

Ashtabula County Introduction



About the Program

In an on-going effort to assist property owners along Ohio's Lake Erie coast by providing free technical assistance, the *Lake Erie Shore Erosion Management Plan (LESEMP)* is being developed by the Ohio Department of Natural Resources through a partnership between the Office of Coastal Management, Division of Wildlife and Division of Geological Survey.

The *LESEMP* identifies the causes of erosion in specific areas called reaches which are stretches of shore with similar site conditions. The *LESEMP* then outlines the most likely means of successful erosion control based on reach-specific erosion issues, geology and habitat. The objective of the reach-based approach to erosion control is to simplify the decision process while enhancing the effectiveness of solutions to erosion related issues.

The *LESEMP* does not contain any regulatory oversight provisions.

Introduction

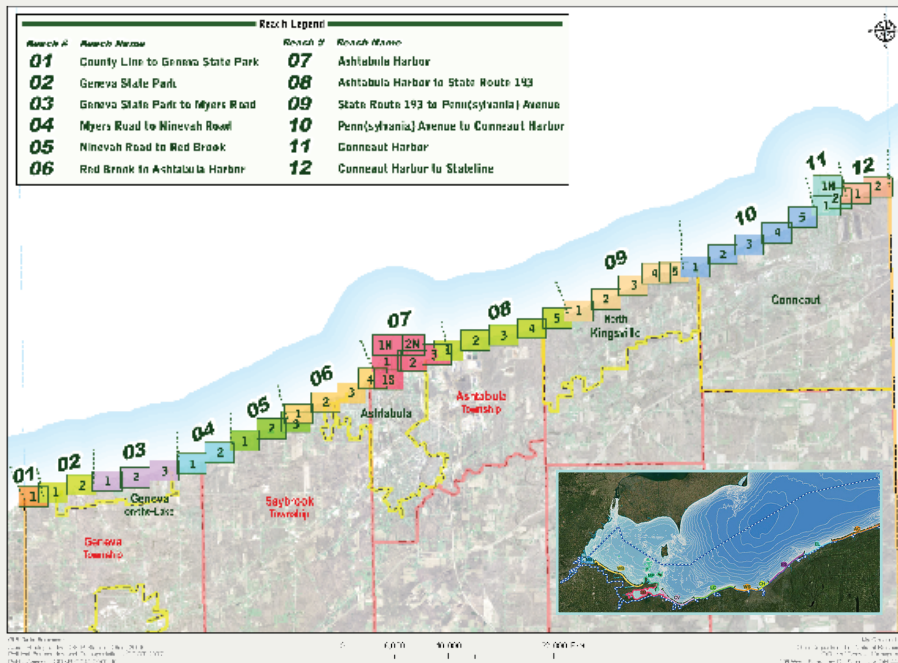
Ashtabula is the easternmost county along Ohio's lakeshore, bordered on the west by Lake County and on the east by the Commonwealth of Pennsylvania. The county is located in the eastern third of Lake Erie's Central Basin. Ashtabula is the largest county in Ohio. It comprises 27 miles of Ohio's Lake Erie shore, or 8.65 percent of the state's 312-mile coast.

Ashtabula County's shore is oriented in a southwest to northeast direction. Predominant winds blow from the southwest. The county is located entirely within the Lake Erie snowbelt and strong winter storms that produce high snow fall amounts are common. These storms and can lead to conditions that increase the potential for erosion.

The most significant geologic features of Ashtabula County's shore are high bluffs ranging from 15 feet to over 60 feet in height. These continuous bluffs are interrupted by river mouths. The county's two harbors, Ashtabula and Conneaut, and several marinas contain significant amounts of coastal infrastructure and alterations to the natural shore.

Historically, beaches have not been a prominent feature within this region as is exemplified by the relatively small to nonexistent beaches present today. The areas to the west of the western harbor jetties in the cities of Ashtabula and Conneaut do contain large beaches; however these were formed by the trapping of sediment moving to the east. The harbor structures at these two locations prevent the alongshore flow of sand, resulting in the formation of large beaches at Walnut Beach in the city of Ashtabula and Conneaut Township Park beach in the community so named.

