# **Nature-Based Design Practices Case Study**



# Sebago Lake State Park, Maine

#### **For More Information Contact**

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#### Description

The Sebago Lake State Park has experienced some of the most severe erosion on the lake. Intense wind, waves, and high-water levels have toppled trees and pulled shoreline and beach sand away. As stewards of Sebago Lake, the Sebago Lake State Park (SLSP) and Portland Water District (PWD) partnered on a project at SLSP's popular Songo Beach swimming area. The project aims to address erosion while serving as a demonstration site for living shoreline stabilization on a Maine lake using <u>Clean Water Act 319</u> <u>grant</u> funding.

The stabilization project addressed approximately 300 feet of chronically eroding shoreline near the park's swimming beach area. All the woody structures were build using approximately 75 oak trees harvested from nearby SLSP forests with the root wads attached. Root wads are utilized in two areas, in the highest-energy wave break zone (Vertical Aggradation Rootwad Structures) and in the worst bank loss areas (Engineered Log Jams) to dissipate the energy carried in breaking waves. Tree stems with attached root wads were 10 and 32 feet in length, and 12-16 inches in diameter. Slash and piles are utilized together in lower and mid-energy level wave break zones to trap sediment and promote growth of vegetation (Post Assisted Wicker Weaves). These are branches 8 and 10 feet in length and 2-4 inches in diameter. Brush, piles, and slash are used together in lower energy wave break areas to capture sediment (Brush Aggradation Bundle Struc-

tures). These are branches 8 and 10 feet in length and 2-4 inches in diameter, and small brush bundled among the branches.



**July 2, 2024:** Vertical Aggradation Rootwad Structures absorb energy from some of the largest breaking waves. Brush aggradation bundles were reinforced with help from volunteers along with 520 live stakes being planted. *Carina Brown, PWD.* 



**July 2, 2024:** Brush Aggradation Bundle Structures of branches and brush woven around the upright logs absorb energy from less intense waves and trap sand and sediment carried in waves. Live stakes sprouting new growth. *Carina Brown, PWD.* 



MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION www.maine.gov/dep

# Permitting

State permitting required a Permit-by-Rule Section 12 Restoration of natural areas and Permit-by-Rule Section 13 Habitat creation of enhancement and water quality improvement activities pursuant to Chapter 305 of the Natural Resources Protection Act from the Maine Department of Environmental Protection. Prior to submitting permits, several meetings were held with DEP staff. A final permit review meeting included IF&W and DEP. No federal permits were required.

This project will help protect Sebago Lake's pristine water quality by reducing sediment loading by an estimated 40 tons and phosphorus loading by an estimated 34 tons per year.

## Lessons Learned

Having contractors familiar with these types of practices can ensure project feasibility given site conditions and keep project to budget. DEP and Cumberland County Soil and Water Conservation District developed a list of contractors with living shoreline installation experience.

All practices except for plants were installed by the end of December 2022. Heavy and frequent precipitation events of spring and summer of 2023 and resulting persistent high water levels in the lake resulted in the fabric encapsulated soil lifts failing.

Over 30 volunteers from IDEXX, Lakes Environmental Association, Sebago Clean Waters and members of the public joined source protection staff and BPL staff for a stewardship day in October 2023. Volunteers planted live stakes of willow, elderberry, and buttonbush, and added brush to upright lumber posts to finalize BABS designed by Tighe & Bond.

Messaging at highly visible sites educate the public about what they are looking at and goals of the project which can reduce abuse of site by public and help project succeed.

#### July 25, 2023

Photo 3: Installing root wads (Vertical Aggradation Rootwad Structures). Carina Brown, PWD.

### Resources

See the site at 3 Chronolog Stations! Visitors are uploading pictures over time using their phones.

- Site 1: https://www.chronolog.io/site/MSP101
- Site 2: https://www.chronolog.io/site/MSP102
- Site 3: https://www.chronolog.io/site/MSP103

#### For more information:

Sebago Lake Shoreline https://www.maine.gov/dacf/parks/ sebagolake-shoreline.shtml Sebago in Depth https://www.pwd.org/sites/default/files/ pwd 2301 sebago in depth summer 0616 web out.pdf

lifts provide a stable upper shoreline into which the plantings can be-

come established to create even na Brown, PWD.



#### January 16, 2024

Photo 5: Lake level is especially high from winter storms. The data used to site these structures put water levels lower than the structures and out of harms way in terms of winter ice sheets. Carina Brown, PWD.





**Design combines Vertical Aggradation Rootwad** Structures, Engineered Log Jams, Post Assisted Wicker Weaves, Brush Aggradation Bundle Structures, Fabric Encapsulated Soil Lifts, and vegetation.

#### July 25, 2023

Photo 4: Biodegradable fabric-wrapped soil more stability. Cari-