

Ashtabula County: Reach AC 09



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.

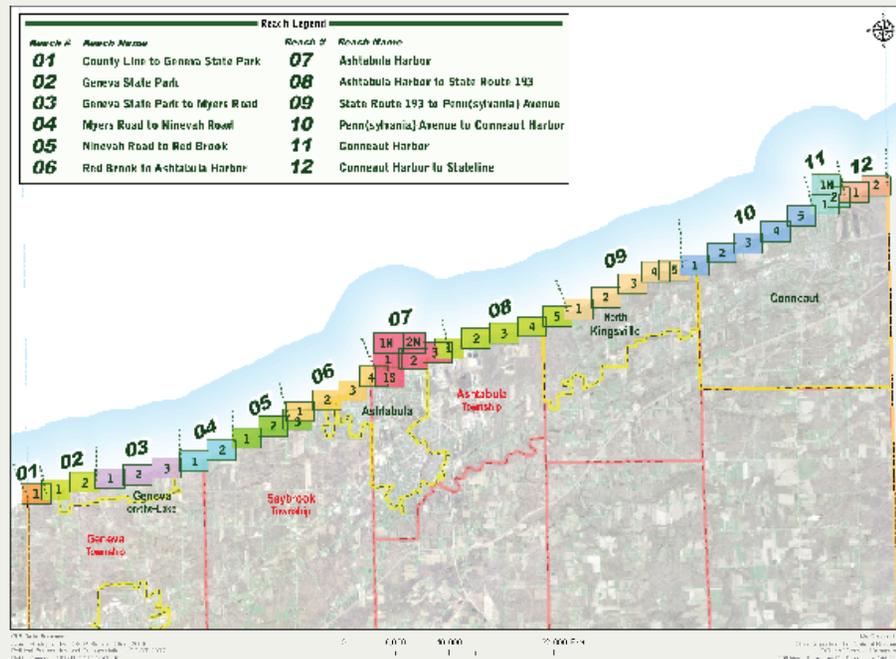
Description

The reach from State Route 193/North Main Street to Pennsylvania (Penn) Avenue encompasses Al Cummings Sunset Park at the western border and residential areas throughout. Some of the residences are within 50 feet of the top of the bluff, whereas others are well over 100 feet away. Historically, there were more residences; however erosion of the bluff has led to the loss of these buildings. The 60 to 65-foot bluffs are comprised of till overlain by glaciolacustrine clay and sand. The shale bedrock nearshore is covered with a thin band of sand and gravel immediately offshore. Beaches are almost completely absent from this reach with any sand present in the nearshore drifting from west to east. Several headlands are present and appear to be the result of groins. One prominent example is a series of headlands and embayments at the western end of the reach, beginning roughly 3,000 feet east of State Route 193 (approximately 225 feet west of Regal Drive). The headlands appear to be formed by the placement of shore structures, with the embayments forming to the east of the structures. The largest of the three headlands and associated embayments is the one farthest east. Another headland and embayment formation appears northeast of Poore Road. Overall the formation of embayments within this reach shows signs of continuous erosion.

The higher bluff heights, the characteristics of the bluff materials, and overall lack of sediment within this reach make this an area that is especially prone to erosion. Waves approaching the toe of the bluffs cause erosion and undercutting. Erosion at the top of the bluff is typically caused by excess surface and ground water on and within the bluff. The water reduces the stability of the overlying soils and causes the upper portion of the bluff to slump. Even those properties with adequate toe protection, either as beaches or structures, may experience erosion in the upper bluff. Debris flows, where clay materials become too saturated to hold up the upper portions of the bluff leading to slumping, may also occur in this area.

