



Managing Erosion on Great Lakes Shorelines

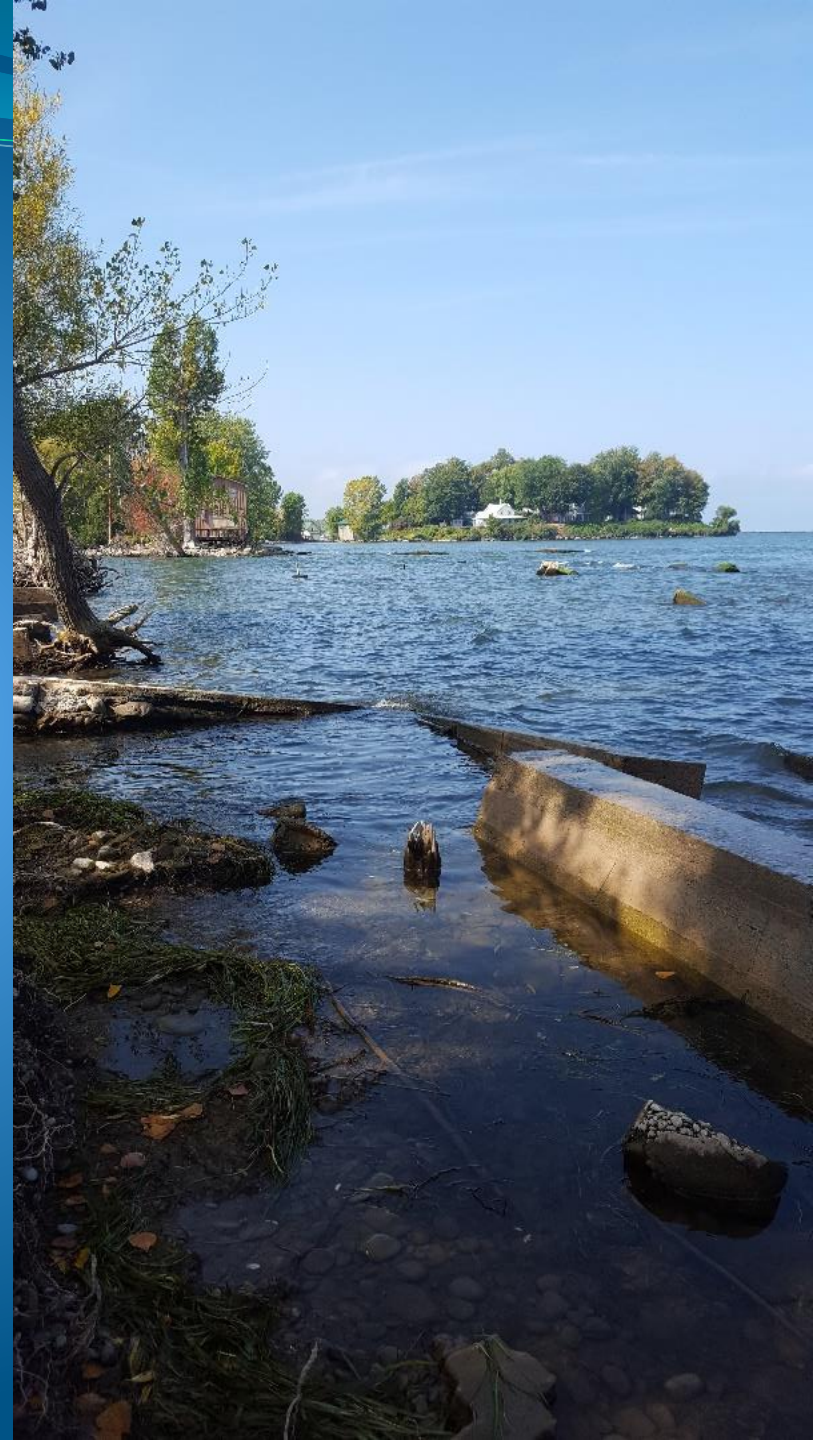
Roy Widrig

New York Sea Grant

Great Lakes Coastal Processes & Hazards Specialist

Why We're Here

- Discuss erosion management of Lake Ontario coastal properties
- Coastal Zone Permitting
 - DEC, DOS and USACE
 - Emergency permitting
- Place-based solutions
 - What to expect from shoreline management options



