

Riparian Area Intactness Assessment

Buffalo, Gull, Pigeon and Sylvan Lakes

Arin MacFarlane Dyer, Integrated Resource Planner

September 28, 2018

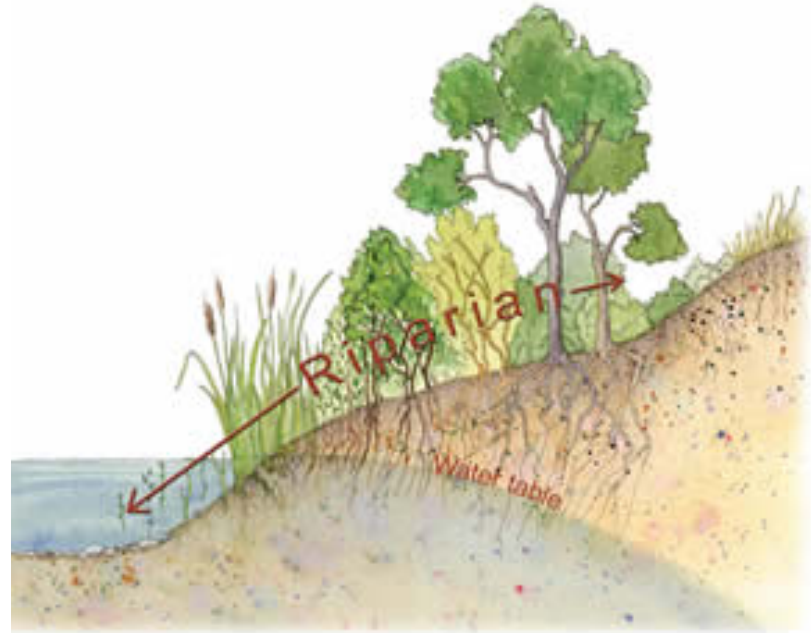
Outline

1. Project Background
2. Methods
3. Results
4. Conclusions
5. Next Steps



What Are Riparian Areas?

Lands adjacent to streams, rivers, lakes and wetlands, where the vegetation and soils are strongly influenced by the presence of water.



Source: Cowsandfish.org

Importance of Riparian Areas



What do Riparian Areas Do?

Key Ecological Functions



1. Trap & Store Sediment

- Sediment adds to and builds soil in riparian areas.
- Sediment aids in the ability of soils to hold and store moisture.
- Sediment can carry contaminants and nutrients - trapping it improves water quality.
- Excess sediment can harm aquatic animals like fish and insects.



2. Build & Maintain Banks & Shorelines

- Erosion is balanced with bank building - the effects of erosion are reduced by adding bank and shore elsewhere.
- Increase stability, resilience and recovery.
- Maintain or restore profile of channel - extends width of riparian area through higher water tables.



3. Store Water & Energy

- Watershed safety valve - storage of high water on the floodplain during floods.
- Reduce flood damage by slowing water and reducing erosion.
- Slow flood water allowing absorption and storage in underground aquifer.



4. Recharge Aquifers

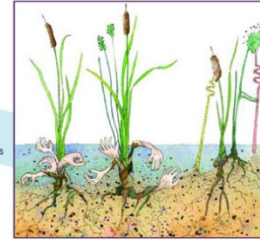
- Store, hold and slowly release water.
- Maintain surface flows in rivers and streams and levels in lakes and wetlands through storage and slow release.
- Maintain high water table and extend width of productive riparian area.



5. Filter & Buffer Water



- Reduce amount of contaminants, nutrients and pathogens reaching the water.
- Uptake and absorption of nutrients by riparian plants.
- Trap sediment, reduce water quality issues and enhance amount of vegetation to perform filtering and buffering function.



6. Reduce & Dissipate Energy



- Reduce water velocity, which slows erosion and sediment transport.
- Resist erosion and slow channel and shoreline movement.
- Aid in sediment capture.

7. Maintain Biodiversity



- Create and maintain habitats for fish, wildlife, invertebrates and plants.
- Connect other habitats to allow corridors for movement and dispersal.
- Maintain a high number of individuals and species.



8. Create Primary Productivity



- Vegetation diversity and age-class structure creates links to other riparian functions.
- High shelter and forage values.
- Enhance soil development.
- Capture and recycle nutrients.



These are the basic functions; read on to see how they translate into products, services and benefits.

Source: Cowsandfish.org

Importance of Riparian Areas

- Societal values associated with riparian ecosystems:
 - Aesthetics
 - Resources
 - Ecosystem Services



Why are riparian areas important?

- Generally considered the single most serious long-term issue facing fisheries and aquatic health today.
- Easy to over-look as we typically focus on only small areas or projects accepting so called minor loss, but cumulatively this loss adds up.
- Changes in shoreline and shallow water habitats resulting from shoreline and riparian development have degraded key fish spawning, nursery and foraging habitats, reduced thermal and predator cover all results in reduced fish production for the lake or stream.



Challenges for Riparian Area Management

- Dynamic in nature, affected by:
 - Changes in hydrological patterns
 - Changes in upland lands
 - Changes in uses of riparian areas
- Difficult to delineate extent and assess condition
- Jurisdictional issues

Provincial Direction & Support



- Beneficial Management Practices Guide for New Development in Alberta's Settled Areas

Provincial Direction & Support

- Master Schedule of Standards and Conditions
 - Desired outcomes
 - Restricted activity periods
 - Setbacks
- Regional operational signs

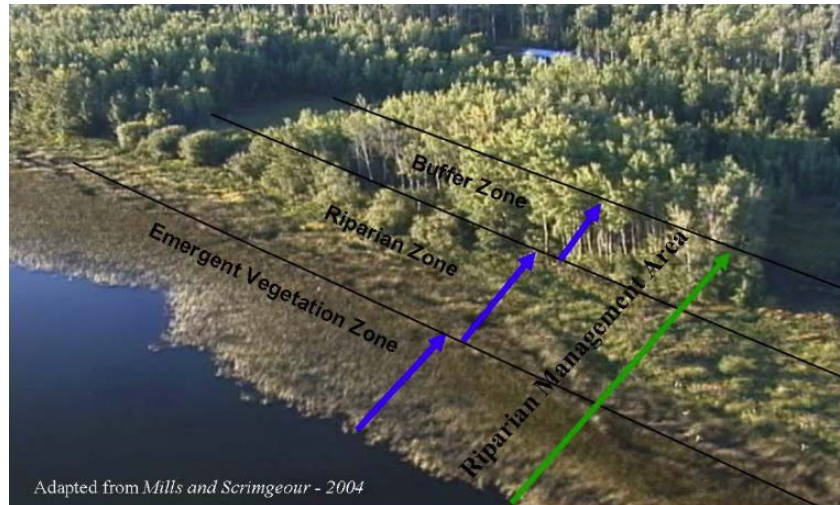


Previous Riparian Assessments

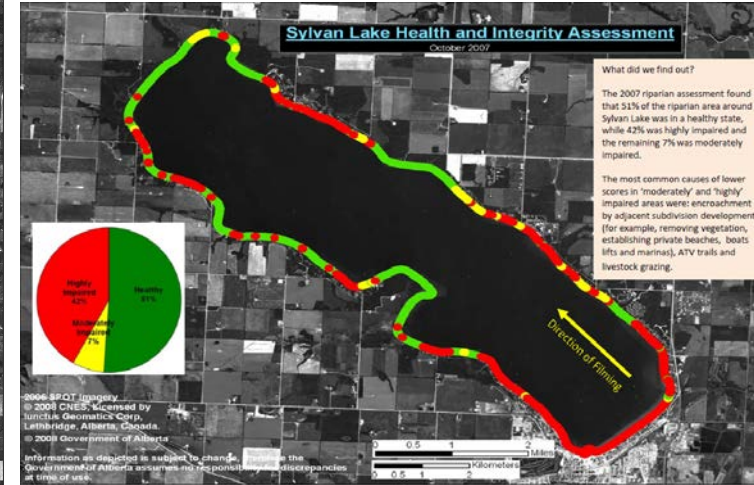
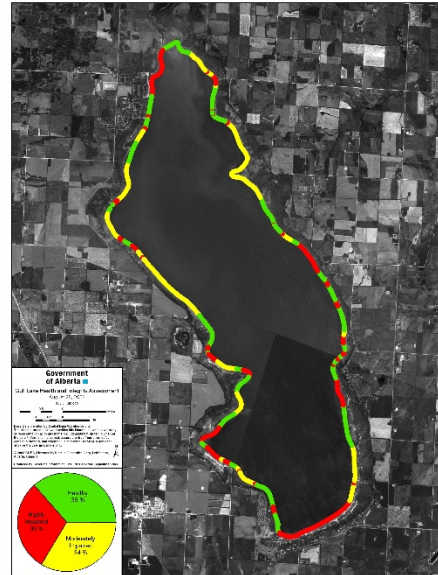
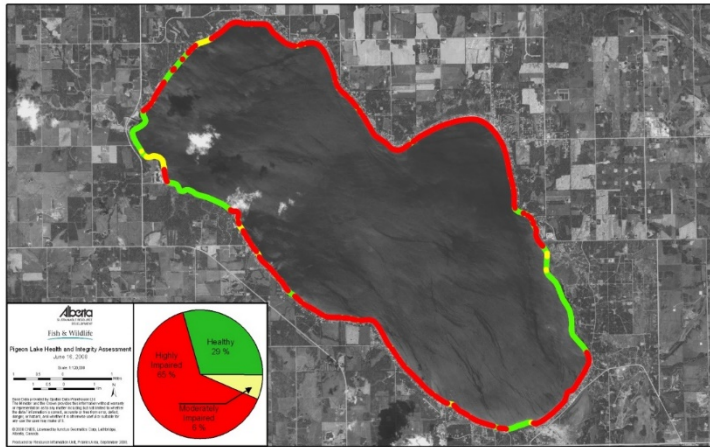
- 2007/2008 Aerial Assessments
- Goals
 - Determine where riparian health and emergent vegetation status were affected by human activities
 - Use information to stimulate public awareness and action
 - Use information to support on-the-ground riparian conservation and protection activities
- Results were mapped and videography shared

2007/08 Aerial Assessment

- The area of interest where management activities are focused to address negative impacts. Includes shoreline emergent vegetation zones and a protective buffer zone.



