

# BIG SHELL

# LAKE CAPACITY STUDY

## ABOUT THE PROJECT

As a collective, the Resort Village of Big Shell (RV), the Resort Village of Echo Bay (RV), and the Rural Municipality of Spiritwood (RM) identified a need to undertake a Lake Capacity Study to measure key environmental and physical characteristics of Big Shell Lake to assess how current levels of development and lake use affect ecological conditions.

In 2022, the RV's and RM hired Urban Systems to undertake the Lake Capacity Study. Field studies, data collection, and community engagement initiatives were undertaken by Urban Systems between spring 2022 and summer 2023. In October 2023, Urban Systems provided the Lake Capacity Study report to the RV's and RM for review and facilitated a presentation of the findings and recommendations with the group.

The report provides guidance on how the RV's and RM can collaborate together on making decisions to support a balance between the preservation of the natural environment, development, and recreational use of the lake.



The project consisted of four phases which are summarized in this document along with high-level study findings, recommendations, and key objectives. To review the full report, please contact the RV of Big Shell, the RV of Echo Bay, or the RM of Spiritwood.





## PHASE 2 - FIELD STUDY

To build on information collected through Phase 1, field surveys were undertaken to conduct water quality sampling, habitat assessments, and boat capacity data collection.

Water sampling was done on four occasions over a period of fourteen months. Monitoring was conducted at four sampling sites: Sunset Rim, Aspen Ridge, Big Shell and Echo Bay. Based on preliminary data and observations, the water quality rating for Big Shell Lake is good overall. The parameters of chloride, ammonia, nitrate, nitrite, and dissolved oxygen all fall within acceptable guideline criterion. In comparison to data from a 1998 water quality assessment, there does not appear to be any downward trend in water quality. However, there is a significant time difference between these two sampling events.

## PHASE 1 - TAKING STOCK

The first phase of the project focused on taking stock of available information about the lake to identify existing data and evaluate data gaps. The RV's and RM provided information on habitat conditions, existing water quality data, local wastewater, solid waste management, roads, stormwater management, and other infrastructure data. Regional information was collected on historical, meteorological, and hydrological data, local watershed boundaries and potential wetland areas. A land use analysis was also conducted using aerial imagery and mapping to estimate qualitative habitat cover types and land use currently present within the study area.



The habitat field assessment was conducted on August 5, 2022, to confirm and refine the desktop observations. Vegetation survey plots were selected to gain general habitat character that could then be applied to areas with similar landscape and vegetation community characteristics around the lake. Natural areas within the study area can be generalized into five ecosite descriptions, including BP 6 Trembling Aspen/ beaked hazel/ sarsaparilla: Fresh Loamy Sand, BP15 Balsam poplar – white spruce/ feathermoss: Very moist silty loam, BP17 Manitoba maple - balsam poplar/ ostrich fern: moist silty clay loam, BP25 Willow shrubby rich fen: Wet humic organic, and BP26 Graminoid fen: Wet humic organic.

The boat count took place on July 1, 2023, and included a morning count and afternoon count. In addition to active boats on the lake, boats located on the shoreline, docks, and boat lifts were recorded, including any watercraft stored on private property that were visible to the road.