Ground Rules & About Sea Grant

- We **will not** be discussing the control of outflows by the International Joint Commission (IJC) and lake levels – but will discuss living with both high and low water on the Lake Ontario shoreline
- New York Sea Grant’s role is “*Bringing Science to the Shore*” and is to be presented without bias
- We are here to present an array of options, without specific recommendations or endorsements
- The goal is to find the right option for individual property owners

In Your Folder

- Agenda
- August 2019 Contractor List
- What is New York Sea Grant?
- Erosion Management for Great Lakes Shorelines
- **Workshop Evaluation**

Agenda

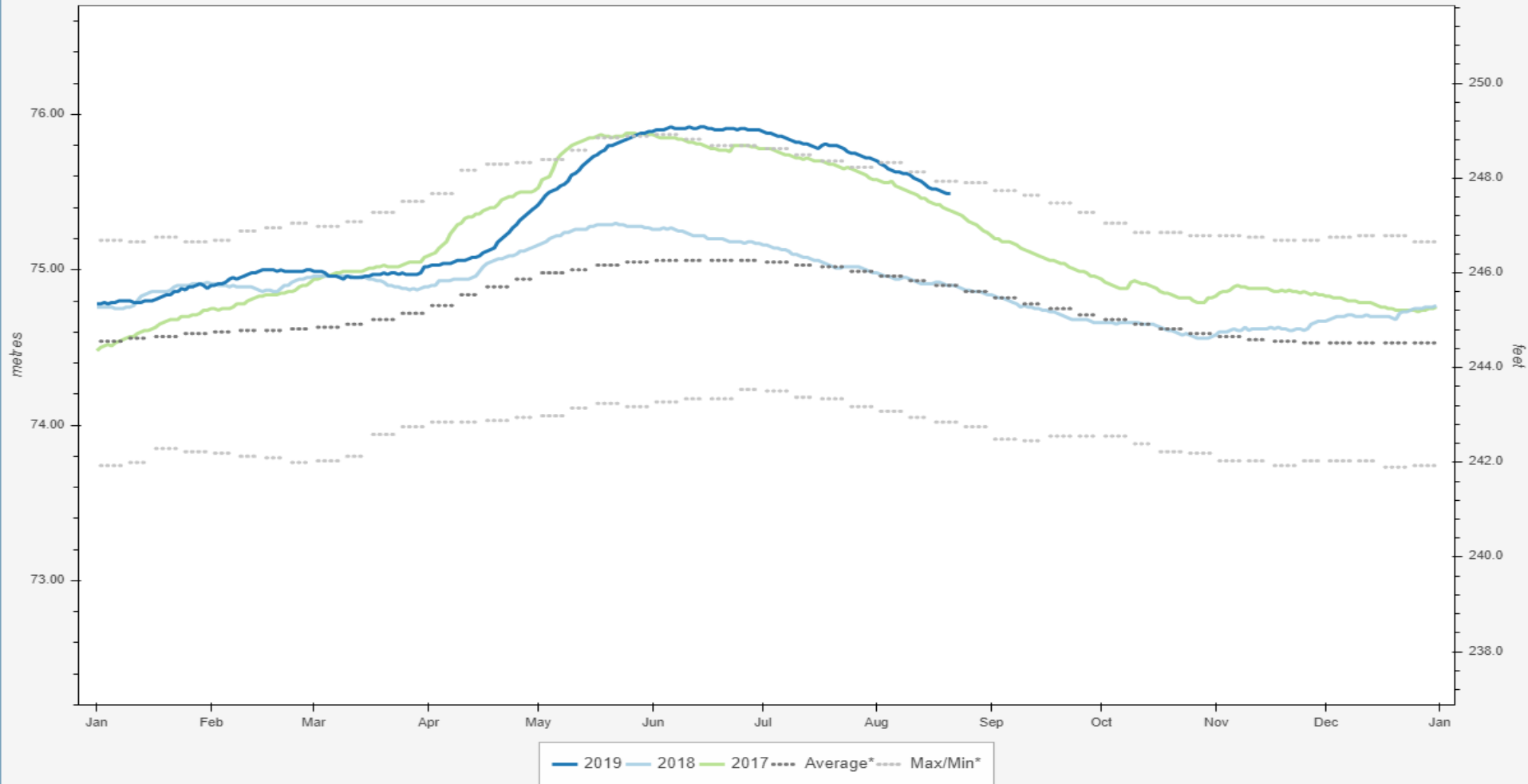
- Overview of Lake Ontario's Coastal Processes
- NYS DEC CEHA & Permitting Process
 - Beth Geldard and Thomas Haley, DEC Region 8
- NYS DOS Coastal Consistency
 - Laura McLean, DOS
- US Army Corps of Engineers
 - Diane Kozlowski, USACE

Coastal Processes

- What's going on in the lake and on the shore?
 - Why?
 - How's it going to change?
 - How can these processes be influenced by human activity?

