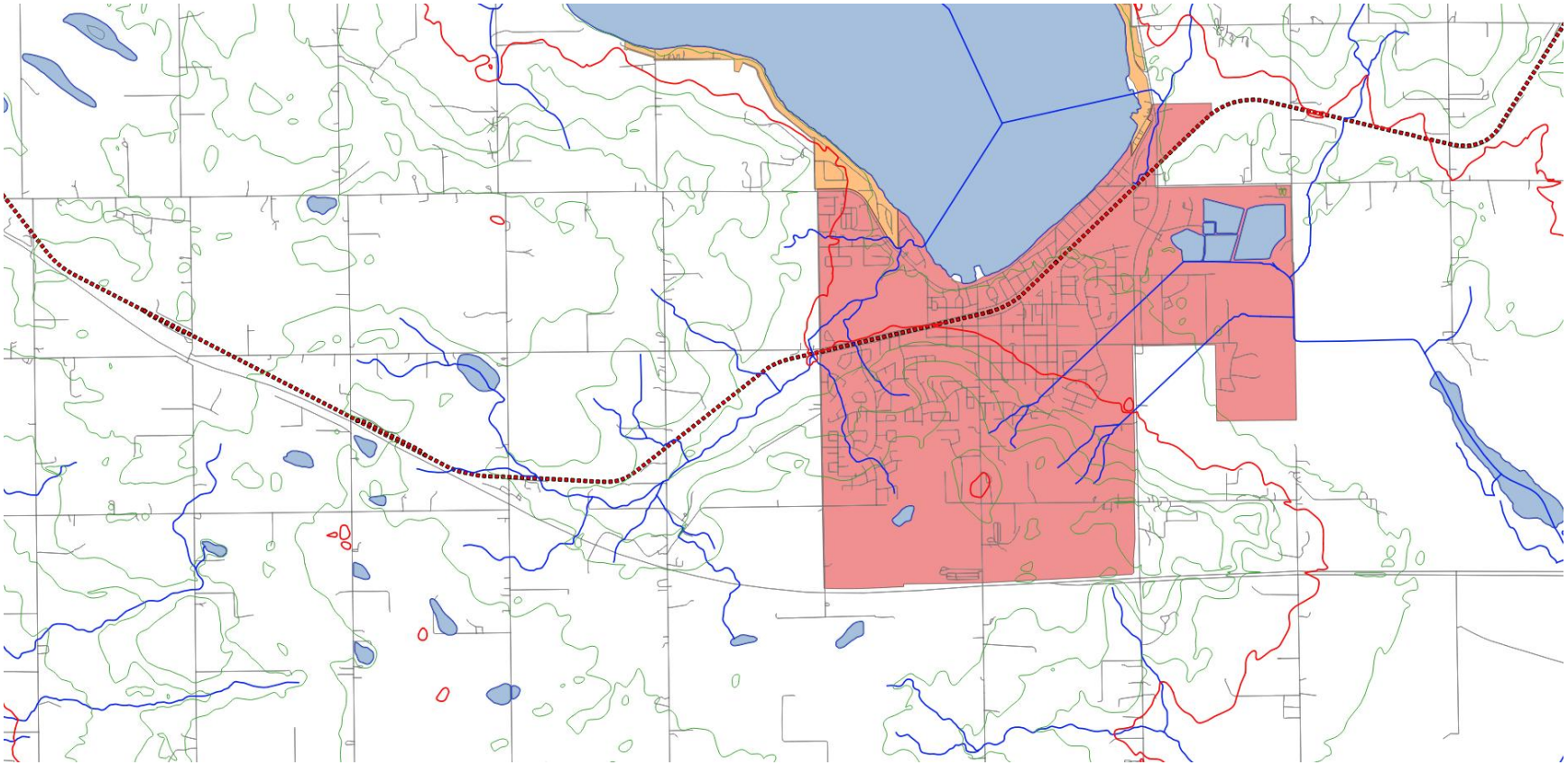
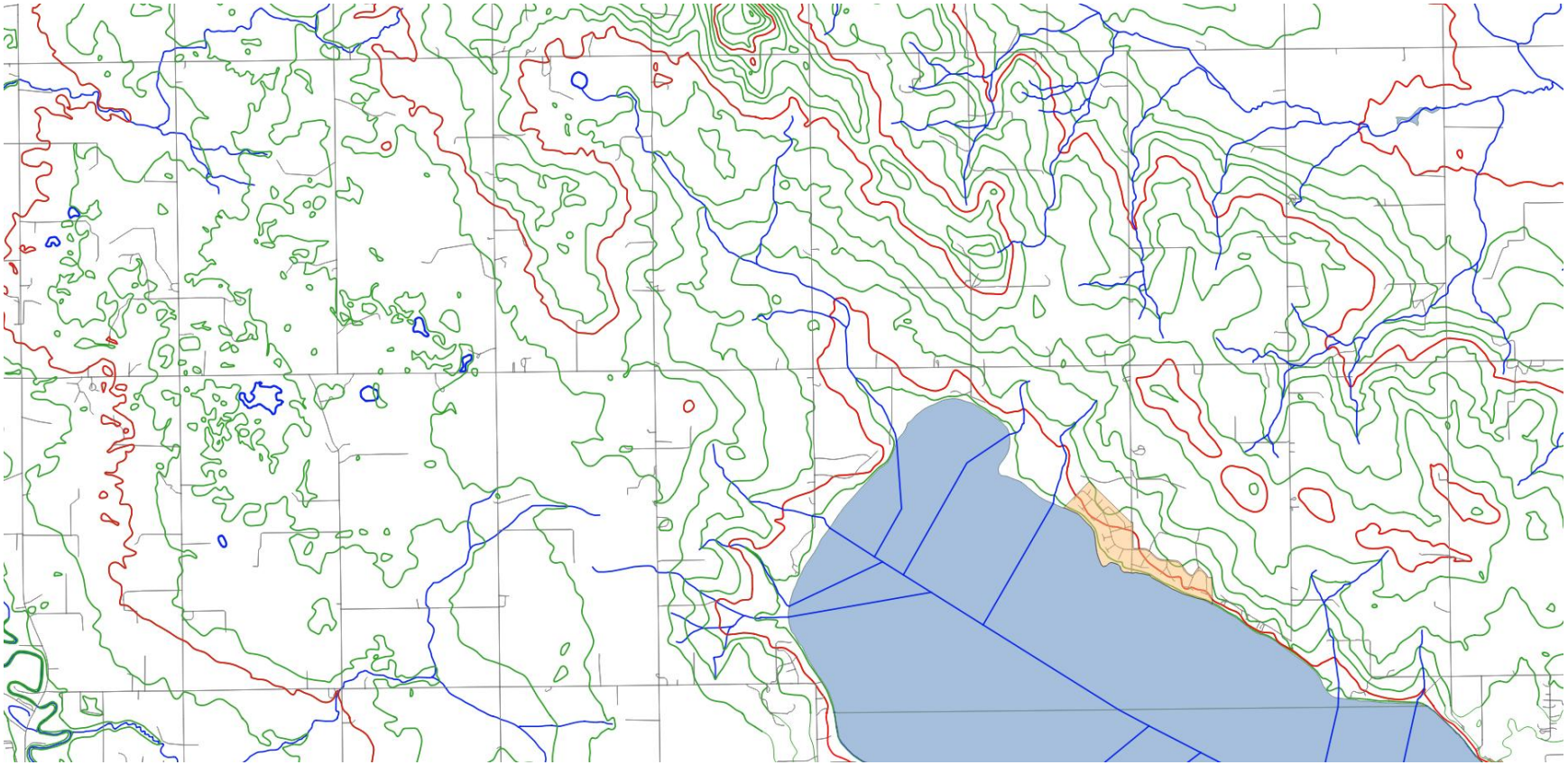