## MORNING COUNT

🕒 6:12 AM

**284**  
Boats

**35**  
Sea-doo



**Total Watercraft 319**  
Docked or parked on land

## PEAK USAGE COUNT

🕒 1:10 PM



Boats

Active

Docked

**81**    **164**



Sea-doo

**7**    **33**

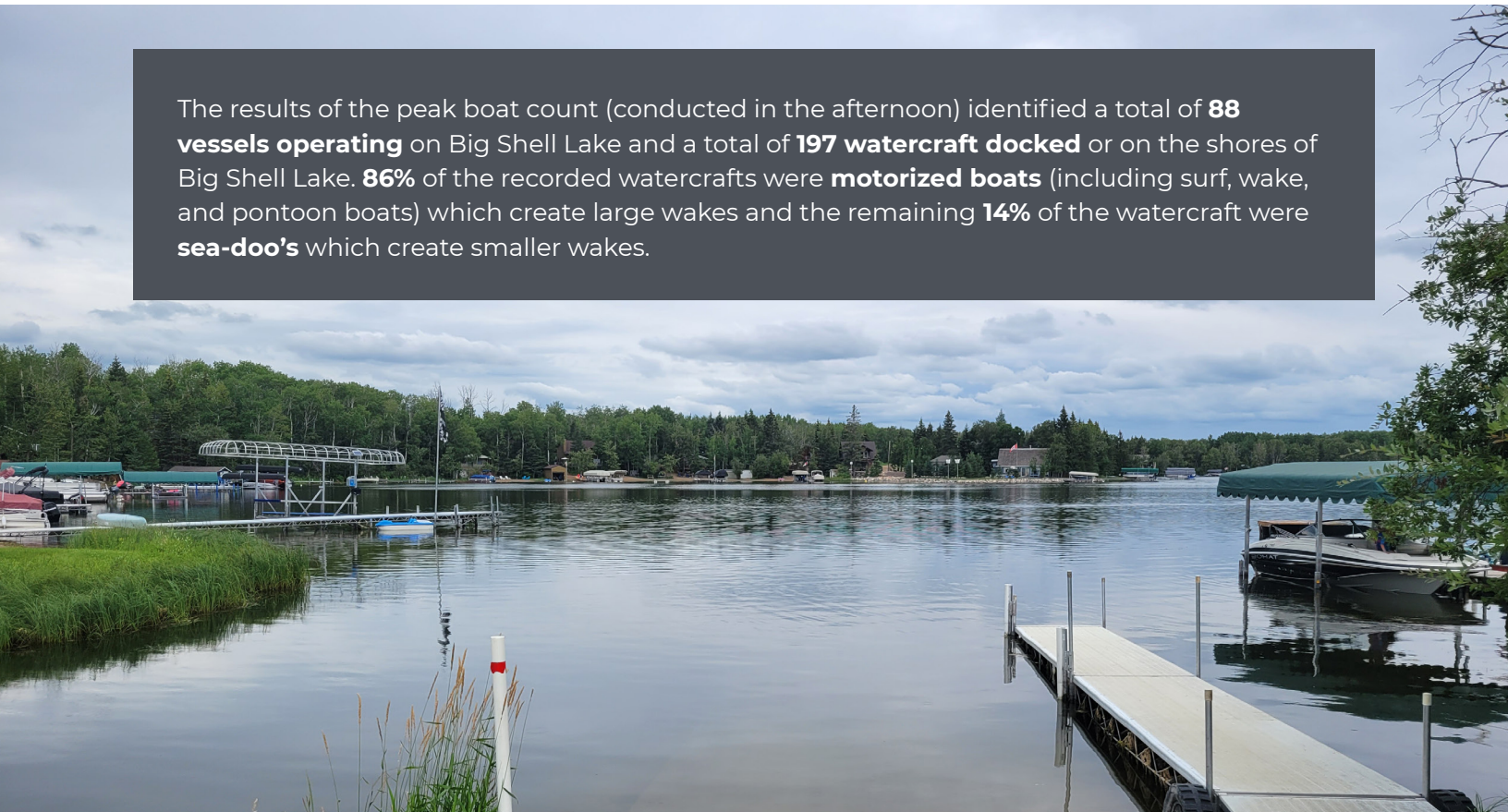


Subtotal

**88**    **197**

**Total Watercraft 285**

The results of the peak boat count (conducted in the afternoon) identified a total of **88 vessels operating** on Big Shell Lake and a total of **197 watercraft docked** or on the shores of Big Shell Lake. **86%** of the recorded watercrafts were **motorized boats** (including surf, wake, and pontoon boats) which create large wakes and the remaining **14%** of the watercraft were **sea-doo's** which create smaller wakes.





## PHASE 3 - PUBLIC ENGAGEMENT

A public survey was developed to engage with lake users and collect feedback. The survey was distributed by email to all property owners within the RV's and RM. The survey was also promoted via social media. In conjunction with the survey, an in-person engagement session was held on August 6, 2022 at Big Shell Lake. The morning was spent near the four-way stop in the RV of Echo Bay and the afternoon was spent at the main beach within the RV of Big Shell. The purpose of the visit was to share information about the project, collect feedback, and promote the public survey.



The survey was open for responses for the month of August 2022.



Of the 249 responses,

**35%** had properties located within the RV of Big Shell

**47%** had properties located within the RV of Echo Bay

**18%** had properties within the Rural Municipality of Spiritwood

Results from the public survey revealed important information on lake usage, existing land uses, and environmental concerns.





The survey respondents expressed concerns about land use and development surrounding Big Shell Lake. The common opinion from lake users is that the lake has reached its development capacity. Many respondents felt that development has started to negatively effect the natural environment of the lake. They commented that when lakefront development occurs, new building materials are brought in and natural vegetation is removed, which alters the natural shoreline, destroys habitat, and threatens native species. Survey respondents noted that there has been significant habitat destruction surrounding Big Shell Lake for the purpose of developing new residential lots. The growing beaver population was noted as another cause of destruction, due to their foraging of vegetation on the shoreline which causes flooding.