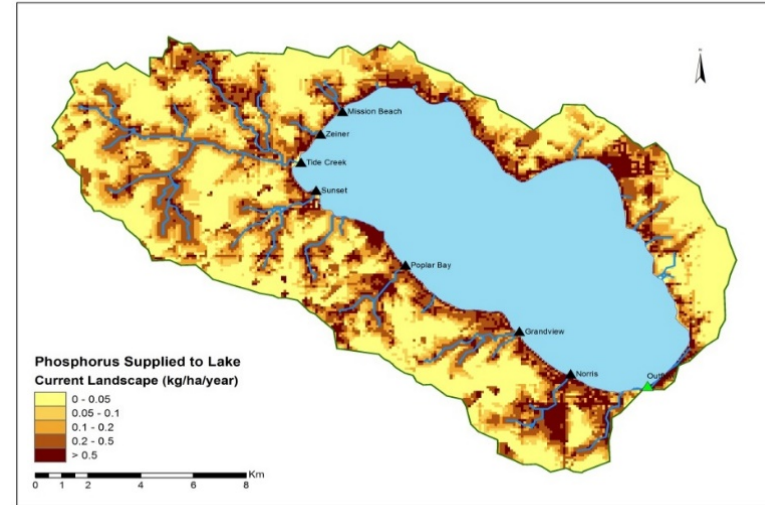
2007/08 Aerial Assessment Results



2018 Riparian Assessment Update

Requested for Planning Purposes:

- WPAC initiatives
- Source Water Protection
 - Camrose Source Water Protection Plan
- Lake Watershed Planning Initiatives
 - Pigeon Lake
 - Sylvan Lake

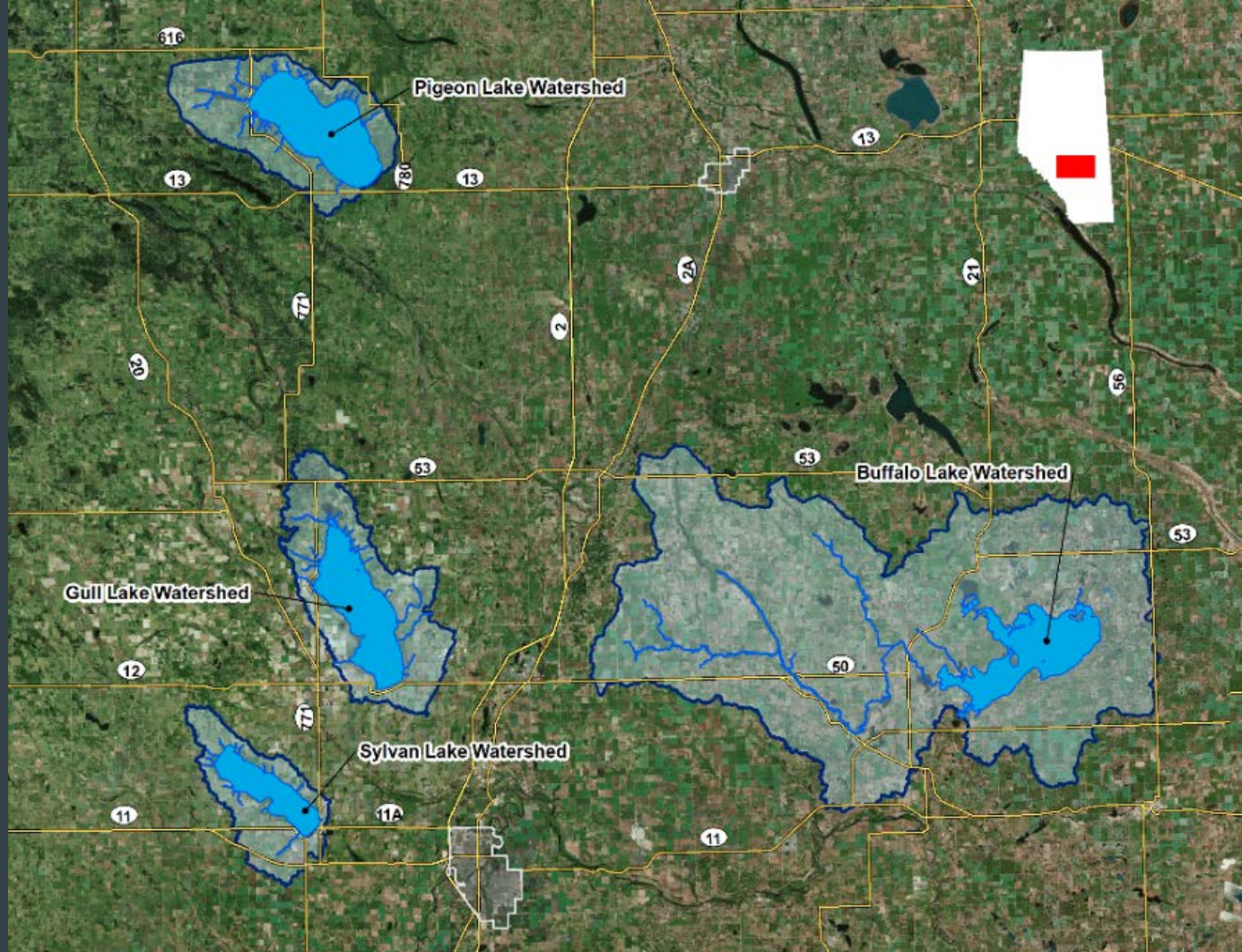


Source: ABMI 2017

Project Goals

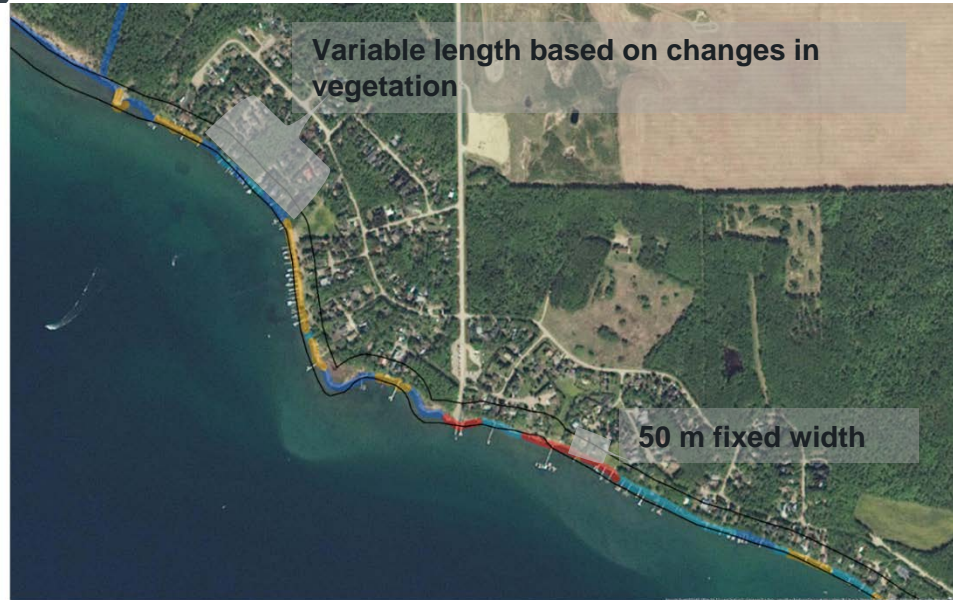
- Develop a GIS-based method and data set to assess riparian extent and condition at watershed scale
 - Lakeshores
 - Tributaries
- Comparison of GIS based assessment to previous surveys
- Identify minimum data standards to advance integration of data into provincial datasets