Current Conditions

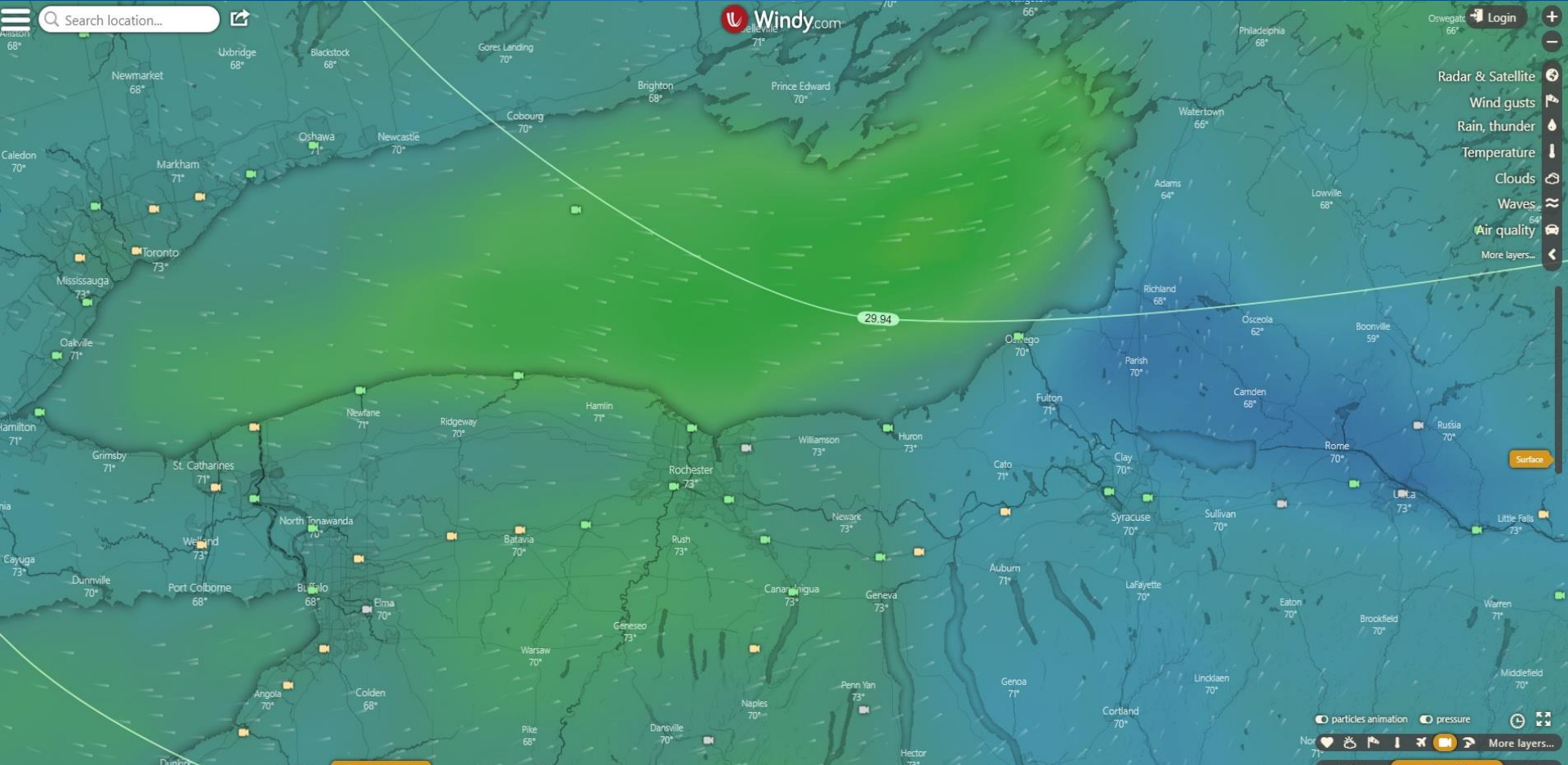
Lake Ontario: Daily Water Levels



Search location...

