
Team 5 UAPP411

Indian River Inlet Valued Environmental Representation (Indian RIVER)

Indian River Bay and Inlet

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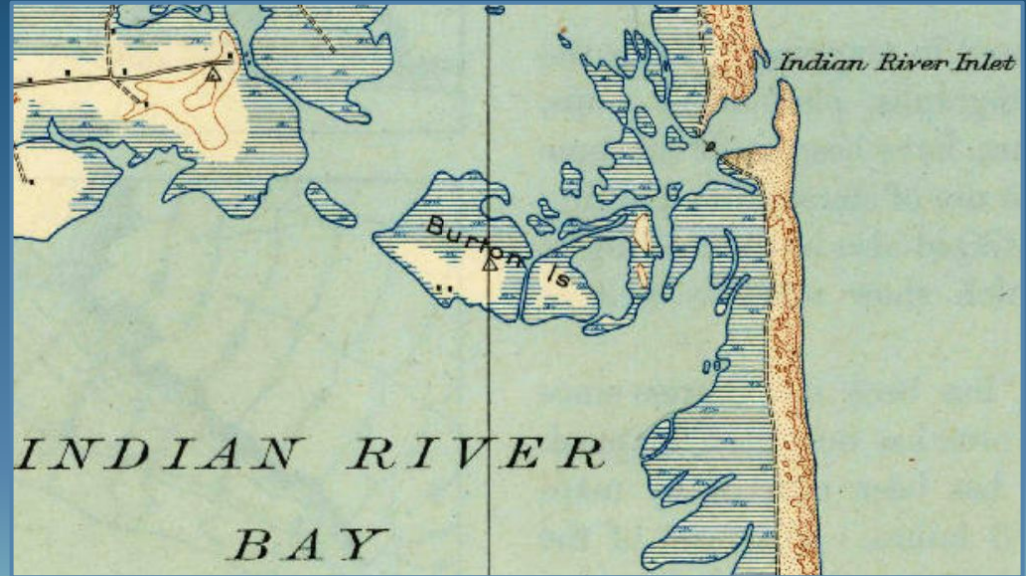
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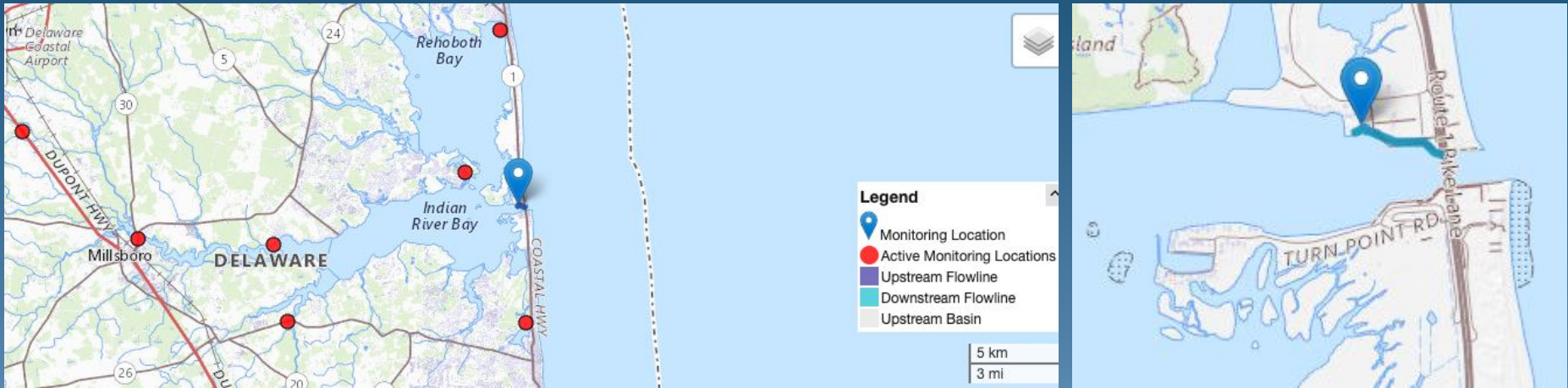
Mission Statement

The mission of Indian RIVER is to secure secure the attainment of fishable, boatable, and swimmable water quality standards in the Indian River Inlet and Bay of southeastern Delaware by the year 2030.