Watershed Study Areas



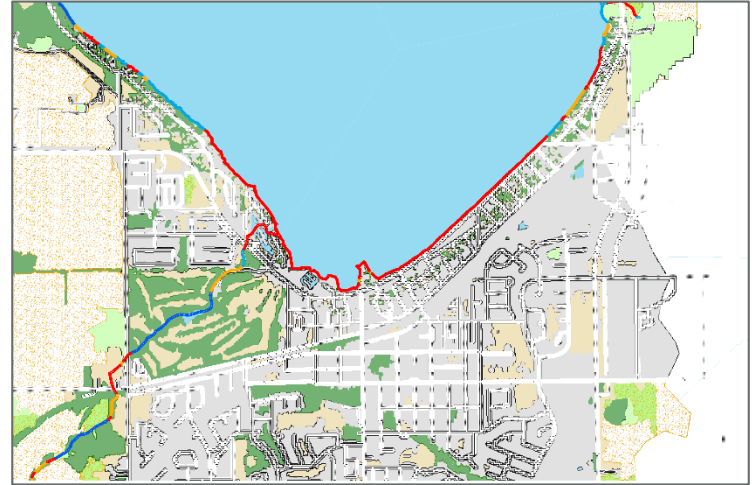
Methods

1. Approach based upon videography method and metrics
2. Riparian management areas (RMA) were created and used as the unit of analysis



Methods

3. High resolution (6m) SPOT Satellite Imagery obtained for 2017



4. Spot imagery is converted to a landcover

Methods

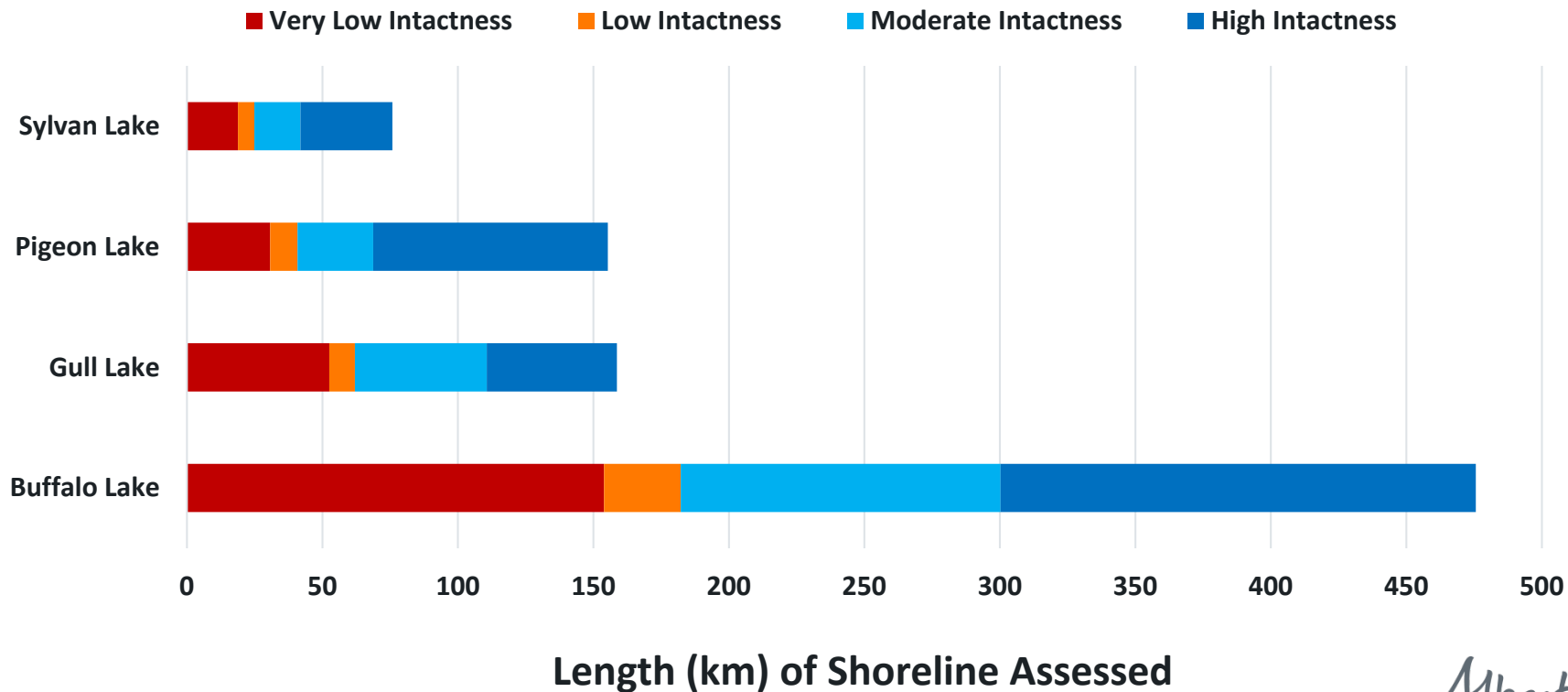
5. Intactness calculated per RMA based on:

- % cover all natural vegetation (wetlands, shrubs, grassland, forests)
- % cover woody vegetation (forest)
- % cover all human impact and development (crops, pasture, disturbed, houses, lawn, roads, ditches)

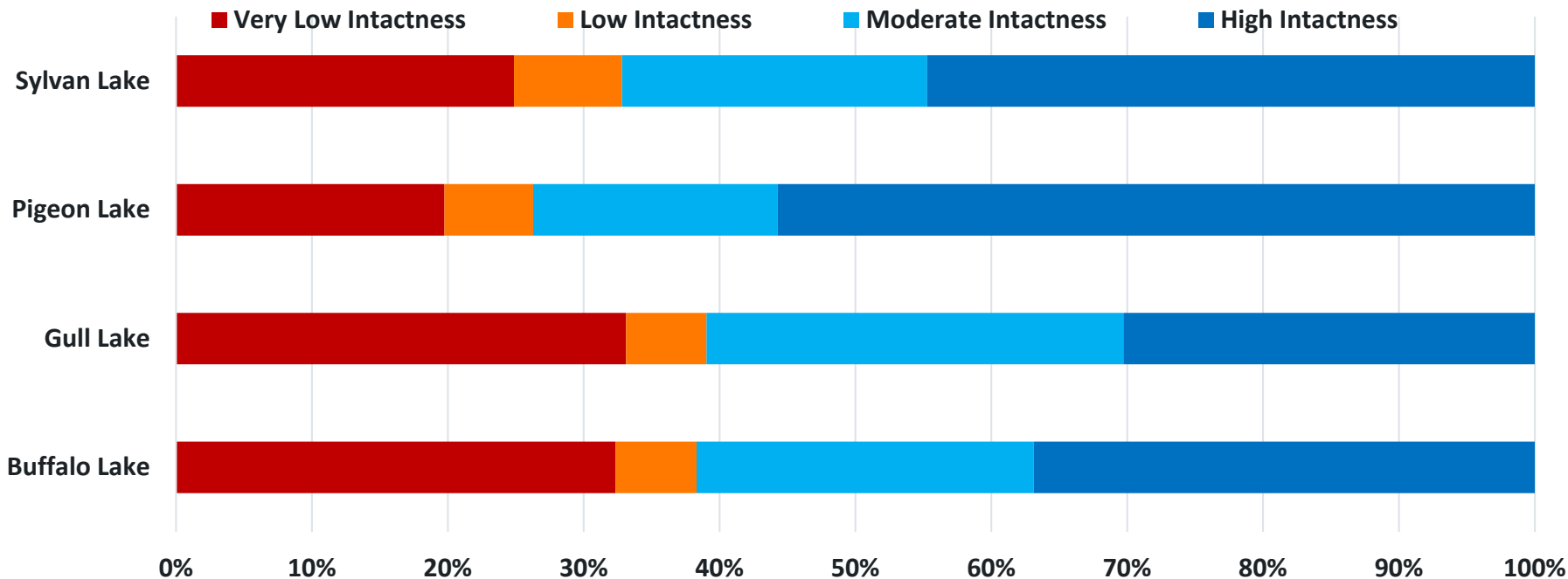
6. Scores for each metric aggregated into a single score that was then assigned to an intactness category.

