GAME OF FLOODS : PRESERVATION EDITION

ALEX WESTHOFF, AICP
MARIN COUNTY COMMUNITY DEVELOPMENT AGENCY
KEEPING HISTORY ABOVE WATER, 4/13/16

AGENDA

9:00 Introductions

9:15 Presentation

9:35 Play Game

11:05 Report Back (large group)

11:30 Game Feedback (large group)

11:50 Evaluation

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

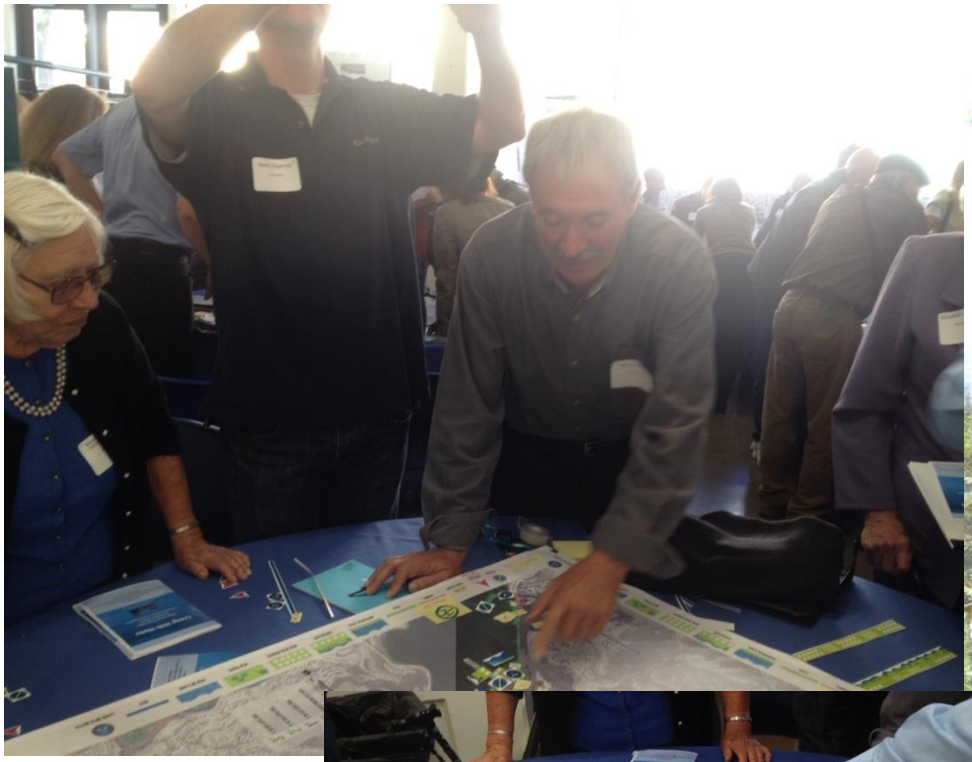
Managed Retreat
- Retreat $$$$ | E | ●
- Post-storm prohibitions $ | E | ●
- Move here $$$ | EEE | ●
- Stricter land use zoning $ | E | ●

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

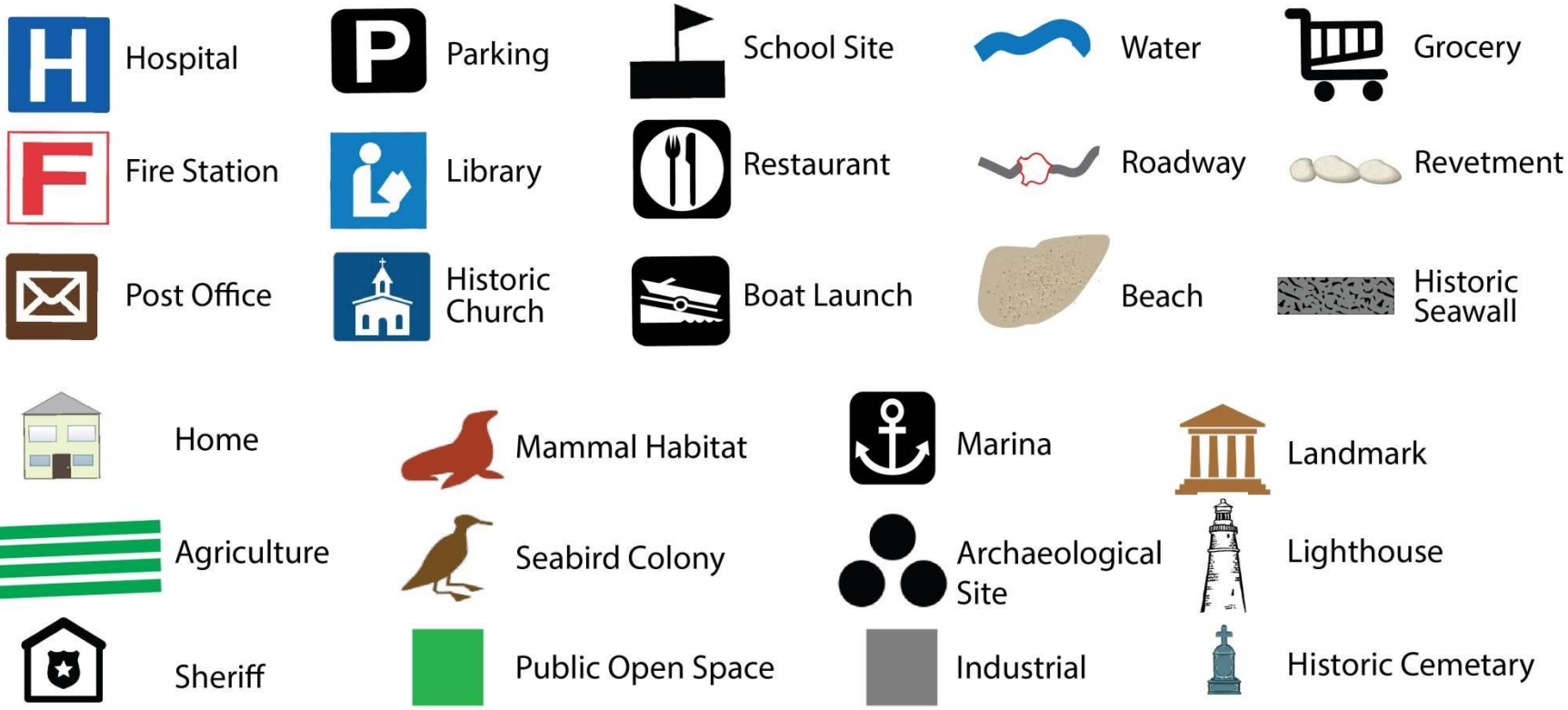
Developed for:

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

CALIFORNIA PRESERVATION FOUNDATION

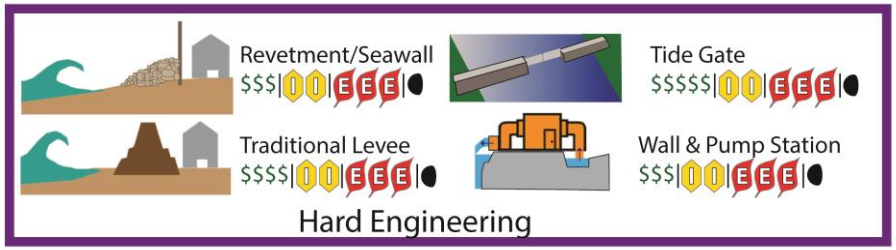
Asset Mapping & Inventory

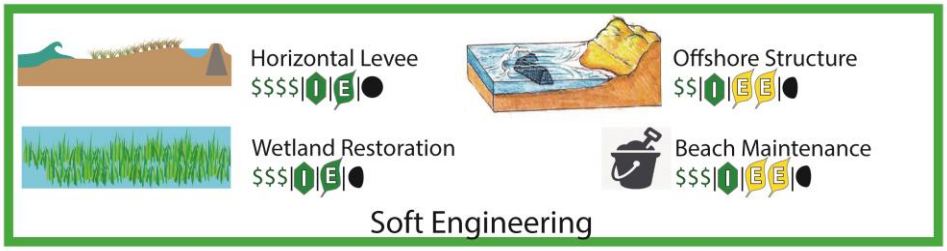
Mapping people; livelihoods; infrastructure, environmental, and economic, social, & cultural assets



