

LIVING LANDSCAPES:

Combining Education and Ecology for a more Resilient New York Harbor

Murray Fisher, Co-Founder and Chair, Billion Oyster Project
Brad Howe, SCAPE Landscape Architecture



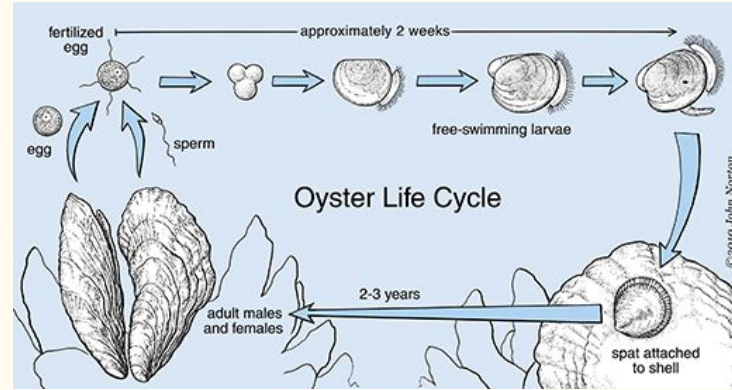


BILLION OYSTER PROJECT

Restoring Oyster Reefs to New York Harbor through public education

**EDUCATION PLUS
RESTORATION.**

What are oysters? Why oysters?





BILION OYSTER PROJECT

- NON-PROFIT, FOUNDED IN 2014**
- BASED AT & BORN OUT OF THE NEW YORK HARBOR SCHOOL**
- 30 EMPLOYEES, \$4.5 MILLION ANNUAL BUDGET**
- OYSTERS RESTORED: 30 MILLION**
- NUMBER OF SCHOOLS ENGAGED: 70**
- RESTAURANTS ENGAGED: 70**
- POWER BOATS: 9**
- BEAT UP VAN: 1**



photo credit Benjamin Von Wong



photo credit Benjamin Von Wong



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HELP RESTORE NEW YORK HARBOR!

For more information visit: www.BOP.nyc

BILION
OYSTER
PROJECT

SHELL COLLECTION

Supported by:



THE 1772 FOUNDATION
Preserving American Historical Structures





photo credit Benjamin Von Wong



BILLION OYSTER PROJECT NEAR YOU

- REEFS
- OYSTER NURSERIES
- SCHOOLS
- OYSTER RESEARCH STATIONS
- RESTAURANTS
- COMMUNITY PARTNERS



Join the movement!

