



Natural Climate Solutions Report

Maintaining and Restoring Natural Habitats to Help Mitigate Climate Change



**Marshes are 1st Line of Defense for
*Flood & Erosion Control***



[Natural Climate Solutions Report](#)

R. LaFrance, National Audubon Society (CT)

COASTAL WETLAND NATURAL CLIMATE SOLUTIONS

DR. BROOKE BATEMAN, AUDUBON'S
DIRECTOR OF CLIMATE SCIENCE

Natural Climate Solution	Description
Restore coastal wetlands	Plant native plants, restore natural hydrology (e.g., via water control structures or improved drainage), and improve nutrient management practices; facilitate adaptation potential of salt marshes for sea level rise through raising marsh profile or providing passage for marsh migration, restoration of seagrass beds
Avoided coastal wetland conversion	Establish new protected areas, expand the Coastal Barrier Resource System, improve land tenure, and enforce land-use laws
Reduce anthropogenic nutrient inputs	Improve agricultural practices and treatment of municipal wastewater, improve habitat upstream through re-vegetation to reduce sediment inputs, and better control runoff from storm sewers
Living shorelines	Use plants or other natural elements for stabilization to reduce soil erosion, reduce flooding, and improve coastal resilience

COASTAL WETLAND NATURAL CLIMATE SOLUTIONS

- Coastal wetlands store the most carbon per acre, and can drawdown 2.5 times more carbon per year with restoration efforts
- Get BOTH Mitigation and Adaptation Benefits
- Restoration of coastal wetlands will build resilience against Sea Level Rise for birds like Saltmarsh Sparrow



Saltmarsh Sparrow

CT POLICY SOLUTIONS

- GC3 – Finance Report / Gov.'s EOs
- ACC CLIMATE CHANGE ADAPTATION (2021)
- State-dedicated funds to leverage federal funds
- New Federal Funding Opportunities



[\\$4M Marsh Restoration Project Launches in Stratford](#)



[Progress made on freshwater ponds at Great Meadows Marsh](#)

Corrie Folsom-O'Keefe, Director of Bird Conservation

Audubon is “in the game” in Stratford

Why Care About Marshes?

INSIDE THE LONG ISLAND SOUND FOOD WEB

Microscopic animals (zooplankton) receive energy by grazing on tiny plants (phytoplankton); energy then transfers up through complex pathways known as **food webs** as higher animal species eat lower animals and plants. The illustration shows a simplified Long Island Sound food web.

HUMANS: Commercial fish and recreational anglers harvest millions of fish each year to our markets and homes.



LARGER FISH SPECIES: Fish, such as striped bass and bluefish, that prey on smaller forage species.



FORAGE AND LARVAL FISH: Small fish, such as herring, and larva of larger species, such as lobster, which consume copepods.



JELLIES: Floating animals that consume copepods but are a poor source of food for most other animals. Species include jellyfishes and ctenophores (which do not have stingers).



VIRUSES: Marine viruses (principally bacteriophages) are the most abundant biological entities on the planet.



BACTERIA: Mainly single-celled organisms that break down organic substances into nutrients, such as nitrogen, that can be used by plant and animal life.



DETRITUS: Organic matter from plants and animals (pathways shown in lighter lines). Contains nutrients that are consumed and recycled into the food web.



BIRDS: Many coastal birds prey on fish in the Sound.



SEALS: Large mammals increasing in abundance as a result of cleaner waters and the 1972 Marine Mammal Protection Act. They are migrants who spend winters offshore, mainly on rock outcroppings.

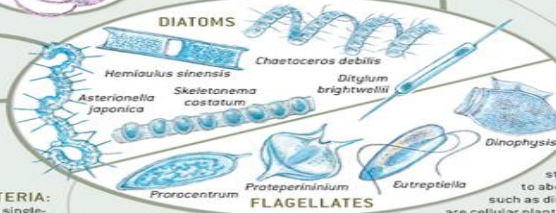
COPEPODS (zooplankton): Microscopic animals that eat phytoplankton and smaller zooplankton. They are crustaceans (related to shrimp), and are important food for larger animals.



CILIATES (zooplankton): Extremely small animals that feed on phytoplankton such as dinoflagellates. They have hair-like structures (cilia) used to move, feed, and breathe.



DIATOMS



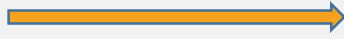
FLAGELLATES

PHYTOPLANKTON: Known as primary producers, the type and growth of these microscopic plants are controlled by environmental factors, including nutrients, light, and temperature. In winter, about 70-90% of phytoplankton "biomass" is composed of diatoms, whose skeletal structures help them stay afloat. In summer, diatom abundance declines to about 30% of phytoplankton mass, as other species such as dinoflagellates increase in abundance. Flagellates are cellular plants that use whip-like organelles (tails) to move up the water column to reach the light needed to make energy.