Windy.com

Login



- Radar & Satellite
- Wind gusts
- Rain, thunder
- Temperature
- Clouds
- Waves
- Air quality
- More layers...

Surface

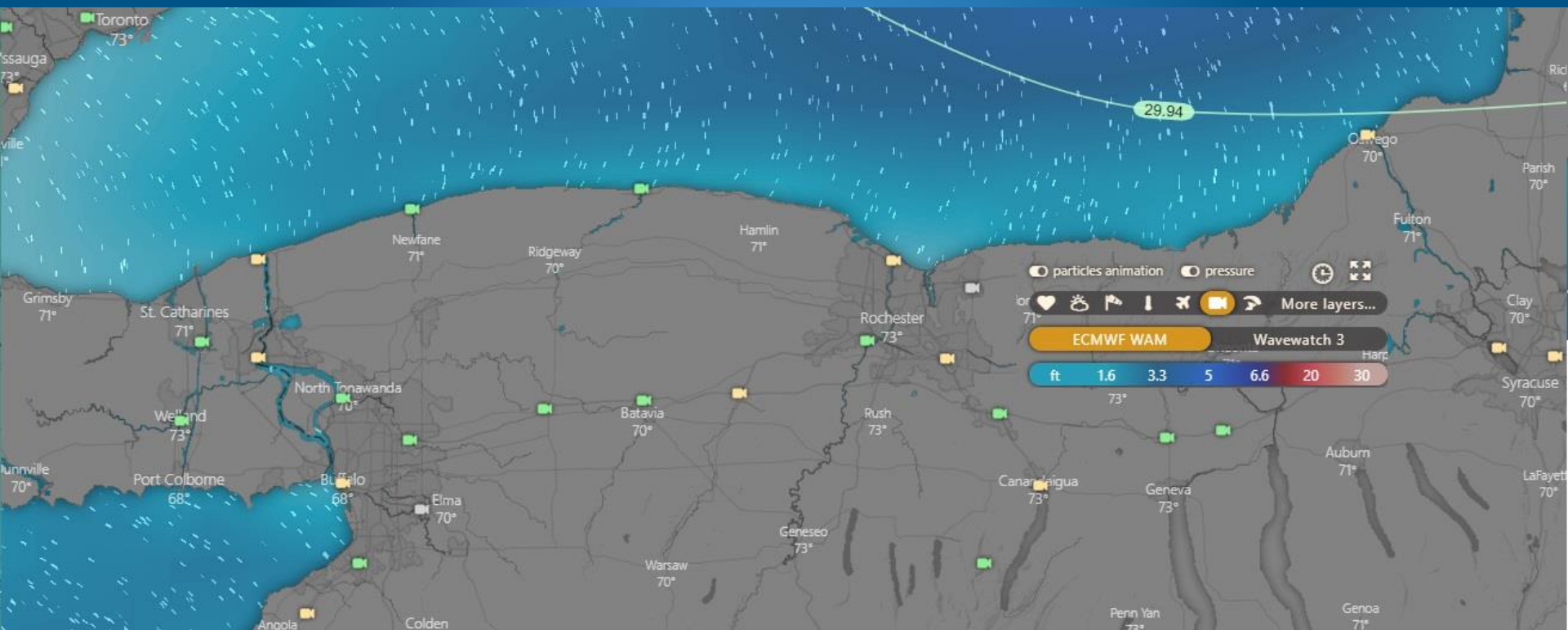
particles animation
 pressure
 More layers...

NAM **ECMWF** GFS

kt 0 5 10 20 30 40 60

Wednesday 28 Thursday 29 Friday 30 **Friday 30 - 12 PM** Saturday 31 Canada Sunday 1 Monday 2 Tuesday 3 Wednesday 4 Thursday 5 Friday 6