SCAPE

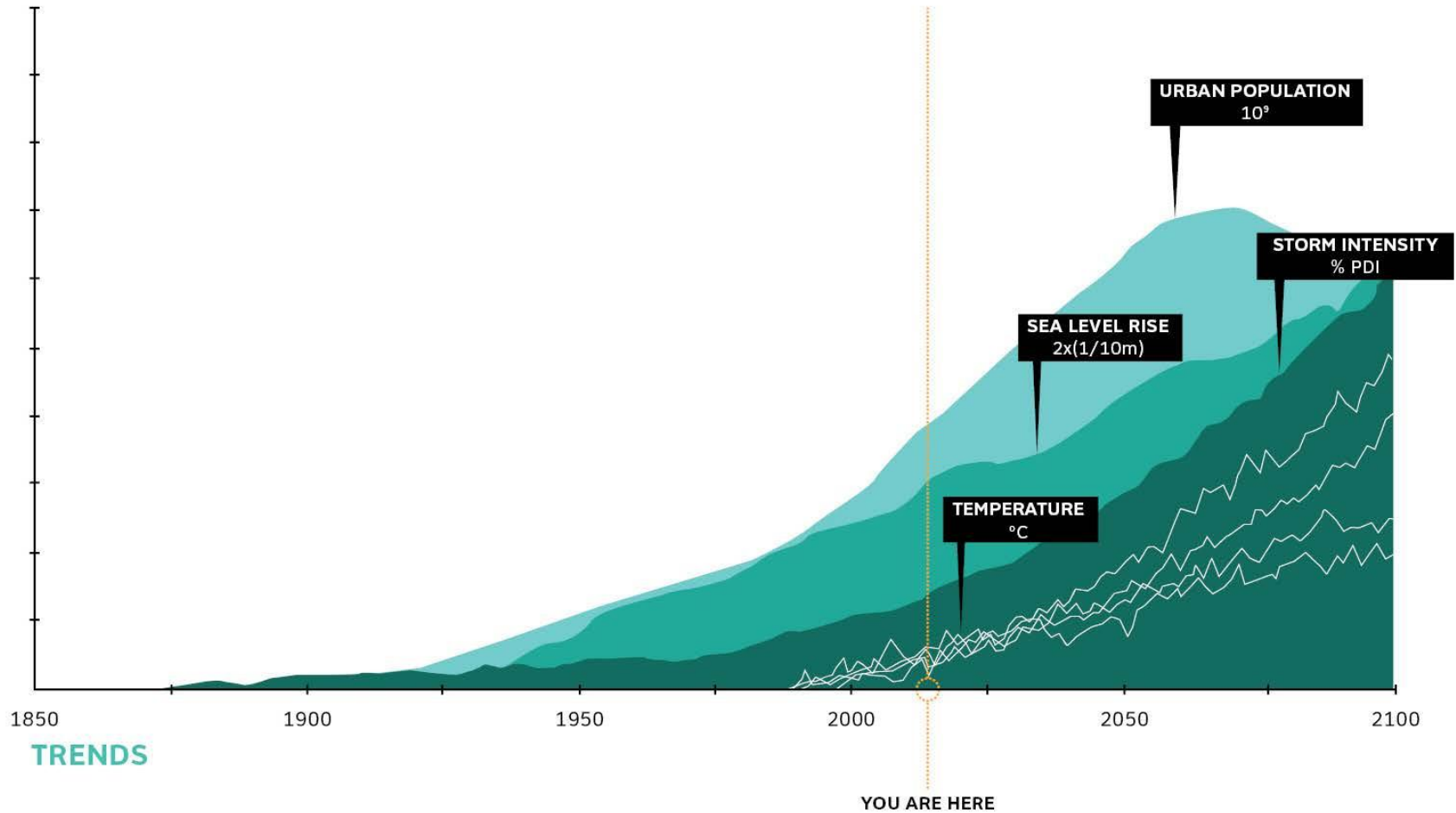


LANDSCAPE ARCHITECTS

ARCHITECTS

URBAN DESIGNERS

PLANNERS



HOW CAN DESIGNERS ACT?



REVIVE LANDSCAPE SYSTEMS



FORGE CONNECTIONS



The image is a composite of two photographs. The left side shows a coastal restoration site with numerous vertical wooden stakes driven into the ground, likely for planting or stabilization. The right side is a close-up of a mussel bed, showing dark, clustered mussels with a small crab on top. The text 'GENERATE ECOSYSTEMS' is overlaid in the center in a bold, yellow, sans-serif font.

GENERATE ECOSYSTEMS



EMBRACE
PHYSICAL REALITY



ENGAGE PEOPLE



EXPERIMENT



PROJECTS ↔ **POLICY**


DESIGNERS VISUALIZE CHANGE.

An aerial photograph of Boston, Massachusetts, showing the city's dense urban grid, the Charles River winding through the center, and the harbor with several islands. The text "RESILIENT BOSTON" is overlaid in large, white, sans-serif capital letters across the middle of the image.

RESILIENT BOSTON

BOSTON
 ITS ENVIRONS and HARBOUR
 with the
REBELS WORKS
 RAISED AGAINST THAT TOWN in 1775
 from the Observations
 of LIEUTENANT PAGE of HIS MAJESTY'S Corps of Engineers,
 and from those of other Gentlemen.

One Mile






WATSON DOCK WHARF

AQUARIUM

Dream Big

YIELD
AHEAD
IN SNOW

1% ANNUAL CHANCE STORM WITH 40" OF SEA LEVEL RISE





DORCHESTER

SOUTH BOSTON

DOWNTOWN

EAST BOSTON



MATTAPAN

FRANKLIN PARK

CODMAN SQUARE

ASHMONT

FIELDS CORNER

TENEAN BEACH

VICTORY PARK

UPHAMS CORNER

NEPONSET RIVER

MALIBU BEACH

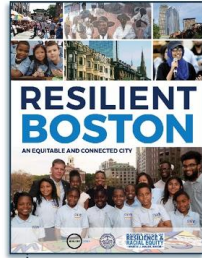
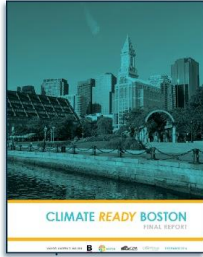
MORRISSEY BOULEVARD

- FLOOD ADAPTED BUILDINGS
- ELEVATED LANDSCAPES
- CONNECTIONS AND ACCESS



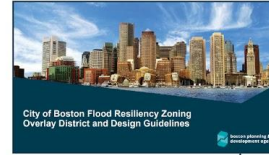
- FLOOD ADAPTED BUILDINGS
- ELEVATED LANDSCAPES
- CONNECTIONS AND ACCESS

2016
CLIMATE READY BOSTON
REPORT



2017
RESILIENT BOSTON

2018
RESILIENT BOSTON
HARBOR VISION

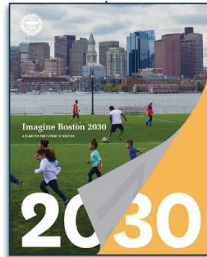
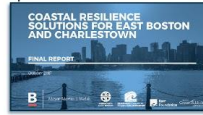