Recession /Erosion

The ODNR Division of Geological Survey has evaluated the recession of Ohio's Lake Erie shore during three time periods: 1876 to 1973, 1973 to 1990





Slumping and debris flows are both caused by an excess of surface and ground water on or within the bluff. Along this reach, it is likely that all properties require some level of ground water management because of the bluff heights and composition (i.e. sand over till).

and 1990 to 2004. Changes between the rates measured in each of the time periods can be attributed to development along the coast and natural factors such as lake level changes. In the first time period, low coastal development persisted along Ohio's coast with some of the lowest development rates in Ashtabula County. In the 1970s, development increased causing an increase in the use of shore structures to protect properties. It was also during this time that the highest lake levels were recorded and severe storms battered the Ohio coast. This coupling of storms and negative impacts of shore structures led to a general increase in recession rates. In the most recent time period, high lake levels were recorded once again, but the use of better designed shore structures worked to limit the levels of erosion. For the purposes of determining recession rates within this reach, the data for each time period for the area from State Route 193/North Main Street to Pennsylvania (Penn) Avenue was analyzed. Between 1876 and 1973, recession rates within this area ranged from less than 1 foot per year up to 5 feet per year. The highest rates of erosion occurred mainly north of Harmon Road and west of Poore Road (Camp Luther) within the eastern and central

parts of the reach. Aside from these areas of higher recession, a majority of this reach exhibited rates less than 3 feet per year.

During the 1973 to 1990 time period, average recession rates ranged from 0 to 9.5 feet per year with a majority of the reach greater than 3 feet per year. While a few locations exhibited lower recession, the high rates during this time period were relatively uniform across the entire reach.

In the 1990 to 2004 time frame, the rates decreased slightly with a range of 0 to 8.2 feet per year. Of significance for the third time period is one large area where rates ranged from greater than 4 feet per year to 8.2 feet per year. This hot spot of erosion includes properties to the east of Berkshire Road to the east of Poore Road, roughly around Cleveland Drive. Another area with elevated recession rates includes the stretch of shore from just west of Kingsboro Drive east to a large groin just east of Lands End Lane. Within this area recession rates range from greater than 2 feet per year to more than 4 feet per year. Throughout the rest of the reach, recession rates range from less than 1 foot per year to greater than 2 feet per year, with several exceptions of low recession (0 feet per year).

Beaches/Sand Supply

Since sand supply is directly connected to beach presence, the size, number, location and widths of beaches are good indicators of sand supply. Overall, this reach is void of beaches, except for the areas around the groin-formed headlands at the western and central portions of the reach. Based on a review of historic aerial images, it appears beach size has not changed much within this reach during the period of record. The limited amount of sand that has been present appears to be highly susceptible to fluctuating lake levels, with diminished beaches during higher lake levels.

Summary

The reach from State Route 193/North Main Street to Pennsylvania (Penn) Avenue contains high till bluffs. The bluffs within this area show signs of slumping, sliding, and possible debris flows. Any of the buildings located near or at the bluff edge could be in danger of loss or collapse due to erosion. Groins are the dominant shore structure throughout the reach, with several failing structures or the remnants of structures found in the nearshore. In conjunction with slumping, the absence of beaches and shore structures has led to a reach prone to erosion at the toe of the bluff.

Reach AC 09 - State Route 193 to Penn(sylvania) Avenue

Map 1



GIS Data Sources:
 Aerial Photography - OSIP, State of Ohio, 2006
 Political Boundaries and Transportation - ODOT, 2007
 Public Access - ODNR OCM, 2009-10



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Reach AC 09 - State Route 193 to Penn(sylvania) Avenue

Map 2



Legend					
	Reach Boundary		U.S. Route		Township Road
	County Boundary		State Route		Municipal Street
	Municipal Boundary		County Road		Park Road
	Township Boundary		Public Access		