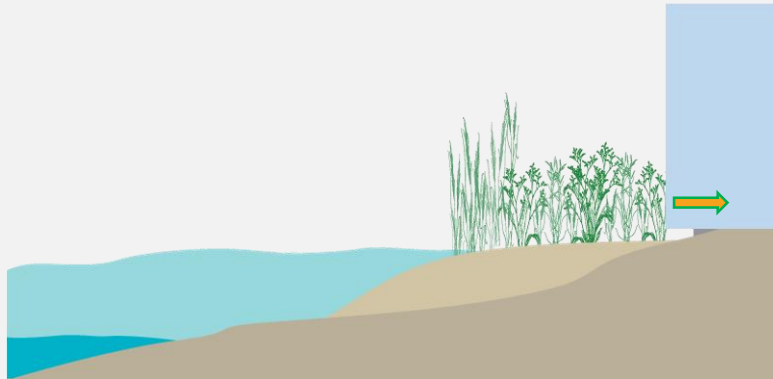
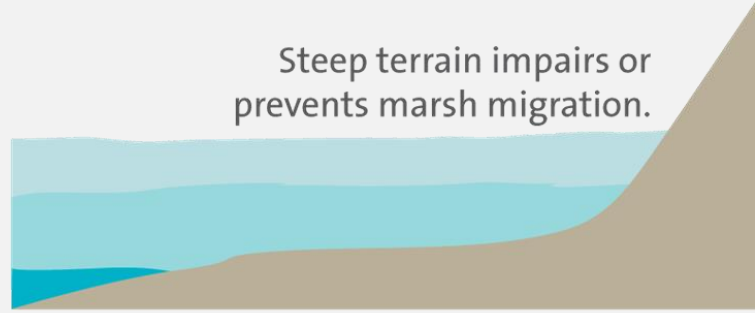
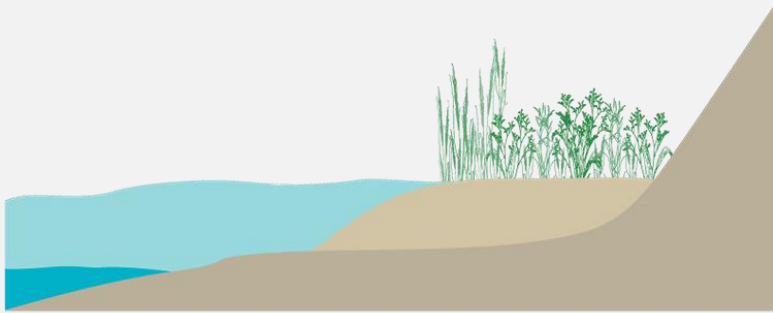