2019
FLOOD RESILIENCY ZONING
OVERLAY DISTRICT AND
DESIGN GUIDELINES

2019 (ONGOING)
CLIMATE READY DOWNTOWN
AND NORTH END



2017
CLIMATE READY EAST BOSTON
AND CHARLESTOWN



2017
IMAGINE BOSTON 2030



2018
CLIMATE READY SOUTH
BOSTON



2018 (ONGOING)
MOAKLEY PARK VISION PLAN

2019 (ONGOING)
CLIMATE READY
DORCHESTER





**DESIGN PROVIDES THE PHYSICAL
CONTEXT FOR ECOLOGICAL AND
SOCIAL LIFE**



LIVING BREAKWATERS

IS 34 Tottenville
Our Lady Help of Christian School

Conference House
Park Visitor Center

Conference House
Park

Shoreline
Protection Project

PS 6 CRI Allan E. I.
Klein School

PS 25
South Richmond
High School

Butler Manor
Wood

PS 3

Oyster Nursery

Floating Water Hub

Living Breakwaters

Shoreline Restoration

Great Kills Harbor

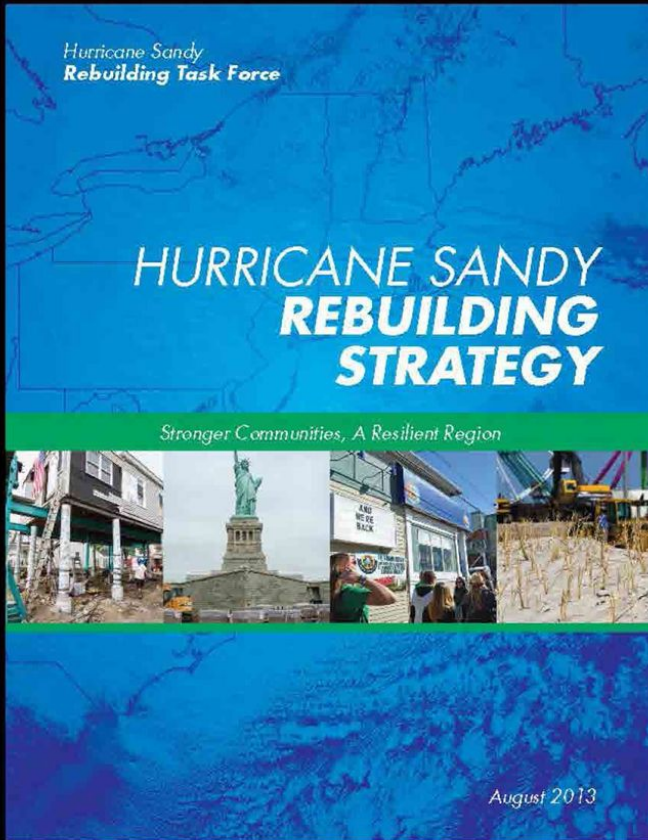
Lemon Creek

Lois to
State New Area

**EDUCATION PLUS
RESTORATION PLUS DESIGN.**

A satellite image of a large tropical cyclone, Hurricane Sandy, showing a well-defined eye and spiral cloud bands. The image is presented in a vertical orientation with black bars on the left and right sides. The word "SANDY" is overlaid in the center of the storm's eye area.

SANDY



REBUILD BY DESIGN

“Climate change is presenting unprecedented threats to communities across the country. Rebuild By Design is a model for how we can use public-private partnerships to spur innovation, protect our communities from the effects of climate change, and inspire action in cities across the world.”

—

Shaun Donovan
Chair of the Hurricane Sandy Rebuilding
Task Force
Secretary of the Department of Housing and
Urban Development

Designing the Process

The TaskForce, with a core group of advisors and staff, created a unique structure for the competition. A successive and connected set of stages was established to orient the design process around in-depth research, cross-sector, cross-professional collaboration, and iterative design development. The design process incorporated a variety of inputs to ensure that each stage's deliverables were based on the best knowledge and talent, and that the final proposals would be replicable, regional, and implementable.

Making room for a collaborative and innovative approach was a side step away from the institutional world. A detour around negotiations, the process aimed to build understanding and trust.

1 TALENT

Objective Gather the talent of the world to work with the talent of the Sandy-affected region.

Process TaskForce Issues a Request for Qualifications and Approaches calling for teams to assemble themselves in interdisciplinary partnerships to tackle the region's physical and social vulnerabilities.

To incentivize participation, the Federal Government pledges funding to implement the winning designs while private philanthropy pledges prize money for competitors.

Result Ten finalist design teams are selected comprising a diverse set of complementary skills and approaches.