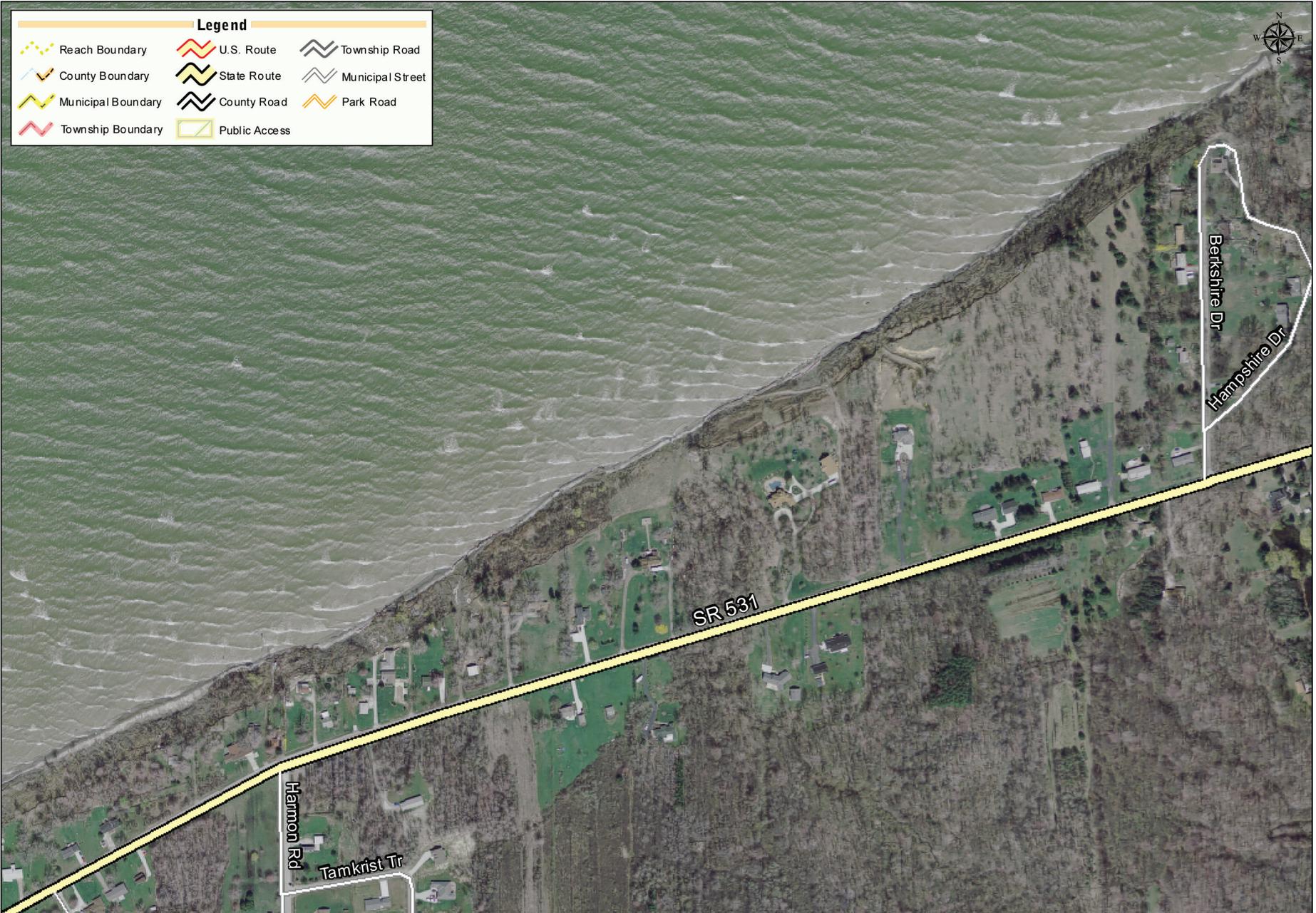
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Reach AC 09 - State Route 193 to Penn(sylvania) Avenue

