



Managing Natural Areas for Resilience to Climate Change: Lessons Learned From the Napatree Point Demonstration Project

Description and Goals

Charles Roman (Judith Swift & Amber Neville), URI CI

Napatree Point Conservation Area

Janice Sassi, WHC/WHFD

Resilience in a Coastal Barrier System

Bryan Oakley, ECSU

Managing for Ecosystem Resilience

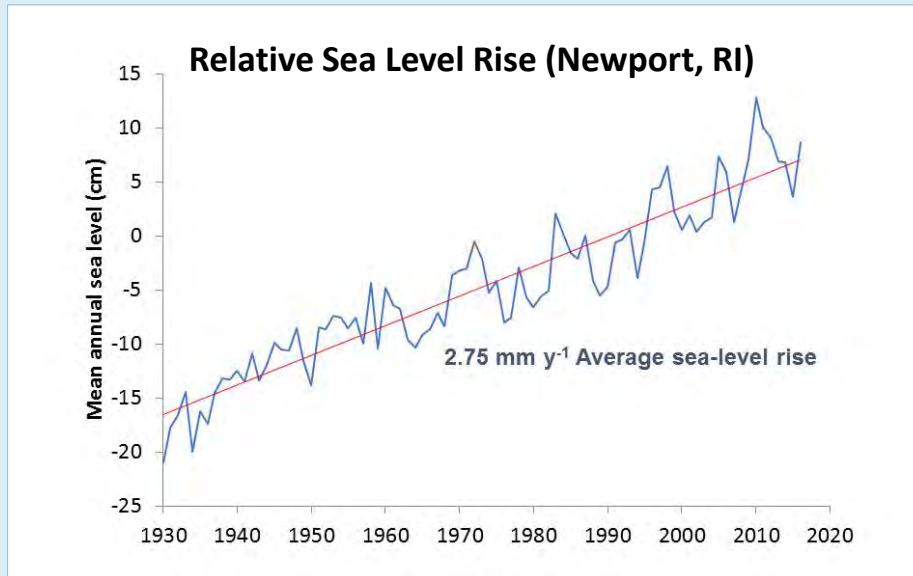
Peter August, URI & NTPCA



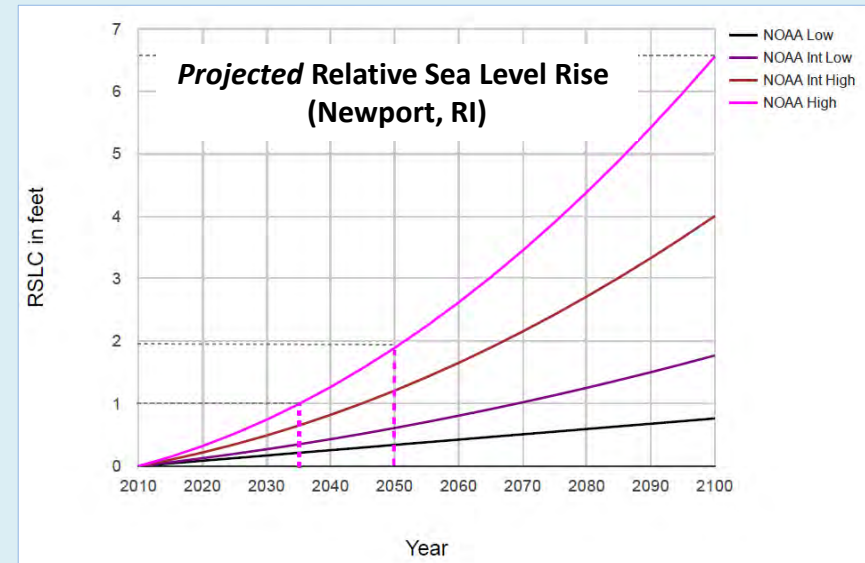
Climate Response Demonstration Sites: An Introduction



Issues Confronting Coastal Communities and Ecosystems *Sea Level Rise, Storm Surge, Flooding*



Data Source: <https://tidesandcurrents.noaa.gov/waterlevels.html?id=8452660>



Data Source: <http://www.corpsclimate.us/ccaceslcurves.cfm>

9 inches of rise over past 86 yrs

6.5 feet of rise by 2100



Climate Response Demonstration Sites: An Introduction



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Superstorm Sandy

National Weather Service. <http://www.weather.gov/okx/Hurricane Sandy>



Photo courtesy, RIEMA



Photo courtesy, Jen Coop/Teresa Crean



<http://queens.brownstoner.com/2012/11/broad-channel-also-abused-by-hurricane-sandy/>



Climate Response Demonstration Sites

-- representing RI coastal settings and development types --



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- natural ecosystems
- undeveloped
- ecological values
- recreational values



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- town centers
- historic heritage
- mixed land use
- natural areas, open space



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- industrial/commercial
- economic significance
- urban parks

Climate Response Demonstration Sites: A Forum for Evaluating Adaptation Practices



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- Provide residents, businesses, landowners, governments, with adaptation strategies to consider when planning for storm surge and sea-level rise
- Broad collaboration with partners (towns and cities, agencies, conservation organizations, community groups, academia, others)
- Provide catalyst support and seek external funding to fill information gaps
- Share findings throughout RI, the region, and beyond

