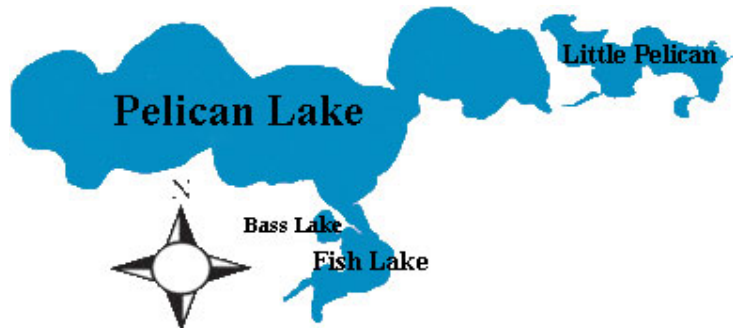


Chapter 1. Executive Summary

Introduction

The PGOLID Lake Management Plan is a comprehensive report from over a decade of data collection and effort from many organizations, including PGOLID, the Pelican Lake Property Owners Association, Blue Water Science and RMB Environmental Laboratories. This plan's purpose to address long range, ongoing concerns and issues related to water quality preservation and lake management. It is intended to be a working document that will provide direction and aid in cooperative decision making for the PGOLID Board, residents of PGOLID, county government, and the public at large with vested interests in establishing and maintaining high standards of water quality and sustainable use of these lakes as a natural resource for generations to come. It is a summary of water quality data, various lake projects, ongoing lake programs and recommendations for future projects. This report is also available online and gets updated yearly once the previous year's data is analyzed (<http://www.pgolid.org/LMP/main.htm>).



The Pelican Group of Lakes encompasses 4 lakes: Pelican, Little Pelican, Bass, and Fish. Although these lakes have somewhat different characteristics, they are all considered to have good water quality for northwest Minnesota.

Understanding What Impacts the Pelican Lakes

- Lake water quality results are within range compared to other lakes in the ecoregion.
- The water quality of the tributary streams is generally good and does not appear that stream inputs of nutrients are great enough to generate problems at this time.
- The lake basins upstream in the watershed act as sedimentation basins and help promote good water quality as streams make their way to the Pelican Lakes.
- Land cover analysis (pages 16-17) shows that impervious surface has increase significantly around PGOLID lakes. Impervious surface causes stormwater to run off into the lake instead of being soaked into the ground. To protect water quality, impervious surface should be minimized.
- Shoreline inventory and visual inspections show that about 60% of the shoreline around the PGOLID lakes is unnatural (manicured lawns) (page 121). In order to preserve water quality, manicured lawns should be converted back into natural vegetation, trees and shrubs.

PGOLID Lake Vitals

	Pelican	Little Pelican	Bass	Fish
Size (acres)	3,986	345	48	261
Mean depth (ft)	22	12	18	27
Littoral area (%)	41	74	50	48
Maximum depth (ft)	55	25	33	69
Volume (acre ft)	87,692	4,140	864	7,047
Watershed Area (acres)	164,092	96,538	138	162,190
Trophic State Index (TSI)	41	46	42	40
Total Phosphorus Mean (ug/L)	14	24	17	12
Chlorophyll a Mean (ug/L)	5	10	5	4
Chlorophyll a Maximum (ug/L)	17	31	17	9
Transparency (Secchi depth, ft)	12.6	8.3	12.0	12.4

PGOLID Goals

The Pelican Group of Lakes Improvement District (PGOLID) was formed to identify, quantify, study, and manage water resources as to preserve quality. Goals that have led to this report were outlined by PGOLID early in 2002. The overall scope can be broken into tasks by subject.

1. Water Quality Evaluation

- Interpretation and analysis of existing lake data
- Identification of all potential sources of lake water pollution, e.g. septic, chemical, runoff, etc.
- Stream monitoring
- Collection of new lake water quality data
- Evaluation of wetlands for wildlife and water quality services
- Characterize lake sediments to evaluate potential for nuisance growth of aquatic invasive plants

2. Invasive Species Management

- Prevention of invasive species through education and DNR intern program
- Control of invasive plants with herbicide
- Promote re-establishment of native plants for quality habitat.

3. Pest Control

- Management of mosquitoes with pesticides to prevent the spread of mosquito-borne illnesses and promote enjoyment of the lake
- Annual spring monitoring for Tent caterpillars and funding available for pesticide treatment if necessary

4. Wildlife and Aesthetics

- Evaluate shoreland conditions
- Promote shoreline restoration
- Recommend ways to improve natural areas

5. On-Site Waste Treatment Systems

- Maintain septic system records of lake properties to monitor the age of systems and possible impacts to the lake
- Encourage residents to properly maintain septic systems and holding tanks

7. Lake Use and Recreation

- Monitor crowding potential
- Placement of buoys for boating safety

8. Lake Management Program

- List ongoing programs and projects
- List of new lake management recommendations
- Identify funding sources, e.g. grants

9. Information and Education

- Keep residents informed of PGOLID projects
- Stay abreast of new rules, regulations and legislation and pass any changes on to residents

PGOLID Programs

Mosquito Treatment

Category	Description	Person(s) Responsible
Mosquito Treatment	PGOLID hires an independent contractor to treat the perimeter of the lake for mosquitoes weekly throughout the summer.	Independent Contractor: Clarke
Recommendations	Continue Program as designed.	