Map 3



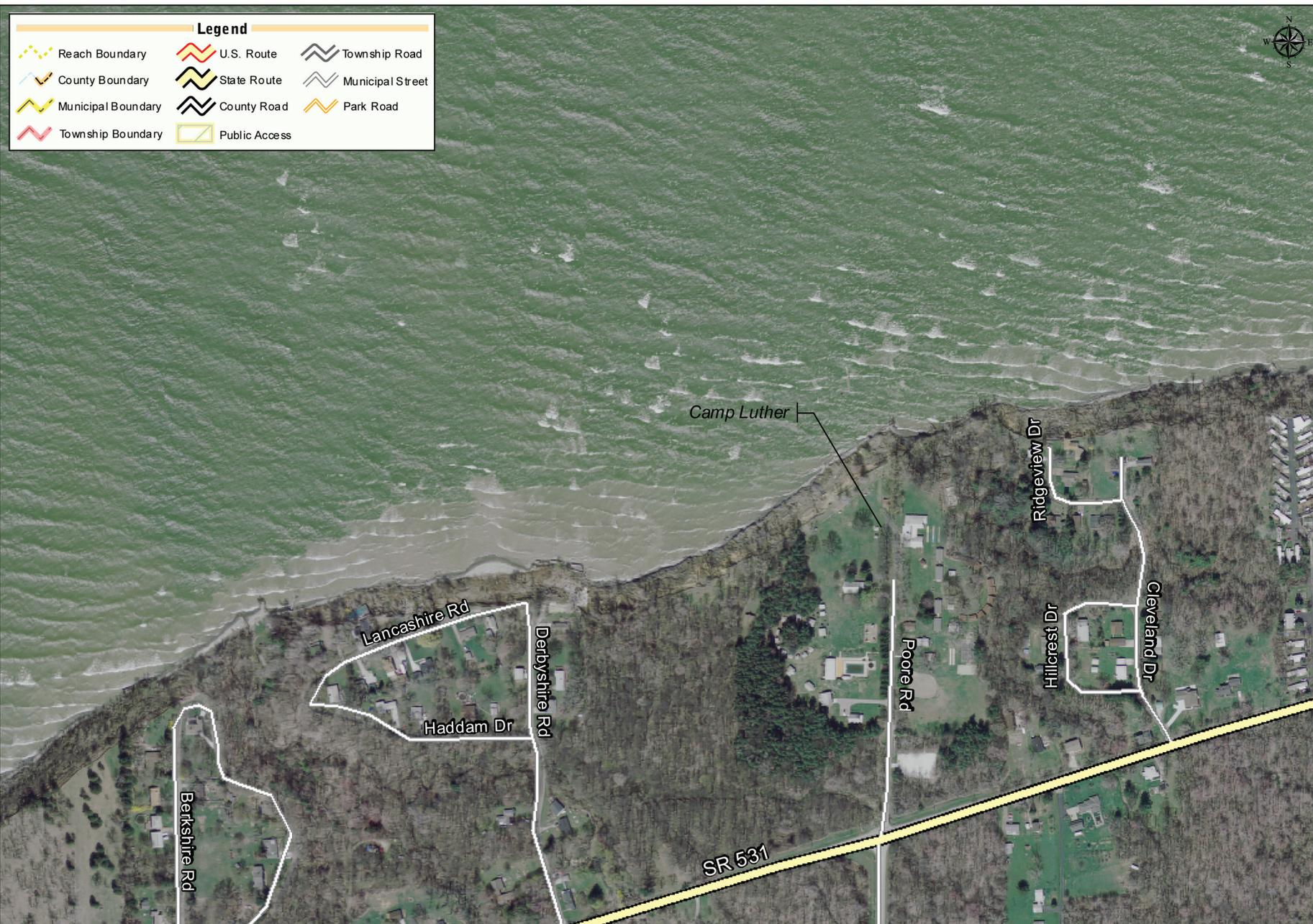
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Reach AC 09 - State Route 193 to Penn(sylvania) Avenue

