

Lakeshore erosion in Sweetwater Lake and Cordry Lake, Brown County, Indiana:  
An assessment of the effects of boat wave action on shoreline stability



Prepared for

Michael Leavitt, Board Chair  
Cordry-Sweetwater Conservancy District  
8377 Cordry Drive  
Nineveh, IN 46164  
Phone: 317-933-2893

Prepared by

Jerry Sweeten, Ph.D.  
Ecosystems Connections Institute, LLC  
9130 North 600 East  
Denver, IN 46926  
Phone: 260-901-0561  
Email: [jesweeten@ecosystemsconnections.com](mailto:jesweeten@ecosystemsconnections.com)

## UNDERSTANDING THE ASSIGNMENT

Ecosystems Connections Institute was requested to provide a proposal to the Cordry-Sweetwater Conservancy District that would address concerns over shoreline stability relative to the effects of boat wave action. Cordry Lake, 160-Acres, and Sweetwater Lake, 275-Acres, were created by earthen dams. Each lake is in the Norman Upland Physiographic region that is characterized by rugged topography and high relief just south of the southern extent of the Wisconsin Glacier. The lakes are built covering the underlying siltstone of Mississippian age and have a well-protected and forested watershed. The lakes are relatively deep with excellent water quality. Both lakes are privately owned with an estimated 1,700 lots across both lakes. Recreation on the lakes is a major part of the communities and over the recent past there is concern over the increase in motorized watercraft with a particular concern over the large waves from wake boats. To assess the effect of increase in the number of and size of waves from the boat traffic, the Cordry-Sweetwater Conservancy District has asked ECI to prepare an adaptable study design to better understand the effect of wave action on the surrounding shorelines and on docks. The Board provided ECI with the following questions.

1. Is there erosion occurring on either lake?
  - a. What is the largest contributing factor to erosion?
  - b. Is there a particular sport or boat that contributes the most to erosion?
  - c. What actions should be taken to reduce erosion?
  - d. What could potentially happen if nothing is done?
2. What effect if any, does wake surfing pose to current dock structures, shorelines, and lake bottom?
3. With concern for both lakes in the district should wake surfing be allowed?
  - a. If yes, how far from shore should wake surfing activity be allowed?
4. Is there a difference between a wave from wake surfing and plowing vs tubing and ski activities?

\*Note: All testing should be done assuming that wake surfing is conducted under current regulations set forth by the district.



Task 1. Complete a review of the scientific literature and “white papers” that have focused on the effect of boat waves, bank erosion on lakes, and can provide regulatory guidance.  
Cost: \$6,500

Task 2. Create a general assessment of the entire shoreline of Cordry Lake and Sweetwater Lake using Matrice 350 RTK w/LiDAR and Photogrammetry to identify priority sites and to serve as a baseline dataset for future assessments. It is proposed to complete this survey twice over the study period of three years. Cost for each lake: \$9,500 (Total=\$19,000/flight)

Task 3. Use identified high priority sites (about 100-m in shore length/site) to complete:

- A. Detailed LiDAR survey and bathymetric map of the nearshore area.
- B. Install shoreline transects using a series of fence posts that will be placed perpendicular to the shoreline. The latitude and longitude position of each post will be determined and distances between each will be measured relative to the shoreline. This approach along with “item A” will allow quantification of the extent of bank erosion and/or accumulation of sediment. Measurements will be taken annually over a three-year period.
- C. Document damage to piers through use of the images from Task 2.
- D. Cost: for each lake: \$6,500/site/year (includes all data processing).

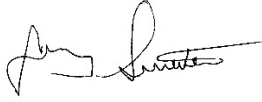
Task 4. Install a remote wave sensor unit that will measure wave height, wave period, wave direction, and wave period energy. Data from each sensor will be available on a live feed website created by and maintained by ECI. Cost per sensor: \$19,500/year

Task 5. Write an understandable and pragmatic final technical report about the study findings along with recommendations. This task also includes annual progress reports, on-site meetings and/or computer meetings. Cost: \$9,500

Project Tasks	Cost	Cost over 3-years
Task 1	\$6,500	\$6,500
Task 2	\$19,000 (\$9,500/ lake)	\$38,000 (two flights)
Task 3	\$6,500/site	\$19,500/site
Task 4	\$19,500/sensor	\$58,500/sensor
Task 5	\$9,500	\$9,500



Respectfully submitted by



Jerry Sweeten and the ECI team of Herb Manifold, Kyle Boone, James Heimlich, and Melinda Sweeten (President)



Jerry Sweeten, Ph.D.  
Professor Emeritus of Biology and  
Environmental Studies  
Manchester University  
Ecosystems Connections Institute  
9130 North 600 East  
Denver, Indiana 46926  
Phone: 260-901-0561

