GAME OF FLOODS : PRESERVATION EDITION

ALEX WESTHOFF, AICP
MARIN COUNTY COMMUNITY DEVELOPMENT AGENCY
CA PRESERVATION FOUNDATION, 4/20/16

AGENDA

10:45 Presentation

11:15 Strategize (Individually)

11:35 Discuss (Small Groups)

12:00 Report Back (large group)

START

THE GAME OF FLOODS *Marin Island*

Sea levels are rising world-wide as warming oceans expand and melt glaciers and ice sheets. Stronger storms coupled with rising seas can significantly damage— even destroy— property, infrastructure, public facilities, natural habitats, and other resources we depend on. In the face of these threats, you are tasked with collaboratively developing a Sea Level Rise Adaptation Plan using the strategies (game pieces).

1. To begin, one player reads the sea level rise scenario aloud.
2. Role the dice to determine who goes first. The highest roll goes first. If a tie occurs, the tied players must re-roll. Players take turns in clockwise order.
3. In turn, each player selects an asset to accommodate, defend, or retreat from. No need to duplicate assets. Use the worksheet provided to record your choice, costs and pros and cons.
4. Next, in turn, each player places and states aloud their preferred adaptation strategies on or around the island. Conflicting strategies are allowed.
5. Use the remaining time to finalize the group's proposal by resolving conflicts. Consider the following factors to inform the proposal: (1) Costs/funding, (2) Private property impacts, (3) Environmental impacts, (4) Equity/social justice concerns, (5) Others. Use your worksheet to take notes.

LEGEND

Evacuation Route
Storm Shelter
Electrical Sub-Station
Marina
Gas Station
Sewage Lift Station
Mammal Habitat
Seabird Colony
Aquaculture
Ranch
Agriculture
Sheriff
Grocery
Public Well
Home
Water
Roadway
Beach
School Site
Restaurant
Boat Launch
Parking
Library
Historic Church
Hospital
Fire Station
Post Office

GAME PIECES

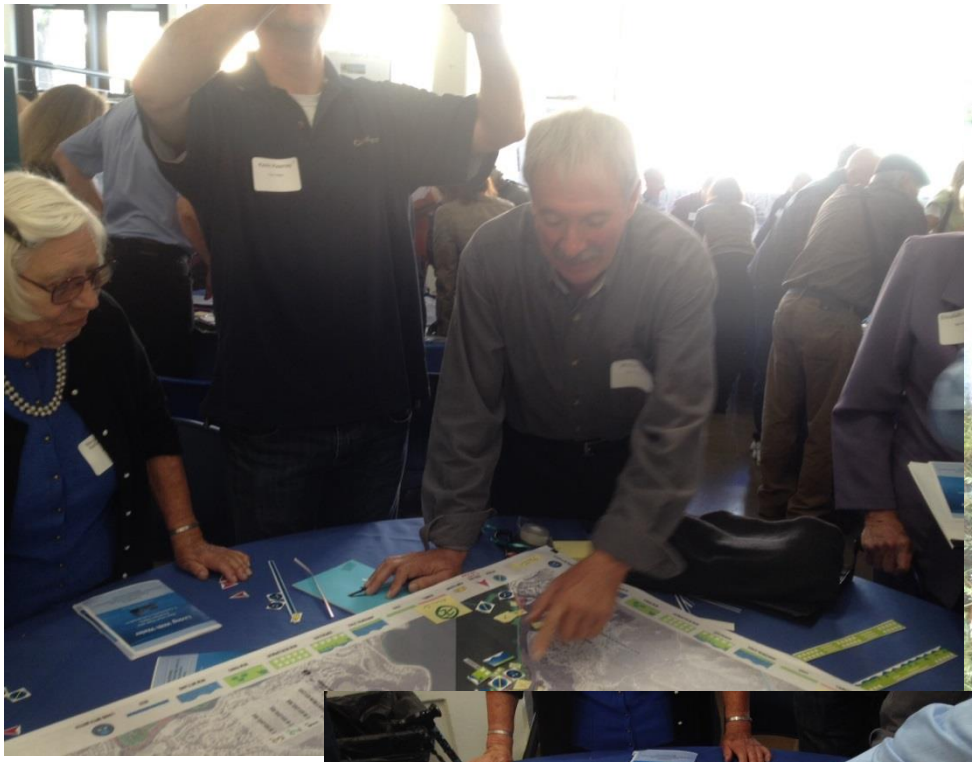
Managed Retreat
- Retreat $$$$ | E | ●
- Post-storm prohibitions $ | E | ●
- Move here $$$ | EEE | ●
- Stricter land use zoning $ | E | ●

Accommodate Water
- Elevate Buildings $$$ | EE | ●
- Elevate/New Road $$$$$ | EEE | ●
- Floodable Buildings $$$$$ | EEE | ●

Hard Engineering
- Revetment/Seawal $$$ | EEE | ●
- Tide Gate $$$$$ | EEE | ●
- Traditional Levee $$$$ | EEE | ●
- Wall & Pump Station $$$ | EEE | ○

Soft Engineering
- Horizontal Levee $$$$ | E | ●
- Offshore Structure $$ | EE | ●
- Wetland/shoreline vegetation $$$ | E | ●
- Beach Maintenance $$$ | EE | ○

COUNTY OF MARIN
C-SMART Program
May 2015




PUMP STATION
SEAWALL
LEVEE
HORIZONTAL LEVEE
SUPERLEVEE
NEW DEVELOPMENT
NEW PARKS
NEW WETLAND
REEF
LIVING WITH WATER


4
4
3'
2'
1'
0'
PUMP STATION
SEAWALL
LEVEE
HORIZONTAL LEVEE
SUPERLEVEE
NEW DEVELOPMENT
NEW PARKS
NEW WETLAND
REEF
LIVING WITH WATER