Consideration of nearshore fish and wildlife habitat is a critical component of the *LESEMP*. To date, human activity within Lake Erie's Central Basin has had minimal known impact on nearshore spawning and nursery habitat. Species native to this portion of the lake (for example, smallmouth bass) readily utilize the sand and boulder substrates in the nearshore. Since little research into the impacts of erosion control measures on these habitats has been completed, habitat specific recommendations will not be as prevalent within this region compared to areas in western Ohio, where more nearshore habitat information has been collected.





Looking north at Conneaut Harbor West Pierhead Light from the Conneaut Port Authority Access. This site includes a beach comprised of sand that has accumulated on the east side of Conneaut Harbor's western breakwater.

Surficial Geology

The characteristics of the shore and nearshore zones in Ashtabula County are consistent across the county. The shore is relatively straight on a regional scale, nearshore (underwater) slopes are low (typically 2.3° or less at 50 feet from shore), and there are no major variations in geology that sharply alter erosion processes. The nearshore zone includes coarse material (mostly sand, but also gravel and cobbles) occurring in a band from about 100 to 700 feet wide and generally 1 to 3 feet deep. Lying beneath and exposed lakeward of this band of coarse material is shale bedrock. The littoral current responsible for transporting material along the shore in Ashtabula County is predominantly from west to east.



Bluff Composition

The geology of the Ashtabula shore can be broken down into three broad categories: 1) bluffs (sand or till); 2) bluffs (sand or till) over shale bedrock; and 3) artificial harbors with associated sandy beaches. The first shore feature listed - bluffs (sand or till) - can be found from around the Ashtabula-Lake county line to the western half of Saybrook Township. The remainder of the county is comprised of the second category, bluffs over shale bedrock, with artificial structures and associated beaches found at the two major harbors and Geneva State Park.

For the most part, the bluffs throughout Ashtabula County are comprised of Ashtabula Till. This type of till is silty, clayey, and contains siltstone and shale fragments. It is a gray color when unaltered, but turns brown when oxidized (weathered). Considered one of the youngest of the tills present within the region, Ashtabula Till was deposited during the last glacial retreat and was most likely placed in a geologically short period of time – approximately 1,000 years.



GENEVA

The shore zone within the county can be further distinguished according to various reaches with similar geology and erosion processes. Beginning at Geneva State Park, an area with relatively low relief with 15- to 30- foot high bluffs, layering within the bluff can be described as follows, starting with the top layer:

1. soil: sediment and organic material that promotes plant growth, easily eroded;
2. sand and pebbles: loose aggregate of various sized materials, easily eroded, highly porous;
3. Ashtabula Till: clayey with silt ribbons, more resistant to erosion, not porous; and
4. Keefus Till: dark reddish-brown, hard, very compact, calcareous (28 percent sand, 30 percent clay), more resistant to erosion, not porous.

Low recession rates have been recorded at the state park and throughout areas to the east. This is due to the presence of narrow but abundant beaches and the lack of large shore-perpendicular structures that trap sediment traveling within the longshore current.

SAYBROOK

Saybrook Township contains more Ashtabula Till, but less layering than is present in areas near Geneva State Park. West of Red Brook in Saybrook-on-the-Lake, the bluffs consist of approximately 30 feet of Ashtabula Till overlain with 8 feet of silt. Small aggregates, or “pods”, of crushed shale and extremely thin bands of silt are present within the till. The bluffs in this area also increase in height, ranging from 30 feet high in the west to 50 feet high in the east.



The western portion of this reach, between Myers Road and Ninevah Road, is marked by small headlands separated by long stretches of shore (greater than 1,000 feet) that lack well-developed beaches and therefore have been areas of significant recession. Considerable undermining of State Route 531 within Saybrook Township was noted as a serious erosion issue in the 1970s. Even after temporary and emergency erosion control actions were taken along this stretch of roadway, erosion still continues to be a threat to the road today.

WEST OF THE CITY OF ASHTABULA



East of Red Brook and continuing to the Ashtabula River, there is an increase in the inclusions of coarser till and pods of ground-up bedrock (shale). This zone of interbedded silts, clays and shale is present throughout the 50- to 60-foot bluffs that comprise this reach.