 Very Low Intactness  Low Intactness  Moderate Intactness  High Intactness

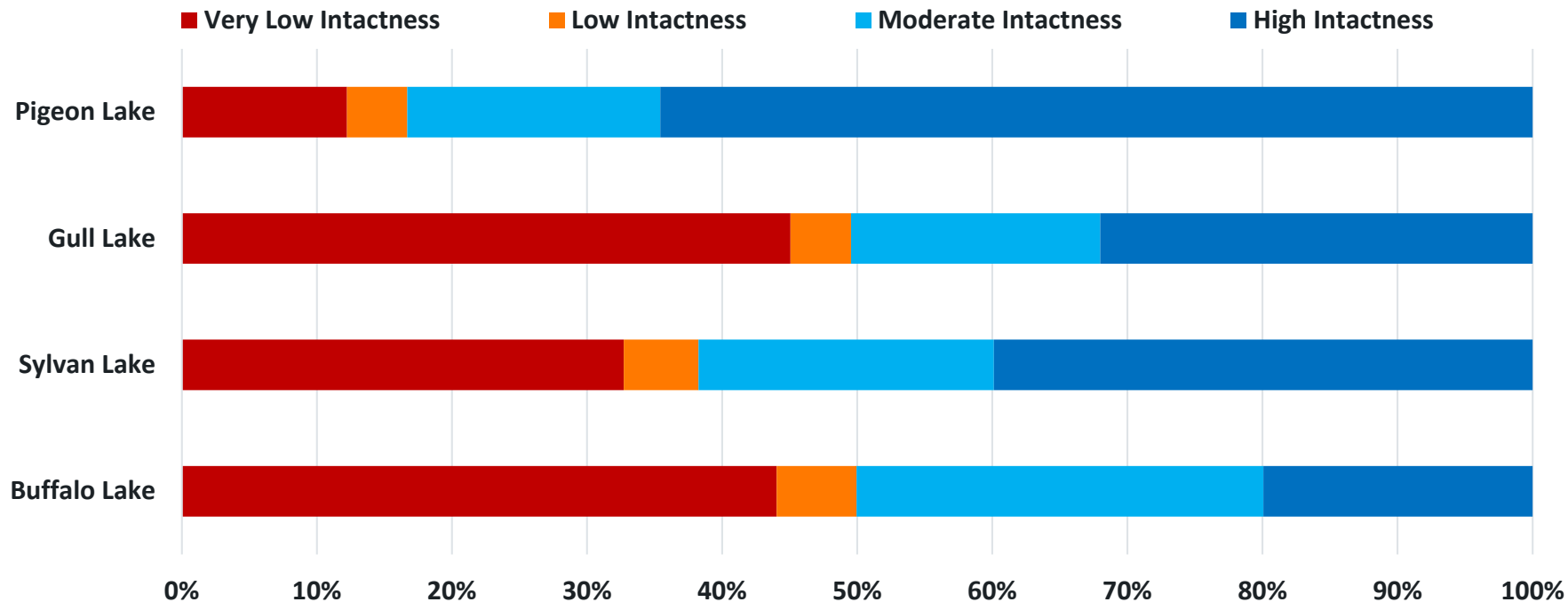
Watershed Results



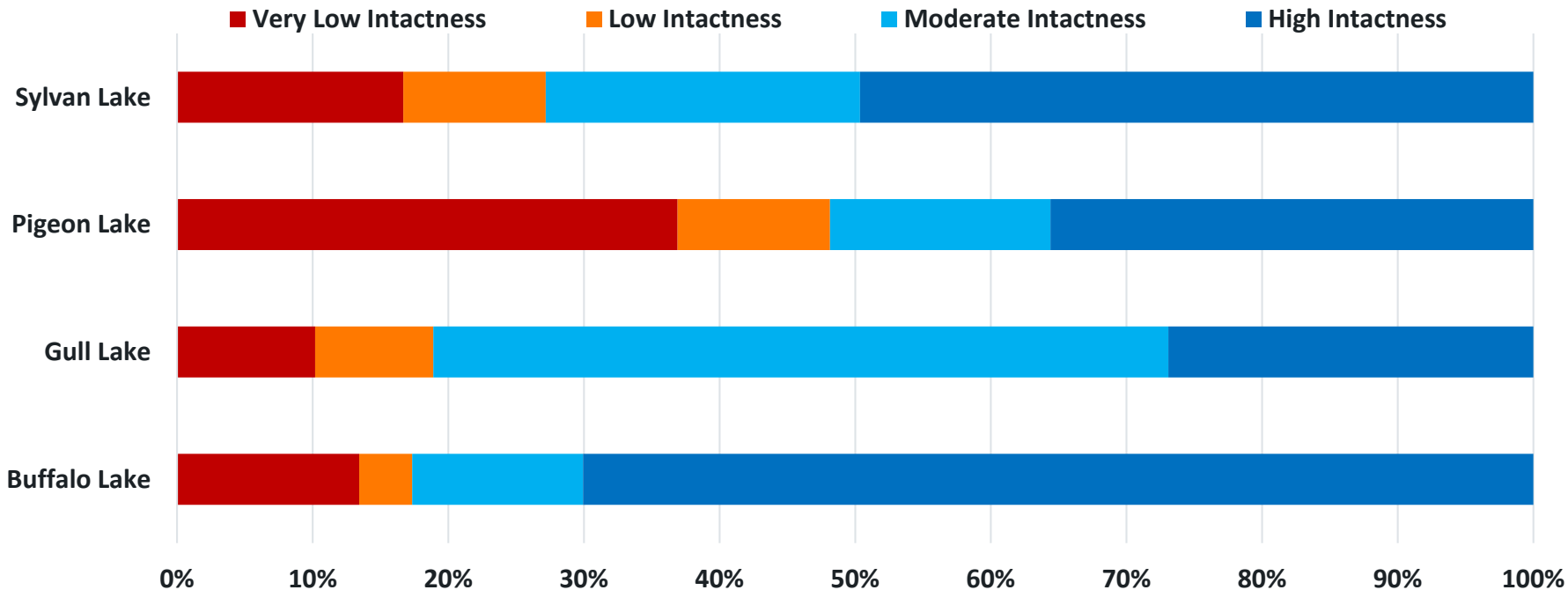
Watershed Results – Relative Intactness



Tributary Results



Lakeshore Results

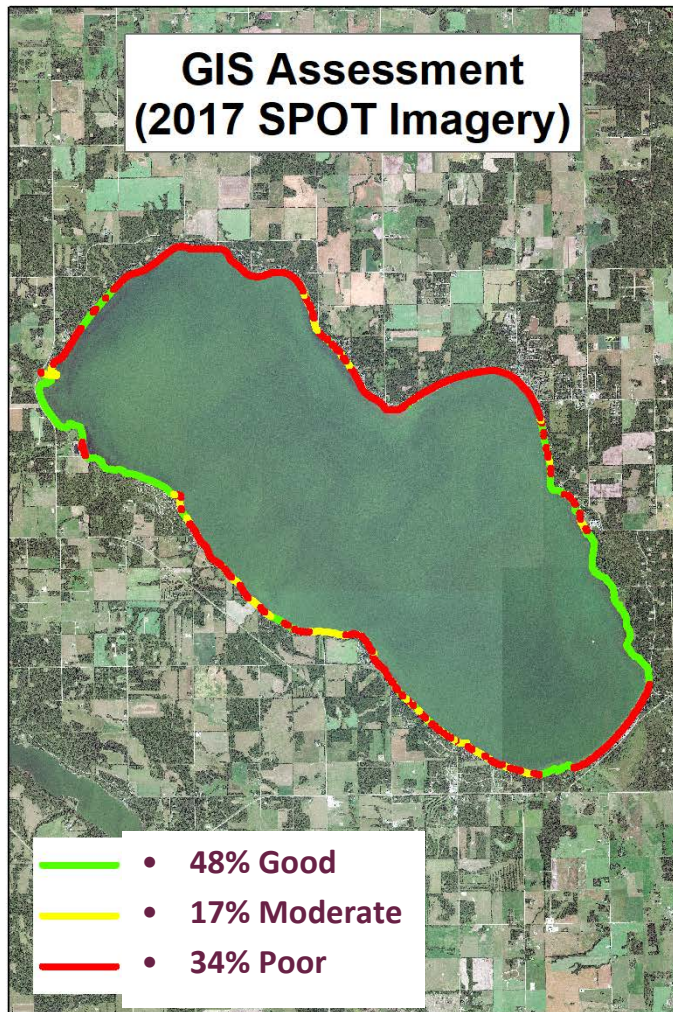


Historical Comparisons

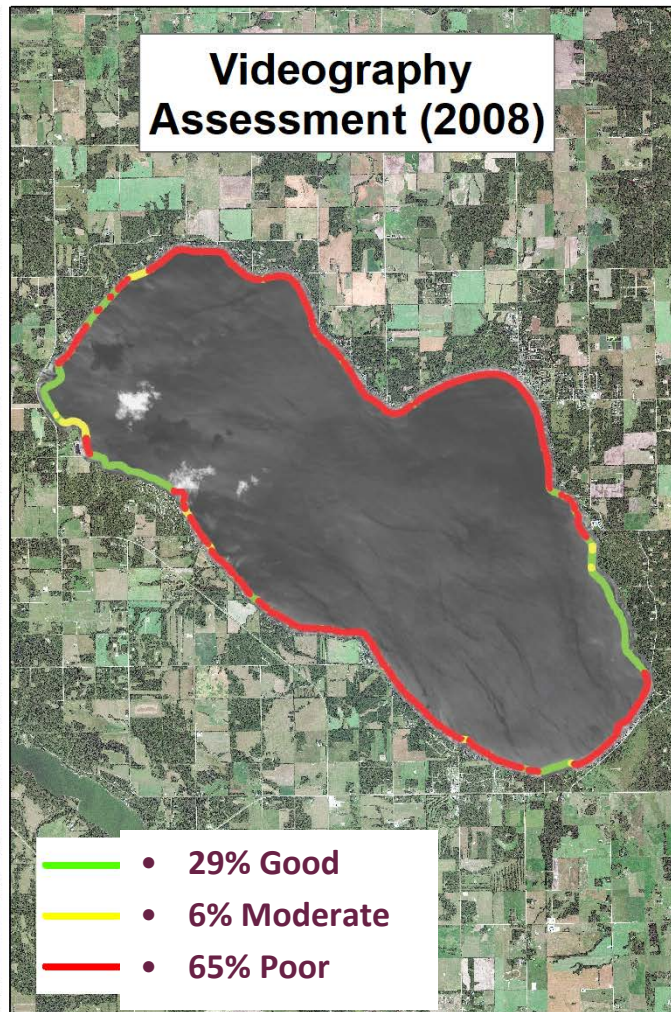


non statistical

GIS Assessment (2017 SPOT Imagery)