Survey respondents also shared concerns relating to boat traffic on Big Shell Lake. A significant number of respondents demonstrated concerns about shoreline erosion due to a high number of boats causing wakes on the lake. They noted that wake boats contribute to noise pollution and poor water quality. Respondents also noted that poor driver behavior is a safety concern to both lake users and the natural environment. They indicated that many boat drivers do not drive safely nor show respect for the lake and other users. This includes driving close to the shoreline, driving close to smaller boats, playing loud music, and throwing garbage into the lake. This also includes disturbing nesting bays and fish spawning areas. Respondents believe that these areas must be protected from boaters, as loon and fish populations have noticeably decreased in the area. Also, lake users expressed a belief that the lake is at capacity with the number of boats.





## PHASE 4 - RECOMMENDATIONS AND GUIDELINES

In accordance with the field study findings, data collected, and public engagement feedback, the following recommendations were prepared to guide the RV's and RM in making sustainable, informed decisions that positively affect people and the environment in the long-term. Recommendations are included on the following pages to further support responsible development and lake use at Big Shell Lake.



## LEGISLATION AND MANAGEMENT

### Options and Considerations:

Review planning policies for Agricultural Residential Development, Lakeshore Development, Hamlet Areas, and Country Residential Development.

Establish criteria or policy for setback requirements from any waterbody, using a scientific approach based on soils, vegetation, slopes, and geotechnical. For example, see *Stepping Back from the Water: a Beneficial Management Practices Guide for New Development Near Waterbodies in Alberta's Settled Region* (2012).

Consider implementing additional requirements for pre-development site assessments:

- Establish standards for surveying and reporting on ecological conditions prior to development activity (i.e. Ecological Impact Assessment).
- Consider limiting vegetation clearing and/or construction activities to take place outside the regional migratory bird period (i.e. prior to April 20 or after August 25).
- Establish policy to ensure the conservation of remaining wetlands as it influences and benefits the health of the lake.
- Establish policies to limit changes to undeveloped shoreline areas to protect sensitive ecological areas, including fish and wildlife habitats.
- Consider installing large diameter culverts at locations known to be susceptible to flooding (RV of Big Shell).



## EDUCATION

### Options and Considerations:

RV of Big Shell, RV of Echo Bay, and RM of Spiritwood should collectively commit to delivering consistent lake use and conservation information to property owners and other lake users.

Develop best-practices and educational materials for distribution to lake users that illustrate measures for conservation and preservation of the natural environment, which can be applied to existing developments and understood by lake users.

Highlight conservation areas around the lake to improve public understanding of the appropriate use of public lands.

Consider collectively developing lake use guidelines to implement 'Slow Zones', increase awareness of boating etiquette best practices, and awareness of environmentally sensitive areas.

Prepare a property owner's manual that promotes awareness, and provides advice on how environmentally responsible maintenance of property can contribute to the health of lake ecology.

Utilize funding sources for educational programs through Provincial and Federal funding.



## MONITORING AND COMPLIANCE

### Options and Considerations:

Annually conduct an evaluation of local development policies, guidelines and permits.

Prepare guidelines to promote annual inspections on infrastructure (ie. Lagoon, waste transfer station, etc.)

Undertake site inspections at the final acceptance of development (i.e. vegetation re-establishment, setbacks, and as built surveys.)

Undertake site inspections during construction activities to ensure compliance of approvals and environmental protection measures have been implemented, monitored, and maintained.

Undertake additional water quality sampling to monitor water quality levels and to further investigate quality of water sources surrounding Big Shell Lake.

Consider a municipal requirement for confirmation of other jurisdictional regulatory approvals (i.e. Fisheries Act) as part of development permit and approvals process.





## ESTABLISHING CRITERIA AND BASELINES

### Options and Considerations:

Develop an environmental framework plan or policy to set out terms of reference for a biophysical/ ecological impact assessment with site specific surveys, such as native and rare plant surveys, soil classification, wildlife and wetland classification, etc.

Establish setback policy for waterbodies, wildlife corridors, environmentally sensitive areas, and areas of potential or known contamination.



## DESIGN CONSIDERATION

### Options and Considerations:

Create updated density regulations to limit the number of lots that can be developed within the Lakeshore Development District and Residential District.

Ensure development density and site coverage is compatible with the physical capabilities of the shoreland and water body.

Allow for conservation of a publicly accessible waterfront.

Avoid the use of retaining walls below the high-water mark and require more natural landscape features, including rocks and plantings set into a stable slope.

## KEY OBJECTIVES

As an outcome of this study, the RV's and RM have a desire to collectively make lake management decisions that support the following objectives:

- Protect and maintain shorelines, natural habitats and environmentally sensitive areas surrounding Big Shell Lake.
- Mitigate impact to shorelines, natural habitats, and environmentally sensitive areas where where development currently exists surrounding Big Shell Lake.
- Limit future development surrounding Big Shell Lake to maintain current environmental conditions.
- Establish lake user guidelines to address safety concerns, protect shorelines from erosion, and maintain lake water quality.

As a next step in achieving these objectives, Council and administrators of the RV's and RM should create a strategic plan framework to prioritize and implement report recommendations.