From Red Brook to Walnut Boulevard beaches are narrow. The two largest shore-perpendicular structures (the jetties at the Red Brook Boat Club and a 160-foot-long groin a quarter mile west of Walnut Boulevard) have interrupted the longshore transport of sand, increasing erosion rates downdrift. At Walnut Beach, however, more sand is present. This beach has formed adjacent to the approximately 3,800-foot-long breakwater that defines the western margin of Ashtabula Harbor. A long, shore-perpendicular structure has existed at



this location since at least 1876. Due to the length of the structure and the length of time it has existed at this location, a large beach has formed on the updrift side of the structure. Where the beach is widest, 1,000 feet or more separate the toe of the bluff from the lake.

EAST OF THE CITY OF ASHTABULA

To the east of the city of Ashtabula is the eastern floodplain of the Ashtabula River which transitions to 60-foot high till bluffs capped by 5 to 20 feet of glaciolacustrine clay and/or sand. Immediately east of the city of Ashtabula, intrusions of silt filaments and bedrock pods appear to be confined to the bottom half of the till. This layering of till and silt or bedrock can be seen throughout the reach but is most visible along the bluff in the village of North Kingsville. In this area, till layers ranging from 3 to 8 feet in thickness may be visible at lake level due wave erosion at the toe of the bluff. In other areas between the City of Ashtabula and village of North Kingsville, one to two feet of shale is visible at lake level. This is especially true for the stretch from Russell Drive to Labounty Road in Ashtabula Township.

The shore zone from the Ashtabula River to the First Energy facility is heavily modified with port infrastructure, offshore breakwaters, and jetties. The shore-perpendicular structures, some more than 2,000 feet long, disrupt the longshore transport of sand for the rest of this reach and beyond. A public beach exists at Lakeshore Park where it is protected by small, segmented breakwaters. The remainder of this reach contains few beaches, most of which are too small to provide adequate erosion protection. East of the power plant facility, the reach is sparsely developed with few shore protection structures. Consequently, there is a continuous stretch, about 3 miles long, of rapid recession and State Route 531 is threatened in several places.



NORTH KINGSVILLE

In the area of North Kingsville, the 60- to 65-foot high bluffs are mainly Ashtabula Till with silt filaments and pods of crushed shale throughout. Around Camp Luther, the composition changes with an increase in lacustrine sand. The layering in this area is:

1. sand: yellow;
2. sand: yellow, lacustrine, and layered;
3. sand: gray, water-bearing; and
4. till: gray silty, calcareous (calcium carbonate or chalk-like), prominent areas of erosion at the base of the bluff.



Of significance for erosion is the boundary formed between the till layer and the sand layer. The third layer of sand is water-bearing, which means that water is able to filter through the first two layers of sand into the third layer before being slowed at the till layer. This is often referred to as a perched or elevated water table. Water moves through the bluff towards the lake at the intersection of the sand and till layers. Erosion along the face of the bluff occurs due to the escape of perched ground water.

Beaches along this stretch are generally very narrow, reflecting the effect of the long shore-perpendicular structures at Ashtabula Harbor. A number of ruined or submerged groins along this reach do little to trap sand in the present day but in the past may have caused downdrift sand starvation. This assessment is based on several small headlands and crescent-shaped embayments in this area.

CONNEAUT

The bluffs along the Conneaut reach are about 65 feet high at the west end of the reach and give way to the floodplain of Conneaut Creek at Conneaut Harbor before rising again to 40 feet east of Conneaut. The bluffs along this reach are mainly Ashtabula Till overlain by glaciolacustrine deposits. Denser residential development on the west side of the city has produced an area



with many individual small groins. As a result, thin beaches are present throughout, creating some level of protection from wave energy.

Similar to the city of Ashtabula, there is a significant accumulation of sand adjacent to the west breakwater at Conneaut Harbor, resulting in a substantial public beach. East of the harbor, the shore is sand-starved with narrow or non-existent beaches.

Geology - Summary

From a regional perspective, Ashtabula Till dominates the bluffs of Ashtabula County. A 50-foot drift of Ashtabula Till runs from Saybrook-on-the-Lake to Conneaut, a majority of the county. Some locations may have sand and gravel overlying the till, as was described above. The base of the till drift is approximately at lake level, with bedrock or Keefus Till underneath the Ashtabula Till. Keefus Till is much older in age than the Ashtabula Till and therefore is not as evident along the Lake Erie bluffs. Bedrock within this area consists of shale, shaly limestone, and shaly sandstone.