Map



The map above provided by USGS displays the Indian River Bay and Rehoboth Bay, both being connected to the Atlantic Ocean





Background

- Located in Delaware Seashore State Park
- Indian River Inlet & the Charles W. Cullen Memorial Bridge
 - The bridge spans 950 feet and is the sixth bridge that has crossed the Indian River Inlet
- Atlantic Ocean
 - Boats & marine life
- Indian River Bay - Area: 86 mi²
 - 15 miles long
 - Average freshwater flow ~ 5 m³/s
 - Nanticoke Indian Tribe - the tidewater people
- Rehoboth Bay - Area: 72 mi²





History

- Development of the Delaware coast
- Issues with shoal development over the years - Inlet has gradually shifted North
- Inlet cycles through open and closed for decades, as the inlet was consistently shifting and too shallow
 - Hazard for navigation
- 1880-1930: Consistent dredging. Additionally, the inlet was dug out by hand, and blown open using dynamite, but nothing would stick
- 1936: Management of the Inlet passed to the State Highway Commission; decided to add jetties to fix the inlet in place
 - Added a swing bridge to facilitate ship traffic, and connect Rehoboth Beach and Bethany Beach
- Jetties remain operational today, and serve as a permanent fix





Economics & Funding

Inland Bays Economic Value of \$4.5 Billion

- 35,000 jobs
 - Tourism
 - Recreational activities
 - Real estate
- Water quality

Government Funding

- Indian River Inlet
 - \$43 million to repair scour hole to increase accessibility last year
- Indian River
 - \$1 million towards operations, maintenance and rehabilitation this year
- Intercoastal waterways from Rehoboth Bay to Delaware Bay
 - Over 10 million in the last 2 years for operations and maintenance





Policies and Mandates

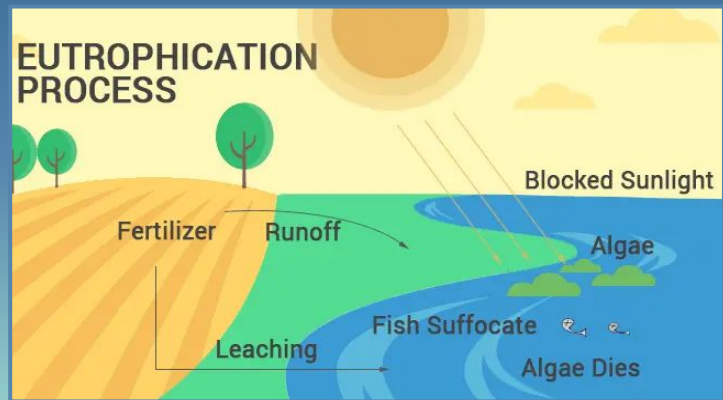
- Coastal Zone Management Act (CZMA): Signed in 1972, and administered by NOAA. Provides for the management of the USA's coastal resources.
- Delaware Coastal Zone Act: Named DNREC as the managing organization of the Indian River Inlet
- Delaware House Bill 160: Permit for the addition of shellfish aquaculture on the Delaware Inlets
- Management of recreational activities





Problem 1: Eutrophication

- Overgrowth of algae due to excess nutrients in water
 - Nitrogen and phosphorus
- Main sources of nutrients
 - Agricultural runoff (40% of Delaware land is used for agriculture)
 - Wastewater released into water
- Problems with eutrophication
 - Depletes oxygen in water
 - Dissolved oxygen is consumed as algae die
 - Fish and aquatic life need oxygen to survive