“The Coastal Institute was founded to provide Rhode Island with a neutral setting where knowledge is advanced, issues discussed, information synthesized, and solutions developed for the sustainable use and management of coastal ecosystems.” (Coastal Institute mission statement)



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Climate Response Demonstration Sites: An Introduction



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Some Adaptation Strategies to Consider

- Retreat or relocate (incentives, buyouts, acquisition)
- Land use planning (coastal setbacks, flood hazard areas)
- Elevate or flood-proof buildings
- Shoreline stabilization (living shorelines, hardened structures)
- Dykes, hurricane barriers



Climate Response Demonstration Sites: An Introduction



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Change in response to storms and sea-level rise, followed by natural recovery, are constant features of barrier systems



Photo courtesy, Janet Freedman



Janice Sassi

Napatree Point Conservation Area: An Overview



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Mission



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NATURAL AREAS
NAPATREE POINT
CONSERVATION AREA

MISSION STATEMENT

We protect and enhance the ecological condition and ecosystem resilience of Napatree Point in order to make it a safe, enjoyable, and informative destination for all visitors.

OUR VISION

The Napatree Point Conservation Area is recognized as a national model for natural area stewardship and is regarded as a premier destination for visitors to enjoy its dramatic natural beauty and spectacular wildlife.



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Geography





Size of Napatree

- Land Area – 76 Acres
- Lagoon Area – 10 Acres
- Total Shoreline – 3.6 Mi (2.1 Mi bayside, 1.5 Mi oceanside)
- Width of barrier – 500 – 1,000 Ft



Napatree Point: Early 20th Century

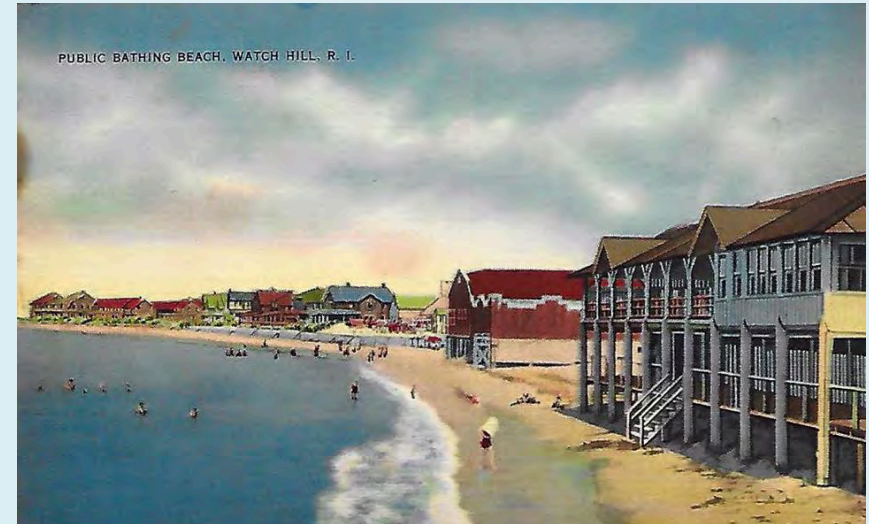


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- Heavily developed
- 39 cottages along the barrier, beach club, yacht club



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Hurricane of 1938



(0 606-886C-118)(9-24-38-3P)(12-1200)

WATCH HILL, R.I.

...is a replica of the First Issue of The Sun which could be printed after
 ing two feet deep, and all power lines were wrecked by the hurricane on W
 pled, and not until Friday afternoon was power on so that this small sheet
 press. More than 5,000 copies of this edition were sold in Westerly on Fri
 was deemed advisable to reprint it in this first regia

Hurricane Edition **THE SUN** Local and Shore News **Weeks Struck**

Vol. 46, No. 89 WESTERLY, R. I., FRIDAY SEPTEMBER 23, 1938 Price Three Cents Noyes Point Sand Bar; way O

Misquamicut Wiped Out; Napatree Point Gone; 50 Dead; Scores Missing

Westerly Paralyzed by Tropical Hurricane; Cottages at Charlestown Beach and Quonochontaug Washed Away; 4 Dead, 4 Missing In Stonington

Misquamicut with 800 cottages was entirely wiped out, all cottages on Napatree Point, Watch Hill, destroyed and more than 50 people killed and millions of dollars of property damage resulted from a tidal wave and hurricane which struck Westerly late Wednesday afternoon.

Charlestown Beach and Quonochontaug likewise were destroyed. Westerly and the Rhode Island shores received the brunt of the force in New England, more deaths being reported in this locality than any other.

Records show that just 125 years ago to the day, September 21, a hurricane struck Westerly.