ADAPTATION MEASURES

PROTECT





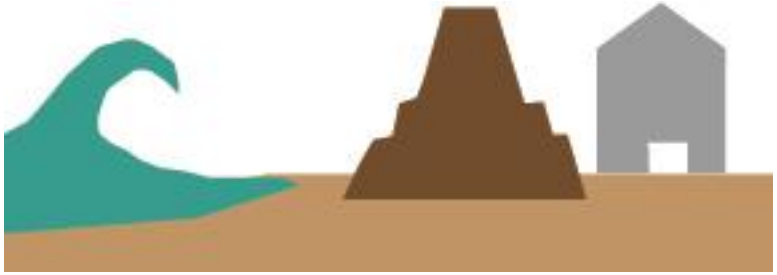
ACCOMMODATE

RETREAT

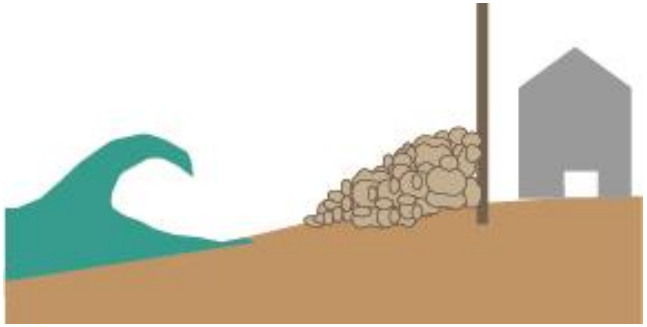
INVENTORY

1. PROTECT

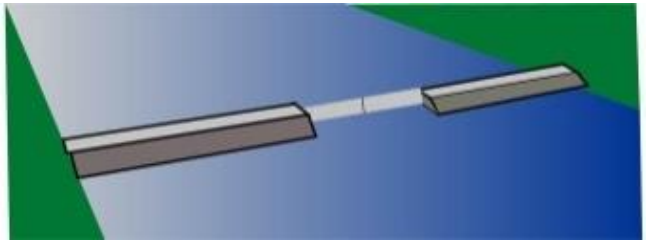
Hard (Traditional) Engineering



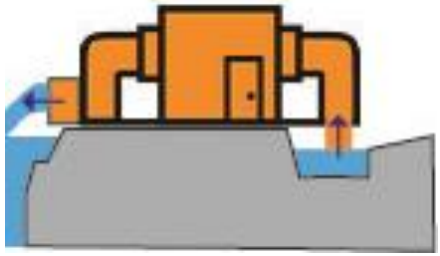
Traditional levee



Seawall/Revetment

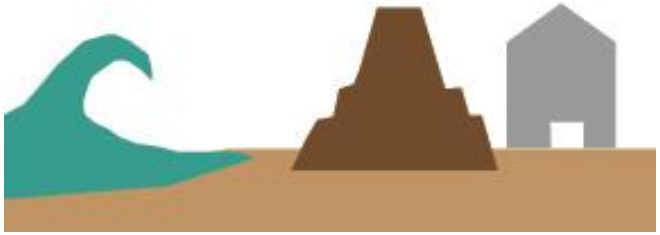


Tidal gate



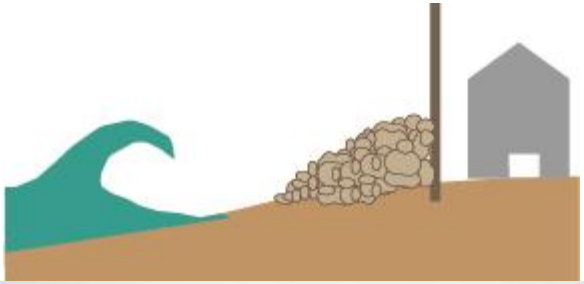
Wall & Pump Station

Levee



Sacramento-San Joaquin Delta/ Locke

Seawall

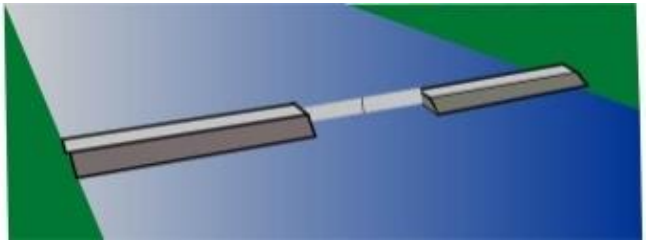


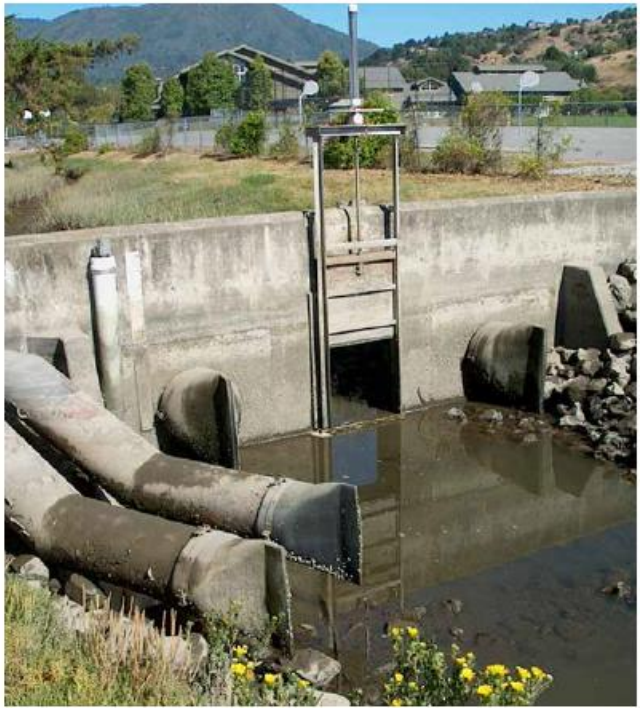
St. Augustine, FL

Jones Point, Washington D.C.