Map 4



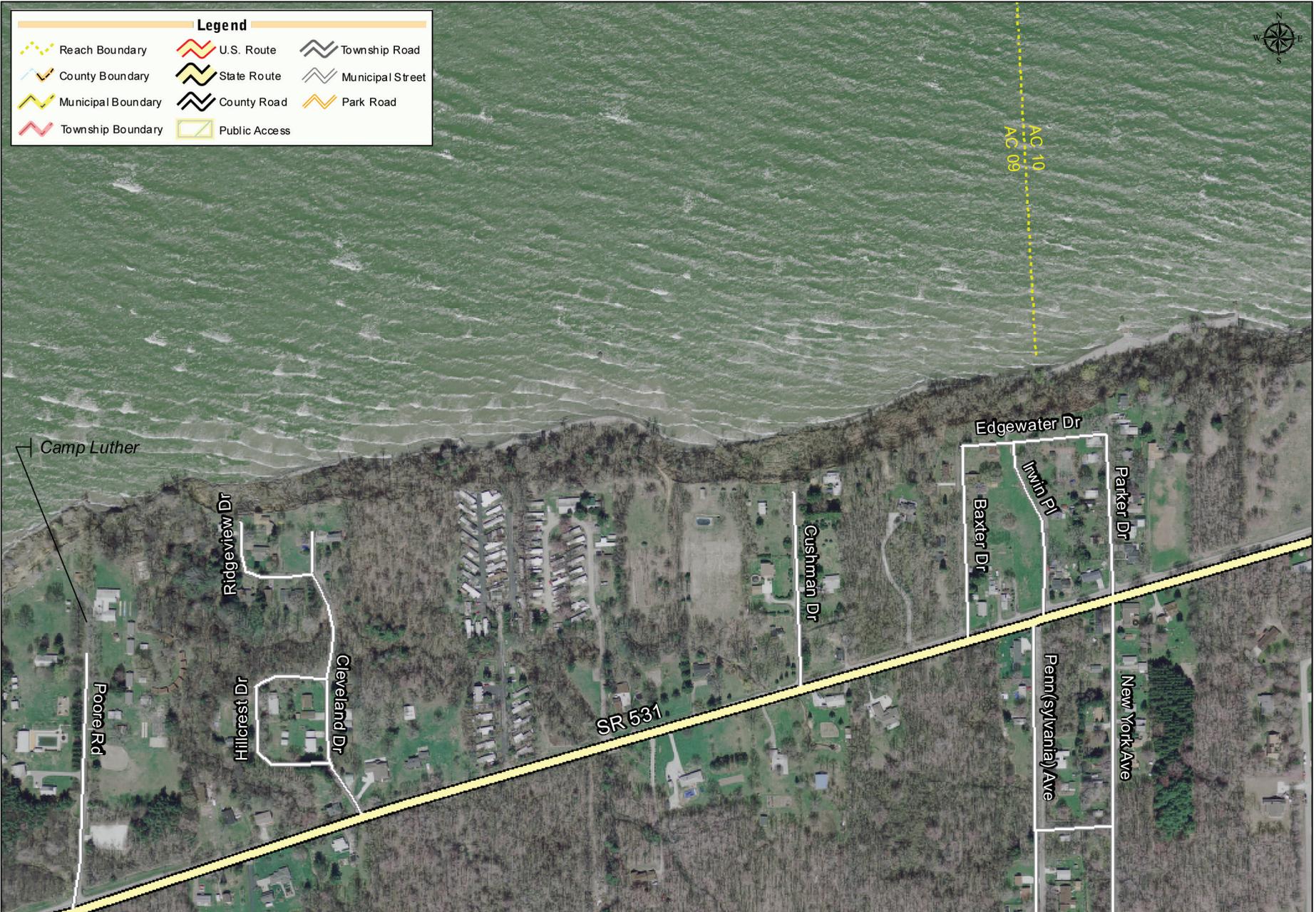
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0 250 500 1,000 Feet

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Reach AC 09 - State Route 193 to Penn(sylvania) Avenue

Map 5



Legend

Reach Boundary	U.S. Route	Township Road
County Boundary	State Route	Municipal Street
Municipal Boundary	County Road	Park Road
Township Boundary	Public Access	

GIS Data Sources:
 Aerial Photography - OSIP, State of Ohio, 2006
 Political Boundaries and Transportation - ODOT, 2007
 Public Access - ODNR OCM, 2009-10

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Recommendations

The recommendations included below are options that may be applicable to properties within this reach and should only be used for planning purposes. Based upon the above physical characteristics, the following recommendations are suggested for State Route 193/ North Main Street to Pennsylvania (Penn) Avenue. Each recommendation includes a brief overview of the solution prior to addressing areas within the reach where the recommendation is best suited. For more information on any of the items listed below, please refer to the Glossary and Appendix: Erosion Control Solutions.