© GEM & contributors

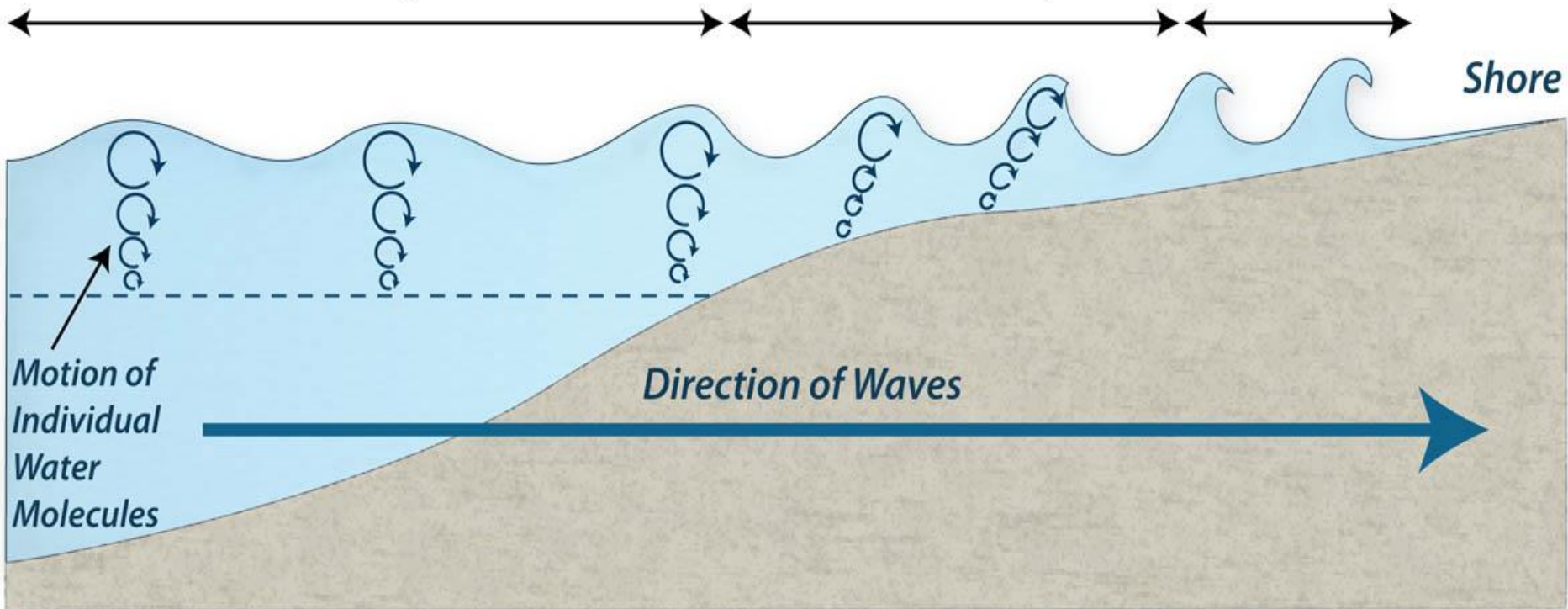


Breaking Waves

*Deep water waves
not affected by bottom*

*Waves feel
bottom and steepen*

*Breaking
waves*



Shore

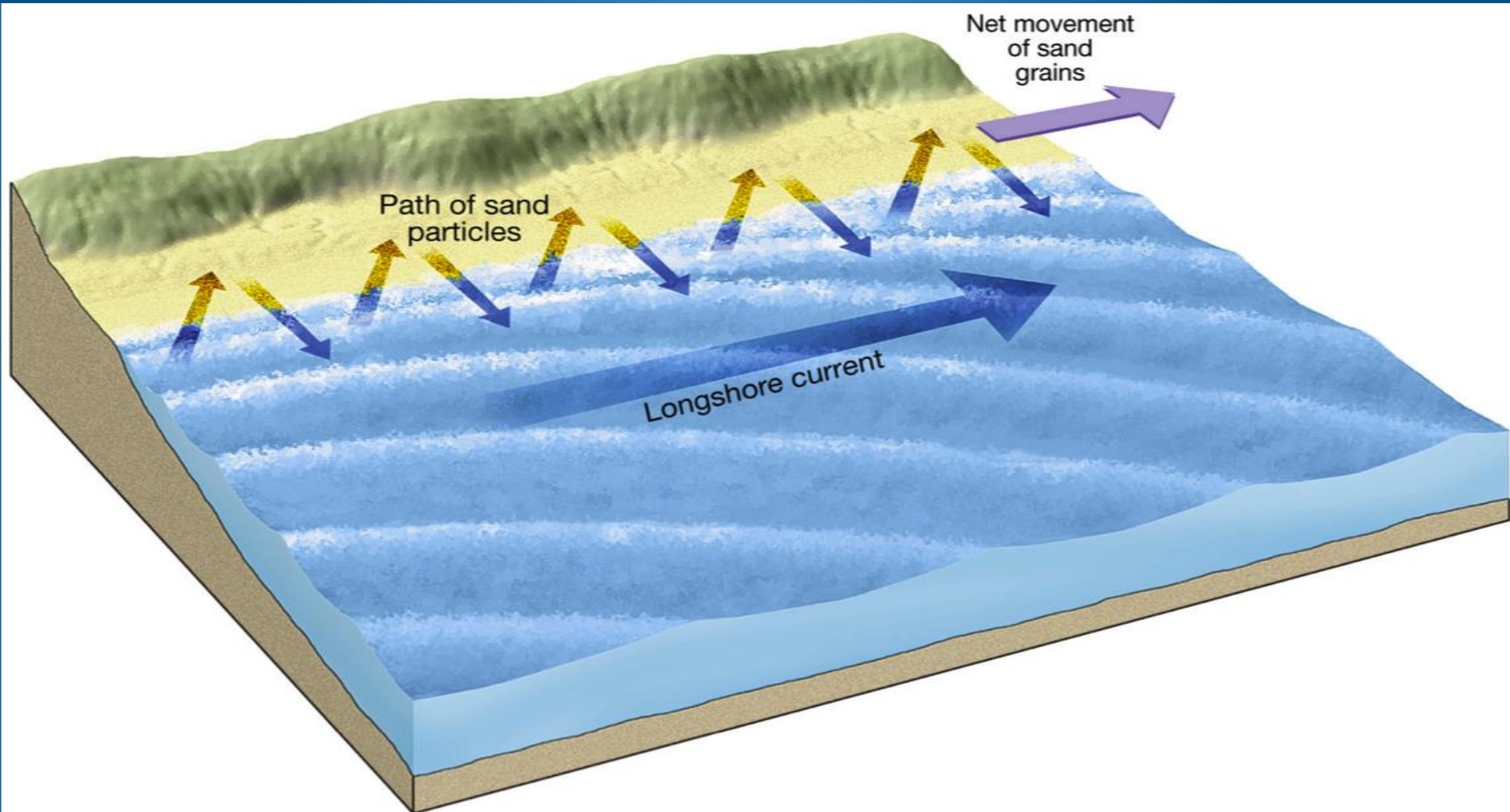
*Motion of
Individual
Water
Molecules*

Direction of Waves

Wave Action on Shorelines



Longshore Transport / Drift



LO Flood Inundation Tool

<https://seagrant.sunysb.edu/articles/t/coastal-community-development-program-resources-tools-coastal-resilience-index>

