CAPE MEARES LAKE WATER QUALITY MONITORING

Proposal

Rev 2: January 16, 2025

WHAT IS A “HEALTHY LAKE”?

A "healthy lake" is defined by a balanced ecosystem with clean water, adequate dissolved oxygen levels, a diverse range of aquatic plants and animals, balanced algal growth, and low levels of pollutants, essentially indicating a stable environment where native species can thrive without major disruptions;

Key indicators include water quality parameters, the presence of healthy animal populations and biodiversity along the shoreline.

A healthy lake is a very general term, as every lake is different with its goals and strategies. https://www.lakework.com/blogs/blogs/what-does-a-healthy-lake-look-like

SIGNS OF AN UNHEALTHY LAKE

Eutrophication (nutrient pollution). Increased nutrients and algal growth lead to loss of oxygen – deadly to amphibians and other organisms

- Reduce sunlight to desirable plants and microorganism under the water surface.
- Reduce microorganisms leading to less food for fish and waterfowl.

Harmful Algal blooms (Aesthetics – smell, algal mats; toxicity – skin irritation, gastrointestinal problems, injure/kill wildlife and pets).

Unbalanced animal/fish populations

High levels of pollutants

- Pollution such as human activity, ag runoff, pesticides, fertilizer, construction

Invasive species dominating the ecosystem

Significant changes in water clarity

MONITORING PROGRAM

A well-designed monitoring program takes an adaptive management approach using verifiable and reliable science.

Monitoring objectives should be simple, easily communicated, and relevant to people's concerns.

Data and information derived from monitoring should be easily understood, well-documented, and accessible in a variety of formats for relevant audiences (e.g., scientists, public and private land managers, policy makers).

Oregon Conservation Strategy. 2016. Oregon Department of Fish and Wildlife, Salem, Oregon.

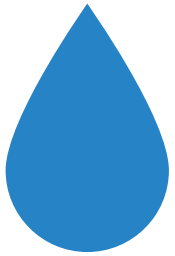
WATER QUALITY PARAMETERS

Parameter	Indicates	Measureable
Water clarity (Turbidity)	If the water is cloudy or murky, it could be a sign of excess algae in summer or silt in winter. Algae indicate excess nutrients such as nitrogen and phosphorus	Easy
Lake water level	Are minimum water levels changing over time? (Impact of climatic variations such as rainfall patterns and longer, warmer summers)	Easy
Water Temperature	The temperature of the water can affect the health of aquatic life and algal growth	Easy
Conductivity	Conductivity of the water indicates the amount of salt in the water. Is there enough ocean water entering the lake to impact aquatic life?	Easy
Nutrient Levels	Excess nutrients in a lake can cause an overgrowth of algae and other aquatic plants, which can lead to oxygen depletion and harm the overall health of the lake • Nitrogen (N) • Phosphorous (P)	Moderate Need Lab tests

WATER QUALITY PARAMETERS

Parameter	Indicates	Measureable
Lake area changes (using photos)	Are reed expanses expanding in summer? Are there signs of lake sedimentation? If so, where?	Moderate Need drone
pH level	The pH level of the water can affect the health of aquatic life. A pH between 6.5 and 8.5 is generally considered ideal. Change in pH indicates water chemistry change, potential new pollution	Moderate Need special equipment
Bacteria levels	Recreation Safety	Moderate Need lab tests
Biodiversity	The presence of a diverse range of plants and animals in and around the lake can be a good sign of a healthy ecosystem	Difficult – need reliable observations
Dissolved Oxygen	Adequate oxygen levels are essential for the survival of aquatic life	Difficult Need special equipment for accurate results

MONITORING OBJECTIVES



Establish a baseline of how water quality changes throughout the year

We have frequently debated what we think is the water quality and how it varies throughout the year. Let's get data!

Identify how the water quality change from year to year and trends over time

Is the late summer water quality changing over time?

Are storm pattern changes impacting the lake?

Are there threats to birds, animals, fish and native plants that depend on the lake?

SPECIFIC QUESTIONS TO BE ANSWERED 1

Turbidity

- How does turbidity change throughout the year?.
  - Winter turbidity indicates erosion and silting; summer turbidity indicates algae
- Is winter/storm silt settling out at the inlet?
  - If just present at the inlet, the silt is not settling out or building up in the middle of the lake.
- Is winter silt coming from a few big storms or more evenly spread?
  - May inform strategies to reduce the flow of silt
- Generate a data base of "normal" winter turbidity so we can evaluate the effectiveness of different strategies
- Can summer turbidity be used to predict summer algal blooms?
- Does summer turbidity/algae correlate with water temperature?

SPECIFIC QUESTIONS TO BE ANSWERED 2

Water Level

- Is the seasonal minimum water level getting lower over time? (Expected longer, warmer summers).
- Do the trends in water level give us an indication of what we can expect for lake minimum water level in the future?
- Does the data inform us on how much water can be taken from Coleman Creek?
- Does the minimum water level correlate with water temperature?

Water Temperature

- Are water temperatures getting to levels that may be toxic to fish and other wildlife?
- How does water temperature vary by location in the lake or depth?