Pawcatuck Overflows

The ocean backed up the Pawcatuck to flood the

Bodies Recovered

Mrs. Harry Bennett, New York City	Mrs. Kingsbury
Mrs. Ella Bliven	Mrs. Raybocker
Mrs. Ralph Bliven, Misquamicut	Dwain Bliven
Mrs. George Bradley	Mr. Bunce
Mrs. Byron Butten	Ethel Crooker
Mrs. R. N. Byrnes	Frank Pasenti
Mrs. George F. Clark, Shannock	Mrs. John Davidson
Miss Harriet Clark, Shannock	Amos Burdick
Miss Ann Clark, Shannock	Mrs. Amos Burdick
Miss Florence Clark, Shannock	B. I. Lamphar
Mrs. Philip Clemens	Mrs. Ned and two children
Mrs. Lloyd M. Cook	Mrs. William Bliven
George Cross, Charlestown	Two small Morarty children
Mrs. George Davidson	Mrs. F. Hopley
Mrs. Dismore	Agnes S. Herrick
Mrs. Zoe Fletcher	Gatherine Cully
Patner Fitzgerald	Della O'Tool
Mr. James Gould	Frances O'Tool
Thomas Hackley	Ethel Avery
	George Phelan
	Maryell Cook

Every one of the approximately 200 houses on Charlestown Beach was carried away.

Between 75 and 100 houses on the Charlestown-by-the-Sea were demolished. The few houses left in that area have been moved from a few feet to a quarter of a mile away. A few houses on hill pastures are not as badly damaged. Many people who were staying in that section just barely escaped.

Mrs. David Larkhan and daughter who were on the beach started across the Pond on a door. Mrs. Larkhan washed away, but Mrs. Larkhan was saved, although she is in a poor condition.

Mr. Men and family were in their car, leaving the beach, and stopped to assist the Breckinridge family who were in trouble. The wave struck the car, carrying away all his family except himself.

Residents of that section who in through the whole thing re-

List of Dead and Missing



Hurricane of 1938



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WATCH HILL BEACH FRONT
Before and After

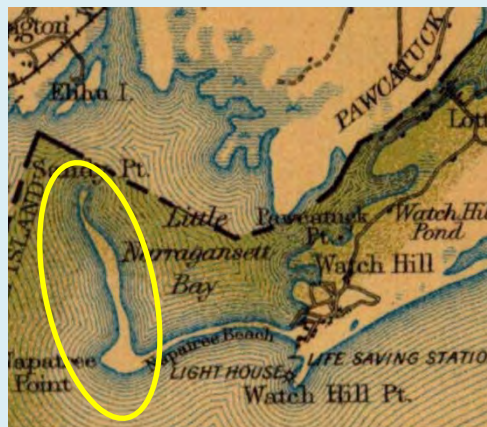


The top view shows the public and private bath houses and the Watch Hill Beach Club along the beach front, and in the background the cottages along Fort Road on Napatree Point. The desolate waste of sand pictured below is all that is left in the wake of the hurricane and high seas. Just back of the two jetties where the Watch Hill Beach Club stood is a breachway. This is the section which bore the brunt of Watch Hill damage.

- All structures swept away
- Napatree wiped clean
- 15 deaths in WH
- 3 breaches (300-900 feet wide)

1893

2014





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A Resilient Ecosystem

Napatree Now, Eight Decades Post-Hurricane of 1938



Audubon News Features Birds

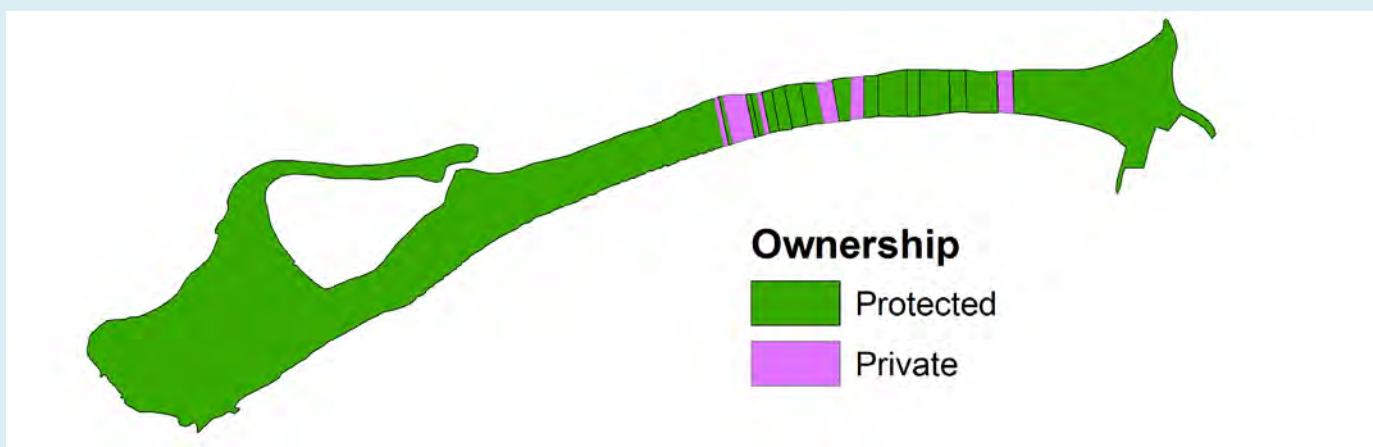
Globally Important Bird Area
Napatree Point/Sandy Point
Rhode Island