BARRIERS TO MARSH MIGRATION → MARSH LOSS

Current Sea Level



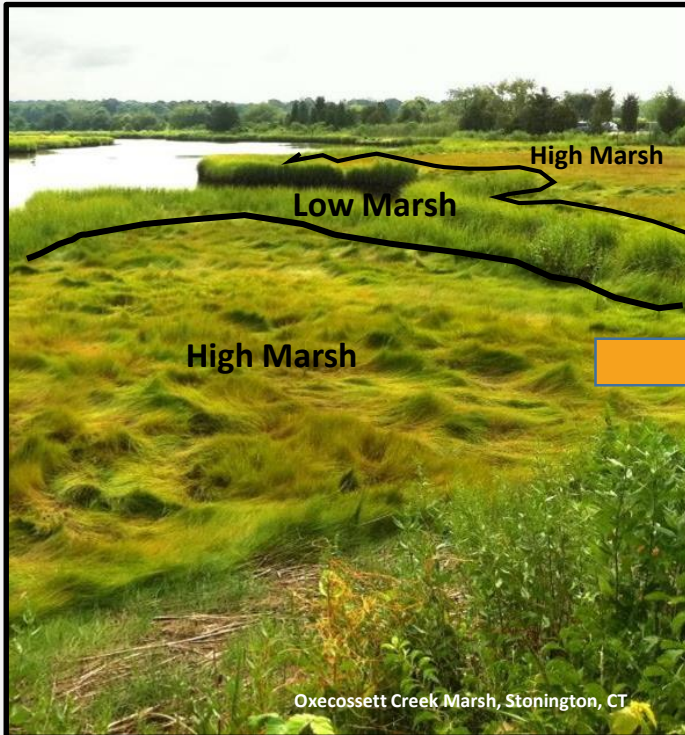
Future Sea Level



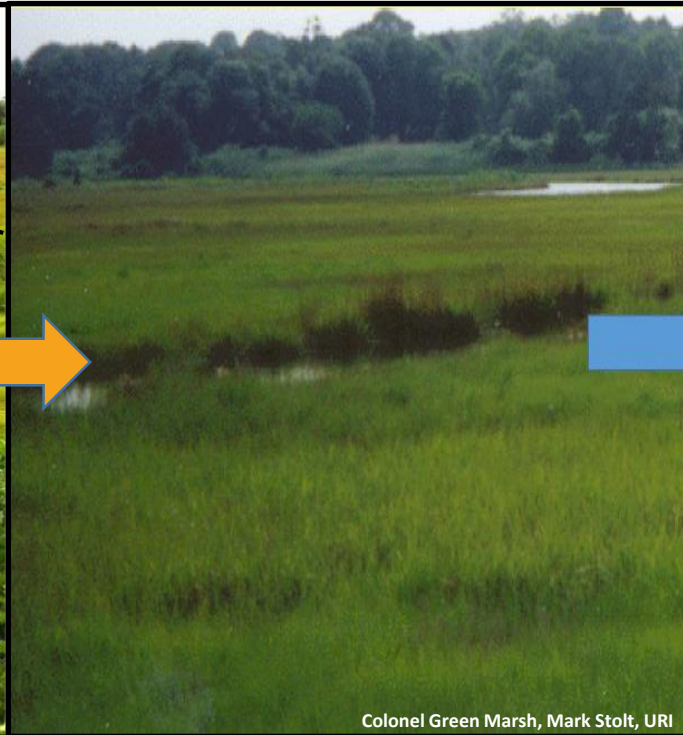
Source: *Make Way for Marshes* (Northeast Regional Ocean Council)

What Does Marsh Change Look Like?

High Marsh



Low Marsh



No Marsh



CT'S FUTURE SALTMARSHES UNABLE TO KEEP PACE WITH SEA LEVEL RISE
(NEAR AUDUBON'S [SALT MEADOWS SANCTUARY](#) IN GUILFORD)
PARTNER - [MENUNKATUCK AUDUBON SOCIETY](#)



CHALLENGE

East River Marsh is threatened by sea-level rise.


SOLUTION

Preserving upland areas will enable the marsh to migrate and naturally adapt.

BENEFITS

Every acre of new marsh adds at least **\$13,951** in ecosystem benefits to the region, annually.

Table 1. Annual, per acre benefits from the East River Marsh.⁶

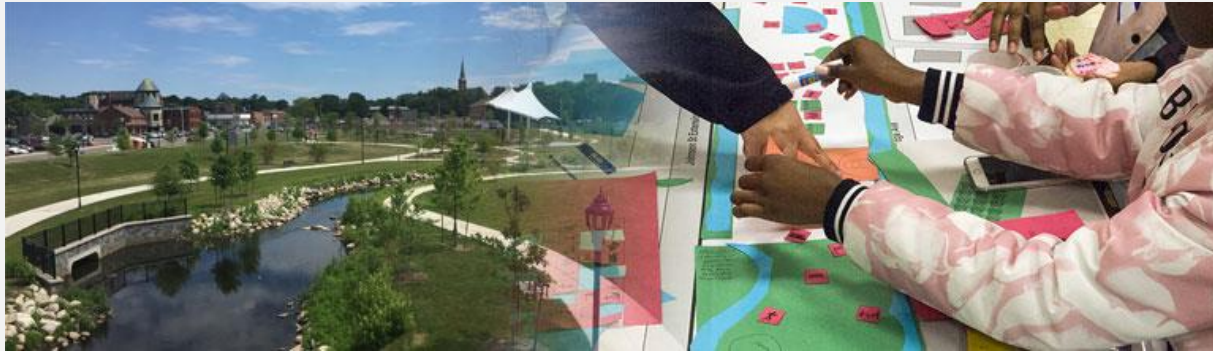
BENEFIT	LOW MARSH	HIGH MARSH
 RESILIENCE		
FLOOD PROTECTION	\$506	\$506
STORM PROTECTION	\$5,872	\$14,680
 ENVIRONMENT		
CARBON SEQUESTRATION	\$2,203	\$4,047
EXISTENCE VALUE ⁷		\$1,748
HABITAT VALUE	\$1,232	\$1,232
WATER QUALITY	\$2,803	\$2,803
 COMMUNITY		
AESTHETIC VALUE	\$952	\$952
RECREATION	\$382	\$382
ANNUAL TOTAL	\$13,951	\$26,350