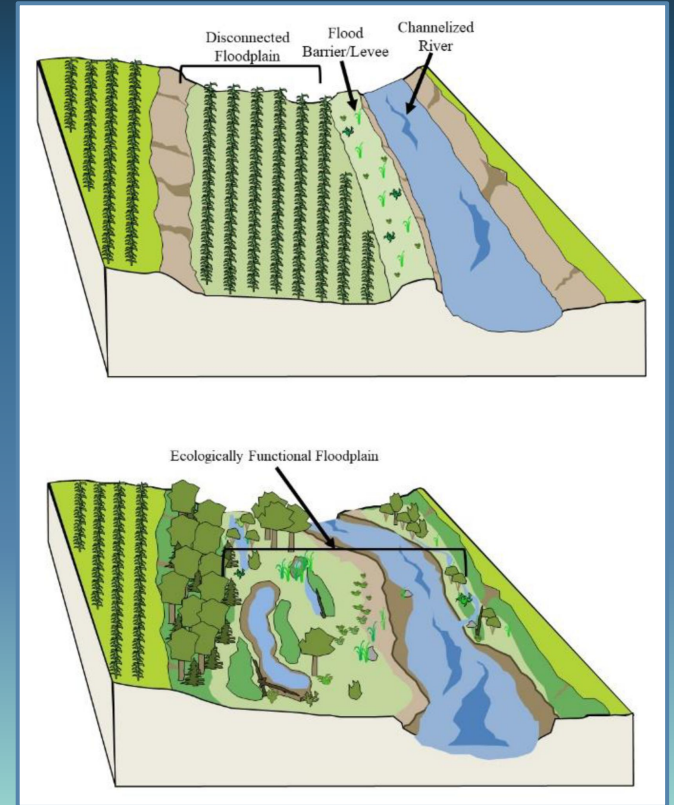


Goal 1: Reduce Nutrients

Significantly reduce nutrient input to the Indian River Bay and Inlet to achieve Delaware standards for aquatic life

Recommendations:

- Educate the nearby agricultural communities on the importance of using the proper amount of fertilizer
- Keeping animals and their waste out of streams and nearby waterways
 - Fencing out
- Plant field buffers along the edges of agricultural fields
 - Help prevent nutrient pollution by absorbing nutrients before they reach the waterways
 - Can be grassed or forested buffer strips





Problem 2: Habitat Loss

- Occurs when the habitat becomes unable to support its native species
 - Reduced quality of water due to
 - Urbanization/construction
 - Sea level rise
- Construction
 - Chemicals can get into soil - end up in water
 - Toxic to ecosystem and water
- Sea level rise
 - Less oxygen available in water (photosynthesis more difficult because sunlight can't reach plants underwater)
 - Erosion of coast (releases more particles in water - diminishes quality of water)

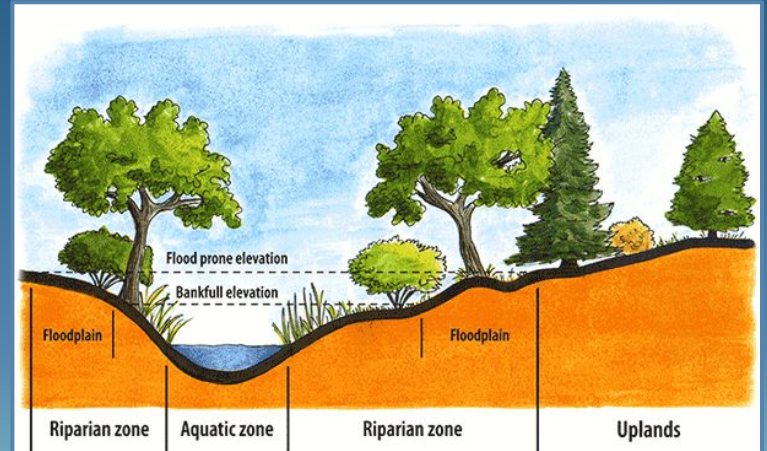


Goal 2: Protect Instream Habitats

Preserve existing stream habitat and restore degraded habitats.