2 RESEARCH

Objective Establish the broadest possible understanding of the region's vulnerabilities to future risks and uncertainties, to enhance resilience.

Process Rebuild by Design's local partner organizations create an intensive, three-month program of field research to introduce teams to a variety of local stakeholders, providing a comprehensive view of the storm's effects – the damage it created as well as the long-standing problems it uncovered or exacerbated.

A Research Advisory Board leads the teams through the region to learn from a variety of perspectives, and teams conduct additional research to supplement this on-the-ground work. Research is collaborative across teams and focuses on typologies as well as locations.

Result A public presentation from each team that includes three to five "design opportunities" describing conceptual approaches for interventions and an overall compilation of research submitted by all teams.

3 DESIGN

Objective Develop implementable solutions that have support from local communities and governments.

Process HUD Secretary Shaun Donovan selects, on average, one design opportunity for each team to develop. Teams then gather diverse local stakeholders into community coalitions, with whom they begin a four-month process of co-designing the final interventions. Using meetings, colloquia, charrettes, and

non-traditional events to gain the broadest perspectives, they create solutions that not only address disaster scenarios, but also enrich the daily life of community members.

Result Ten fully developed, implementable resilience proposals champion communities' visions for future development and have support from the local governments.

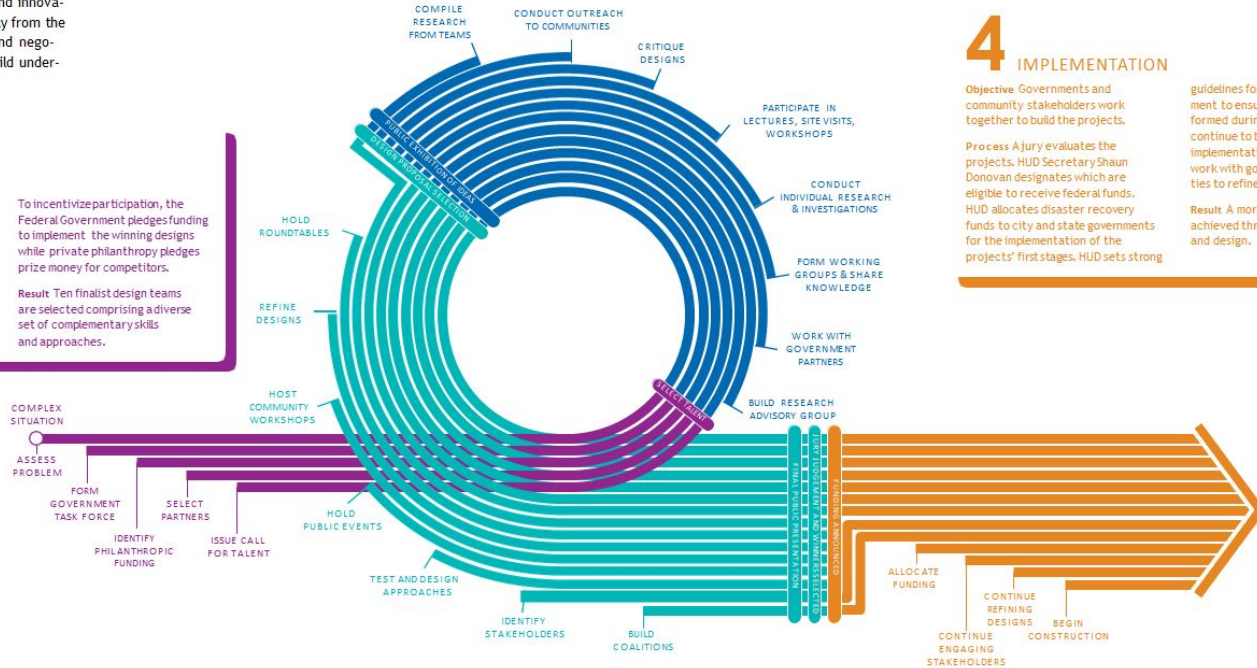
4 IMPLEMENTATION

Objective Governments and community stakeholders work together to build the projects.

Process A jury evaluates the projects. HUD Secretary Shaun Donovan designates which are eligible to receive federal funds. HUD allocates disaster recovery funds to city and state governments for the implementation of the projects' first stages. HUD sets strong

guidelines for community involvement to ensure that the conditions formed during the competition continue to be involved through implementation. Teams are poised to work with government and communities to refine their interventions.

Result A more resilient region achieved through collaboration and design.