Photos: Carl Harvey/Menunkatuck Audubon Society



DEEP CLIMATE RESILIENCE FUND

[HTTPS://PORTAL.CT.GOV/CONNECTICUTCLIMATEACTION/EXECUTIVE-ORDER/DEEP-CLIMATE-RESILIENCE-FUND](https://portal.ct.gov/connecticutclimateaction/executive-order/deep-climate-resilience-fund)



DEEP CLIMATE RESILIENCE FUND

- Track I: Planning
- Applicants can seek up to \$250,000 to fund climate resilience planning that addresses the impacts of climate-related hazards, including how climate change increases weather-related risks.
- **Eligible Applicants include:** Municipalities, Councils of Government, Non-Profit Organizations, Academic Institutions, and private sector entities.

DEEP CLIMATE RESILIENCE FUND

- **Track 2: Project Development**
- Applicants can seek funds to advance resilience project scoping and development that leads to federal funding for implementation. While there is no cap on the amount of funding that can be requested, DEEP expects to fund most project development grant application requests in a range of \$300,000 to \$700,000.
- **Eligible Applicants include** Municipalities, Councils of Government, Non-Profit Organizations, Academic Institutions, and private sector entities.
- The early decision deadline for Track 2 applications is Friday, October 21. Final deadline for all Track 2 applications is 11:59 pm, Thursday, December 1.

CLIMATE RESILIENCE PROJECT PIPELINE

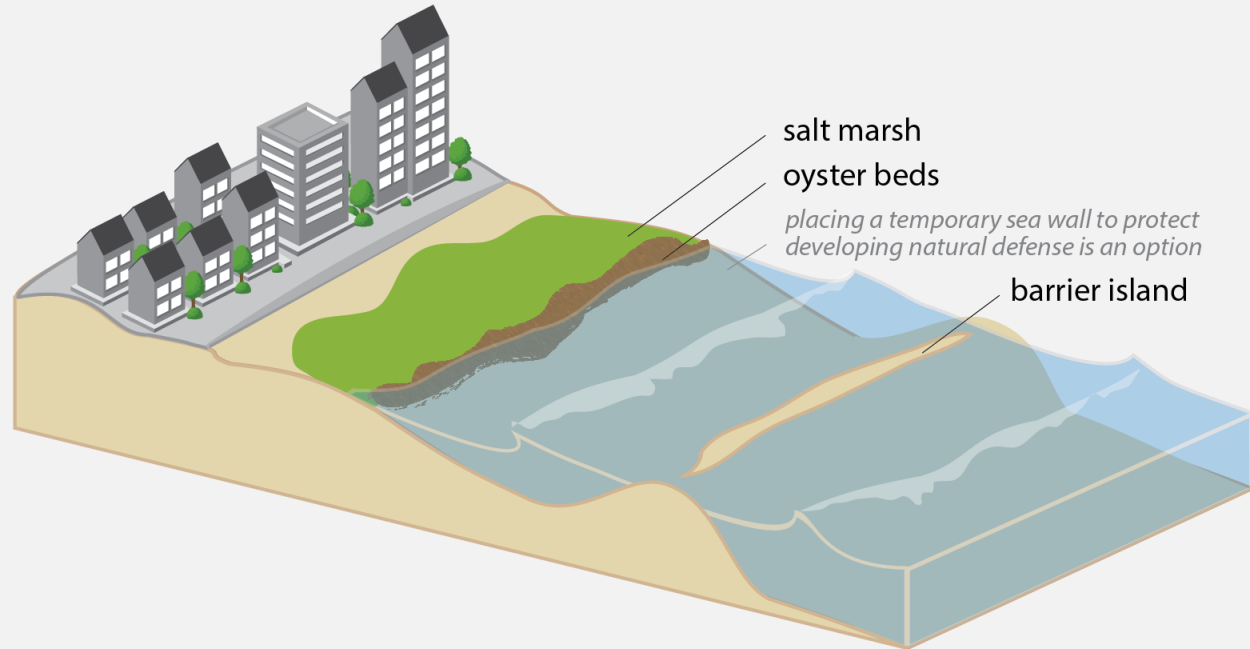
- A primary outcome of this program is to help Connecticut communities develop a climate resilience project pipeline that can win competitive federal grant funding to substantially fund those projects' implementation and construction.
- Federal resilience grant competitions for communities include, but are not limited to:
- [Federal Emergency Management Agency \(FEMA\) Building Resilient Infrastructure and Communities \(BRIC\) program](#)
- [FEMA Hazard Mitigation Grant Program \(HMGP\)](#)
- [FEMA Flood Mitigation Assistance Program \(FMA\)](#)

CLIMATE RESILIENCE PROJECT PIPELINE (CONT.)