Ownership



- Conservation Area (72 Acres) owned by Watch Hill Fire District, Watch Hill Conservancy, RI DEM, Town of Westerly
- Six privately owned in-holdings (3.5 acres)
- Chaplin B. Barnes Conservation Easement held by WH Conservancy





Management Challenges

- Dogs
- Invasive plants
- Trampling dunes
- People management
- Water quality

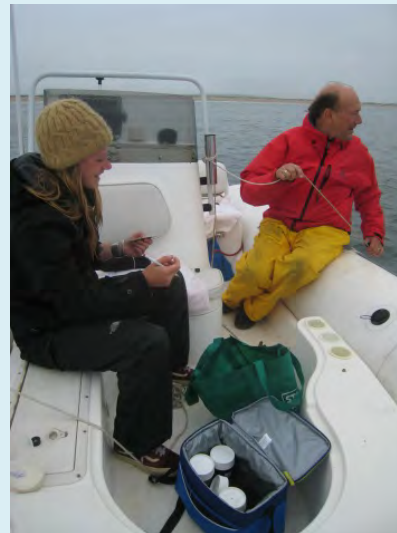


Photo: LLASCC



Conservation Through Education



Classes and Tours



Napatree Investigators



Getting the Word Out



www.napatreepoint.info

The State of Napatree Report: 2016

A Summary of Monitoring, Stewardship, Management, and Education Programs

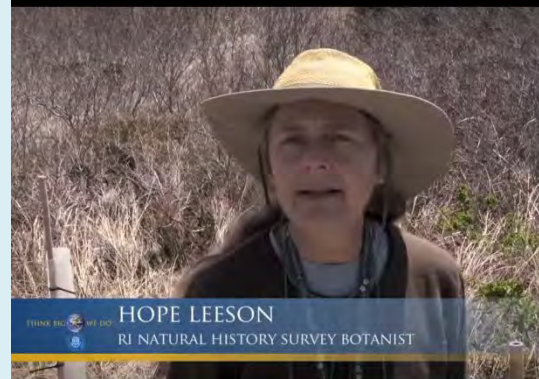


Photo credit: Janice Sassi

Compiled By:
Janice M. Sassi
Napatree Point Conservation Area
Watch Hill Conservancy & Watch Hill Fire District
December 2016



URI Today Napatree



Pete August

Managing for Ecosystem Resilience



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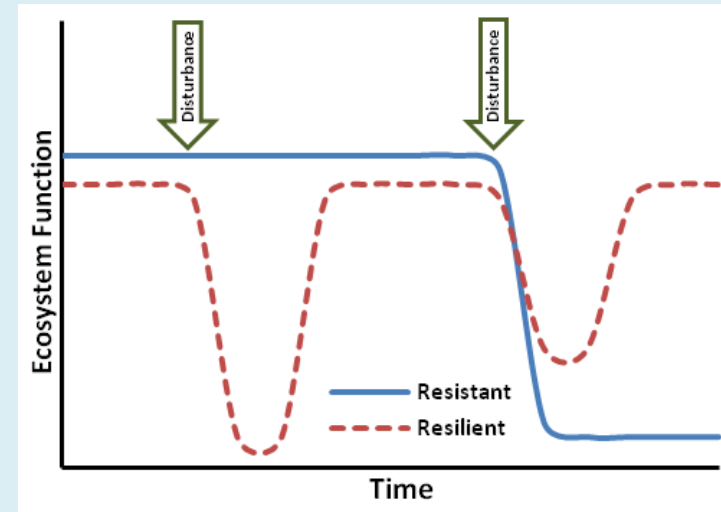
Ecosystem Resilience

The capacity of an ecosystem to absorb disturbance without shifting to an alternative state and losing function and services (Cote & Darling, 2010. PLOS)

Two Aspects

Resistance: *How large a disturbance can the system endure?*

Recovery: *How long will it take to recover?*



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Ecosystem Functions on Napatree

- Geological processes
- Ecological processes that produce habitats for:
 - Rare species (Plovers, Oystercatchers, Osprey)
 - Charismatic species (Raptors, Migrators)
 - Keystone species (Pollinators, Horseshoe Crabs)
- Aesthetics





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Disturbances on Napatree

Short-term (weeks, months)

Trampling vegetation,
Dogs, aircraft, boats disturbing birds
Storms



Photo: LLASCC

Intermediate-term (years)

Invasive species
Storms



Long-term (decades)

Sea level rise
Increased storminess
Warming waters and air
Altered phenology



Managing to Enhance Resilience



What are resilience dynamics on Napatree?