GAME OF FLOODS: PT. REYES STATION

HIGH SCHOOLS

PRESERVATION EDITION

Advisory assistance provided by*:*

National Trust *for* Historic Preservation
Save the past. Enrich the future.™

Changes:

- More urban look and feel
- Increased assets of historical/cultural significance
- Integrity impacts
- Documentation

Developed for:

KEEPING HISTORY ABOVE WATER
APRIL 10-13, 2016 | NEWPORT, RI

CALIFORNIA PRESERVATION FOUNDATION

THE GAME OF FLOODS

Preservation Edition

START

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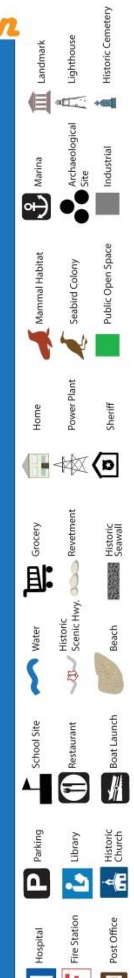
Consider the following factors to inform the proposal: (1) Costs/funding, (2) Private property impacts, (3) Environmental impacts, (4) Equity/social justice concerns, (5) Others. Use your worksheet to take notes.

Sea Level Rise 2050 Scenario Key

RED AREA = Permanent Sea Level Rise Flooding
ORANGE AREA = Temporary Annual Storm Flooding
YELLOW AREA =Temporary 100-Year Storm Flooding

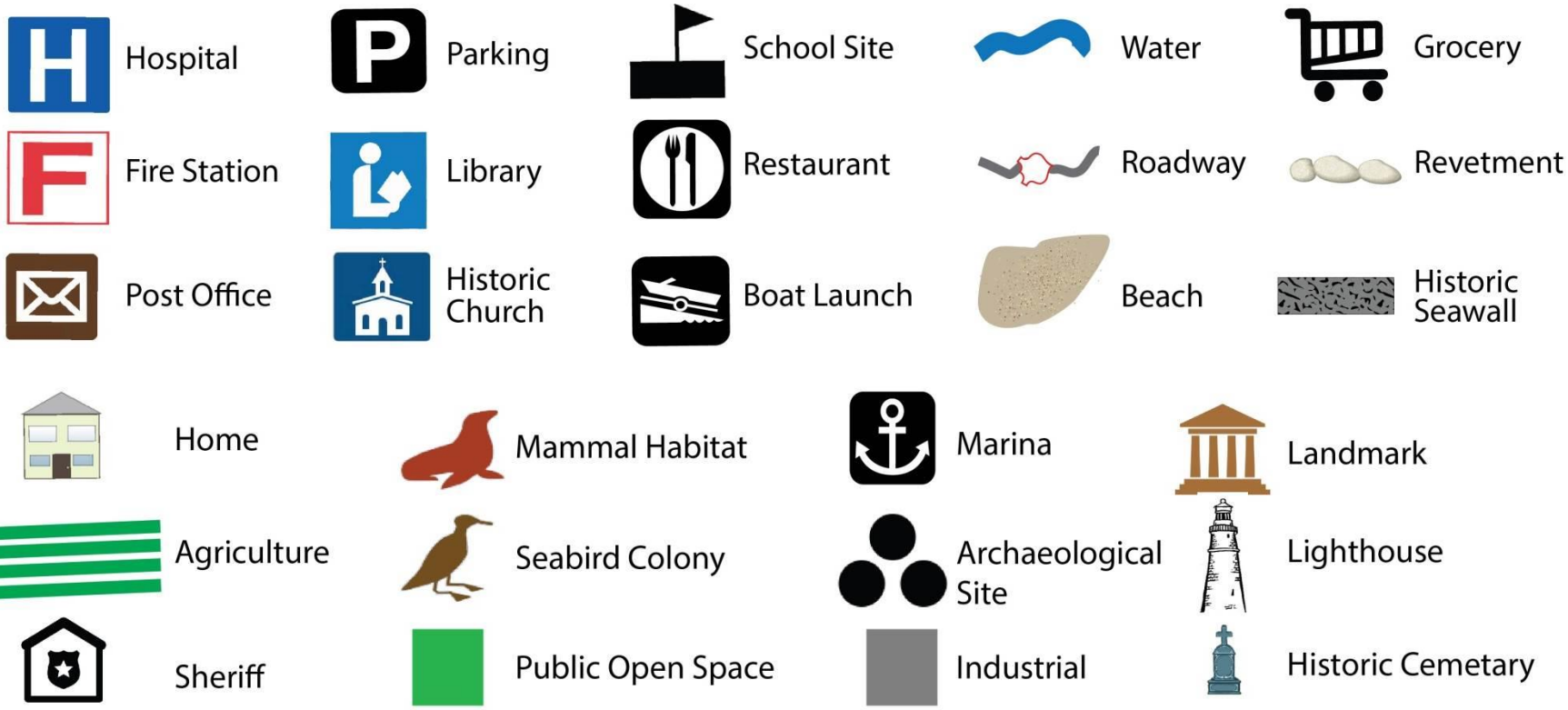
LEGEND



GAME PIECES

Asset Mapping & Inventory

Mapping people; livelihoods; infrastructure, environmental, and economic, social, & cultural assets