Although till portions of bluffs are mainly comprised of fine-grained sediments which are not beneficial for beach-building, a minor amount of sand is also present in the till. When combined with the sand in the upper portions of the bluff, the sand entering the system as the bluffs erode could provide an adequate supply for beach formation. While there may be adequate sediment contained within the bluffs to allow beach formation, erosion control measures constructed along the bluff limit the amount of sand normally contributed to the shore through bluff erosion. Additionally, shore-perpendicular structures act to limit the movement of available sediment along the shore and into the nearshore. This is most evident near large harbor breakwaters where sandy beaches are present on the updrift side and absent on the downdrift side of the breakwaters.

Similar to the shore zone, there is minimal sediment within the nearshore environment of the county. In western areas of the county, the nearshore is mainly comprised of till with the eastern half exhibiting a shale bedrock lakebed. Throughout the county, the lakebed slope is relatively gentle with few offshore sand bars. The only areas with known sand resources available are within and west of the harbor structures.

Habitat - Nearshore

The nearshore habitat of Ashtabula County is fairly consistent in that the lake bottom is predominately exposed shale, covered by significant sand deposits closer to shore. These two substrates provide feeding, spawning, and nursery habitats for fish and wildlife (e.g., smallmouth bass, shorebirds). The nearshore is also seasonally important as a staging area for steelhead as they migrate toward the tributary rivers and creeks during fall and winter for spawning.



Habitat - Beaches

The erosive nature and size of the bluffs themselves have helped create stretches of natural beach, which are an important and yet fragile habitat supporting both flora and fauna. The relatively low level of development and the difficulty of access to the beaches due to bluff heights and steep slopes, lead to fairly well protected habitat.

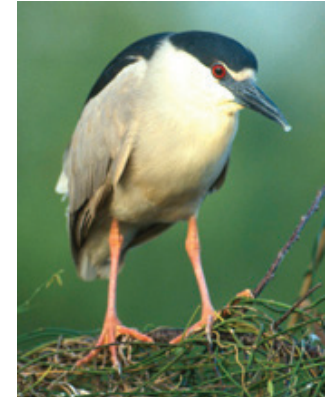
The Ashtabula County Comprehensive Plan 2003 noted the following as one of the priority areas identified by representatives of the Cleveland Museum of Natural History, the Grand River Partners, Inc., and The Nature Conservancy:

Ashtabula Beach Grass Dunes - The sand dunes on Walnut Beach and private lands west of Walnut Beach in the city of Ashtabula support the best beach grass dunes on Ohio's Lake Erie coast. The best Ohio populations of two rare plants, beach grass and beach pea, grow on the dunes.



Habitat - Bluffs

Above the beach, much of the bluff area along the county supports varied vegetation from grasses and sedges to herbaceous shrubs and trees and the associated fauna. This strip above the beach is also important for both resident and migratory bird populations. Thickly wooded bluff areas typically provide habitat or seasonal shelter for water-feeding birds including those less common such as the black crowned night heron (pictured).



Erosion Issues

Coastal erosion in Ashtabula County is a natural and inevitable process resulting from the proximity of clay bluffs to lake waves driven by the prevailing winds. Human-induced changes to the lakeshore accelerate the process of erosion and interfere with the natural mechanisms by which sand is introduced to and transported within the littoral zone. Shore-parallel structures that stabilize bluffs prevent sand from entering the littoral system and shore-perpendicular structures disrupt the longshore transport of sand.

Several factors can play a role in erosion rates. One of the most significant is bluff composition. Due to the high percentage of clay found within glacial till, the bluffs along Ashtabula's shore are prone to erosion from excess groundwater build-up and surface water run-off. Additionally, each type of till may exhibit more or less resistance to wave action. For instance, the Keefus Till found along portions of Geneva State Park is a much harder till than the Ashtabula variety and therefore will be more resistant to waves. Also, areas where the till is capped with sediments such as silt and sand may exhibit greater erosion rates due to the layers of less resistant materials. This is exemplified by areas within Saybrook Township and at Camp Luther in North Kingsville.