- [National Fish and Wildlife Federation \(NFWF\) National Coastal Resilience Fund \(NCRF\)](#)
- [NFWF Long Island Sound Futures Fund \(LISFF\)](#)
- National Oceanic and Atmospheric Administration (NOAA) [Transformational Habitat Restoration and Coastal Resilience Grants](#)
- NOAA [Coastal Habitat Restoration and Resilience Grants for Underserved Communities](#)
- [Connecticut's Clean Water Fund](#) - Reserve for Construction of Green Infrastructure and Reserve for Construction of Resiliency Projects

NATURAL INFRASTRUCTURE

- Benefits of Natural Infrastructure:
 - Can strengthen with time
 - Can be self-maintaining and has the potential for self-repair after storms
 - Can grow and keep pace with sea level rise
 - Can be more cost-effective
 - Provides benefits all the time



ADDITIONAL COASTAL ECOSYSTEM SERVICES



Examples of additional benefits:

1. Fisheries (recreational and commercial)
2. Recreation & tourism
3. Water filtration
4. Cultural services
5. Habitat for other species

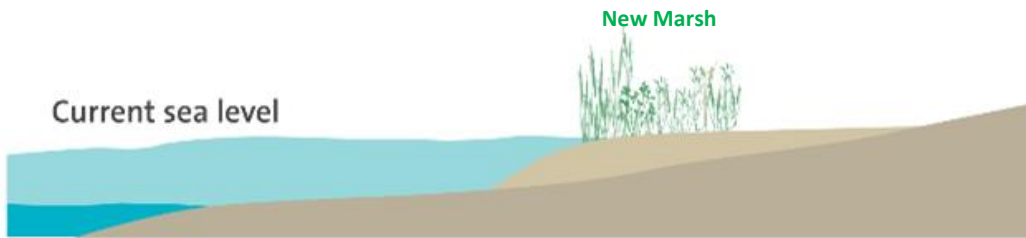
MIGRATION TO HIGHER GROUND

Past sea level

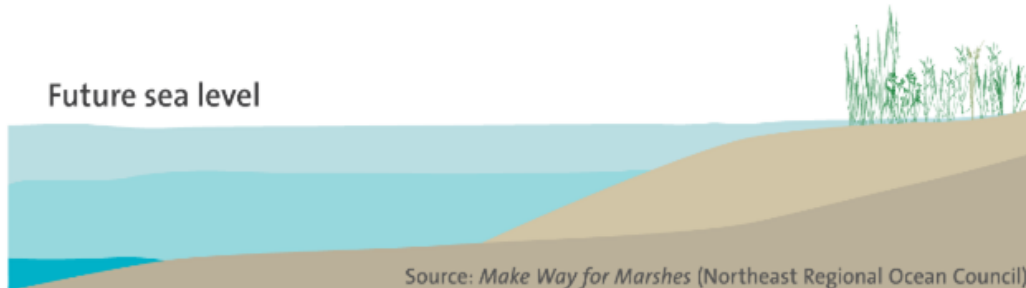


Current sea level

New Marsh



Future sea level



Source: *Make Way for Marshes* (Northeast Regional Ocean Council)

GRAY (BUILT) INFRASTRUCTURE

Sea Wall



Sea Wall and Riprap



Levee



Dike



Natural Infrastructure

Salt Marsh



Coral



Mangrove



Oyster



Dunes



A photograph of a coastal wetland. In the foreground, several white birds, likely egrets or herons, are wading in shallow water. The background shows a dense line of green vegetation, and behind that, a large industrial facility with a tall chimney and a building is visible under a hazy sky. The image is overlaid with a semi-transparent white box containing text.

National Fish and Wildlife Foundation's
National Coastal Resilience Fund
(NCRF)

Joanne Throwe, Field Liaison

NCRF Program Overview

- Administered by NFWF, est. 2018
- Supports nature-based projects that enhance resilience of coastal communities **AND** enhance habitat for fish and wildlife
- Historic federal investment of ~\$30M. Anticipated federal investment of ~\$140M in 2022
- Leverages federal funding with additional private sector contributions

2021 Partnerships

- NFWF
- NOAA
- US Dept. of Defense
- EPA
- AT&T
- TransRe
- Shell
- Occidental Petroleum

NCRF Priority Categories

1. Community Capacity Building & Planning (CCBP)

OR

2. Site Assessment & Preliminary Design (SA/PD)

OR

3. Final Design & Permitting (FD/P)

OR

4. Restoration and Monitoring (R&M)

Planning-Level
Grant

Project-Level
Grants

Notes:

- Pick **ONE** priority category based on desired outcome
- Pipeline intended to prepare you for next stage

LISFF 2022 Sources of Funding

~\$10 million > More \$s in 2022. Lower Match.