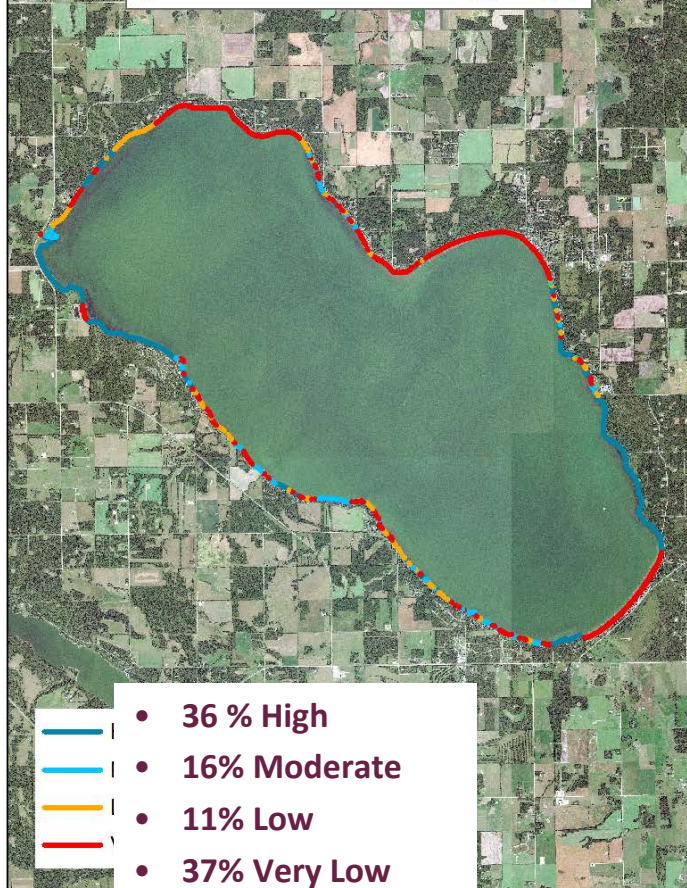


Videography Assessment (2008)

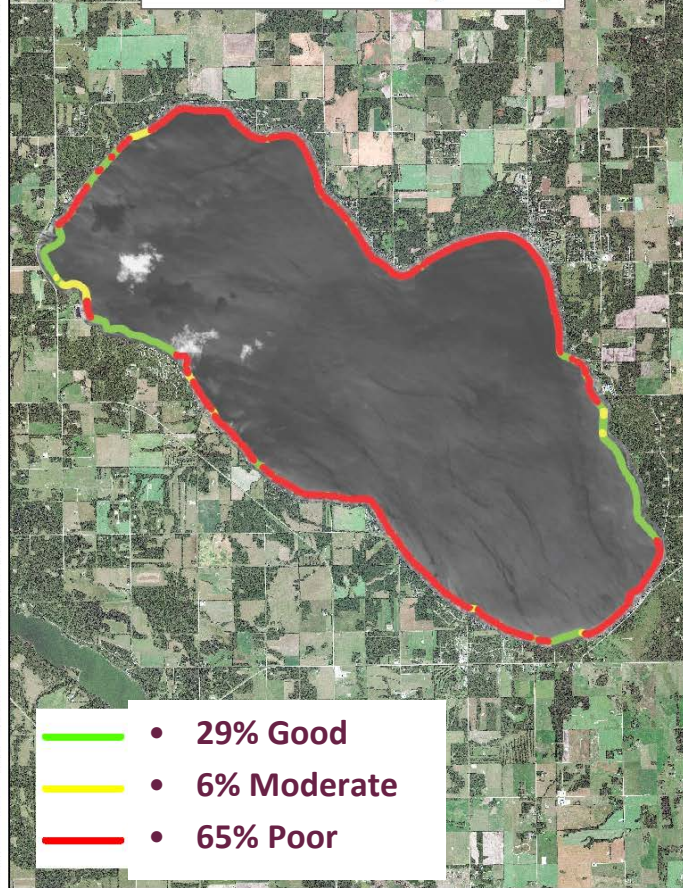


Pigeon Lake

GIS Assessment (2017 SPOT Imagery)

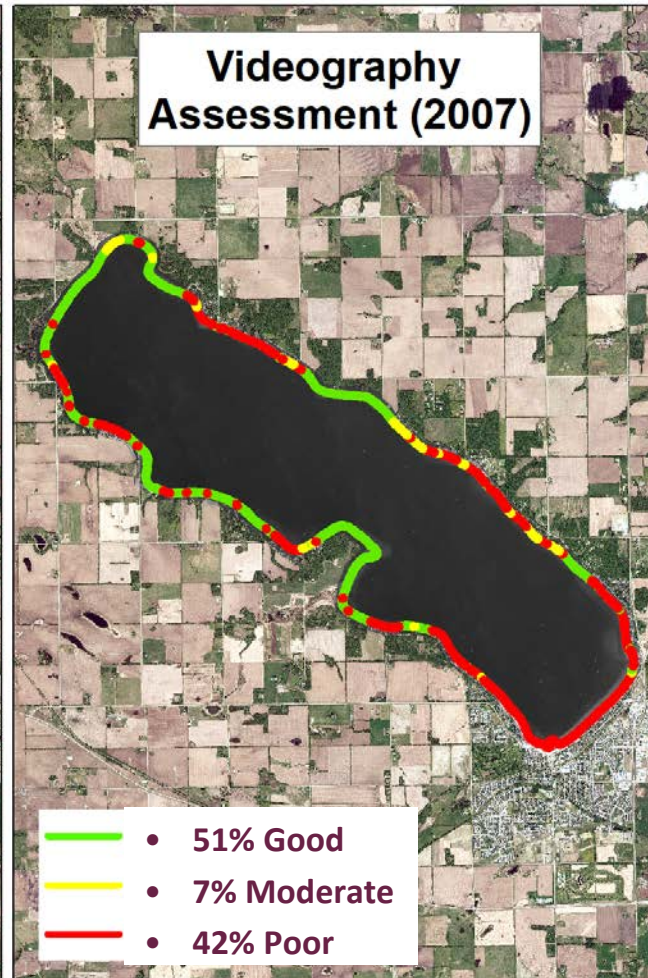
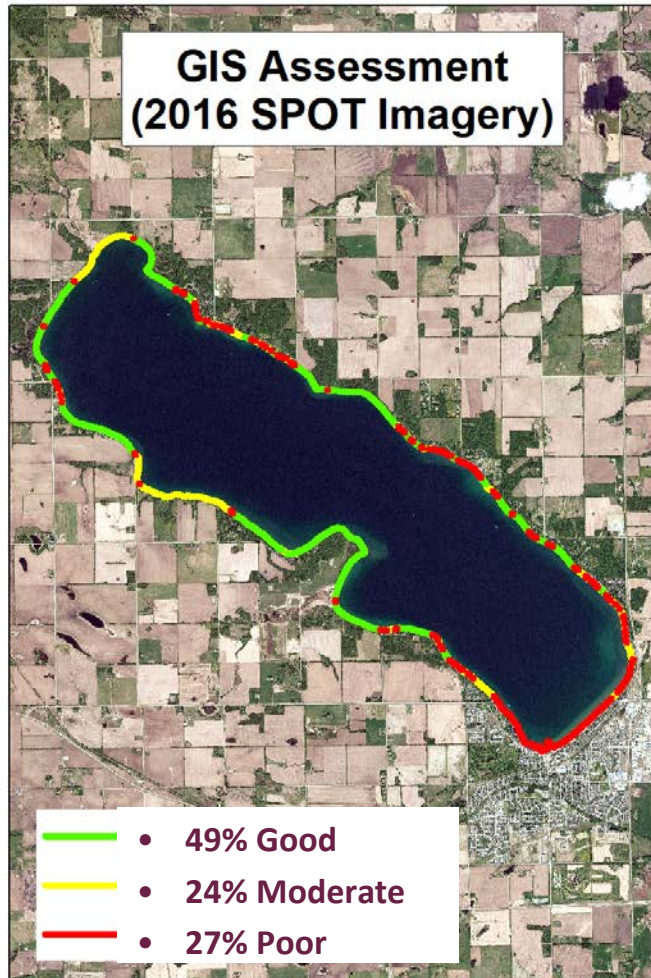


Videography Assessment (2008)