Work by Bruno (1988) found that the clayey bluffs include layers of sand resting directly on top of less permeable, clayey materials. Ground water can saturate these sands rather than filtering down through them and travel lakeward until it seeps out the face of a bluff, softening the clayey materials and accelerating their erosion (drainpipes in the face of a bluff have a similar effect). Bluffs saturated with ground water (from heavy rains or leaking underground pipes) may also fail in the form of rotational slumps or debris flows (slides of loose, saturated materials). However, bluff failures ultimately release sand and other sediments into the nearshore zone. While the finer materials are quickly washed out to the deeper lake, sand and coarser materials remain near the shore where they can form beaches that protect the bluff toe from wave energy.

The major causes of lake-based erosion in Ashtabula County can be classified as those that are related to wave action and those associated with water in and on the bluff. From these two categories, the causes of erosion can be broken down into site specific issues. For Ashtabula County, addressing the following causes of erosion is paramount:

1. Surface water runoff causing surface erosion and rill and gully formation
2. Perched groundwater causing slumping and block failure (e.g. Camp Luther)
3. Wave attack at the toe of the bluff causing lakebed downcutting and bluff instability through removal of lower materials, also referred to as undercutting.

Top Priorities of Local Public Officials

According to public officials in Ashtabula County, the following are their top priorities in regard to erosion issues and control measures:

1. Protection of State Route 531/ Lake Road;
2. Dredging and sediment resource issues county-wide; and
3. Educating property owners and those working along the lake (e.g. zoning inspectors) on the best means of controlling erosion.



Needs Assessment - Ashtabula County Respondents

The *Local Community Needs Assessment* survey conducted as part of the LESEMP had 243 property owners responding, 34 of which were from Ashtabula County (14 %). Of the 140 professionals responding to the survey, 22 were from Ashtabula County (15.7 %).

The most notable responses from the Ashtabula County property owners and public officials include:

1. Both property owners and the public officials ranked “drainage” as a more effective erosion control option than others such as placing pre-cast concrete modules.
2. The results to the question of “likelihood of use” shows a gap between the Ashtabula County property owners’ top four choices and their bottom three. The top four responses, in order are: (1) planting vegetation to hold soil on the bluff, (2) controlling storm water runoff, (3) installing drainage on the bluff, and (4) constructing engineered structures. Well below those options are: (5) placing pre-cast concrete modular structures, (6) dumping concrete rubble/construction debris, and (7) placing sand on the shore. These results could indicate recognition that the bottom three options are not as useful for the conditions within the county, or in the case of dumping concrete rubble/construction debris, is not appropriate.
3. In terms of increasing the adoption of proper erosion control measures, officials listed education as their third highest choice.
4. The officials ranked educational workshops/trainings as their second highest preferred format for receiving information. Overall, the professionals listed education as fourth (out of six options). Combining these results with those for the “increase adoption” question, it becomes evident that the officials within Ashtabula County strongly favor educational assistance related to erosion control. When viewed in light of the results of the meeting with officials from the county, these results are further solidified.
5. ODNR was listed as the first source of information for the Ashtabula officials and fourth for the property owners.

Recommendations

To better provide recommendations for the various coastal conditions within Ashtabula County, the county has been segmented into 12 reaches. Each reach contains introductory material on the coastal setting of the reach, followed by a set of recommendations specific to the reach. For more information on the recommendations, please refer to the Appendix.

The reaches for Ashtabula County are as follows:

Reach AC 01: County line to Geneva State Park

Reach AC 02: Geneva State Park

Reach AC 03: Geneva State Park to Myers Road

Reach AC 04: Myers Road to Ninevah Road

Reach AC 05: Ninevah Road to Red Brook

Reach AC 06: Red Brook to Ashtabula Harbor

Reach AC 07: Ashtabula Harbor

Reach AC 08: Ashtabula Harbor to State Route 193/ North Main Street

Reach AC 09: SR 193/North Main Street to Pennsylvania Avenue

Reach AC 10: Pennsylvania Avenue to Conneaut Harbor

Reach AC 11: Conneaut Harbor

Reach AC 12: Conneaut Harbor to Stateline

The sections for each reach are designed so that they can be read individually or as part of this chapter. The reaches do not have to be read in any order as they do not reference information from other reaches.



References:

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- The LESEMP is being developed by the project partners, Ohio Department of Natural Resources Office of Coastal Management, Division of Geological Survey and Division of Wildlife. Federal grant funding for this project is provided by the National Oceanic and Atmospheric Administration.

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