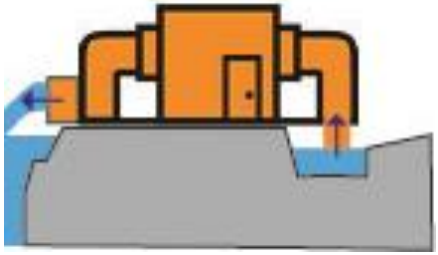
Images: Ann Horowitz

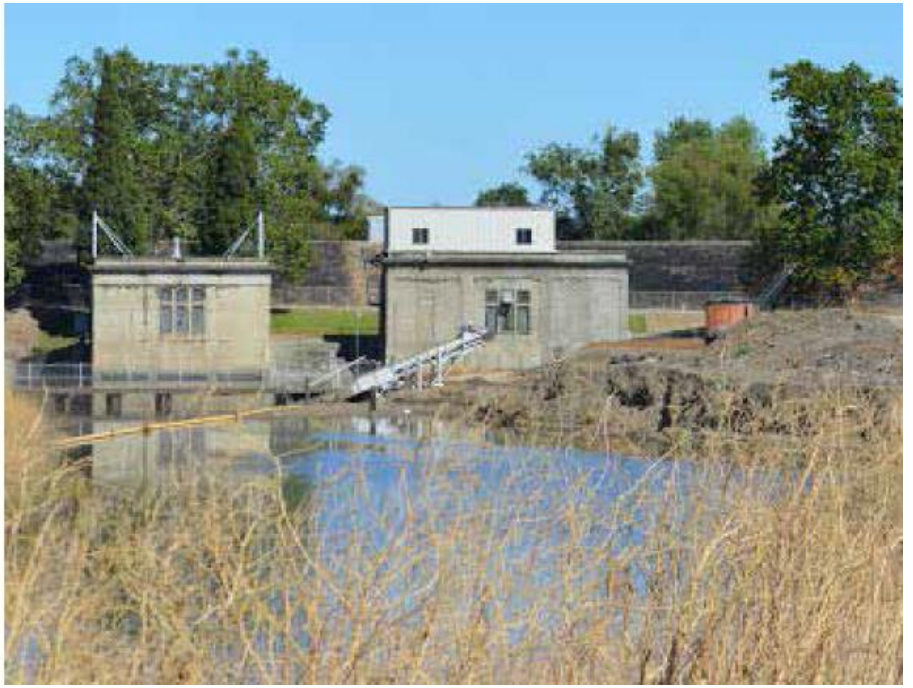
Tidal gate





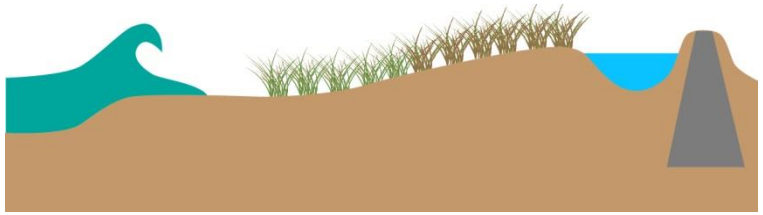
Flood wall & Pump station





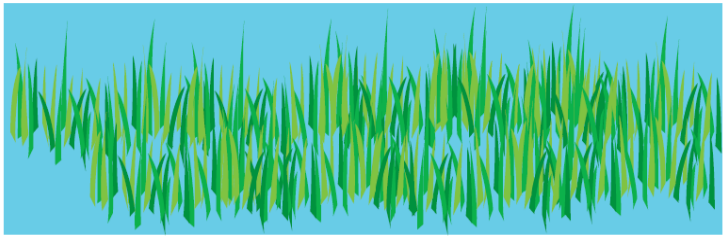
1. PROTECT

Soft (Nature-based) Engineering

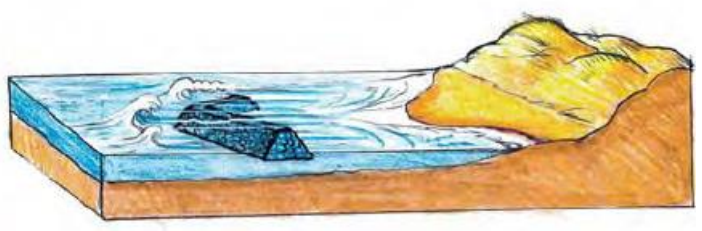


Horizontal levee

Dune restoration &
Beach maintenance

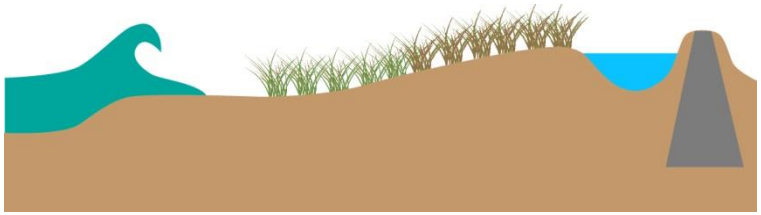


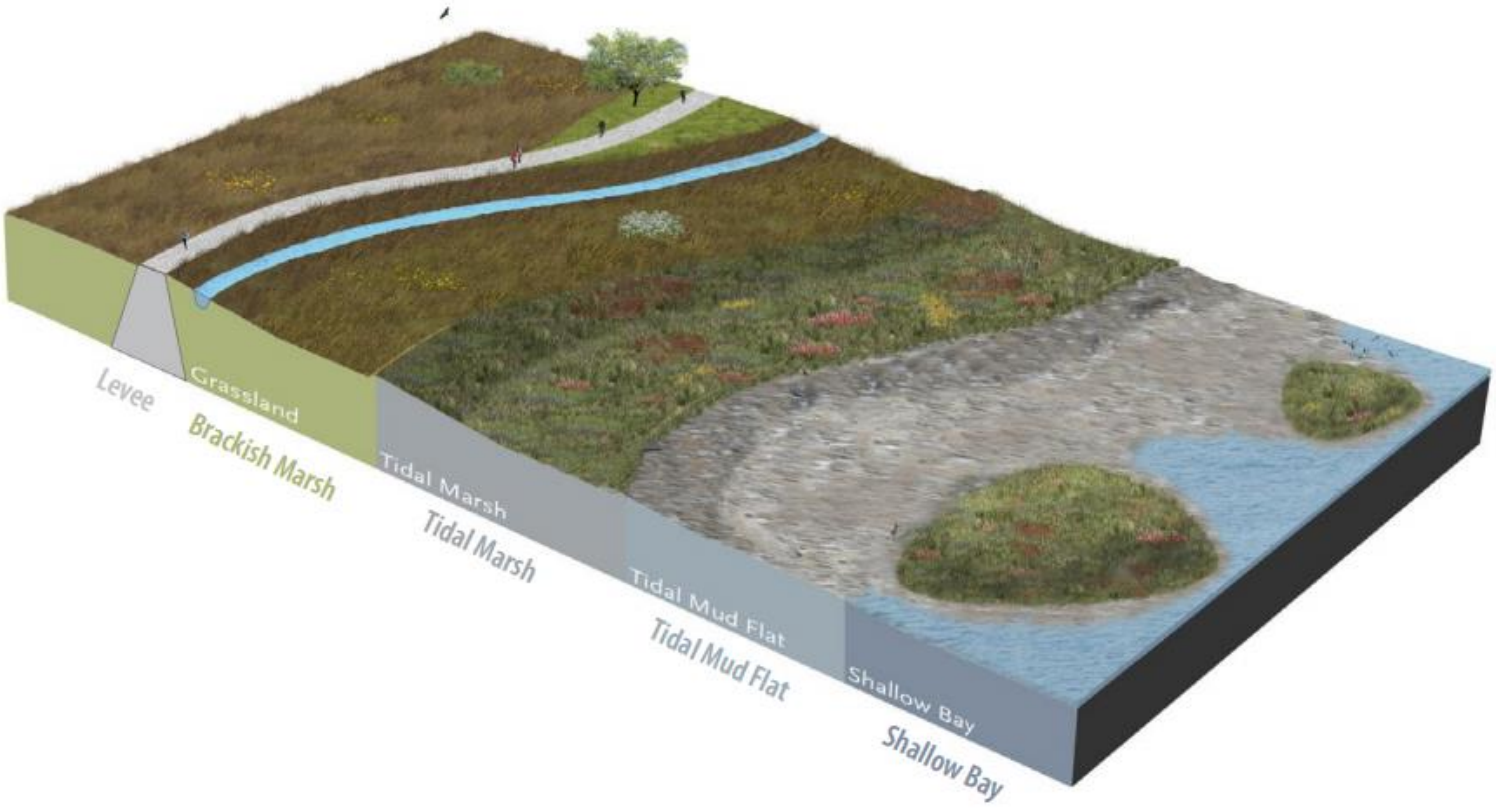
Wetland/ shoreline
vegetation



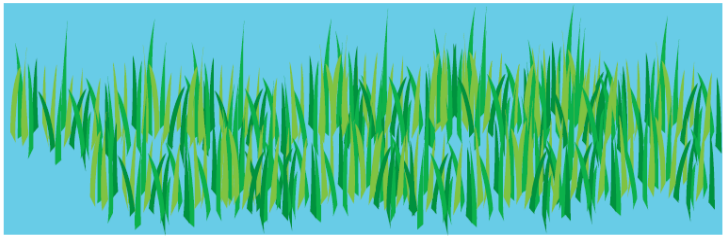
Offshore
structure

Horizontal levee





Wetland/ shoreline vegetation