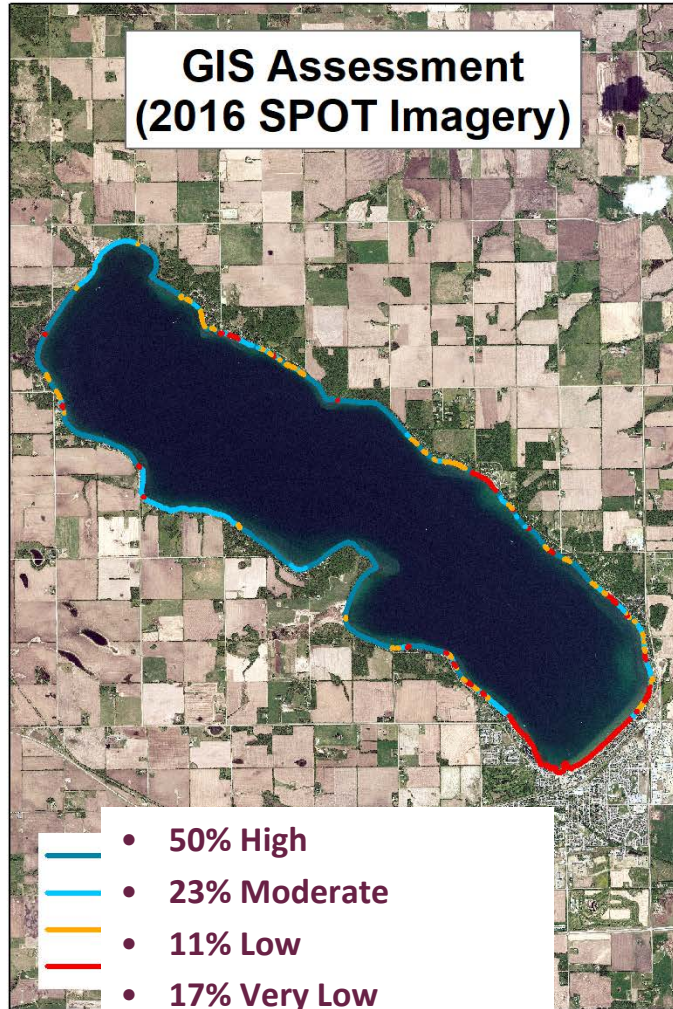


Pigeon Lake

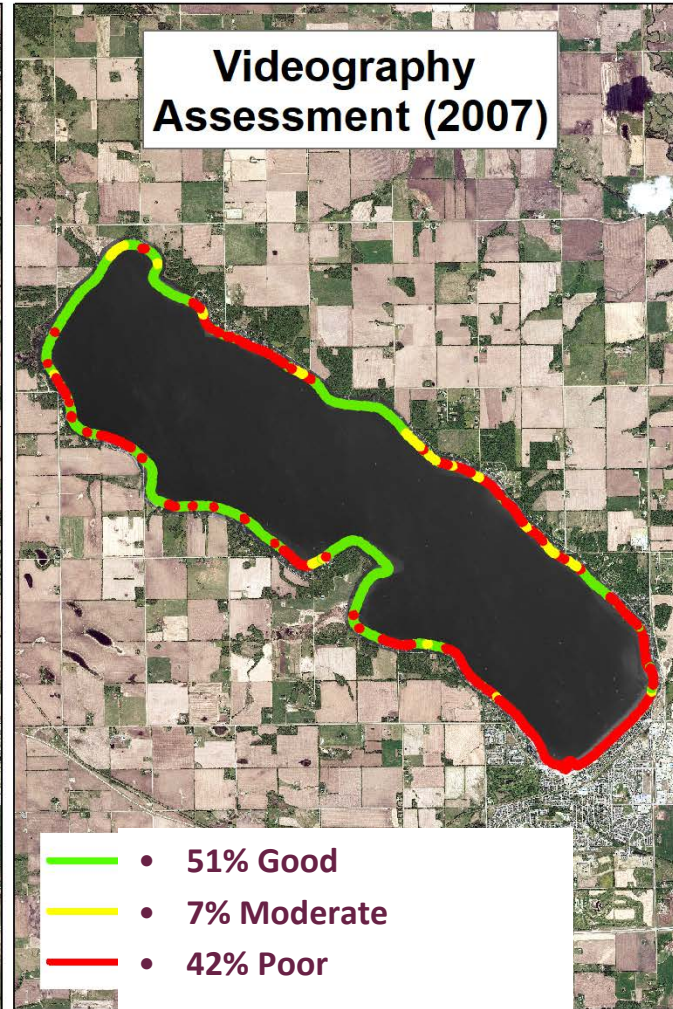
Sylvan Lake



GIS Assessment (2016 SPOT Imagery)

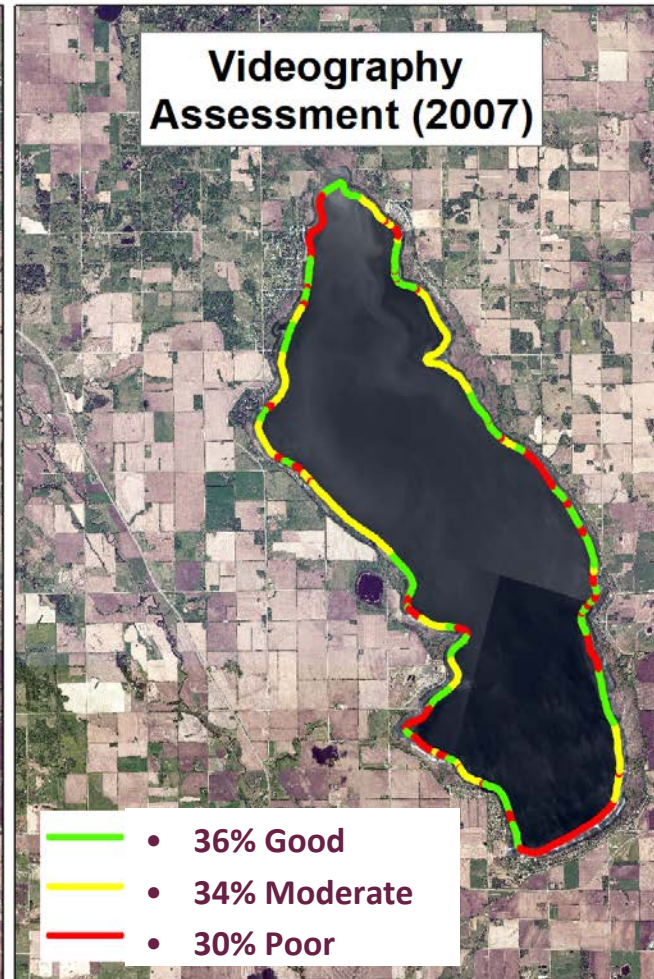
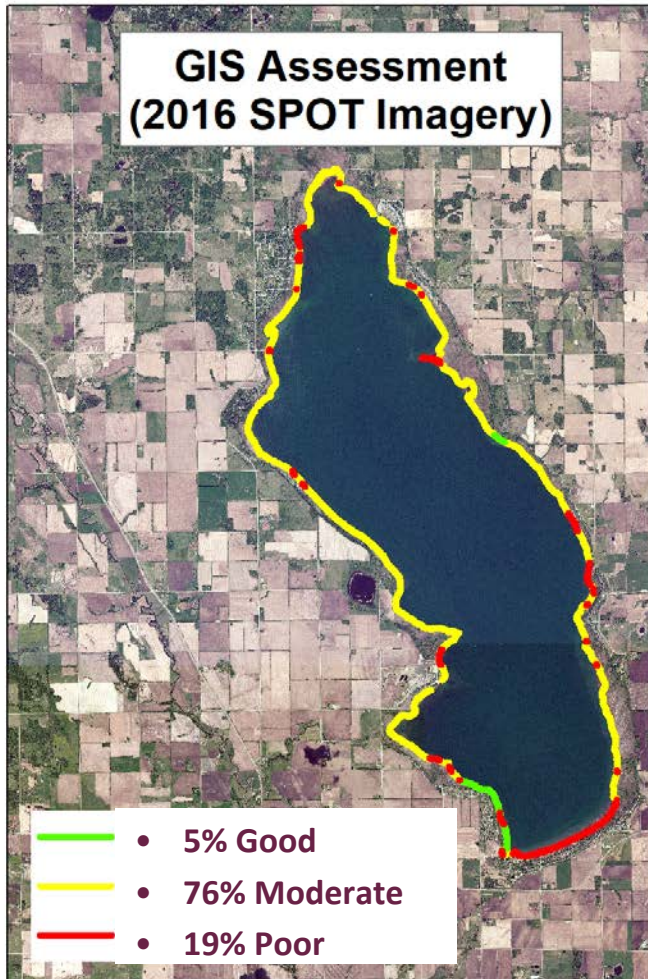


Videography Assessment (2007)