INTERVENTION OPTIONS

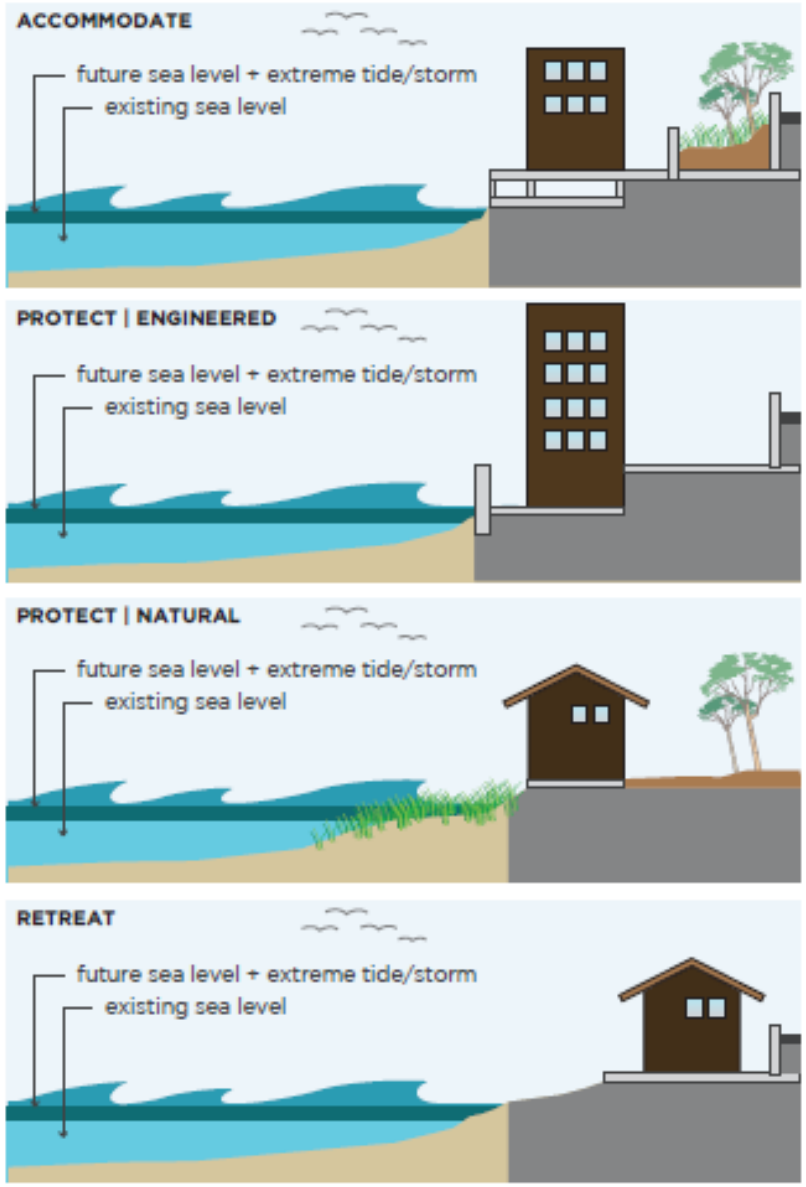
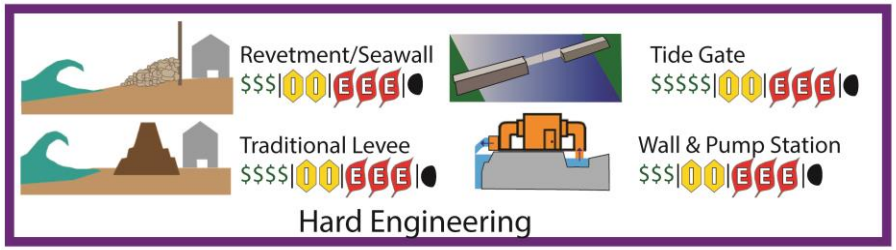
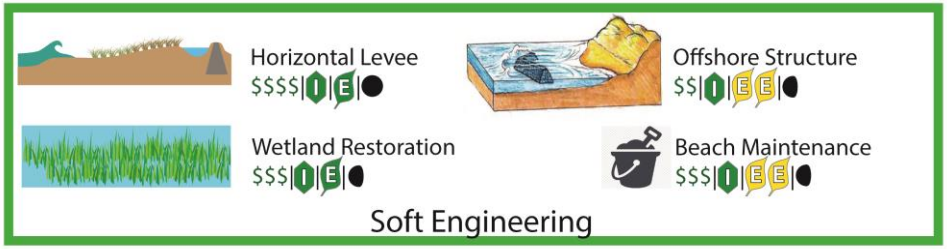