Springfield-MA



Principles & Priorities

CCMP Cross cutting principles: Resilience, Sustainability, Environmental justice

CCMP Theme: Clean Waters & Healthy Watersheds: Improve wq by reducing nitrogen pollution, CSOs, impervious cover, stormwater and point sources of pollution

- **Examples: Focus N reduction or prevention**
 - Plans for or implementation of...
 - Low Impact Development/Green Infrastructure
 - Wastewater treatment onsite or treatment plant retrofits
 - Riparian and forested buffer and channel bank vegetation enhancement to slow and intercept polluted surface runoff
 - Stream channel reconnection to floodplains and adjacent wetlands to promote nutrient removal and reduce erosion

2020–2024 Long Island Sound Comprehensive Conservation and Management Plan Update

This update contains new and revised Implementation Actions (IAs) for the 2020-2024 planning cycle. The full CCMP with the original IAs is at: longislandsoundstudy.net/2015/09/2015-comprehensive-conservation-and-management-plan.



January 2021

Grant Guidelines

Project Performance Period

- Start w/in 6 months complete w/in 24 months after grant award
- Large-scale implementation projects start w/in 6 months & complete w/in 36 months after grant award
- Grant award notice November 2022
- Project start date not before October 1, 2022

Match

- **Much lower match in 2022. Watch for news.**
- **Non-federal** cash funds and/or in-kind services
 - *Examples: In-kind contributions of staff/volunteer time, materials/services donated or other tangible contributions to the project*
- **May be from applicant or partners**
- **Must be deployed during start and end date of LISFF project**