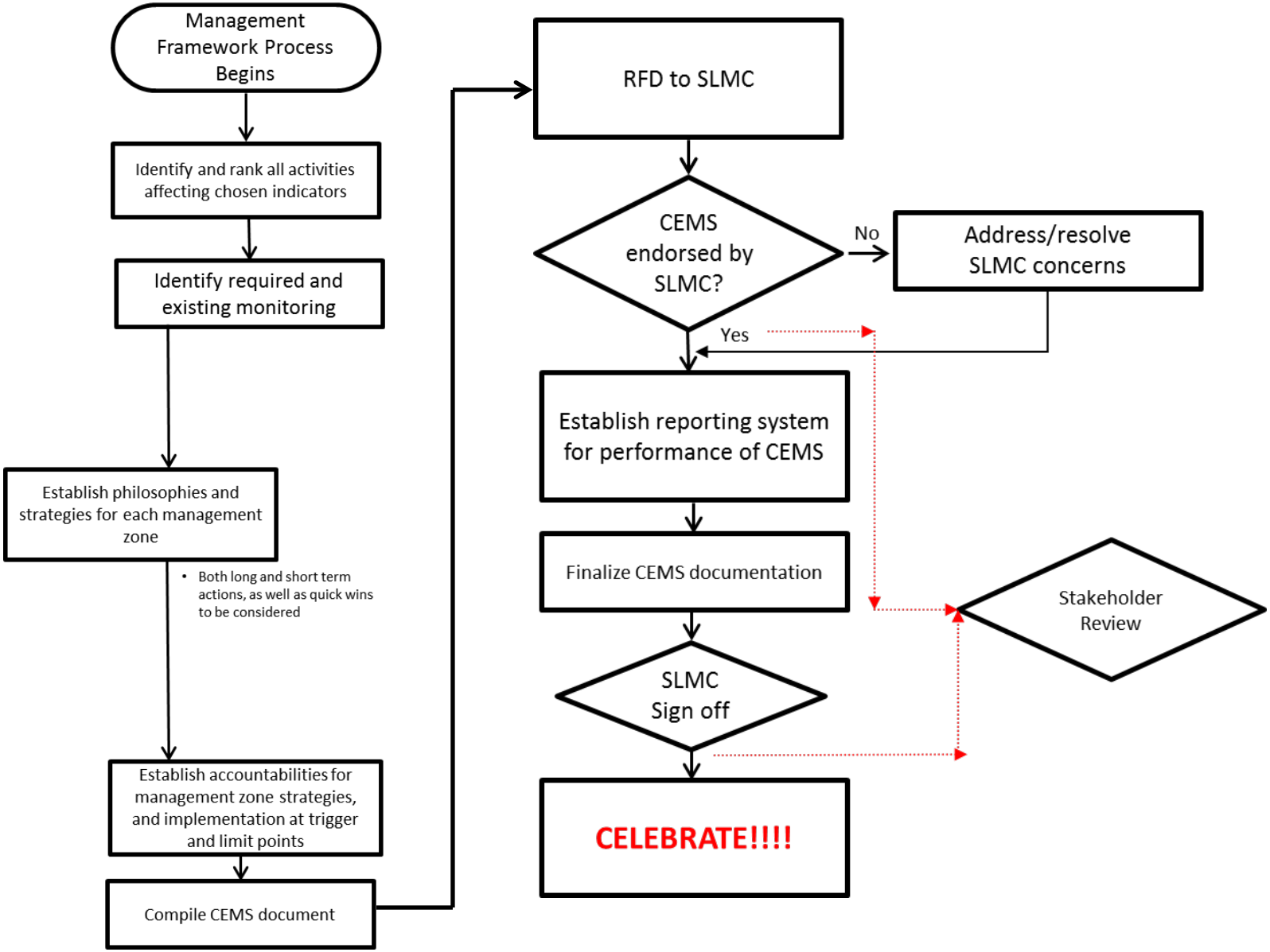
Golf Course Creek Catchment