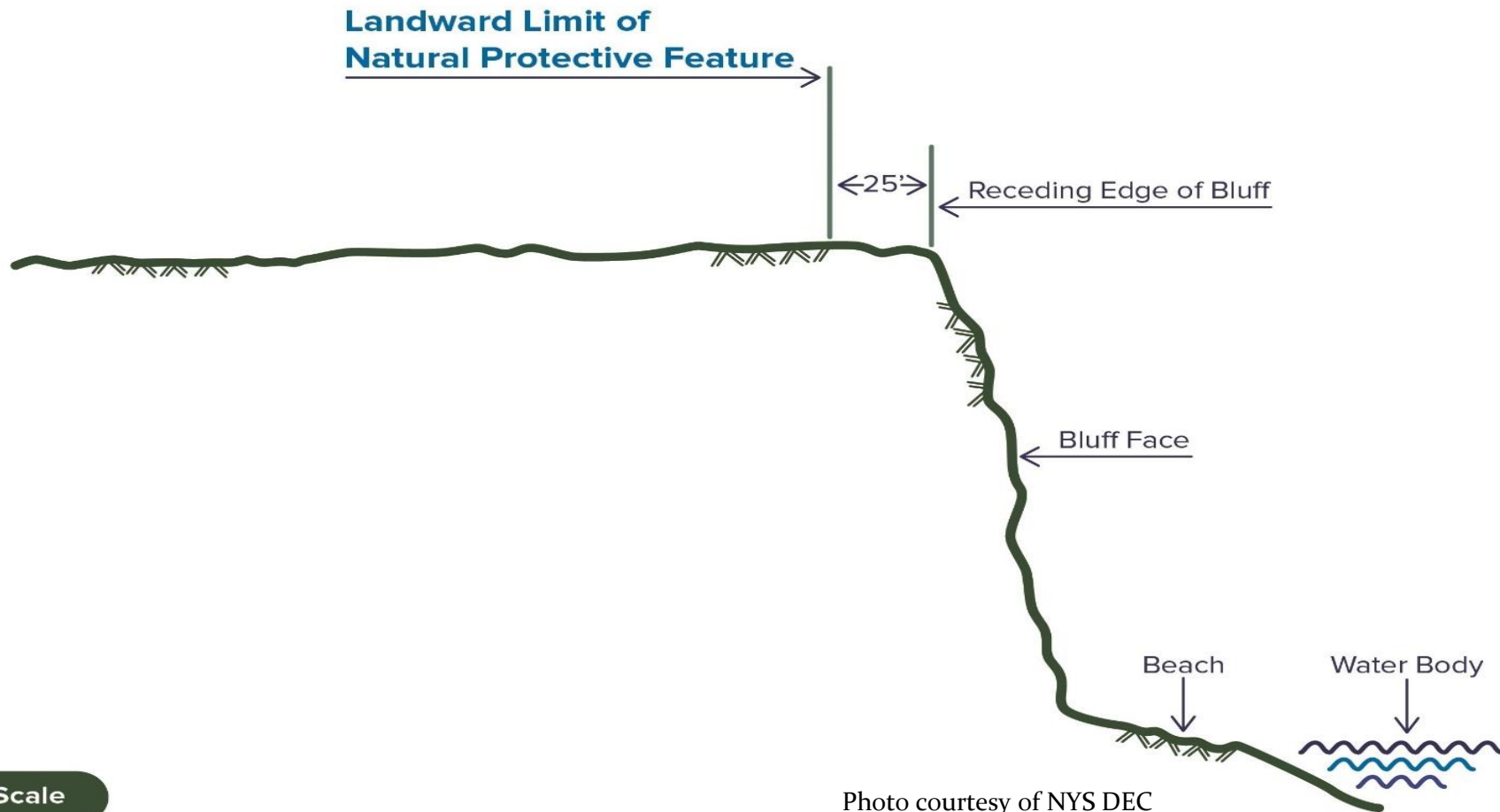


Ontario Shoreline Geology: Bluffs



Ontario Shoreline Geology: Bluffs

Typical Bluff Cross Section



Not To Scale

Photo courtesy of NYS DEC

Ontario Shoreline Geology: Bluffs



Ontario Shoreline Geology: Bluffs



Ontario Shoreline Geology: Barriers



What to do about Shoreline Erosion

- No Action Alternative
- Non-structural Measures
- Nature-based or Bioengineered Features
- Hard Structural Measures

Take no Action

- Let the lake be, but be aware of the consequences:
 - Erosion is ongoing
 - Both high and low water will result in vastly different shoreline changes
 - Be aware of what your neighbors are doing, and how it can affect your property
- The shoreline can remain natural, but structures may be at risk
- Evaluate your acceptable level of risk based on your own values

Non-structural

Building Relocation

- Often difficult to accomplish in the Great Lakes Region, as parcel size and local infrastructure limit the acreage available

Building Elevating

- Very expensive, does not protect the shoreline from erosion – just limits the damage to buildings

Setbacks

- Towns, villages, etc. can work setbacks into their zoning (if possible) to encourage more sustainable properties

Engineered Beaches

- Importing sand to maintain a shoreline or beach
- Difficult to plan and replenish frequently, especially in high-energy environments



Nature-based Features

- Can provide some protection against coastal erosion, but they are **not applicable in all places**
- Low up-front cost, but replacement of living material is an ongoing expense
- Aid in restoration of shoreline to a more natural state, promoting ecosystem continuity along the shoreline
- Can be **bioengineered** to incorporate natural resilience into traditional protection methods

Nature-based Features



Nature-based Features



Photo by Emily Sheridan

Traditional Gray Structures

- Rock rip-rap
- Concrete revetments
- Vertical Walls
 - Sheet piles
 - Poured concrete walls

Can protect property, but may also disrupt the coastal processes and coastal ecosystem, steepen nearshore environment, and cause more erosion flanking adjacent properties















Rocks and Bluffs



Rocks and Bluffs



Making the Right Decision for Your Property

- How much risk you're willing to accept
- Where you are on the lake?
- What's going on at neighboring properties?
- Have you considered natural resilience alternatives?
- What fits your budget (and timeline)?
- **Talk to experts, DEC, DOS, NY Sea Grant, Soil and Water Conservation District, contractors, your neighbors, town or village officials...**