Lake Size

- Is the lake getting smaller? Photos may indicate if reeds are expanding into the lake

SPECIFIC QUESTIONS TO BE ANSWERED 3

Conductivity

- Is the lake stratified by salinity?
- Is ocean water washing into the lake impacting lake salinity?
- In summer, is most of the water leaving the lake by evaporation or seeping into the ground?

Nutrients

- Is algal growth in the lake limited by Nitrogen of Phosphorous?
- Do the nutrient levels (P and N) indicate seepage from septic tanks?

Bacteria

- Does the lake meet recreational water quality standards for e coli bacteria?

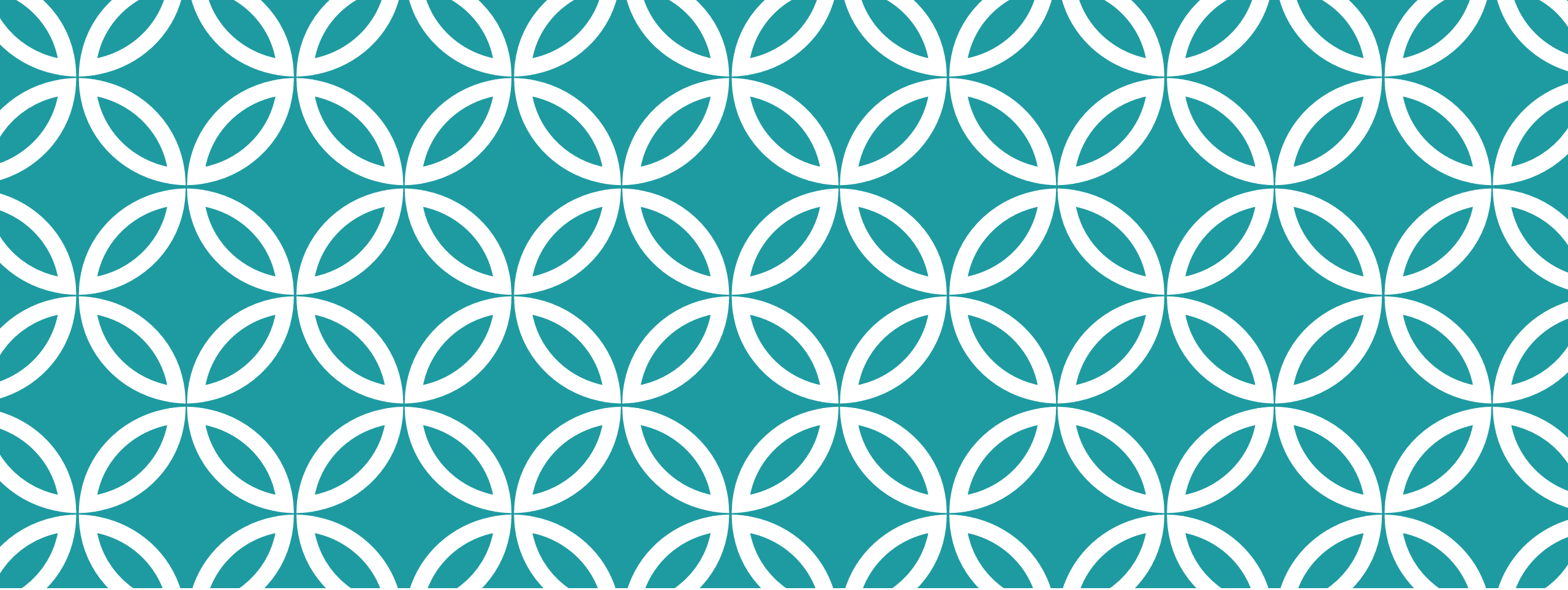
PROPOSED WATER QUALITY MONITORING

Parameter	Where	Frequency
Water level	Secure location (if continuous) Outlet structure (if manual)	Continuously if possible Manual: Once per month (2X in Sept, Oct)
Temperature by location	Across lake Depth (every ft) in middle of the lake	Two times – in spring and late summer
Temperature variation	Inlet and Dock* Adjust based on results of temperature by location	Monthly + (2X in Sept, Oct)
Clarity/turbidity By location	Take measurements at different locations in lake	Two times – in spring and late summer
Clarity/turbidity	Inlet and Dock* Adjust based on results of clarity by location	Monthly
Bacteria	Dock* May vary depending on consult with TEP	As available (Consult TEP)
Conductivity	Inlet and Dock*	Monthly

* Dock samples 6" below surface

PROPOSED WATER QUALITY MONITORING (CONTINUED)

Parameter	Where	Frequency
Lake reed growth Drone Pictures	Inlet area Western side (At dog-leg) North end	2-3 times per year (February, September)
Nutrients (Ammonia and Nitrate N and total P)	Inlet and Dock*	2 times per year (February, September)



BACK UP

DEFINITION OF ADAPTIVE MANAGEMENT APPROACH

An "adaptive management approach" is a systematic and iterative decision-making process that emphasizes continuous learning and adjusting management strategies based on new information gained from monitoring and evaluating the impacts of previous actions, particularly in complex systems where uncertainty is high;

Essentially, it involves actively learning while managing, allowing for flexible adjustments as more information becomes available.