Image: SF Sea Level Rise Action Plan

ADAPTATION MEASURES

PROTECT



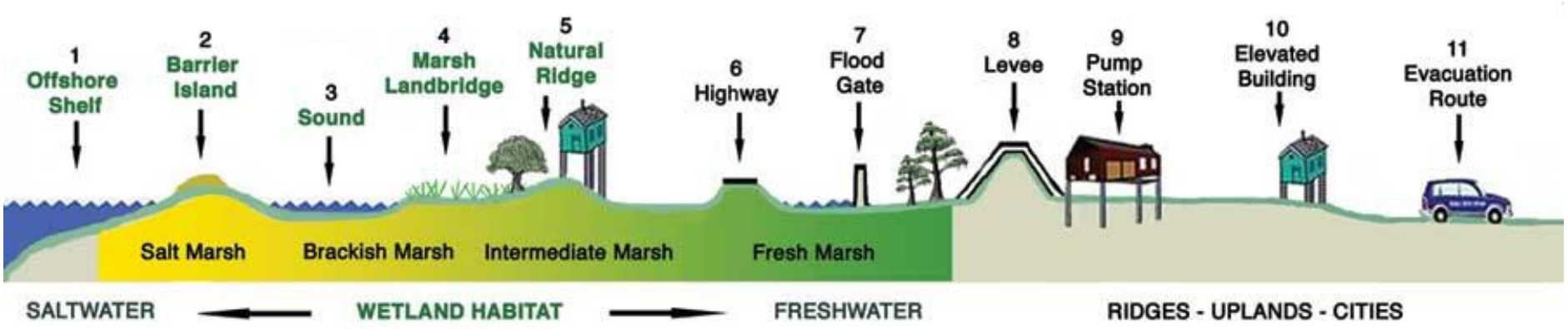


ACCOMMODATE

RETREAT

INVENTORY

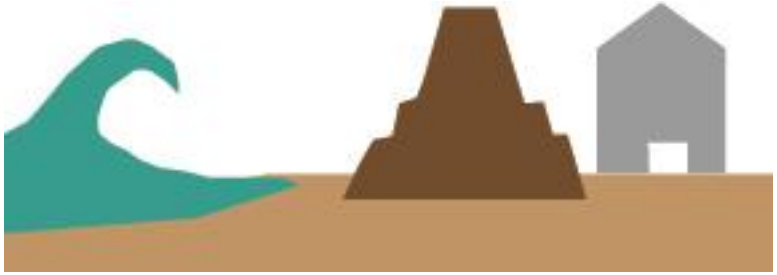
Hybrid Strategies



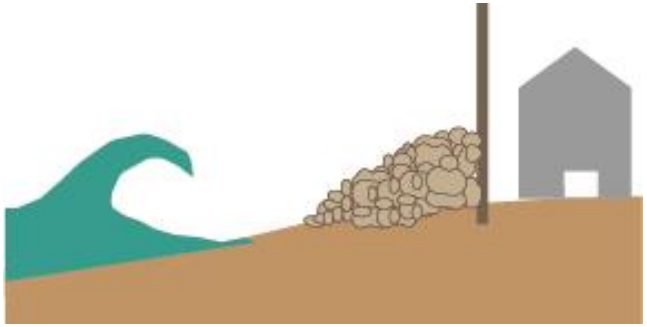
Lopez, John A., 2006, The Multiple Lines of Defense Strategy to Sustain Coastal Louisiana, Lake Pontchartrain Basin Foundation, Metairie, LA January 2006

1. PROTECT

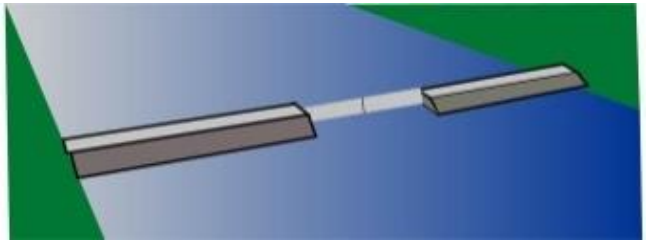
Hard (Traditional) Engineering



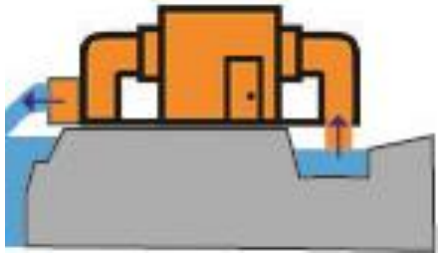
Traditional levee



Seawall/Revetment

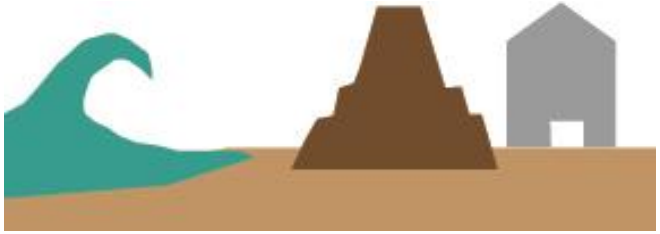


Tidal gate



Wall & Pump Station

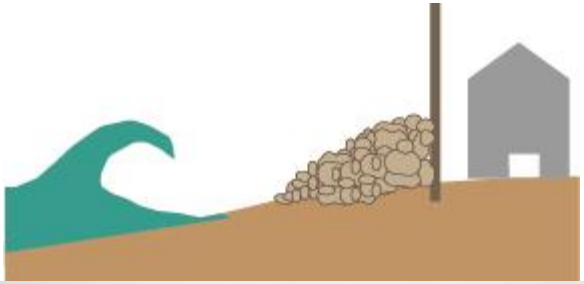
Levee



Costs: High
Integrity Impacts: Medium
Environmental Impacts: High
Effectivenes: Medium to Long Term

Sacramento-San Joaquin Delta/ Locke

Seawall



Costs: High
Integrity Impacts: Medium
Environmental Impacts: High
Effectivenes: Medium to Long Term

St. Augustine, FL

Jones Point, Washington D.C.