Lake Monitoring

Category	Description	Person(s) Responsible
Baseline Water Quality Monitoring	<ol style="list-style-type: none"> 1. Collect water samples at designated lake sites once a month from May to September and evaluate for total phosphorus, chlorophyll <i>a</i>. 2. Secchi disk monitoring once a month from May to September. 3. Dissolved oxygen and temperature profiles taken once a month from May to September. 	PGOLID Water Resource Coordinator
Extra Water Quality Monitoring Projects	<ol style="list-style-type: none"> 1. In 2008-2010, hypolimnion water samples collected twice a month from May to September to evaluate internal phosphorus loading from the lake sediment. 2. In 2009-2010, additional water quality parameters collected including ortho-phosphorus, total nitrogen, chloride, alkalinity, color, conductivity, and total suspended solids. 3. In 2007-2008, collected water samples in Echo Bay to evaluate conditions before a potential new development. 4. In 2015, additional water quality parameters collected to evaluate Zebra mussel suitability: calcium, alkalinity, chloride, magnesium, pH, total dissolved solids, potassium and bicarbonate. 5. In 2015-2016, collect water samples in Echo Bay to see if there are any changes since 2008. 	PGOLID Water Resource Coordinator
Special Lake projects	<ol style="list-style-type: none"> 1. Aquatic insect biomonitoring survey (2008). 2. Zooplankton community monitoring (2015). 	PGOLID Water Resource Coordinator
Recommendations	<ol style="list-style-type: none"> 1. Continue baseline monitoring, and add extra monitoring and special projects when necessary. 	PGOLID Water Resource Coordinator

Watershed/Stream Monitoring

Category	Description	Person(s) Responsible
Baseline Water Quality Monitoring	<ol style="list-style-type: none"> 1. Collect water samples at designated stream inlets monthly (total phosphorus, total suspended solids, water flow, dissolved oxygen, temperature, conductivity). 2. Collect water samples at designated stream inlets after storm events each season (>1 inch rain). 	PGOLID Water Resource Coordinator
Extra Water Quality Monitoring Projects	<ol style="list-style-type: none"> 1. Collect extra water samples during spring thaw to track the snow melt runoff into streams. 2. Collect E.coli samples at Bob Creek and Burton Lake Outlet during baseline monitoring and storm event monitoring to evaluate any health risks from upstream cattle operation. 3. Deploy a flow data logger to establish a rating curve for Pelican River (2015-2016). 	PGOLID Water Resource Coordinator
Special Stream projects	<ol style="list-style-type: none"> 1. Aquatic insect biomonitoring survey (2008). 	PGOLID Water Resource Coordinator
Recommendations	<ol style="list-style-type: none"> 2. Continue baseline monitoring, and add extra monitoring and special projects when necessary. 	PGOLID Water Resource Coordinator

Aquatic Plant Projects

Categories	Description	Person(s) Responsible
Aquatic Plant Surveys	<ol style="list-style-type: none"> 1. In 2003, Blue Water Science was hired to survey aquatic plants in the PGOLID lakes. This transect survey showed moderate aquatic plant diversity and the presence of invasive curly-leaf pondweed. 2. In 2010-2011, PGOLID completed a point intercept survey for all four lakes as a follow-up to the 2003 survey. 3. In 2015, completed a point intercept plant survey on Echo Bay to document the native plant community. 	<ol style="list-style-type: none"> 1. Blue Water Science 2. Independent Contractor 3. RMB Environmental Laboratories
Recommendations	Continue plant surveys every 10 years or so to monitor diversity and the presence of any new invasive species.	PGOLID Water Resource Coordinator

On-site Waste Treatment Systems

Project	Description	Person(s) Responsible
County Records Survey, 2004	Obtained county records for on-site waste treatment systems and evaluated the status and age of systems.	Blue Water Science
Waste Treatment System Screening Volunteer Survey, 2006	Invited lake residents to volunteer for a screening of their on-site waste treatment system.	PGOLID Water Resource Coordinator
County inspections of on-site waste treatment systems and abatements	In 2007-2009, Otter Tail County inspected on-site waste treatment systems that were 20 years old or older. They abated the properties that did not meet requirements.	Otter Tail County Land and Resource Department
County Records Survey, 2012	Obtained county records for on-site waste treatment systems and evaluated the status and age of systems. Compared to 2004 survey.	PGOLID Water Resource Coordinator
Outreach, 2013	<p>Sent a letter to all residents with septic systems or holding tanks over 20 years old recommending they have it checked.</p> <p>Sent out an anonymous voluntary survey to home owners asking about how they maintain their system, while educating them on proper maintenance.</p>	PGOLID Water Resource Coordinator
Recommendations	Maintain records from the county on the ages of septic systems and continue to education residents about waste treatment and water quality.	PGOLID Water Resource Coordinator