Dr. Bryan Oakley

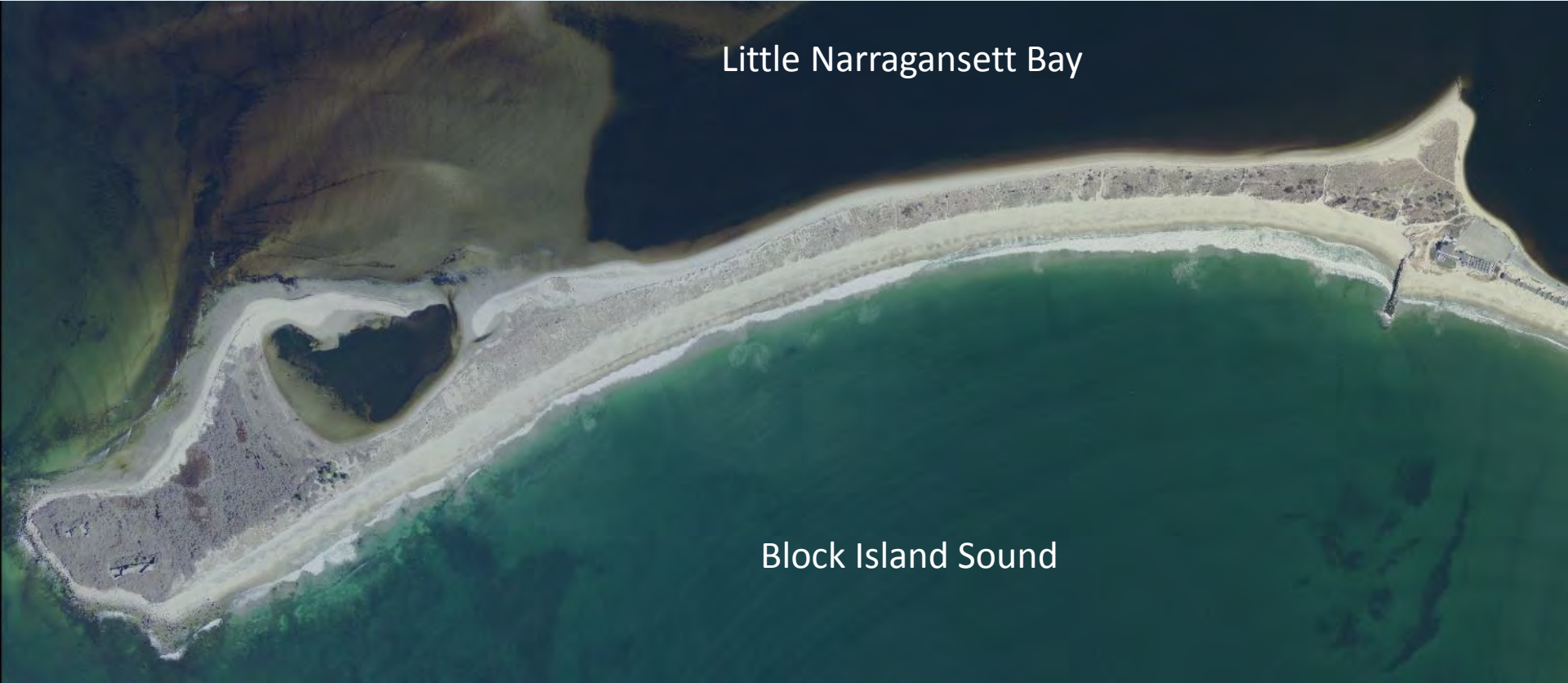


Bryan Oakley

Barrier Resilience to Climate Change: Lessons from the Napatree Barrier



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Little Narragansett Bay

Block Island Sound

Barriers





Barrier Resilience to Climate Change: Lessons from the Napatree Barrier

*“The resolution of conflicts regarding barrier (island) utilization **MUST** be based on a full understanding of the dynamic nature of these islands”*