Giacomini Wetland Restoration, 2008

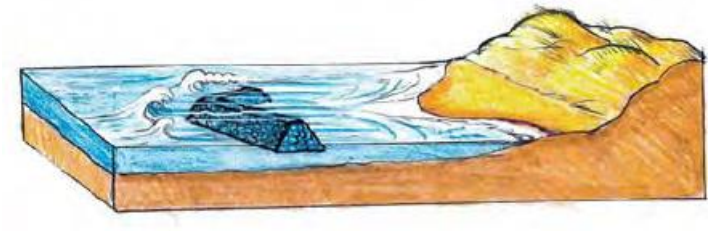
Beach Maintenance


Wikipedia


Ross Clark

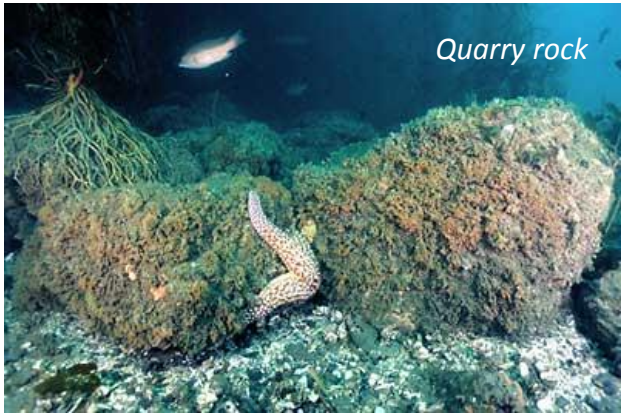
Venetian Court Apartments. Capitola, CA

Offshore structures



San Clemente artificial reef experiment


Concrete


Quarry rock

2. ACCOMMODATE

Elevate buildings

Elevate/New Road

Floodproof Buildings

Amphibiate Buildings

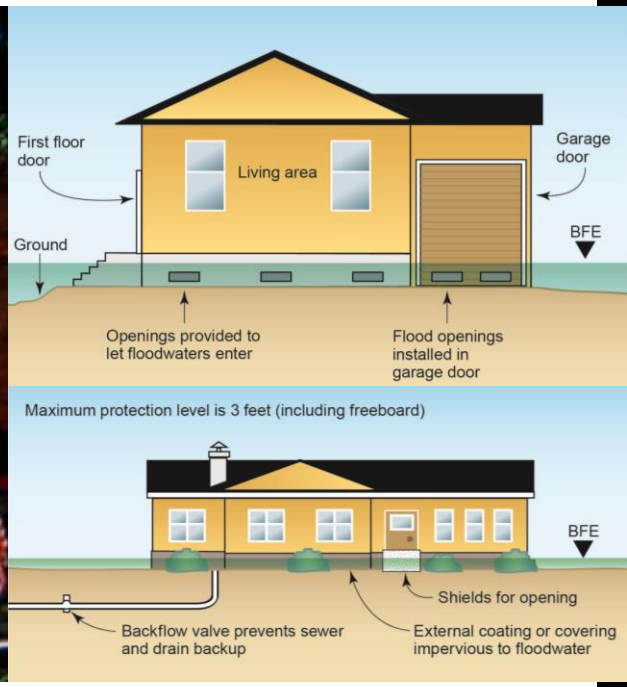
Elevate Buildings

Images: Mississippi Development Authority

Historic Homes in the Mississippi Gulf Coast Region

Floodproof Buildings (Dry/Wet)