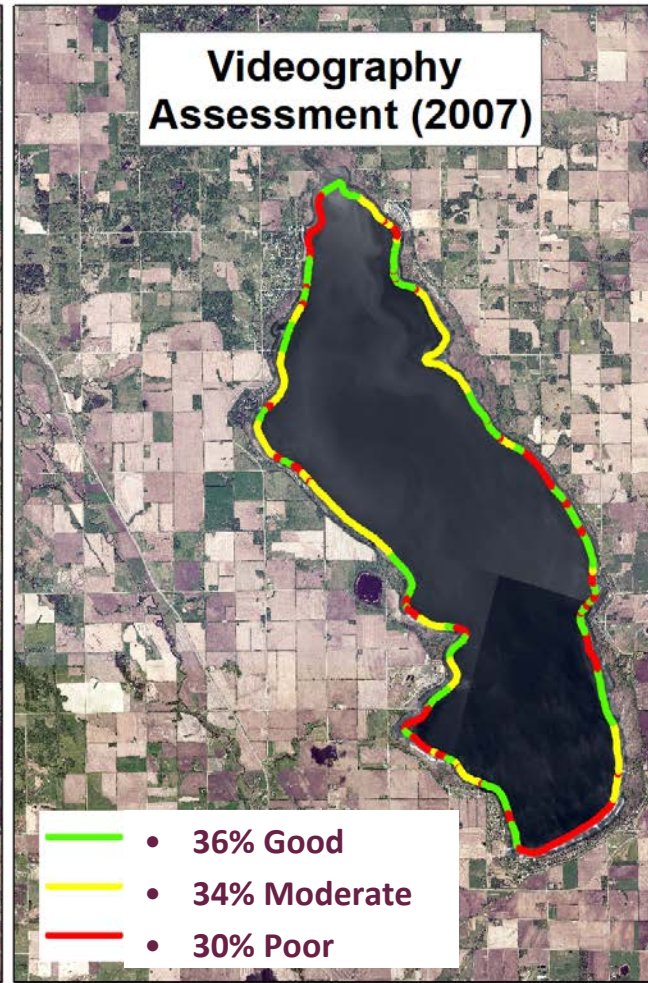


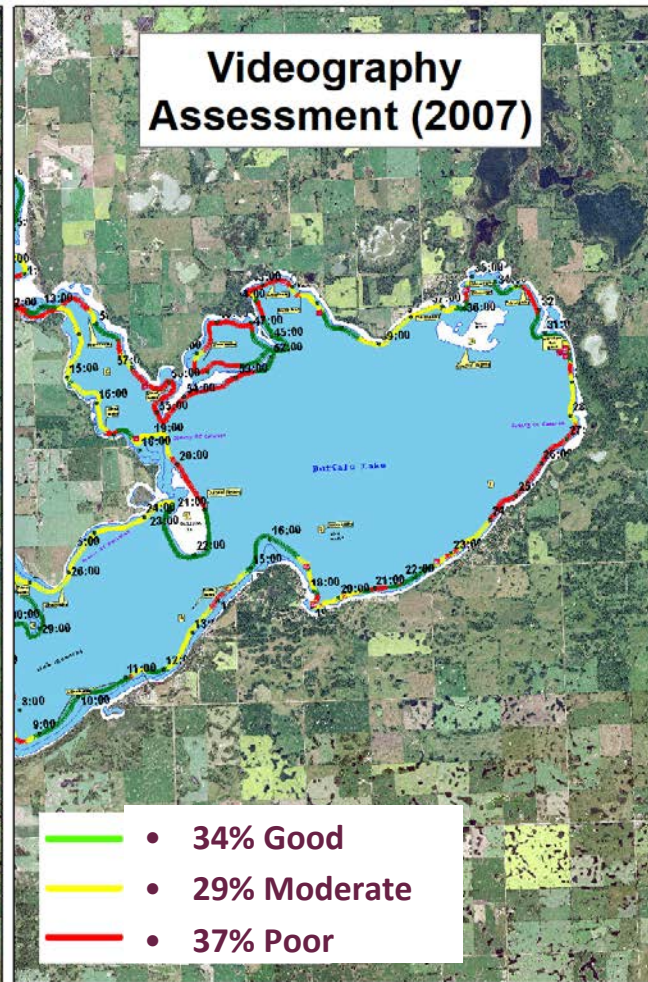
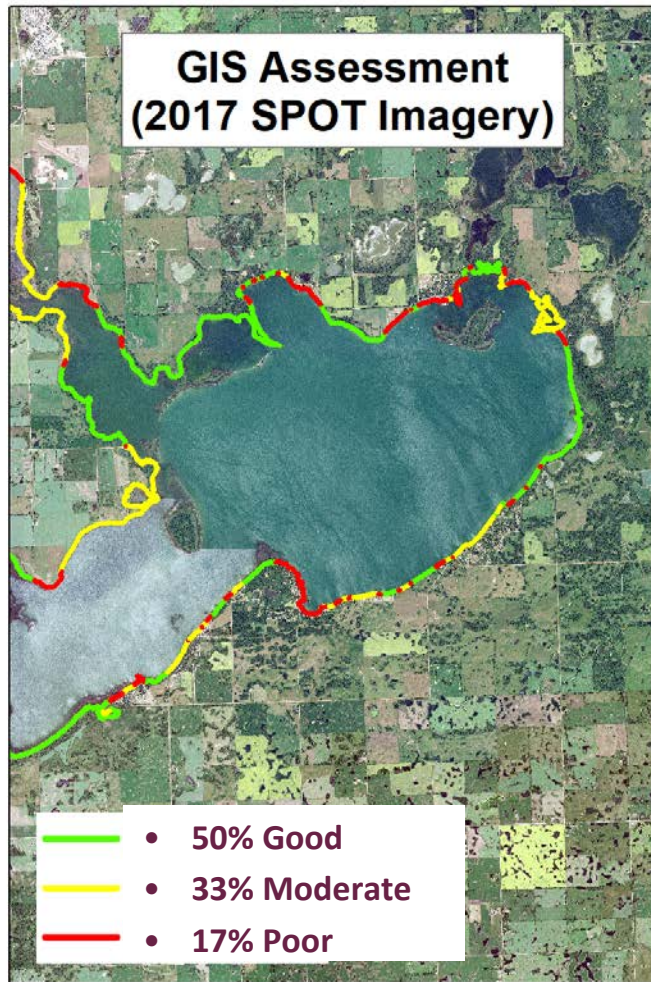
Sylvan Lake

Gull Lake



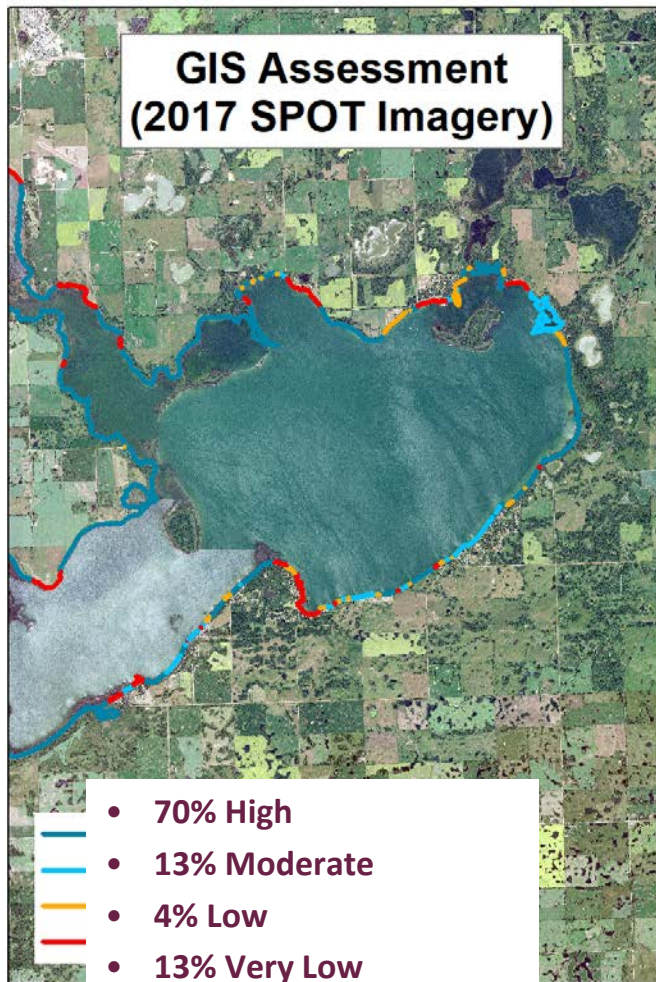
Gull Lake



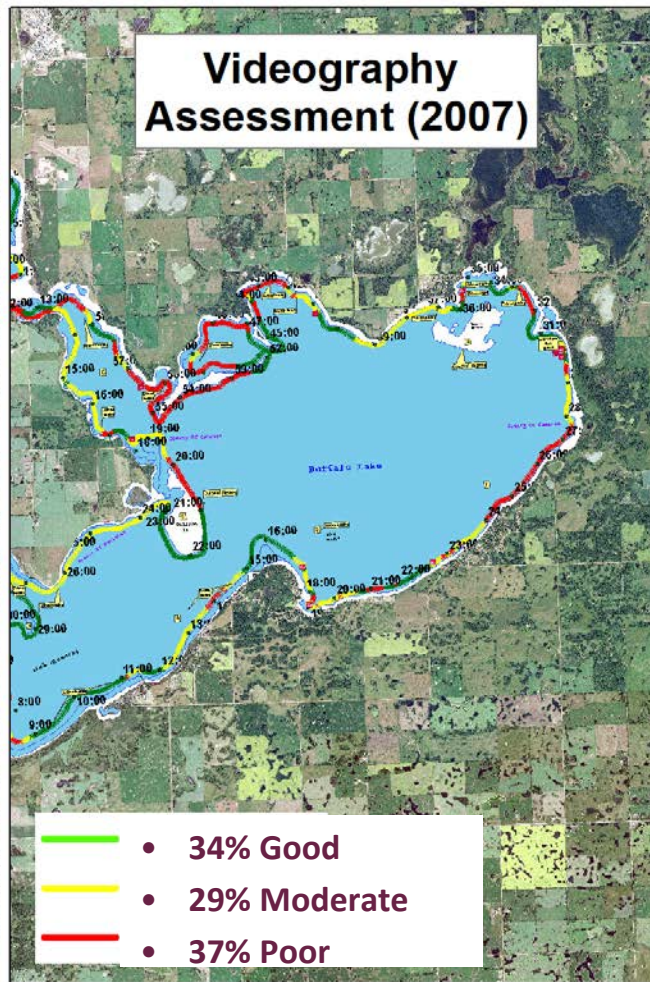


Buffalo Lake East

GIS Assessment (2017 SPOT Imagery)