Great Kills Harbor

Lemon Creek

PS 3

PS 25
South Richmond
High School

PS 6 CPL. Allan F.
Kivlehan School

Mount Loretto
State Unique Area

Butler Manor
Wood

IS 34 Tottenville
Our Lady Help of Christian School

Conference House
Park Visitor Center

Shoreline
Protection Project

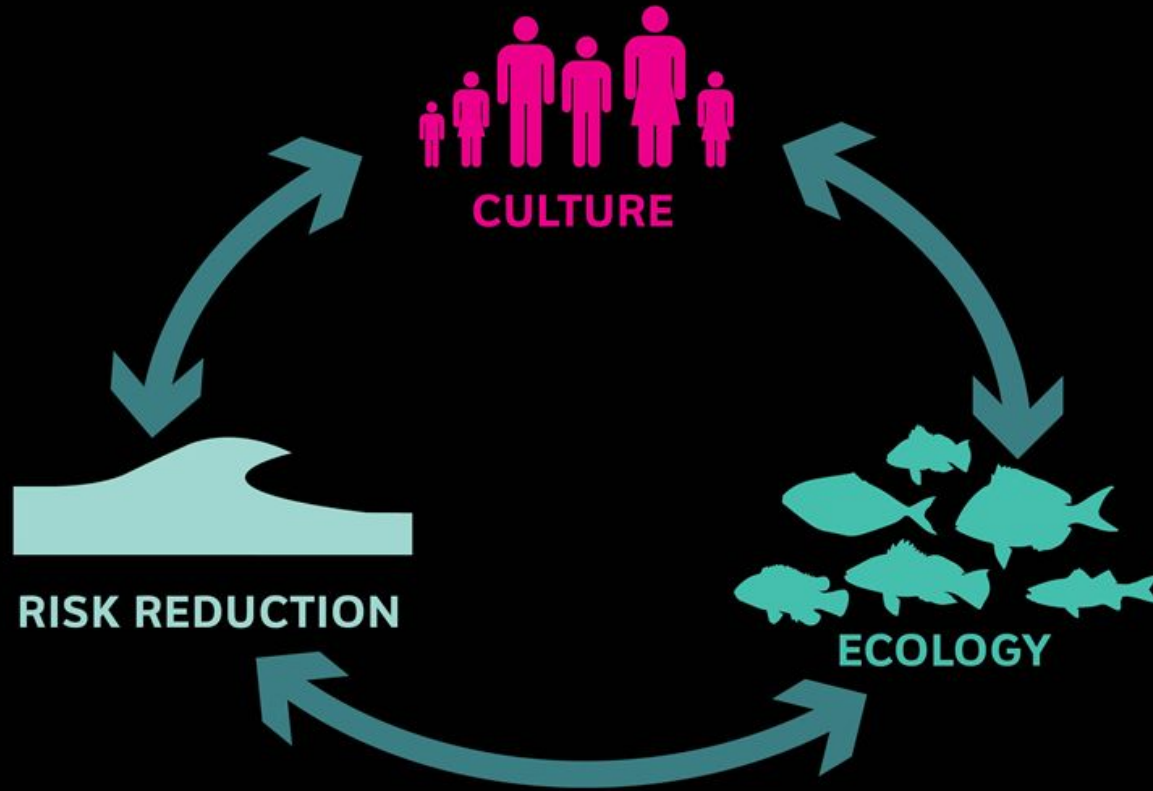
Conference House
Park

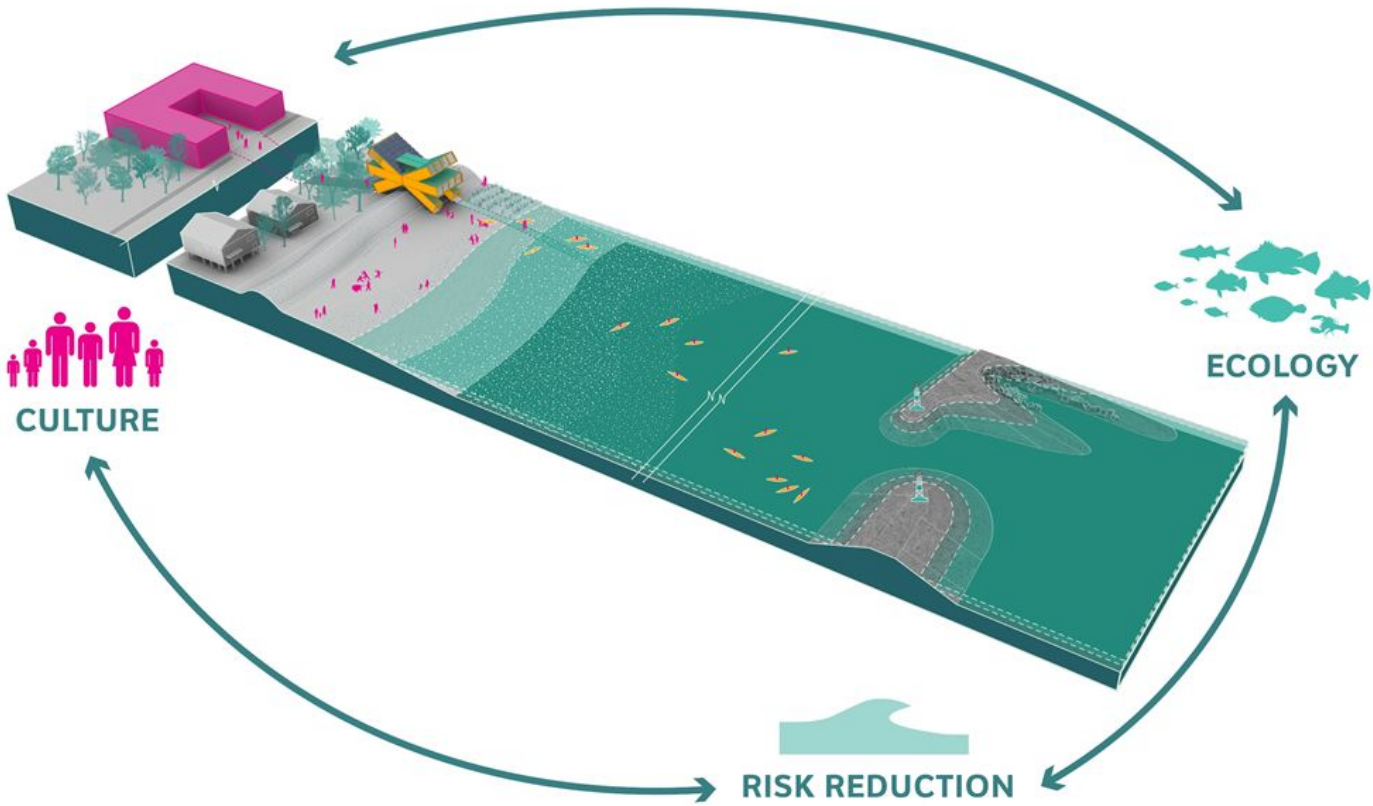
Oyster Nursery

Floating Water Hub

Living Breakwaters

Shoreline Restoration





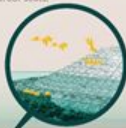
ADJACENT SHELL HALO

Reef ridges were design at a maximum 1:10 slope and incorporate artificial tide pools that retain water between tides, introducing interstitial habitat communities.



EMERGENT HABITAT AND LEE SIDE

Above MHW the breakwater side slopes and crest create opportunities for perching birds as well as haul out areas for harbor seals.



SHALLOW SLOPING INTERTIDAL HABITAT

Reef ridges were design at a maximum 1:10 slope and incorporate artificial tide pools that retain water between tides, introducing interstitial habitat communities.

STEEP SUBTIDAL HABITAT

Vertical and steeply inclined surfaces are placed within the subtidal zone and incorporate both bio-enhancing concrete armor units and stone armor units. The unit complexity, along with low sedimentation and light levels create prime opportunities for the colonization various aquatic organisms.



REEF STREETS CREATE COMPLEX HABITAT

These rocky protrusions and the spaces between are formed by a range of stone sizes and bio-enhancing concrete units. Materials are strategically placed to facilitate complex structured habitat for fish and other aquatic species, particularly juveniles.



OYSTER RESTORATION OPPORTUNITY

The Living Breakwaters create many opportunities for the restoration. Calmer waters on the lee side along with sustained water circulation within the reef streets are prime conditions for the setting and growth of oysters.

WIDENED BEACHES

Reversal of shoreline erosion and accretion of sediment over time will create wider beaches. These beaches will act as an energy buffer and allow for the establishment of dune grasses.