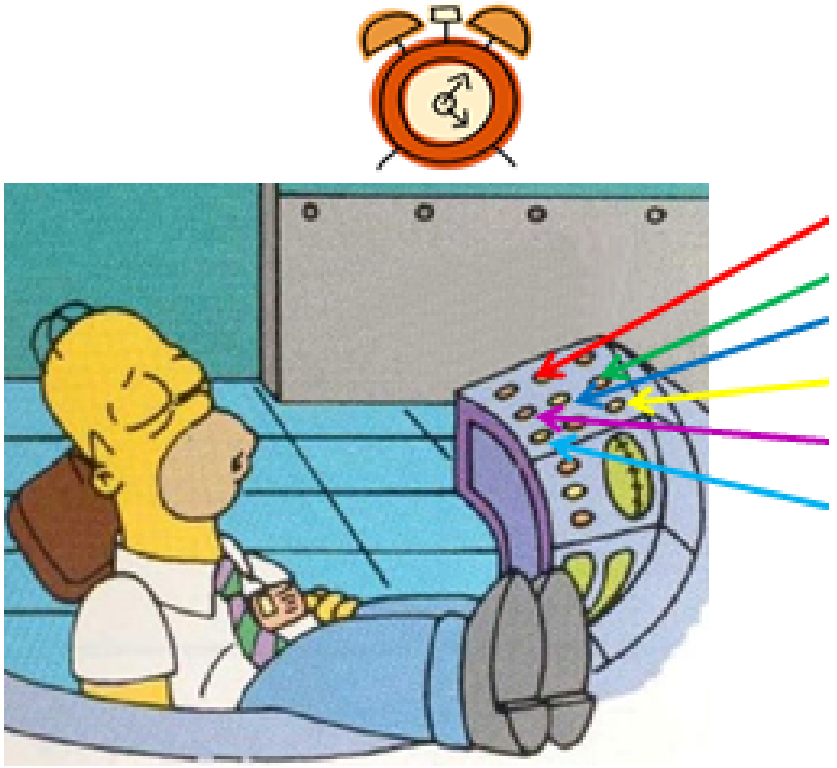
Northwest Creek Catchment




Management Framework Process Begins
Identify and rank all activities affecting chosen indicators
Identify required and existing monitoring
Establish philosophies and strategies for each management zone
• Both long and short term actions, as well as quick wins to be considered
Establish accountabilities for management zone strategies, and implementation at trigger and limit points
Compile CEMS document
RFD to SLMC
CEMS endorsed by SLMC?
No
Address/resolve SLMC concerns
Yes
Establish reporting system for performance of CEMS
Finalize CEMS documentation
Stakeholder Review
SLMC Sign off
CELEBRATE!!!!

Phase 2. The Implementation Plan

Cumulative Effects Management



- Nutrients in Lake
- Nutrients on Land
- Habitat Cover and Health
- Wildlife Biodiversity
- Climate and Weather
- Suspended Solids