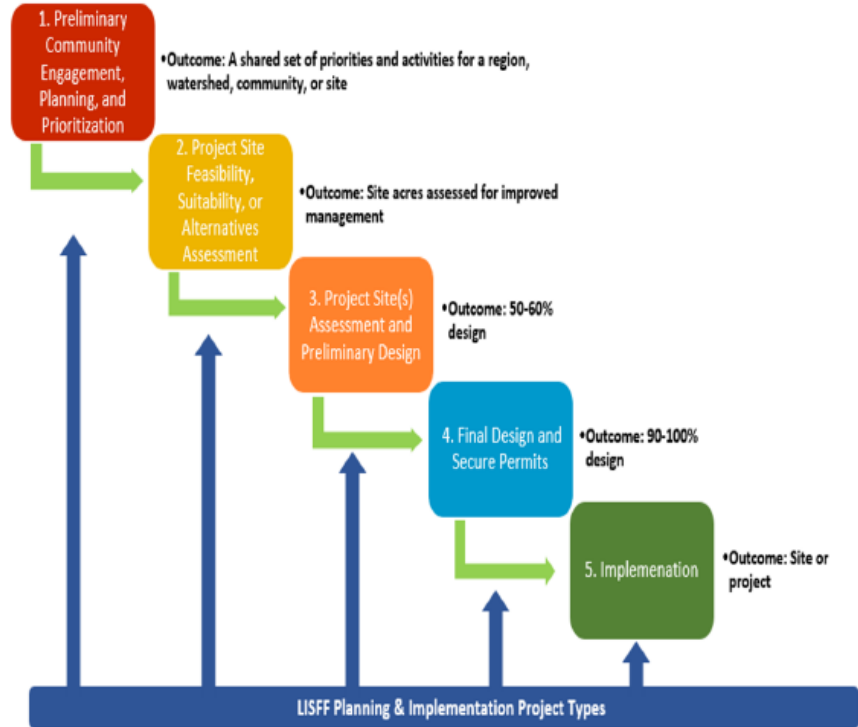


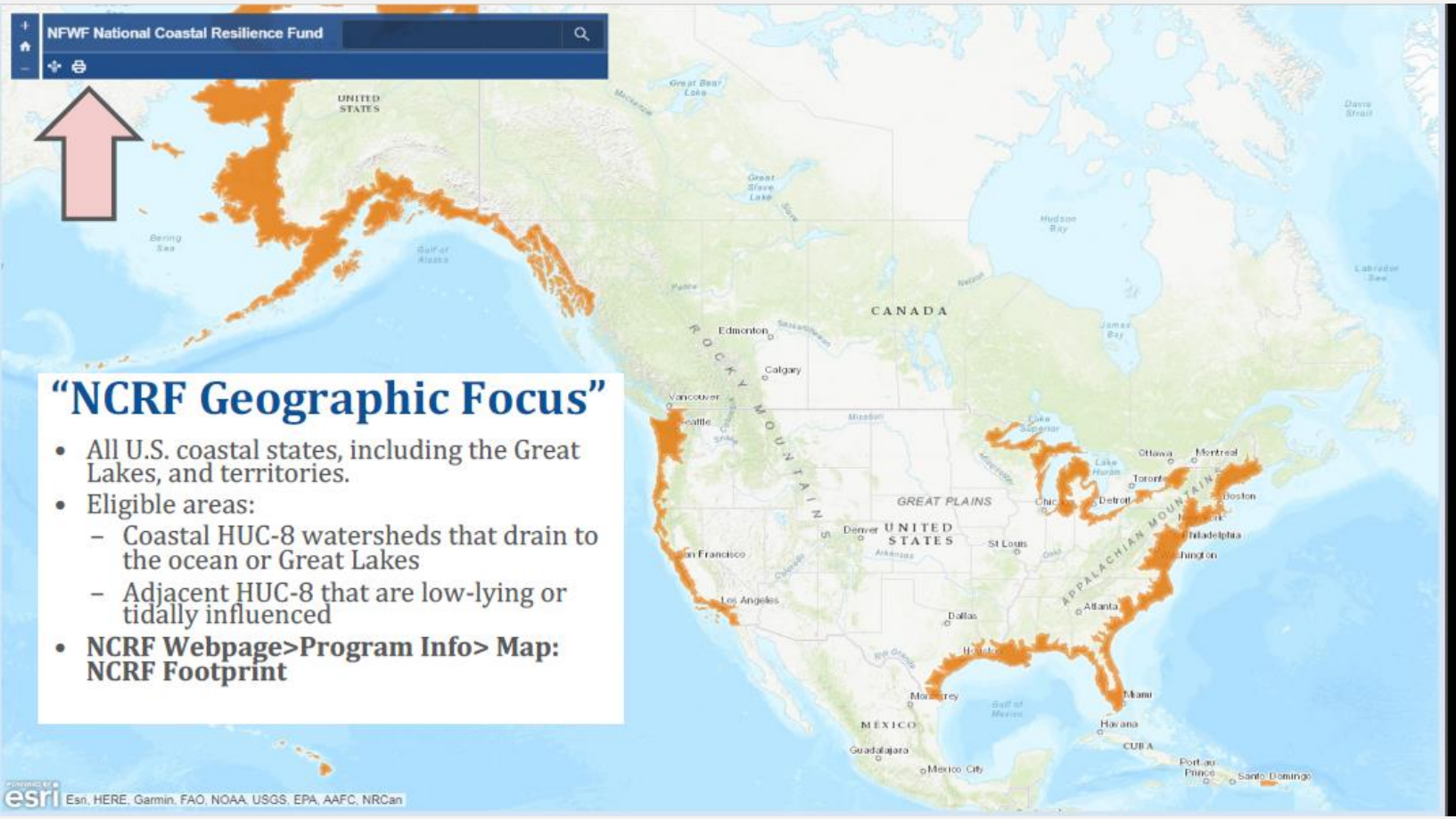
Range of Funds for Grants

Design/Planning: \$50,000 to \$500,000

Implementation: \$50,000 to \$1.5m

Public Participation, Education (only in CT): \$50,000 to \$100,000





“NCRF Geographic Focus”

- All U.S. coastal states, including the Great Lakes, and territories.
- Eligible areas:
 - Coastal HUC-8 watersheds that drain to the ocean or Great Lakes
 - Adjacent HUC-8 that are low-lying or tidally influenced
- **NCRF Webpage>Program Info> Map: NCRF Footprint**

NCRF Eligibility

Eligible

- State, tribal, territorial agencies
- Municipal government
- Non-profits
- Educational institutions
- For-profit organizations*
- Semi-federal orgs./federal partnerships*

Ineligible

- Federal agencies or employees of federal agencies
- Foreign organizations
- Foreign public entities
- Unincorporated individuals

NCRF: Things to Note

- Competitive Applications **MUST**
 - Invest in nature-based solutions (NBS);
 - Have clear benefits to community resilience (i.e, reduced flooding and erosion); **AND**
 - Have clear benefits to fish, wildlife, and habitat