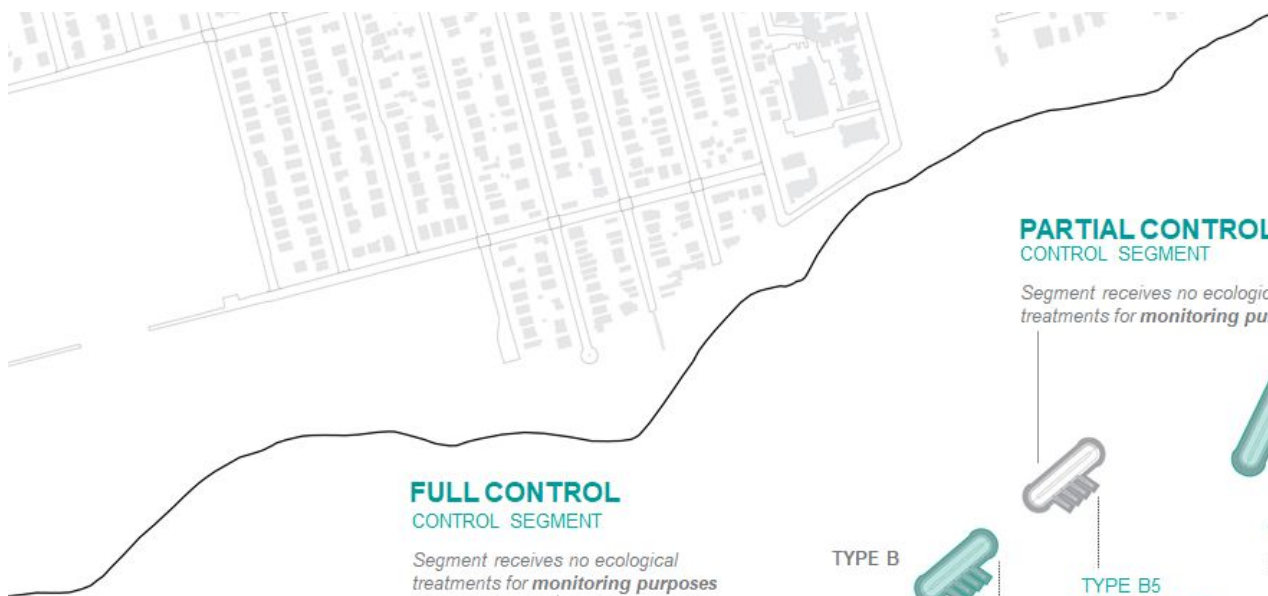


HORSESHOE CRAB SPAWNING HABITAT

Additional sand placed for shoreline restoration or sand that accretes over time will provide additional habitat needed for horseshoe crab spawning.