Invasive Species Projects

Categories	Description	Person(s) Responsible
Chemical Treatment of Aquatic Invasive Plants	1. PGOLID started a Curly-leaf pondweed (CLP) treatment program in 2005. This project has shown a great reduction in CLP and is an ongoing project.	Licensed chemical applicator
Surveys	<ol style="list-style-type: none"> 1. From 2007-present, Eurasian flowering rush surveys are conducted from Buck's Mill to Little Pelican lake. Any flowering rush that is found is hand-removed. This project is ongoing and follows a flowering rush contingency plan. 2. From 2006-present, inspect areas around public accesses for Eurasian watermilfoil. 	PGOLID Water Resource Coordinator
DNR Watercraft Inspection Program	1. From 2006-present, PGOLID has participated in the DNR Watercraft Inspection Program. This program hires DNR interns for the summer to inspect boats for invasive species and survey boaters entering and exiting the two Pelican Lake accesses.	Minnesota Department of Natural Resources (DNR)
Zebra Mussels	1. Educate PGOLID property owners about new regulations that apply to PGOLID lakes since zebra mussels were found in 2009.	PGOLID Water Resource Coordinator and PGOLID Board
Zebra Mussel Monitoring	<ol style="list-style-type: none"> 1. Monitor Zebra mussel veliger density every two weeks throughout the summer, 2012-present. 2. Monitor Zebra mussel adult density and distribution, 2013- present. 	PGOLID Water Resource Coordinator
Recommendations	Continue all programs as currently designed.	PGOLID Water Resource Coordinator and PGOLID Board

Shoreland Projects

Projects	Description	Person(s) Responsible
Shoreland Inventory	In 2004, Blue Water Science was hired to conduct a shoreland inventory on PGOLID lakes. This project evaluated how many parcels had 50% natural vegetation along the shoreline in a strip at least 15 feet deep. The results showed that 40% of properties met these criteria.	Blue Water Science
Shoreline Habitat Restoration Grant	PGOLID has been awarded 3 different grants from the DNR to restore shorelines. Through this program we have completed 15 projects since 2009.	PGOLID Water Resource Coordinator
Recommendations	In the next five years, complete a new shoreland inventory and compare results to 2004 to see if there is any improvement. Implement a voluntary tree and native wildflower seed planting program	PGOLID Water Resource Coordinator

Information and Education

Categories	Description	Person(s) Responsible
Educational Seminars and Presentations	<ol style="list-style-type: none"> 1. Educational seminars for lake residents in the summer. 2. Educational presentations at PGOLID and PLPOA meetings. 	PGOLID Water Resource Coordinator
Dissemination of Educational Information Via Electronic Sources	<ol style="list-style-type: none"> 1. Articles in the Pelican Brief (Pelican Lake Property Owners Association [PLPOA] Newsletter). 2. PGOLID website. 3. Pelican Lake Property Owners Association Website (PLPOA). 	PGOLID Water Resource Coordinator and PGOLID Board
New Regulations	<ol style="list-style-type: none"> 1. Keep abreast of new state/county/local government lake regulations and disseminate the information in an understandable way to PGOLID residents. 	PGOLID Water Resource Coordinator and PGOLID Board
Community	<ol style="list-style-type: none"> 1. Work with upstream landowners, farmers, ranchers, and other lake associations to act in a proactive manner in the protection of the water quality that flows into the PGOLID. 	PGOLID Water Resource Coordinator and PGOLID Board
Recommendations	Continue all programs as currently designed.	PGOLID Water Resource Coordinator and PGOLID Board

Recommendations Summary

These recommendations were provided by the PGOLID Water Resource Coordinator after evaluating the status of past and present projects and the resulting data. These recommendations were written in March of 2016.

1. **Monitoring:** Continue current baseline lake and stream monitoring programs and add extra monitoring and special projects when deemed necessary by the PGOLID Water Resource Coordinator and PGOLID Board.
2. **On-site Waste Treatment Systems:** Continue educating PGOLID residents through various means including surveys, the Pelican Brief and e-communications.
3. **Aquatic Plant Surveys:** Complete a new survey every 10 years or so to monitor plant diversity and the presence of any new invasive species.
4. **Invasive Species:** Continue all current programs including Curly-leaf pondweed treatment, Eurasian flowering rush surveys and removal, zebra mussel monitoring, and DNR Watercraft Inspection Program.
5. **Shoreland Projects:** In the next five years, complete a new shoreland inventory project and compare results to 2004 to see if there is any improvement due to increased education and the DNR Shoreline Habitat Restoration Grants.
6. **Information and Education:** Continue current educational programs including articles for the website, educational seminars and presentations at meetings, communication with neighboring districts and land owners, and new regulation information.
7. **Land Conservation:** Promote the conservation of undeveloped shoreland parcels and smart responsible low-impact development practices. Protect land and limit the opportunities for future high-impact developments via conservation easements.