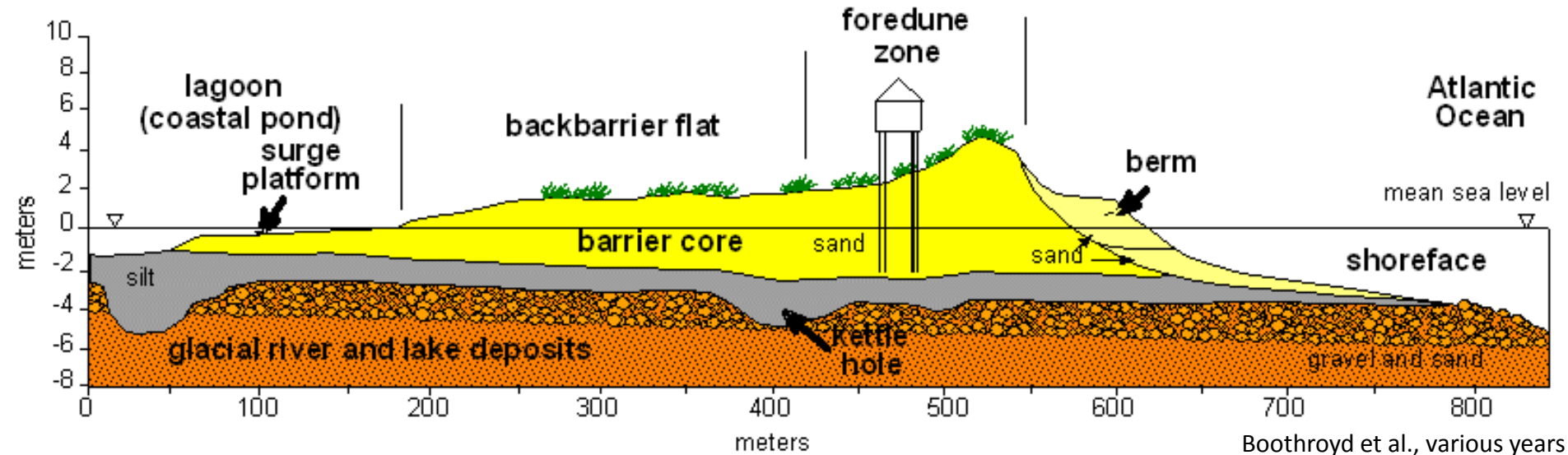
Dag Nummedal



Barrier: Geologic Cross-section



Barrier Geologic Cross-Section



Napatree Point Through Time



1939



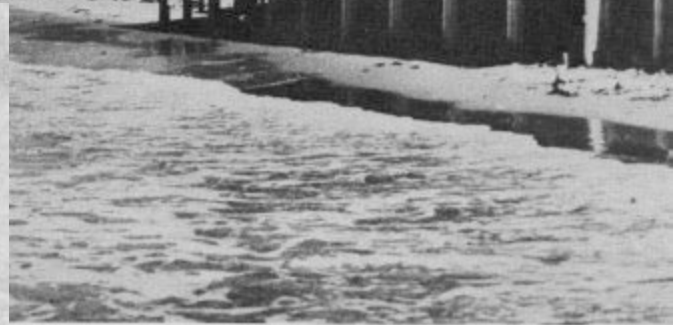
Napatree Point Through Time



Pre-1938 Hurricane



Post-1938 Hurricane



Inlet formation during the 1938 Hurricane



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Nichols and Marston, 1939



Napatree Point Through Time

1962

Hurricane Carol (1954)
Ash Wed Storm (1962)



Napatree Point Through Time



1972

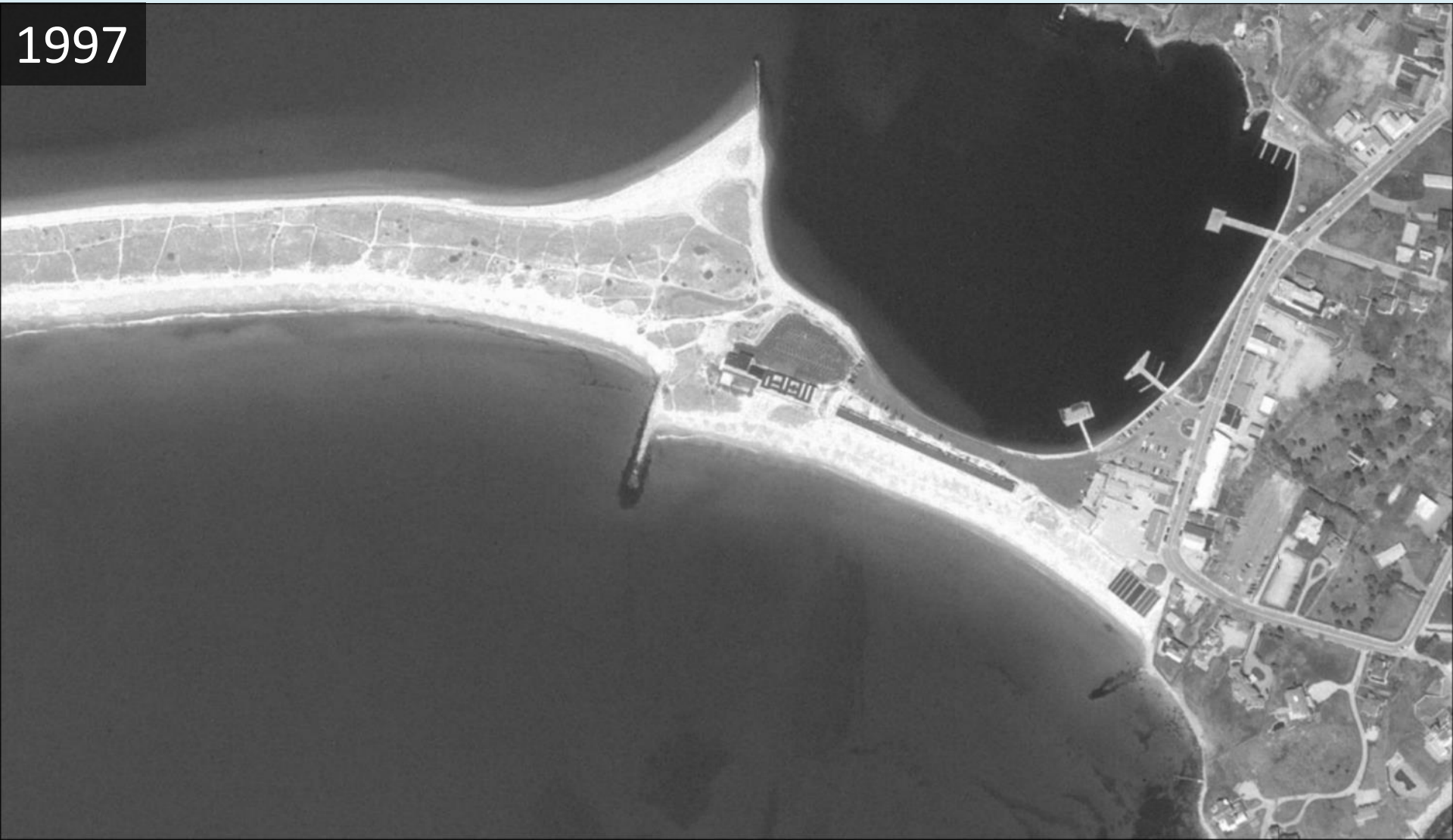


Napatree Point Through Time



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1997



Napatree Point Through Time



2012



Barrier Migration



Overwash and washover fan deposition is the natural response of barriers to storms (and sea level rise)