FULL CONTROL CONTROL SEGMENT

Segment receives no ecological treatments for *monitoring purposes*

TYPE A

TYPE A1 BREAKWATER

- crenellated crest
- reef streets
- ecological treatments

TYPE A2 BREAKWATER

- crenellated crest
- reef streets
- ecological treatments

TYPE B

TYPE B2 BREAKWATER

- reef streets
- ecological treatments

TYPE B3 BREAKWATER

- reef streets
- ecological treatments

TYPE B4 BREAKWATER

- reef streets
- ecological treatments

TYPE B5 BREAKWATER

- reef streets

PARTIAL CONTROL CONTROL SEGMENT

Segment receives no ecological treatments for *monitoring purposes*

TYPE C

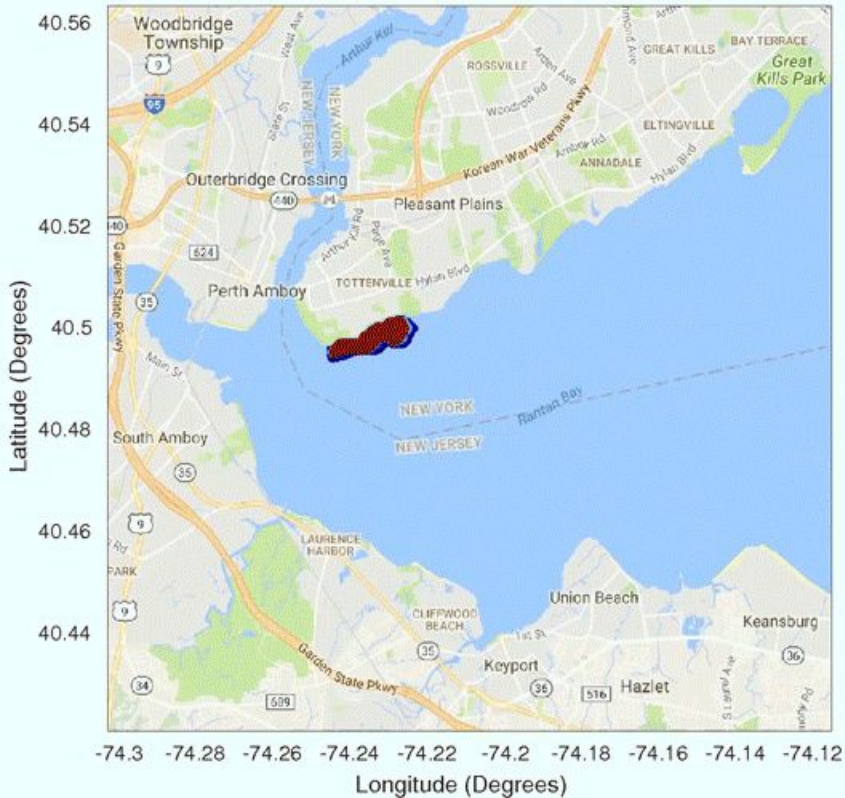
TYPE C1 BREAKWATER

- ecological treatments

TYPE C1 BREAKWATER

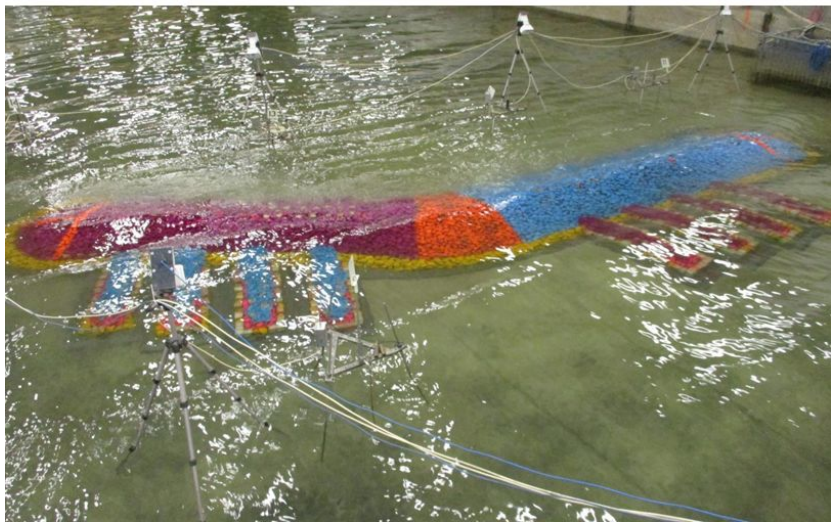
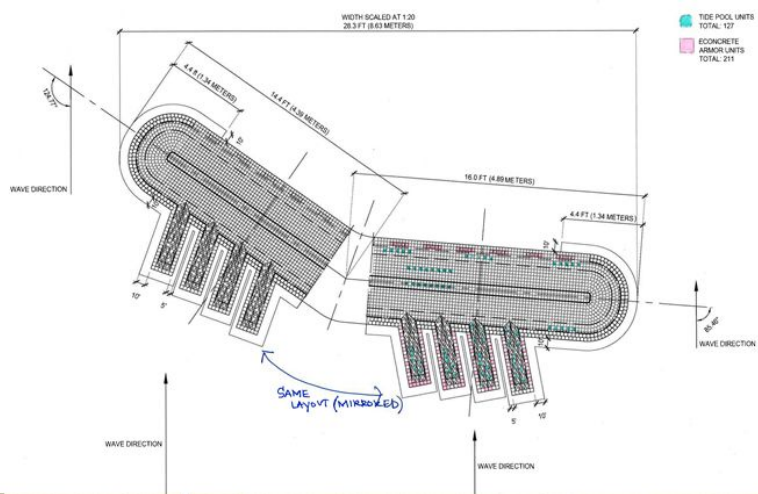
- reef streets
- ecological treatments
- intertidal berm

Percent Remaining Tracer Concentration - 0.01 days



Percent Remaining Tracer Concentration - 0.01 days



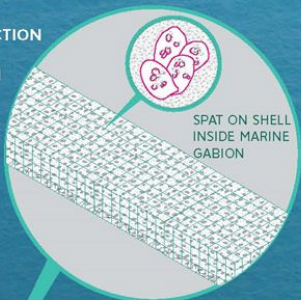




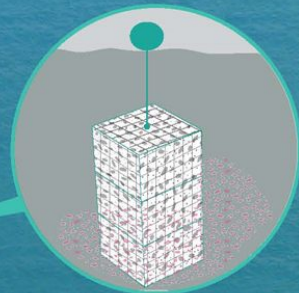


OYSTER RESTORATION TECHNIQUES

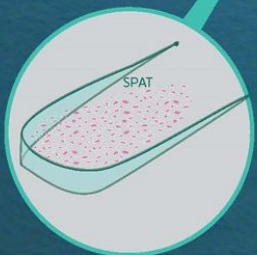
REEF CONSTRUCTION
TECHNIQUE:
OYSTER GABION



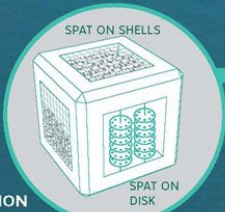
SPAT ON SHELL
INSIDE MARINE
GABION



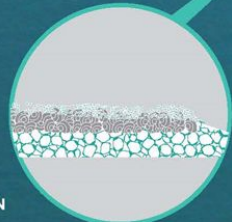
NURSERY (SPAT SANCTUARY)
FLOATING STRUCTURES IN THE LEE OF
THE BREAKWATER



REEF CONSTRUCTION
TECHNIQUE:
IN SITU SETTING



REEF CONSTRUCTION
TECHNIQUE:
BIO-ENHANCING CONCRETE UNITS
WITH "OYSTER DISKS"



REEF CONSTRUCTION
TECHNIQUE:
DISPERSAL OF LOOSE SPAT ON SHELL



NAVIGATIONAL GUIDE AND
MONITORING CAMERA TO
PREVENT POACHING





THANK YOU!

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