Images: Ann Horowitz

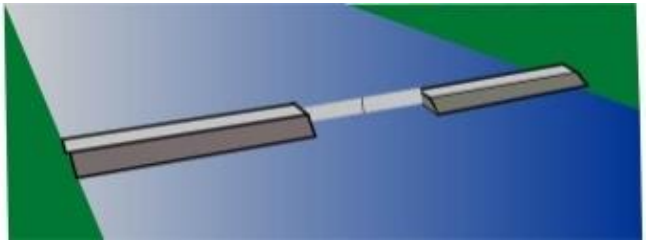
Tidal gate

Costs: Extreme

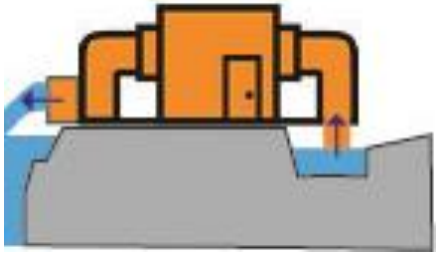
Integrity Impacts: Low to Medium

Environmental Impacts: High

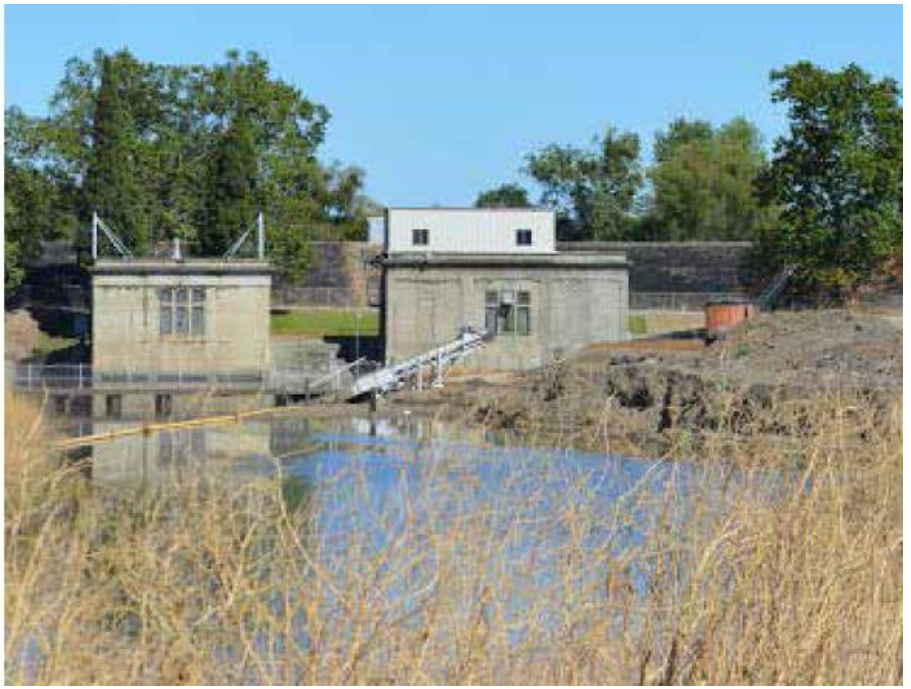
Effectivenes: Long Term



Flood wall & Pump station

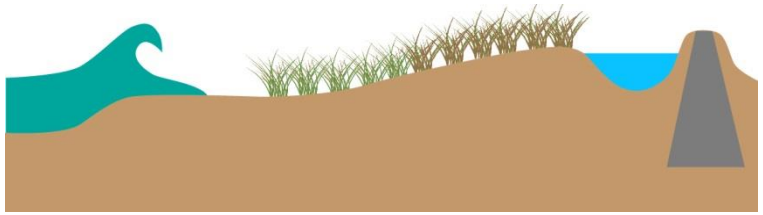


Costs: High
Integrity Impacts: Low to Medium
Environmental Impacts: High
Effectivenes: Medium Term