Sand Management:

1. **Conserve Sand Resources:** *Conserve sand resources within the shore and nearshore areas. Sand is a limited resource in constant fluctuation. Avoid removing sand from the system; sand moved or excavated during construction along the shore should be placed in the nearshore, not on the upland and should not be incorporated into the construction project.*



While the reach is mainly undeveloped industrial property, slumping is a significant issue that currently threatens State Route 531 at the eastern end and could lead to additional areas of threatened roadway.

The reach from State Route 193/North Main Street to Pennsylvania (Penn) Avenue has a low amount of sand within the shore area, as exhibited by the small to non-existent beaches throughout. By conserving the already limited resource, some areas may be able to retain what little beach is present. Retaining sand within the shore area will be beneficial for protecting the toe of the bluff from wave action.

Toe Protection:

2. **Revetments:** *Revetments along the toe of a bluff will aid in protecting against wave-based erosion. In areas without beaches, a structural measure may be necessary to protect the toe of the bluff. The bluffs within this reach have relatively gradual slopes, which are ideal for revetment development. In essence, the revetments form a stable bluff slope, providing protection to the soil underneath while breaking up wave attacks. Since material eroded off the bluff is one source of beach-building sand, some regulatory agencies may require that one of the design components for a revetment be the inclusion of sand pre-filling in the amount equal to that which would have been added to the system over the life of the structure.*

Revetments could be used throughout this reach. When constructing a revetment, consideration should be given to the overall slope of bluff, with re-grading or terracing done along upper portions of the bluff as necessary. By conducting all work during the same time period, disturbances to the bluff are minimized.

Bluff Modifications:

3. **Re-Grading/ Terracing:** *Re-grade or terrace less stable bluffs to a more gradual slope. By creating a lower (flatter) slope angle or terracing the slope to a series of steps, instability caused by gravity's forces on the upper bluff is decreased. Re-grading is a non-structural approach to stabilize the bluff that leaves the shore relatively unaltered. When re-grading, also examine the toe of the bluff to determine if toe protection is needed and if a structural (revetment) or non-structural (beach nourishment) solution would be preferable.*

Except for those areas where a building is too close to the bluff edge, re-grading could be applied to any property within this reach. Along properties that are too close to the bluff edge for re-grading or terracing, the best solutions may either be water management, structural protection of the property, or a combination of these measures.

4. Surface Water Management: *Route surface water away from the face of the bluff. In areas where gullies or rills are forming, surface water is slowly eroding the face of the bluff. Re-routing water away from the bluff may involve changing gutter or driveway drainage. Terracing of the bluff can also be used as a means of intercepting and diverting seeping ground water. Sources of surface water include, but are not limited to roof gutter downspouts, runoff from driveways and sidewalks, precipitation, and sprinkler systems.*

The re-routing of surface water should occur throughout the State Route 193/North Main Street to Pennsylvania (Penn) Avenue reach. Attention to the signs of surface water will allow for early action on limiting erosion due to runoff.

5. Ground Water Management: *Remove ground water from within the bluff. Drainage should be installed in areas with excess water in the bluff which are visible as seeps or springs in the middle of the bluff. A subsurface drainage system should remove water from an upper layer within the bluff (often a sandy layer), and should exit at the lake level to limit lower bluff erosion. Sources of ground water include, but are not limited to leaking septic systems, underground pipes and swimming pools.*

Along the shore of this reach, it is likely that all properties require some level of ground water management because of the bluff heights and composition (i.e. sand over till). The installation of ground water drainage systems will aid in stabilizing the upper portions of the bluff, while limiting the potential for debris slides from overly saturated clay layers.