Recommendations:

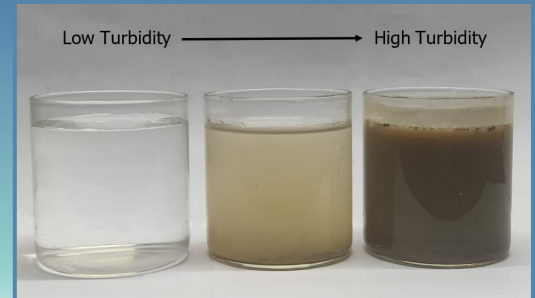
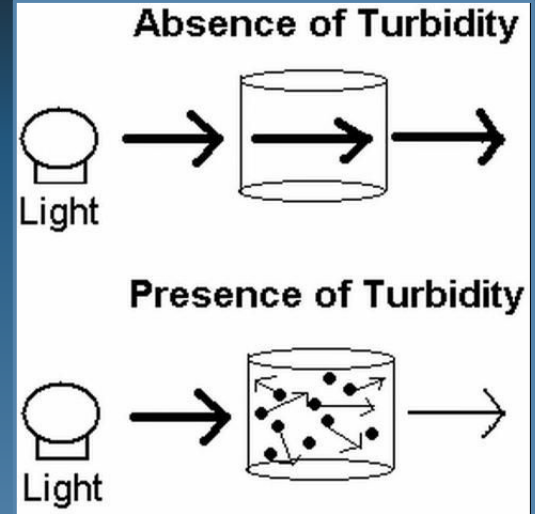
- Enhancing riparian buffers to reduce erosion
 - Planting more native trees and other plants
- Utilize open space/conservation design techniques in the surrounding area
 - Reduces the amount of site area devoted to residential areas and lawns and more to open natural space
 - Design sites to include more habitat area
- Use conservation easements to make land protection permanent





Problem 3: Turbidity

- Particles in water
 - Sediment, like clay
 - Algae
 - Microorganisms
- Excess turbidity
 - Difficult for sunlight to get through
 - Particles can get stuck in fish gills - breathing problems
 - Bacterial growth
 - Appearance/aesthetics



Goal 3: Reduce Turbidity

Significantly reduce turbidity input to the Indian River Bay and Inlet to achieve Delaware standards for aquatic life.

Recommendations:

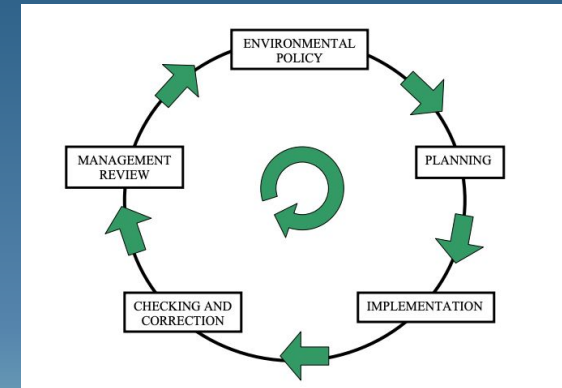
- Disinfect and filter the body of water
- Explore of the option semipermeable filtration system
 - Before the river flows into ocean
 - Or downstream of agricultural and industrial communities



Summary of Goals

In order to improve the overall quality of Indian River Bay and Inlet, it's imperative to understand all the factors relating to one another that would lead to progress in achieving the defined goals. This can be done through:

- Identifying problems and using data to find the root cause
- Understand policy
 - To ensure change and action
 - To enact viable measures
- Collaborative event



Conclusion

- Indian River Bay watershed serves a great purpose for the communities surrounding
- Health of the bay will decline if not monitored, analyzed, and taken care of
- Immediate action should be taken to maintain water quality for future generations



RESOURCES

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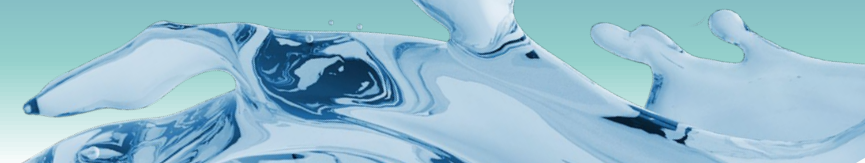
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The background is a gradient from dark blue at the top to light blue at the bottom. There are decorative water splashes in the corners: a large splash on the left, a smaller one on the top right, and another on the bottom right. Small white bubbles are scattered throughout the background.

Thank You!
Any Questions?