DCR Parks as Classrooms Virtual Edition

Waquoit Bay National Estuarine Research Reserve

Is Sea Level Rise Affecting Our Massachusetts Salt Marshes? High School Biology

Overview:

Massachusetts is a coastal state. Much of our coastal areas are fringed by salt marshes which provide many benefits for humans. Climate change, largely due to the burning of fossil fuels, is causing sea levels to rise. What impact is this having locally?

Waquoit Bay National Estuarine Research Reserve, managed jointly by DCR and NOAA (National Oceanic and Atmospheric Administration) is one of twenty-nine Research Reserves in the U.S. studying estuaries and human impacts on them. This activity allows students a peak at Waquoit Bay Reserve's "Sentinel Site" where researchers are keeping an eye on what's happening over time. Students meet a Reserve researcher who shows them the research site on Cape Cod and students use real data from that site to come to their own conclusions.

Format:

Video (4 minutes) and graph to analyze

Curriculum Connections:

High School Biology
HS-LS2-6 Analyze data to show … that extreme fluctuations in conditions may result in a new ecosystem… **Clarification**: Examples of changes in ecosystems could include… climate changes … or sea level rise.

Assessments:

Pre-Assessment Activity:
Ask your students if they've been to a salt marsh before and have them discuss their experiences, what an estuary is, and why they are important. If there are students that don't have experience with salt marshes you can show this video to give them some background. What's an Estuary? (2 minutes)
http://oceanservice.noaa.gov/facts/estuary.html

Have them use Google Maps and search for South Cape Beach State Park to see where they will be going virtually. In satellite view they can see the salt marshes in that area.

Activity during video: Have students write down any questions that come up for them while watching the sentinel site video. They should look for the answers to these questions: What is a sentinel site? Why do you think it's called that? What have the

Waquoit Bay NERR researchers found out?

Play video: How are sentinel sites keeping watch on our drowning coast? (4 minutes)
https://www.youtube.com/watch?v=XCoTPax56F0&t=4

Post Assessment Activity

What are the researchers at Waquoit Bay Reserve observing in the salt marsh there?
Is the marsh surface keeping up with sea level rise?
What actions are the researchers trying out to help preserve the salt marsh? Is there anything you can do to help?

Extend the Experience:

1. Have the students analyze the graphs of actual data on the attached work sheet.
2. If possible, visit a salt marsh near your school. Here's a list of a few of the many other Massachusetts state parks that have salt marshes: Belle Isle Marsh, Nickerson State Park, Boston Harbor Islands, Demarest Lloyd State Park, Ellisville Harbor.
3. Start your own school or student sentinel site. It can be simple, something in the school yard (or their own backyard) that they observe over time (see Sentinel Site activity booklet here https://www.wellsreserve.org/project/sentinel-site-lesson-plan) . If you have time try monitoring a wetland or other ecosystem over time (see Adopt-a-Wetland activity with tips here http://www.waquoitbayreserve.org/wp-content/uploads/teacher-adopt-a-wetland-stewardship-project-and-field-study.pdf).
4. Try one of the sea level rise viewers to see what is projected for your own area.
   Cape Cod Commission Sea Level Rise Viewer https://slrv.apps.capecodcommission.org/
   NOAA Sea Level Rise Viewer https://coast.noaa.gov/slr/
   City of Boston SLR Viewer https://www.boston.gov/departments/environment/climate-ready-boston-map-explorer

Additional Educator Resources:

More in-depth analysis of Waquoit Bay Reserve Sentinel Site data
http://www.nerrssciencecollaborative.org/media/files/WQB_SET_Outreach_2020-02-26.pdf

NOAA 4 pager "Will Tidal Marshes Survive Rising Seas?"
http://www.nerra.org/01/wp-content/uploads/2018/09/NERRS_Marsh_Brochure_onscreen.pdf

Another Waquoit Bay Reserve video illustrating sea level rise impacts:
Time Traveling, Ancient Forest Revealed, Cedar Stumps (3 minutes)
https://www.youtube.com/watch?v=A_K7w2IqIBU&t=32s

Contact: WBNERR Education Coordinator, joan.muller@mass.gov
Web site: www.waquoitbayreserve.org

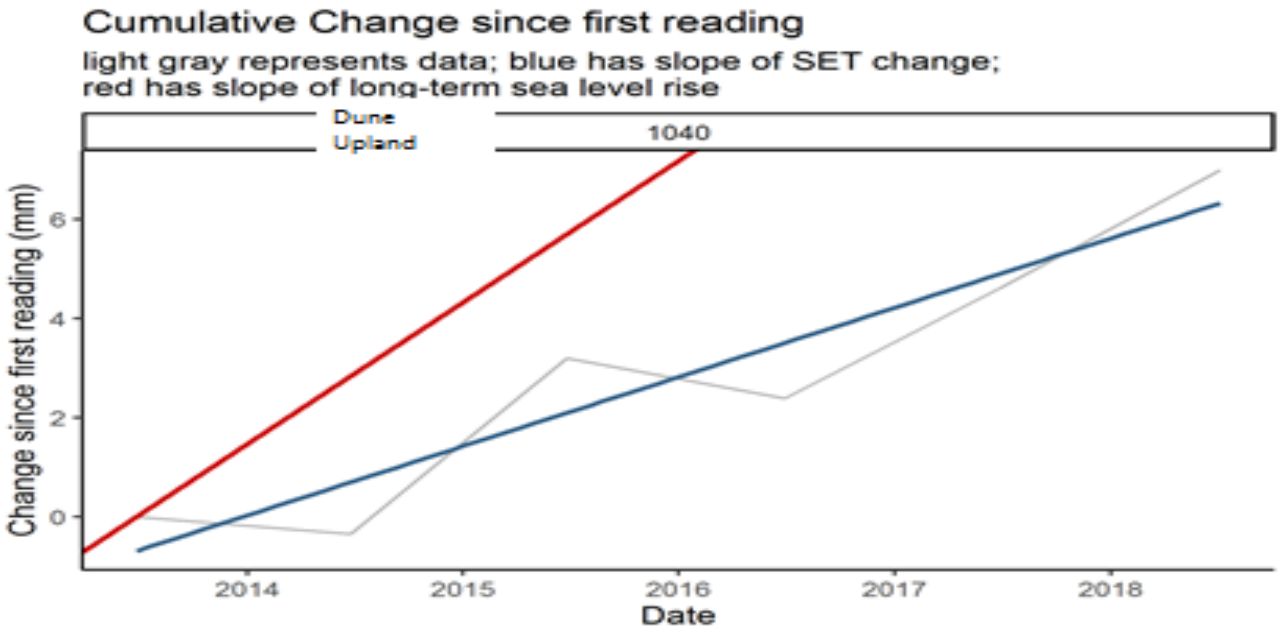
Sea Level Rise (red) vs. Surface Elevation (blue) at the Sentinel Site at South Cape Beach State Park at Waquoit Bay National Estuarine Research Reserve

This graph represents an average of all the sites observed.

1. What do you notice about the elevation of the marsh surface? Is it increasing, decreasing, or staying the same over time?

2. What do you notice about the sea level rise? Is it increasing, decreasing, or staying the same over time?

3. Is the elevation of the marsh surface keeping up with sea level rise? Explain what you think will happen at this salt marsh over time.



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For more information on this data contact Waquoit Bay National Estuarine Research Reserve. www.waquoitbayreserve.org