6. Vegetation: *Encourage growth of vegetation along the bluff slope. Where possible plant vegetation, preferably native species, along the bluff to remove excess ground water while retaining soil strength. It is also possible to simply allow the natural succession of native plant species to grow along the bluff.*

High levels of ground and surface water throughout the State Route 193/North Main Street to Pennsylvania (Penn) Avenue area make every property well suited for the placement of vegetation along the bluff. Due to the height and slopes of the bluffs, specific species and types of vegetation may be better suited for different areas of the bluff (i.e. trees along the lower bluff).

Management and Monitoring:

7. Bluff-Top Management: *Keep heavy materials, equipment or structures well back from the edge of the bluff-top. This also applies to placement of debris or yard waste near or over the edge of the bluff. Shrub and grass clippings can become saturated with water and greatly increase the weight on the bluff's slope, directly causing slumping. Any structure (concrete decks, stone walls) or heavy object (vehicles, boats) placed near the bluff edge will increase the stress within the soil and can easily lead to slope failure.*

This recommendation is applicable to the entire reach from State Route 193/North Main Street to Pennsylvania (Penn) Avenue.

8. Coordination of Projects: *Continuation of similar erosion control measures along a stretch of shore will often yield more effective protection than the installation of multiple types of structures adjacent to one another. Most erosion control measures function better when utilized over large areas of the shore.*

It appears shore structures have already been constructed as group projects along this reach of shore. For instance, the groin fields that are present throughout much of this reach appear to have been built, for the most part, as grouped projects covering multiple properties. When following the above recommendations, consider similar grouping of projects to achieve the desired results.



Erosion within this reach is likely to be toe erosion from wave action, coupled with slumping in the upper portions of the bluff. Slumping often occurs within this reach due to the glaciolacustrine clay and sands that overlay the till.

9. Water Management-Monitoring: Monitor the bluff for any changes to the amount/flow of water. Any changes in water patterns on a bluff could be signs of potential future failure planes (i.e. areas of slumping or sliding). Regular monitoring of the bluff will allow for the early detection and correction of these smaller problems, which will likely be less costly than measures taken after the issues worsen.

Similar to all reaches within Ashtabula County, the State Route 193/North Main Street to Pennsylvania (Penn) Avenue reach must give consideration to the high levels of surface and ground water present. The entire county receives more precipitation than other counties to the west, and therefore property owners will always need to be aware of water on and within the bluffs. Careful monitoring throughout this reach will allow for pro-active measures to reduce excess surface and ground water.



The 17.4-acre Al Cummings Sunset Park is located on land north of State Route 531. The top of the park's bluff is marked by a wooden split rail fence and visible in the upper left of this picture. This area of the coast has experienced significant erosion, and there is no beach at the base of the bluff.

10. Shore Structure Management- Monitoring: Monitor and maintain shore structures. Routine monitoring of shore structures will allow for early detection of any potential failures. Smaller repairs performed more frequently will be less costly and can often increase how long the structure will be effective at controlling erosion. If removal of an aged or deteriorating structure is necessary, consider the above recommendations as potential future solutions.

Most shore structures within this reach have deteriorated appearances and functionality. Monitoring older structures will provide advanced notice to when they are failing or causing damage to surrounding areas; while the monitoring of new structures for their effects downdrift will allow for early alterations that will limit negative impacts.

References:

- Carter, Charles H. and Donald E. Guy. Report of Investigations No. 122, Lake Erie Shore Erosion, Ashtabula County, Ohio: Setting, Processes, and Recession Rates from 1876 to 1973. State of Ohio, Department of Natural Resources, Division of Geological Survey, Columbus, 1983.
- Ohio Department of Natural Resources, 1998 Final Coastal Erosion Area (CEA) Mapping
- Ohio Department of Natural Resources, 2010 Final Coastal Erosion Area (CEA) Mapping

Learn More:

LESEMP Webpages: ohiodnr.com/tabid/20501.default.aspx

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