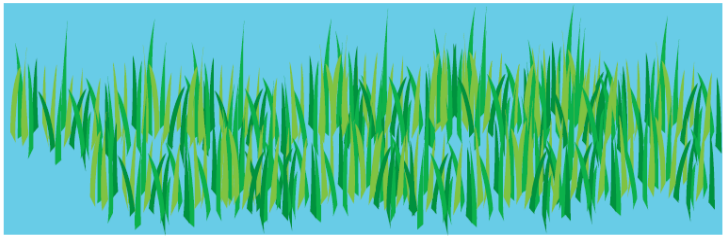
1. PROTECT

Soft (Nature-based) Engineering

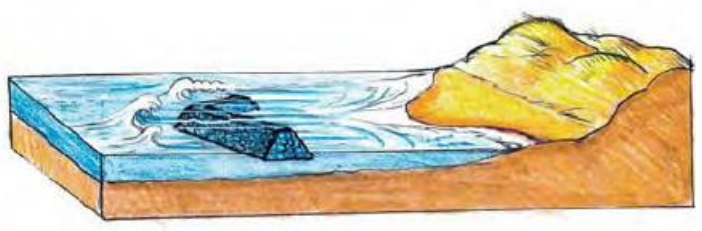


Horizontal levee

Dune restoration &
Beach maintenance

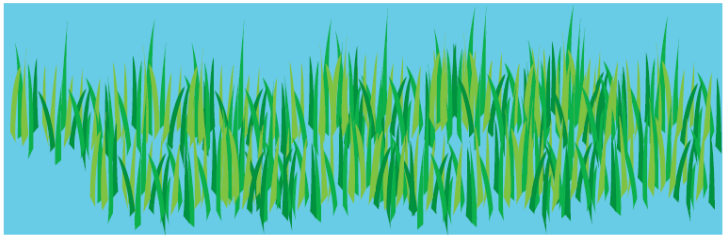


Wetland/ shoreline
vegetation



Offshore
structure

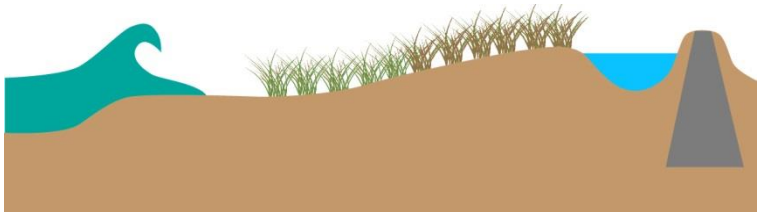
Wetland/ Living Shorelines



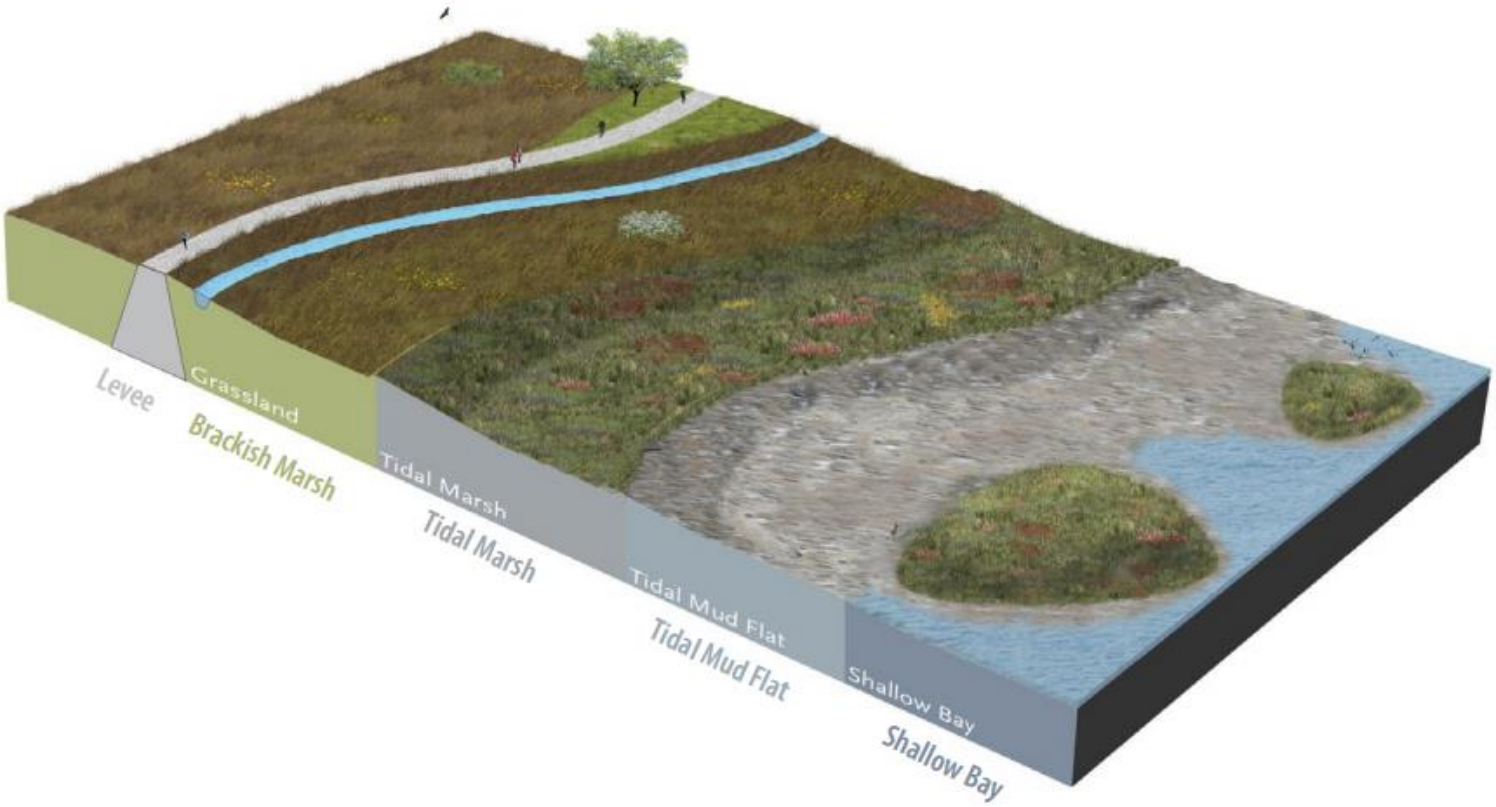
Costs: Medium
Integrity Impacts: Low
Environmental Impacts: Positive
Effectivenes: Medium Term (Wave Attenuation)
Locations : Sheltered Bays, Open Coasts

Giacomini Wetland Restoration, 2008

Horizontal levee



Costs: High
Integrity Impacts: Low
Environmental Impacts: Positive
Effectivenes: Long Term (waves and sea level rise)
Locations : Sheltered Bays



Beach Maintenance

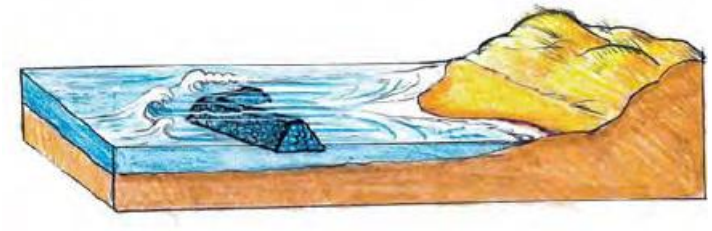
Costs: Medium to High
Integrity Impacts: Low
Environmental Impacts: Negative to Positive
Effectivenes: Medium Term (Wave Attenuation)
Locations : Sheltered Bays, Open Coasts

Wikipedia

Ross Clark

Venetian Court Apartments. Capitola, CA

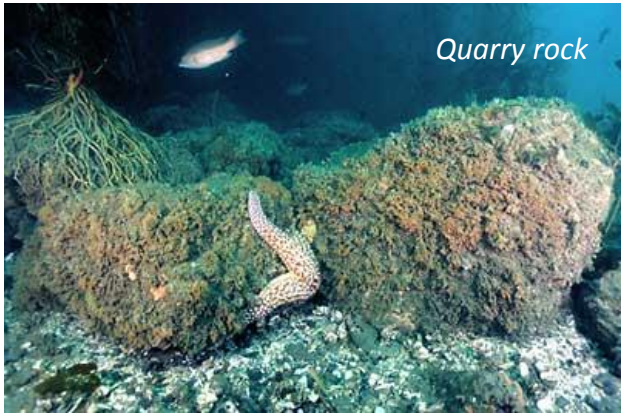
Offshore structures



Costs: Medium to High
Integrity Impacts: Low
Environmental Impacts: Positive
Effectivenes: Medium Term (Wave Attenuation)
Locations : Sheltered Bays, Open Coasts

San Clemente artificial reef experiment

Concrete



Quarry rock

2. ACCOMMODATE

Elevate buildings

Elevate/New Road

Floodproof Buildings

Amphibiate Buildings

Elevate Buildings

Costs: Medium to High
Integrity Impacts: Medium to High
Environmental Impacts: Neutral
Effectivenes: MediumTerm
Locations : Sheltered Bays, Open Coasts