Retrofitted buildings in Darlington, Wisconsin



Wet (above) and Dry (below) floodproofing

Images: Federal Emergency Management Agency

New/elevate road

Amphibiate Buildings

Amphibiation Candidate.
Galveston, Texas

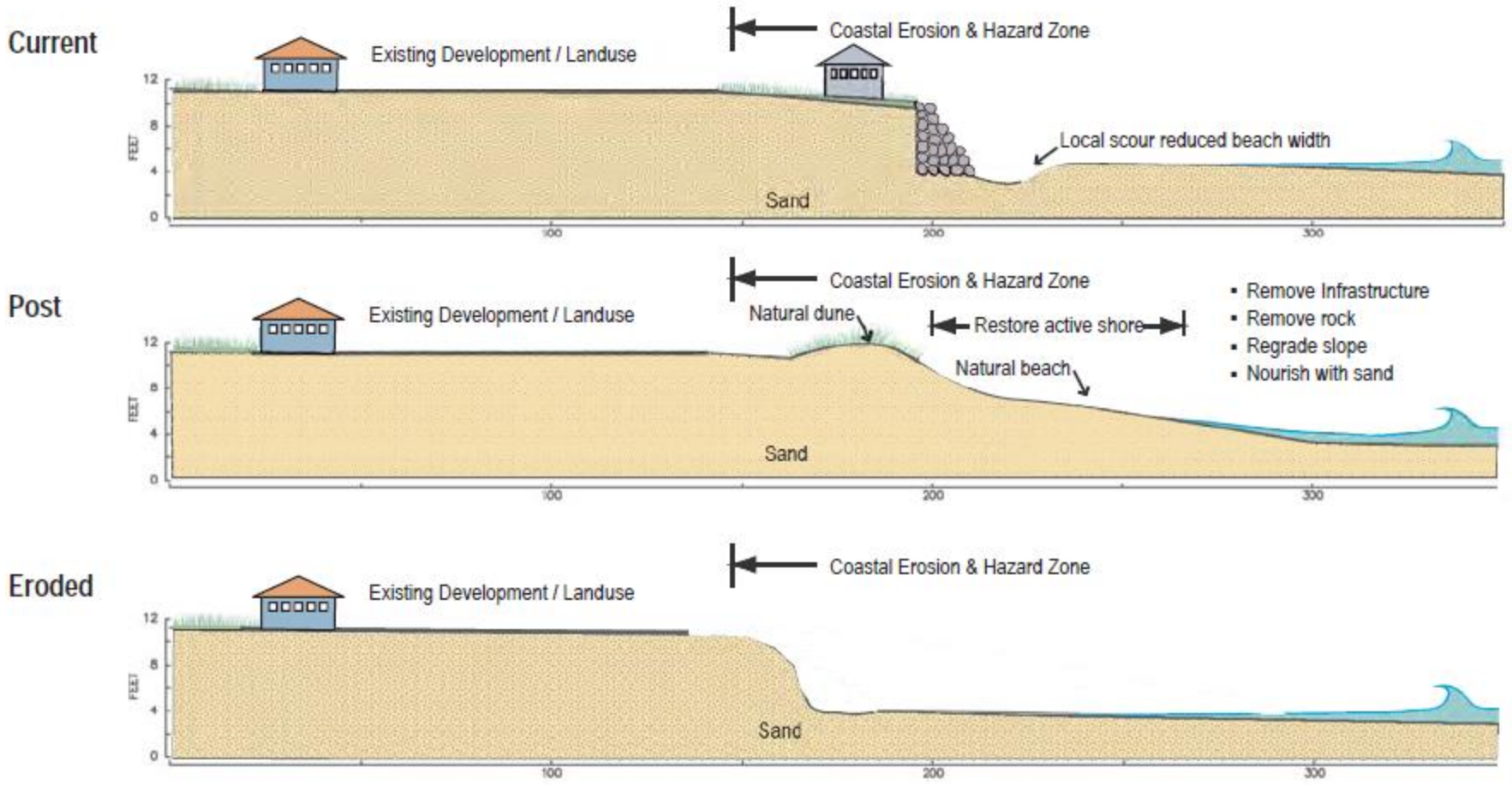
Images: Elizabeth English

3. RETREAT

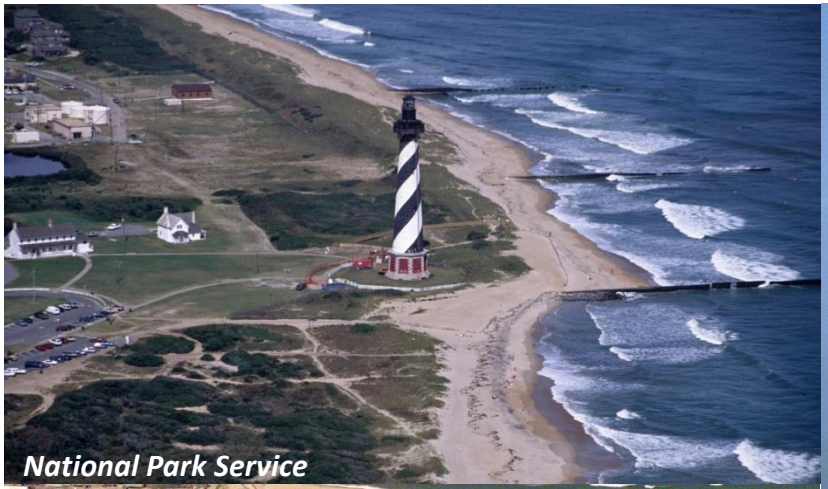
Relocation

Abandonment

Managed Retreat

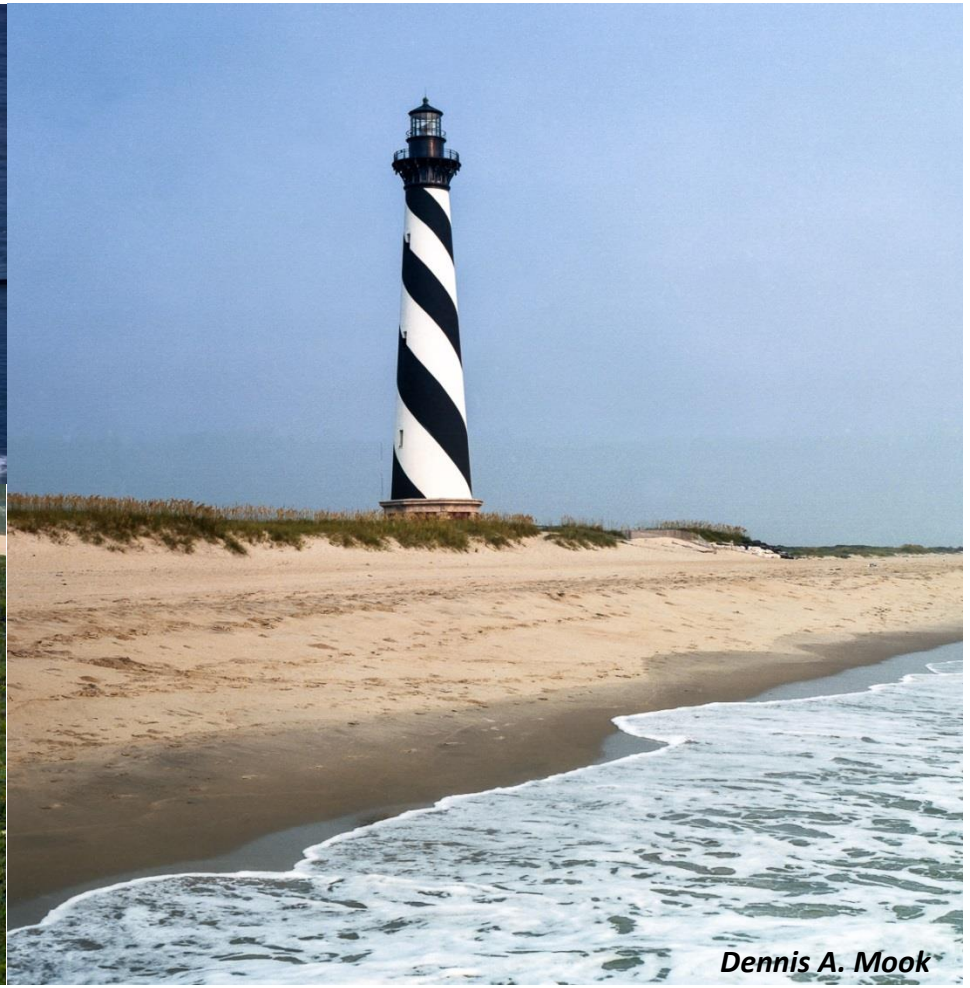


Relocation



National Park Service

National Geographic



Dennis A. Mook

Cape Hatteras Lighthouse, North Carolina

Abandonment

Lauren Armstrong