Piecemeal vs. Community Approach

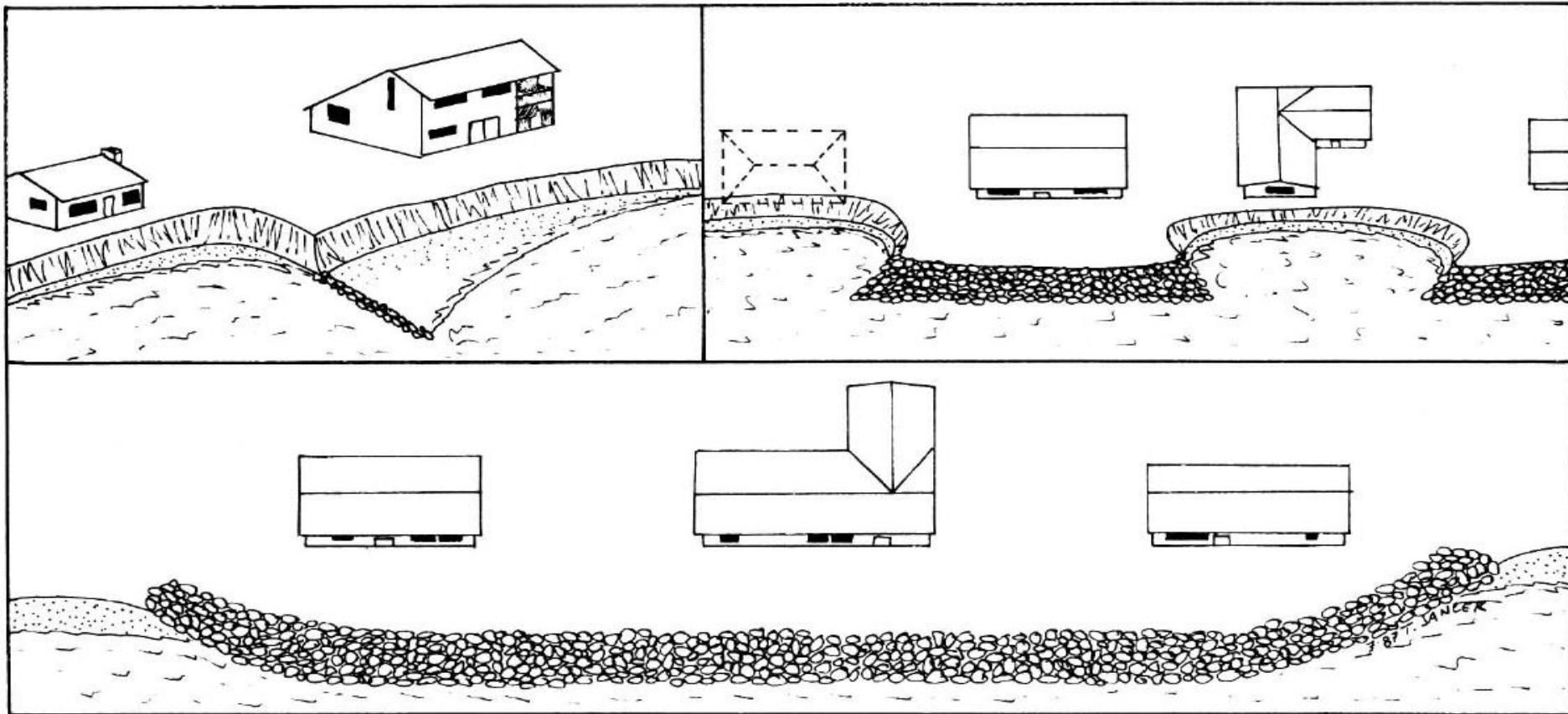


Figure 2. Attempts to control coastal erosion on a property-by-property piecemeal basis is often ineffective, with individual protective structures sometimes shifting erosion problems to adjacent properties or being damaged by continued erosion on adjacent properties. A proper erosion control approach is a unified, group project.

Every Situation is Different



Questions/Comments



This workshop was made possible by New York Sea Grant and funding from the New York State Department of Environmental Conservation through the New York State Environmental Protection Fund.

Resources

- Coastal Erosion Hazard Area maps (CEHA)
- Environmental Resources Manager
- Digital Coast
- CanVis
- CRRA
- NOAA Great Lakes Portal (wind, weather, waves)
 - <https://www.weather.gov/greatlakes/ontario>
- GLERL Coast Watch – Satellite Imagery
 - https://coastwatch.glerl.noaa.gov/modis/region_map.html
- Coastal Boundary Map
(http://appext2o.dos.ny.gov/coastal_map_public/map.aspx)