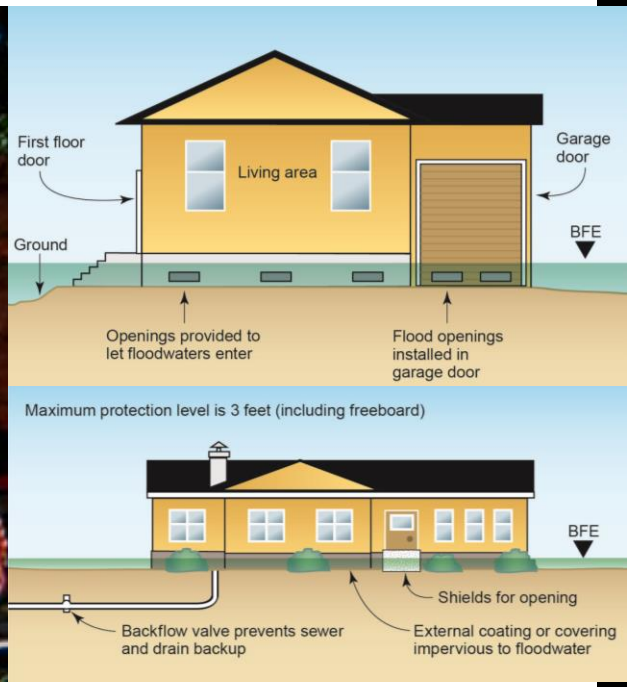
Images: Mississippi Development Authority

Historic Homes in the Mississippi Gulf Coast Region

Floodproof Buildings (Dry/Wet)

Costs: Low
Integrity Impacts: Low
Environmental Impacts: Low
Effectivenes: Medium Term
Locations : Sheltered Bays, Open Coasts

Retrofitted buildings in Darlington, Wisconsin



Wet (above) and Dry (below) floodproofing

Images: Federal Emergency Management Agency

Amphibiate Buildings

Costs: Low to Medium
Integrity Impacts: Low
Environmental Impacts: Low
Effectivenes: Medium Term
Locations : Sheltered Bays

If you can elevate it, you can amphibiate it!

-Dr. Elizabeth English
the Buoyant Foundation

Amphibiation Candidate.
Galveston, Texas

Images: Elizabeth English

New/elevate road

Costs: High
Integrity Impacts: Low to High
Environmental Impacts: High
Effectivenes: Long Term
Locations : Sheltered Bays, Open Coasts

3. RETREAT

Relocation

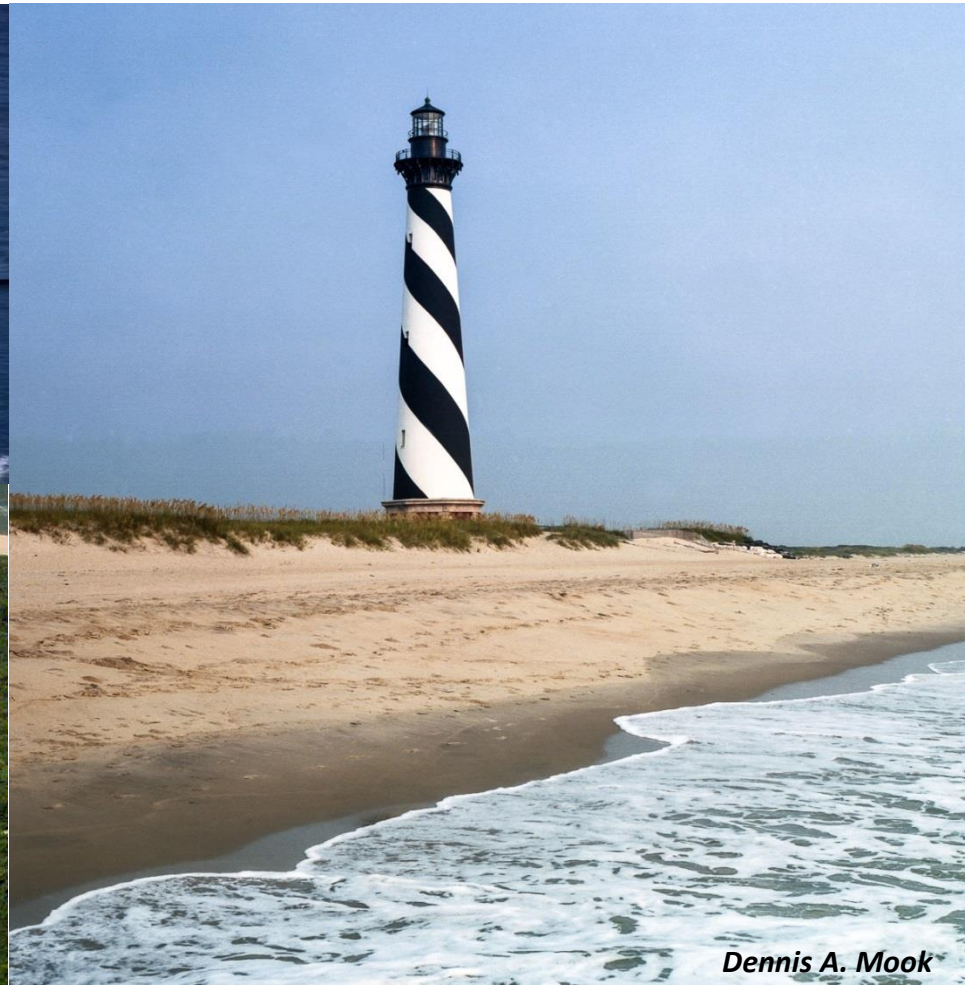
Abandonment

Relocation

Costs: High
Integrity Impacts: High
Environmental Impacts: Positive
Effectivenes: Long Term
Locations : Sheltered Bays, Open Coasts