Stinson Beach, CA

4. DOCUMENTATION

Historic American Building Survey

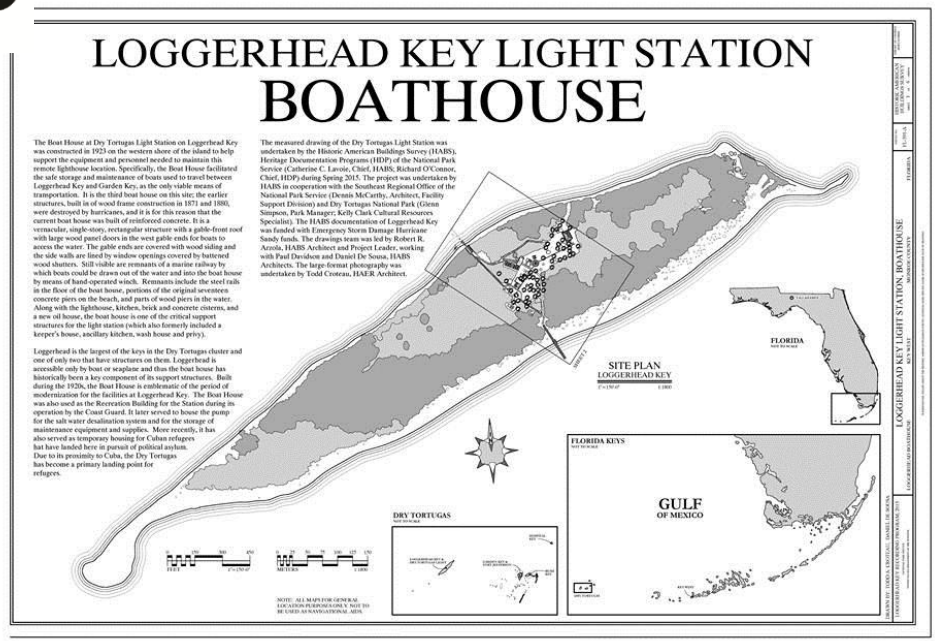
Cultural Resource Inventory

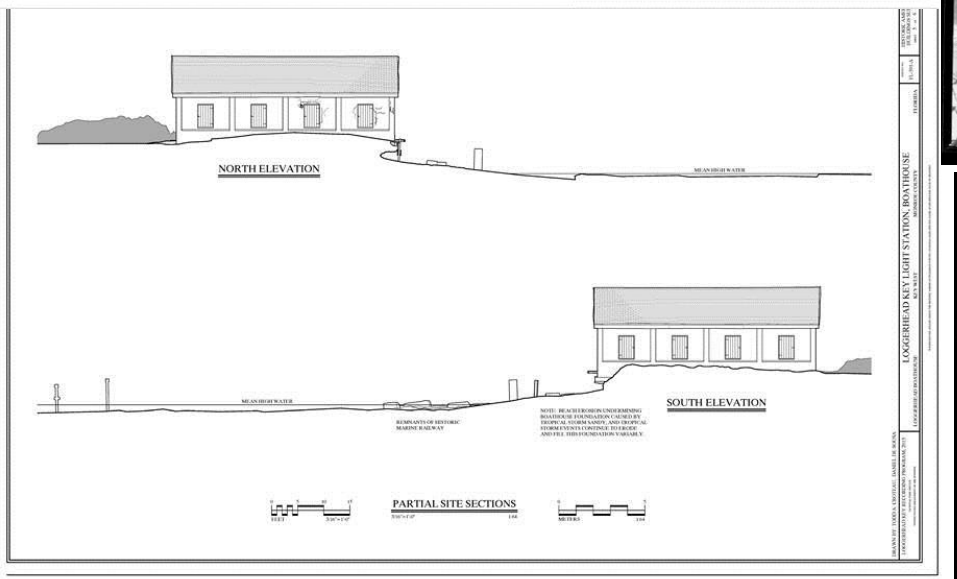
Inventory

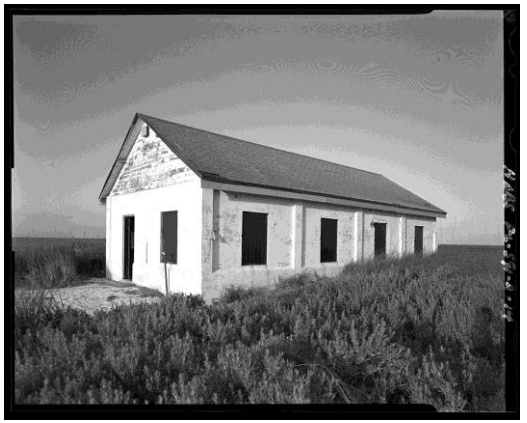
Column 1	Column 10	Column 11	Column 12	Column 13	Column 14	Column 15	Column 16
Name and Address of Asset Subject to Hazard (same as previous page)	Level of Property Vulnerability (High, Medium, Low)	Loss to Structure ($)	Loss to Contents ($)	Loss of Function or Use ($)	Displacement Cost	Total Loss for 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