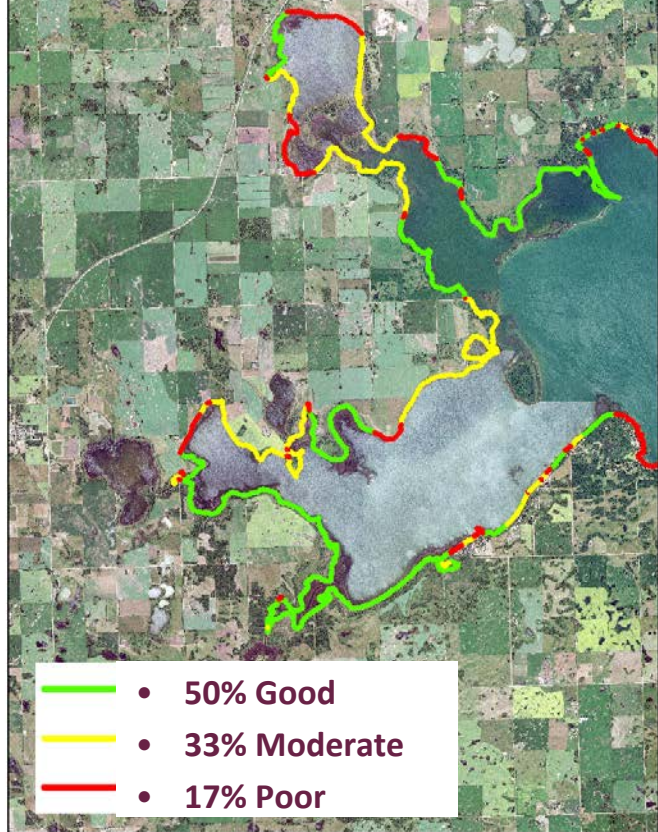


Videography Assessment (2007)

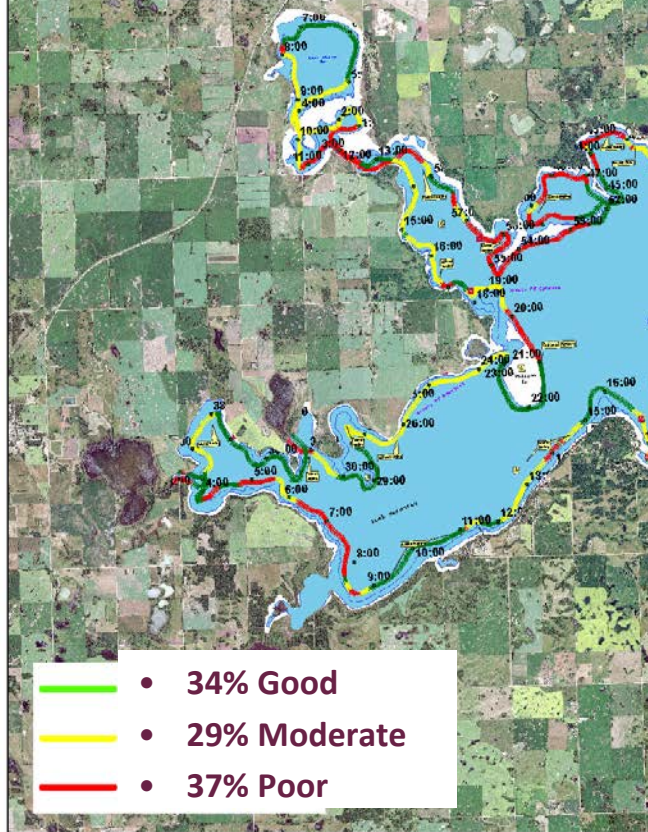


Buffalo Lake East

GIS Assessment (2017 SPOT Imagery)

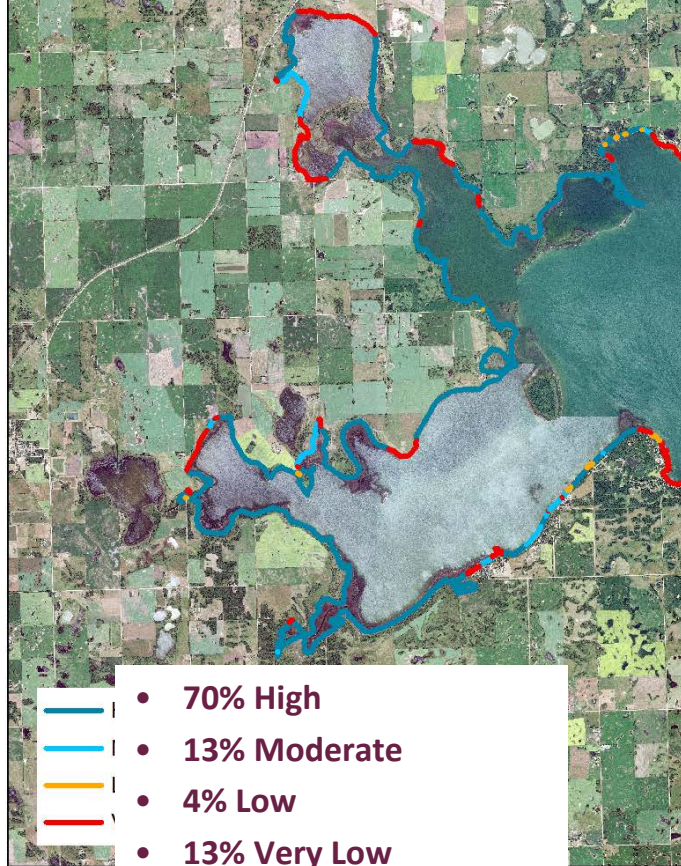


Videography Assessment (2007)

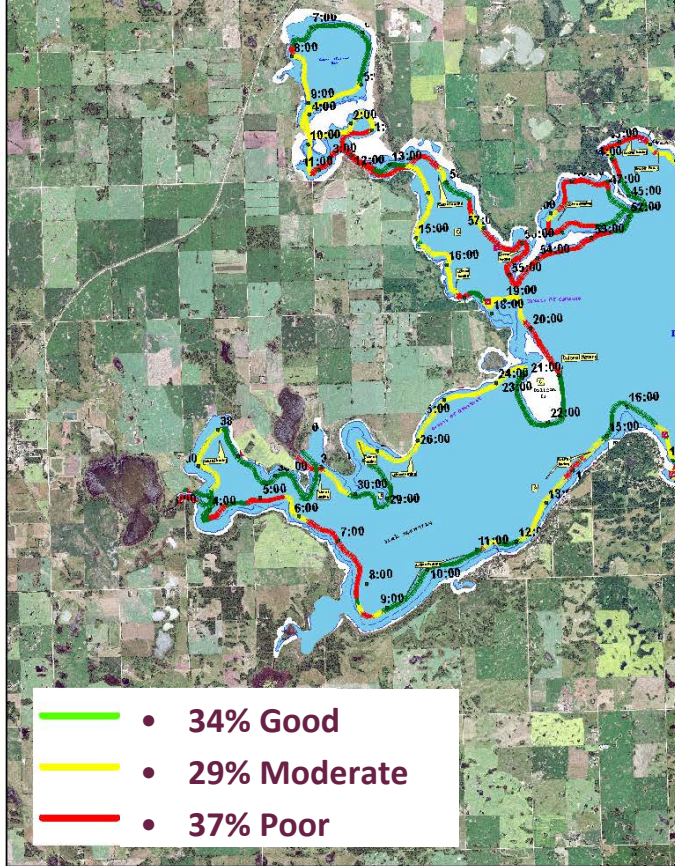


Buffalo Lake West

GIS Assessment (2017 SPOT Imagery)



Videography Assessment (2007)



Buffalo Lake West

Conclusions

- New method rapidly and effectively repeats aerial videography method
- Tool is objective and repeatable, great for watershed-level assessment and for prioritization of ground-based surveys

Conclusions

- Majority of riparian management areas in watersheds were high or moderate intactness (>60%)
- Tributary riparian management areas had poorer condition than lakeshores for Buffalo, Gull, Sylvan Lakes
- Lakeshore had poorer condition than tributaries for Pigeon Lake
- Comparison of lakeshore maps between 2008 and 2017 indicate improvement over time

Next Steps

- Creation of Respect Our Lakes infographic
- Validation of land cover and intactness levels
(field surveys summer 2018)
- Spatial data available via data sharing agreement

Questions?



Thank you!

Arin.MacFarlane-Dyer@gov.ab.ca