National Park Service


National Geographic


Dennis A. Mook

Cape Hatteras Lighthouse, North Carolina

Abandonment

Costs: High
Integrity Impacts: Extreme
Environmental Impacts: Positive
Effectivenes: Long Term
Locations : Sheltered Bays, Open Coasts

Lauren Armstrong

Stinson Beach, CA

4. DOCUMENTATION

Historic American Building Survey

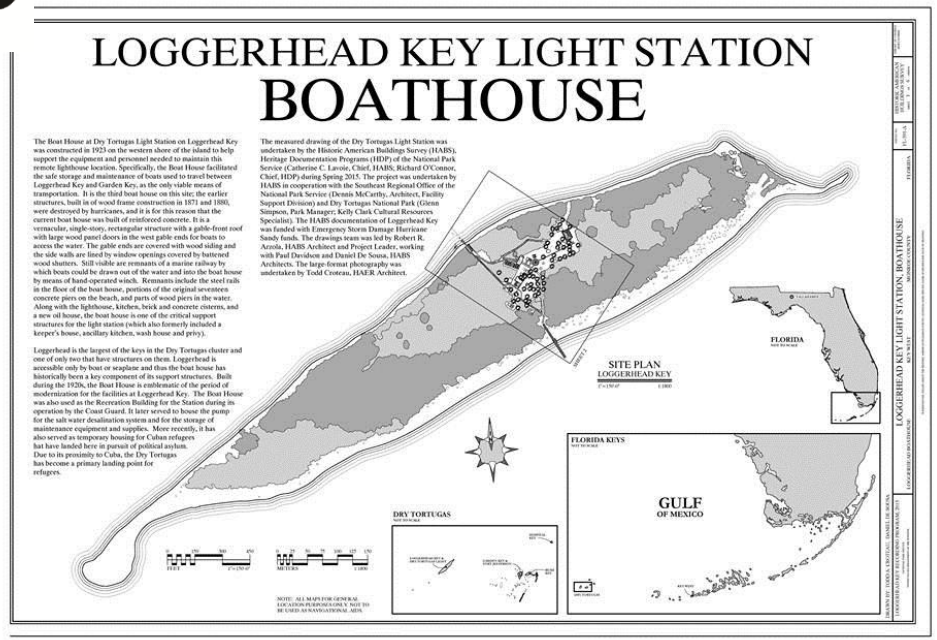
Cultural Resource Inventory

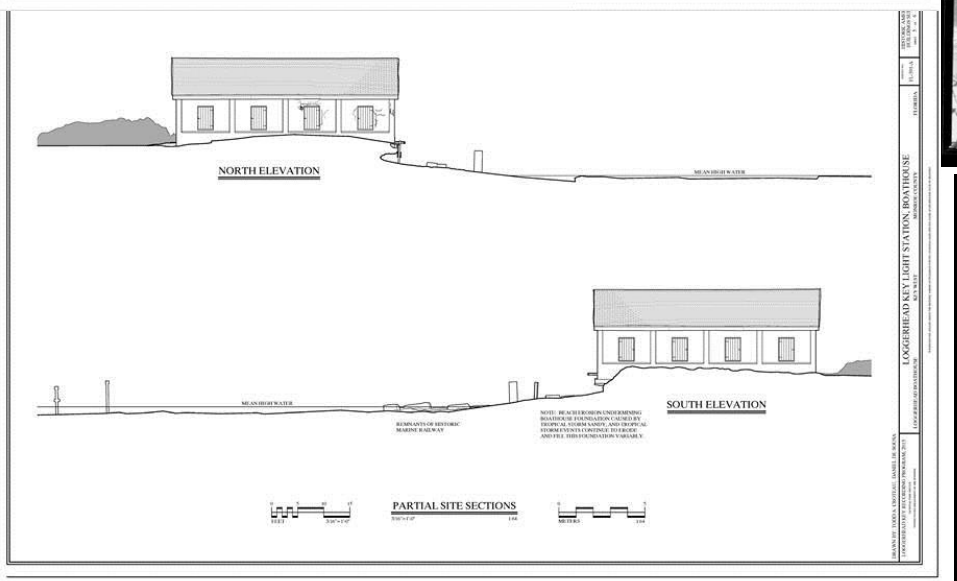
Inventory

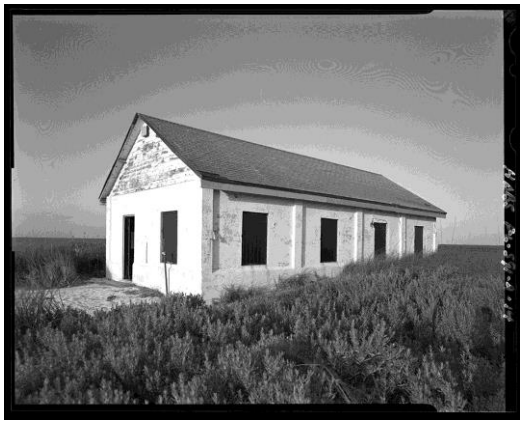
Column 1	Column 10	Column 11	Column 12	Column 13	Column 14	Column 15	Column 16
Name and Address of Asset Subject to Hazard (same as previous page)	Level of Property Vulnerability (High, Medium, Low)	Loss to Structure ($)	Loss to Contents ($)	Loss of Function or Use ($)	Displacement Cost	Total Loss for Hazard Event	Level of Community Value for Ranking Purposes (High, Medium, Low)
Hazardville Opera House 50 Main Street	Medium	$300 K	$150 K	$30 K	$190 K	$670 K	Medium
Lehman Gardens Corner of Main and North	High	N/A	$20 K	N/A	N/A	$20 K	High

FEMA

Historic American Building Survey







National Park Service

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GAME ON!

THANK YOU!