NCRF Priority Categories

1. Community Capacity Building & Planning (CCBP)



2. Site Assessment & Preliminary Design (SA/PD)

3. Final Design & Permitting (FD/P)

4. Restoration and Monitoring (R&M)

- **Avg. project length:** ~2yrs
- **Estimated avg. award amounts:** ~\$300K-\$350K
- **Outcome:** Plan with prioritized nature-based strategies and projects
- **Key components:**
 - Stakeholder engagement, capacity-building
 - Planned resilience projects that include nature-based features

NCRF Priority Categories

1. Community Capacity Building & Planning (CCBP)

2. Site Assessment & Preliminary Design (SA/PD)

3. Final Design & Permitting (FD/P)

4. Restoration and Monitoring (R&M)

- **Avg. project length:** ~1yr
- **Estimated avg. award amount:** ~\$250K-\$500K
- **Outcome:** Preliminary design (30-60%), “go-no go” decision, determines appropriate site(s)
- **Key components:**
 - Projects prioritized in previous planning activities
 - Focus on specific assessment
 - Preliminary permitting conversations
 - May include baseline monitoring

NCRF Priority Categories

1. Community Capacity Building & Planning (CCBP)

2. Site Assessment & Preliminary Design (SA/PD)

3. Final Design & Permitting (FD/P)

4. Restoration and Monitoring (R&M)



- **Avg. project length:** 1.5yrs
- **Estimated avg. award amount:** ~\$500K-\$750K
- **Outcome:** Final design (90-100%), permitting conversations
- **Key components:**
 - Position projects for restoration-ready implementation
 - Readiness for permitting
 - May include baseline monitoring

NCRF Priority Categories

1. Community Capacity Building & Planning (CCBP)

2. Site Assessment & Preliminary Design (SA/PD)

3. Final Design & Permitting (FD/P)

4. Restoration and Monitoring (R&M)



- **Avg. project length:** ≤ 3 yrs + 1 yr monitoring
- **Estimated avg. award amount:** ~\$5M-\$10M
- **Outcome:** Implementation and monitoring
- **Key components:**
 - Projects prioritized in previous planning activities
 - Completed assessments & designs
 - Clear understanding of permitting requirements

WHY SALT MARSH CONSERVATION PLANNING?



Live marsh grasses

Salt marsh in growing season

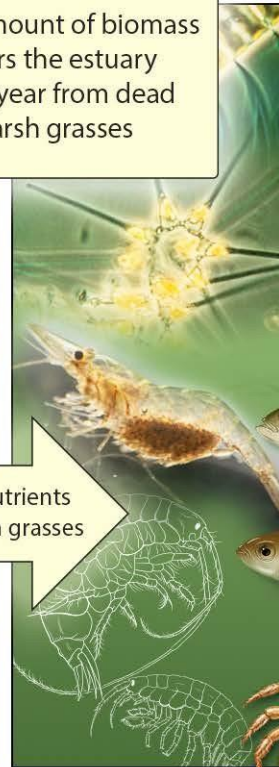


Dead marsh grasses

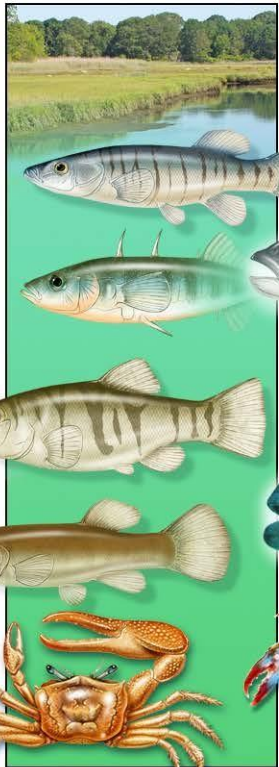
Salt marsh in winter

Huge amount of biomass enters the estuary every year from dead marsh grasses

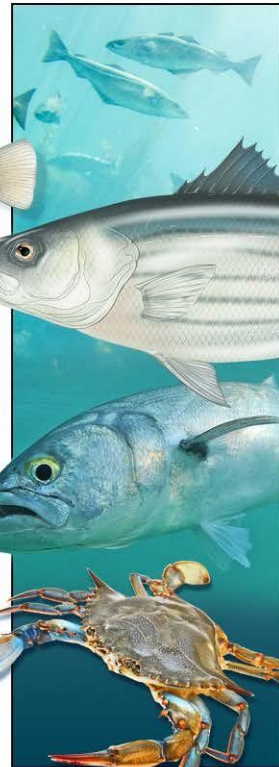
Flow of nutrients from marsh grasses



Primary breakdown by microfauna



Small vertebrates and invertebrates



Larger predators (sport fish, crabs)