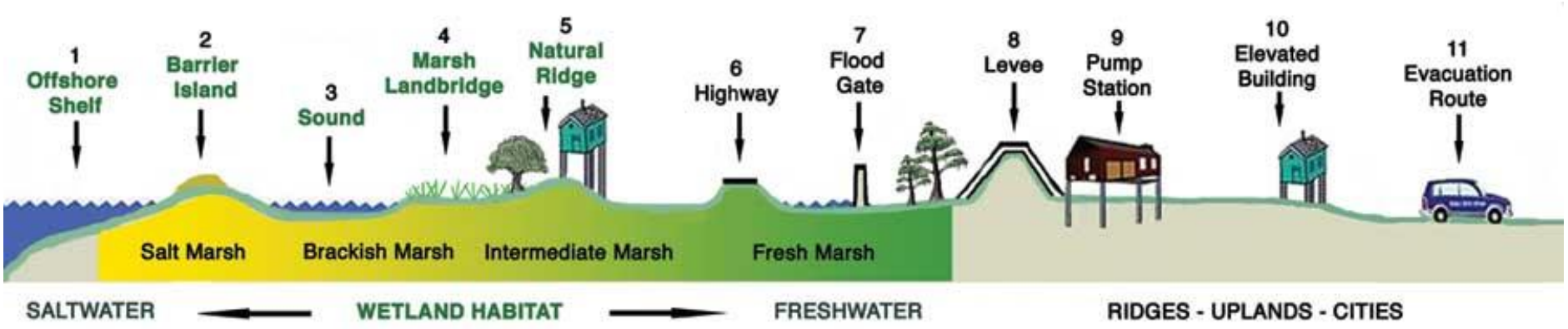






National Park Service

Hybrid Strategies



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

COSTS $$$

Real World **– costs are messy and depend on many factors**

+ planning & engineering

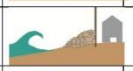
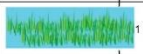
+ permitting

+ maintenance & repair

Game World **– costs are simpler one-time costs and given to you per unit (i.e. mile or # of buildings)**

Game of Floods *Preservation Edition*

Adaptation Piece Reference Sheet

Name	Piece	Piece Units	Cost ($)	Impacts Black (extreme) Red (neg.) Yellow (caution) Green (none/pos.)		Flood Protection	Protects against					Feasibility	
				Environmental	Integrity		Temp. Flooding	Storm Surge	Sea Level Rise	Wave Impacts	Erosion	Sheltered Bay/ Riverine	Open Coast
Hard (Traditional) Engineering													
Traditional Levee		1 Mile	$$$$	EEE	II	med ●	x	x	x	x	x	x	
Seawall or Revetment		1 Mile	$$$	EEE	II	med ●	x	x	x	x	x	x	x
Tidal Gate		Creek width	$$$$$	EEE	II	med ●	x	x	x			x	
Flood Wall & Pump Station	Requires electricity 	1 Mile	$$$	EEE	II	short ○	x	x	x			x	
Soft Engineering													
Horizontal Levee		1 Mile	$$$$	E	I	long ●	x	x	x	x	x	x	
Wetland/ shoreline vegetation		1 Acre	$$$	E	I	med ●	x	x		x		x	
Beach Maintenance & Dune Restoration		1 Mile	$$$	EE	I	short ○	x	x		x	x	x	x
Offshore structure		1 Mile	$$	EE	I	med ●	x	x		x		x	x
Accommodate (flood tolerant)													
Elevate buildings		4 Buildings	$$$	EE	III	med ●	x	x		x		x	x
New/elevate road	(each piece is 2 miles)	1 Mile	$$$$$	EEE	III	long ●	x		x			x	x
Floodproof Buildings (Dry/Wet)		Neigh-borhood	$	EE	II	med ●	x		x			x	x
Amphibiate Buildings		4 Buildings	$$	EE	I	med ●	x					x	
Managed Retreat													
Abandonment		1 Historic Site or 4 Buildings	$	E	IIII (historic sites) / II (buildings)	long ●	x	x	x	x	x	x	x
Relocation		1 Historic Site or 4 Buildings	$$$	EEE	III (historic sites) / II (buildings)	long ●	x	x	x	x	x	x	x
Documentation													
Historic American Building Survey			$$	N/A	+II (positive impacts if used for mitigation)	N/A	N/A						
Neighborhood Survey			$	N/A	+I (positive impacts if used for mitigation)	N/A	N/A						

OBJECTIVE

Collaboratively develop a vision for 2050 to adapt to rising seas with minimal economic, environmental, and integrity impacts.

ROLES

- Preservationist
- FEMA Officer
- Sustainability Coordinator
- Park Service Staff
- Entrepreneur
- Ecologist

Strategy	E = Environmental (Leaves)	I = Integrity (Diamonds)	$ = Economic (dollar Signs)
Flood Proof	2	2	1
Horizontal levee	1	1	3
Sea wall	3	2	3
HABS	N/A	-2	2
Total	6	3	Total Above 6 = ____3_____

Grand Total = Total E + Total I + $>6 = <u>12</u>

GAME ON!

THANK YOU!