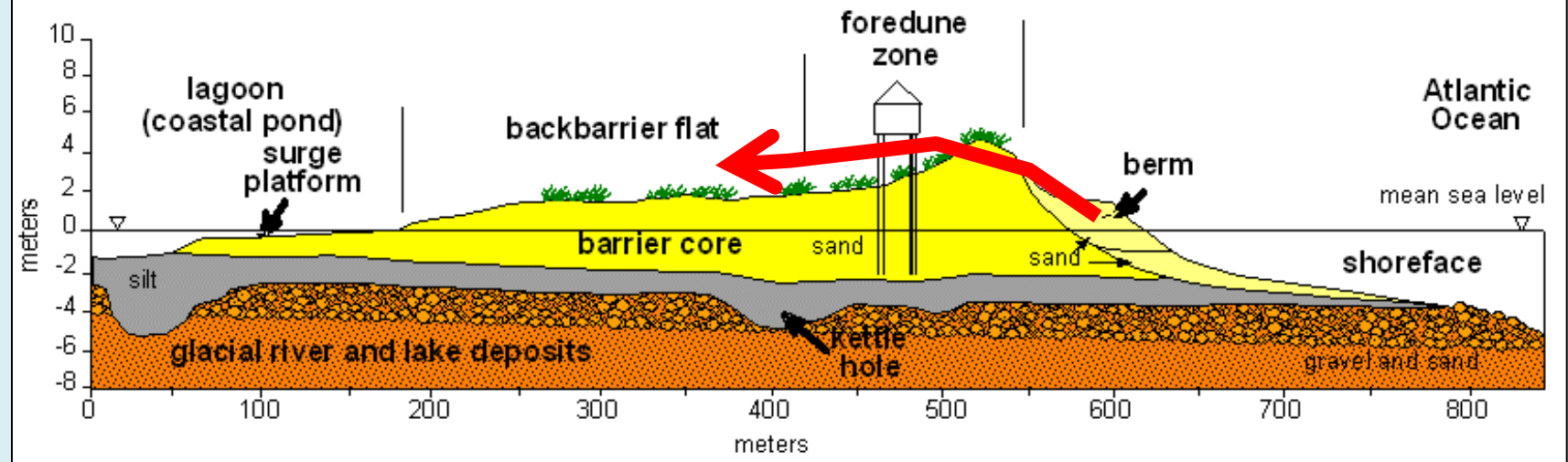




Barrier Migration

Barriers migrate landward and upward!

Barrier Geologic Cross-Section



Barrier Migration



The response of the *humans* to washover fan deposition...



The future of barriers...



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- The combined effect of rising sea level and stronger storms potentially acting at higher elevations on the barrier could **accelerate shoreline retreat**

Gutierrez et al., 2007



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The future of barriers...

- Barriers are sensitive to a variety of driving forces... ...changes in processes could make a barrier 'less stable'
- ...the potential for rapid barrier-island migration or segmentation/disintegration is high

Gutierrez et al., 2007





The future of barriers

- Overwash and deposition of washover fans **critical for barrier migration in response to storms and sea level rise**
(Godfrey and Godfrey, 1976; Leatherman, 1979, Houser and Hamilton, 2009; Timmons et al. , 2010)
- This geologic process, which can look catastrophic in the immediate aftermath of a storm, is vital to the evolution of (Barriers) in response to future storms and sea level rise.



Let the geologic processes... geologize!

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Pete August

Stewardship at Napatree: It Takes a Village

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Our Partners

The 'Our Partners' section features a grid of logos for various organizations. At the top left is the Watch Hill Conservancy logo. To its right is the Watch Hill Fire District logo, which includes the text 'Chartered 1901'. Further right is the Napatree Point Conservation Area logo, a diamond-shaped emblem with a bird. Below these are the U.S. Fish & Wildlife Service logo, the Coastal Resources Management Council (CRMC) logo, and the RbodyNative.org logo. The Coastal Institute logo is centrally located. To its right are the BIM (Rock Island Maritime Institute) logo and the Rhode Island Natural History Survey logo. Below the Coastal Institute logo is the D-E-M logo. To the right of D-E-M is the NOAA logo. Further right is the USDA logo. Below the NOAA logo is the QLF logo. To the right of QLF is the MESM logo. Below the MESM logo is the EDC logo. To the right of the EDC logo is the Save the Bay logo. Below the Save the Bay logo is the logo for The University of Rhode Island, College of the Environment and Life Sciences. To the right of this is the UMass Amherst logo. Below the UMass Amherst logo is the URI Watershed Watch logo. To the right of the URI Watershed Watch logo is the BOEM (Bureau of Ocean Energy Management) logo. Below the BOEM logo is the RIGIS logo. To the right of the RIGIS logo is the Sacred Heart University logo. Below the Sacred Heart University logo is the Eastern Connecticut State University logo. To the right of the Eastern Connecticut State University logo is the logo for The Washington Trust. Below the Eastern Connecticut State University logo is the logo for The Westerly Land Trust.



Stewardship to Enhance Ecosystem Resilience



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Enhancing Plant Diversity for Pollinators



Redirecting Visitor Traffic Away From Fragile Natural Areas



Stewardship to Enhance Ecosystem Resilience



Rare Species Protection



Invasive Species Control



Stewardship to Enhance Ecosystem Resilience



Sand-friendly Fencing



Minimizing Impacts to Submerged Aquatic Resources



Stewardship to Enhance Ecosystem Resilience



Encouraging Proper Behavior and Best Practices

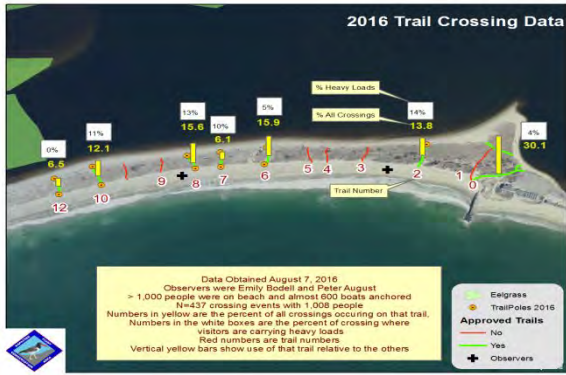


Stewardship Practices to Enhance Ecosystem Resilience



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Monitoring



Getting the Word Out



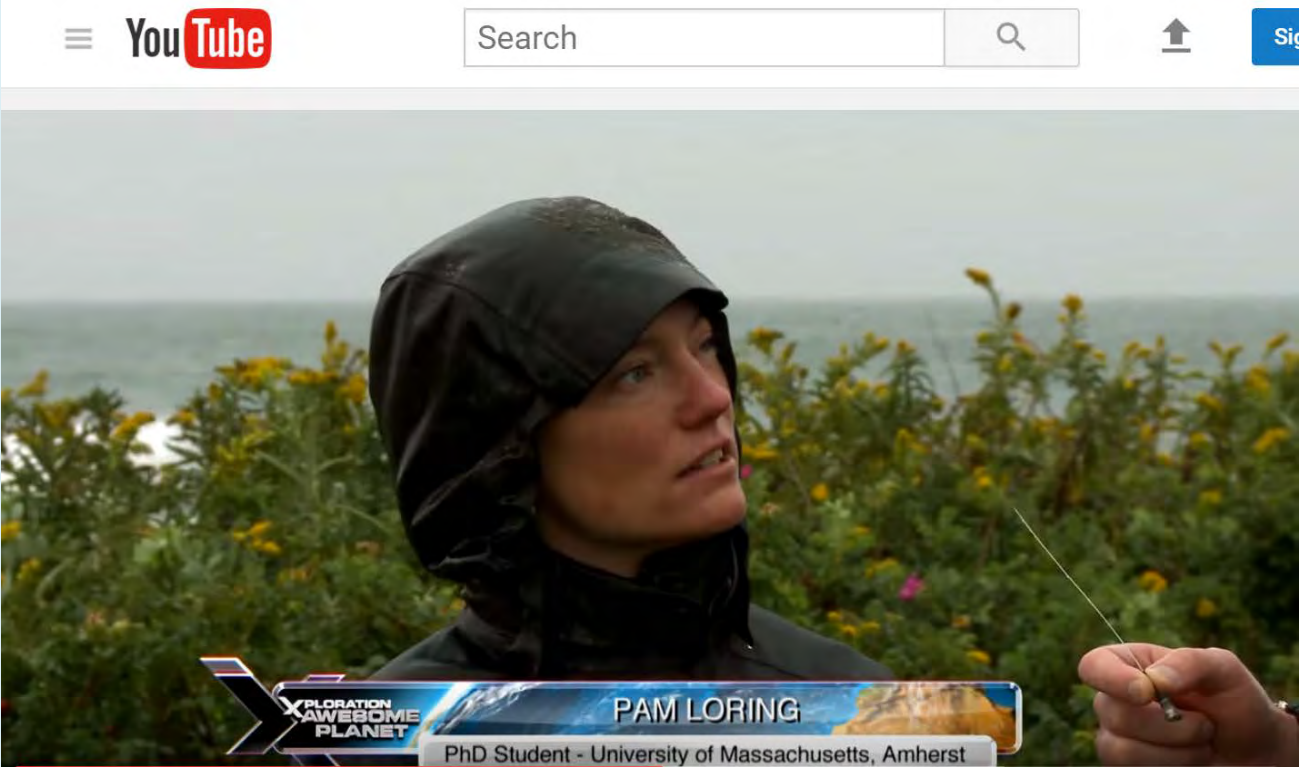
The State of Napatree Report: 2016

A Summary of Monitoring, Stewardship, Management, and Education Programs



Photo credit: Janice Sassi

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