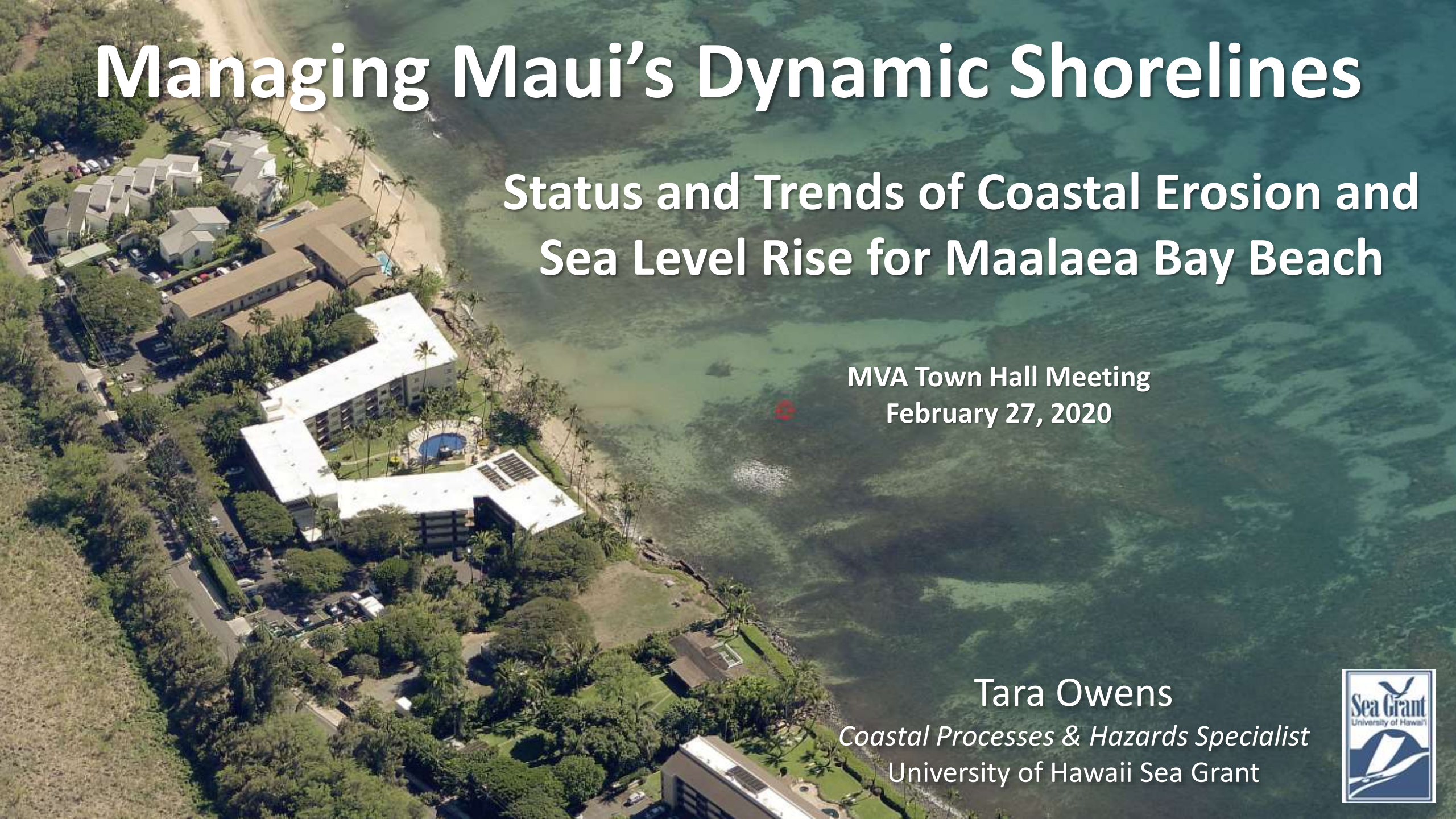


Managing Maui's Dynamic Shorelines

Status and Trends of Coastal Erosion and Sea Level Rise for Maalaea Bay Beach

MVA Town Hall Meeting
February 27, 2020

Tara Owens
Coastal Processes & Hazards Specialist
University of Hawaii Sea Grant

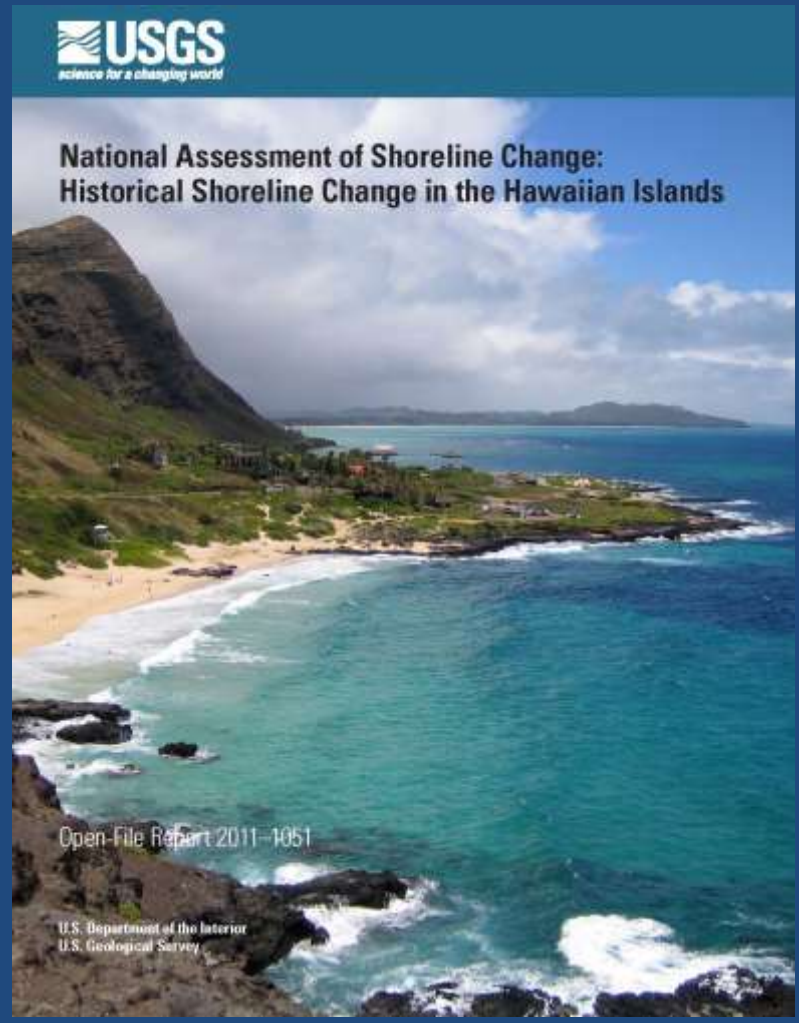

DANGER

MAALAEA BAY BEACH PROPERTIES

- 8 condominium and 2 single family properties
- Condos built between 1971 and 1981
- Various types of shoreline protection fronting properties

EROSION IS WIDESPREAD ON MAUI

- 85% of Maui shorelines are eroding over the long-term.
- Maui's beaches are experiencing the highest rates of erosion for the Hawaiian islands.
- Maui has the highest percentage of beach loss (11% or ~4 miles).



Fletcher, Charles et. al., 2011. *National Assessment of Shoreline Change: Historical Shoreline Change in the Hawaiian Islands.* U.S. Geological Survey Open-file Report 2011-1051, 55p.

CONTRIBUTIONS TO EROSION

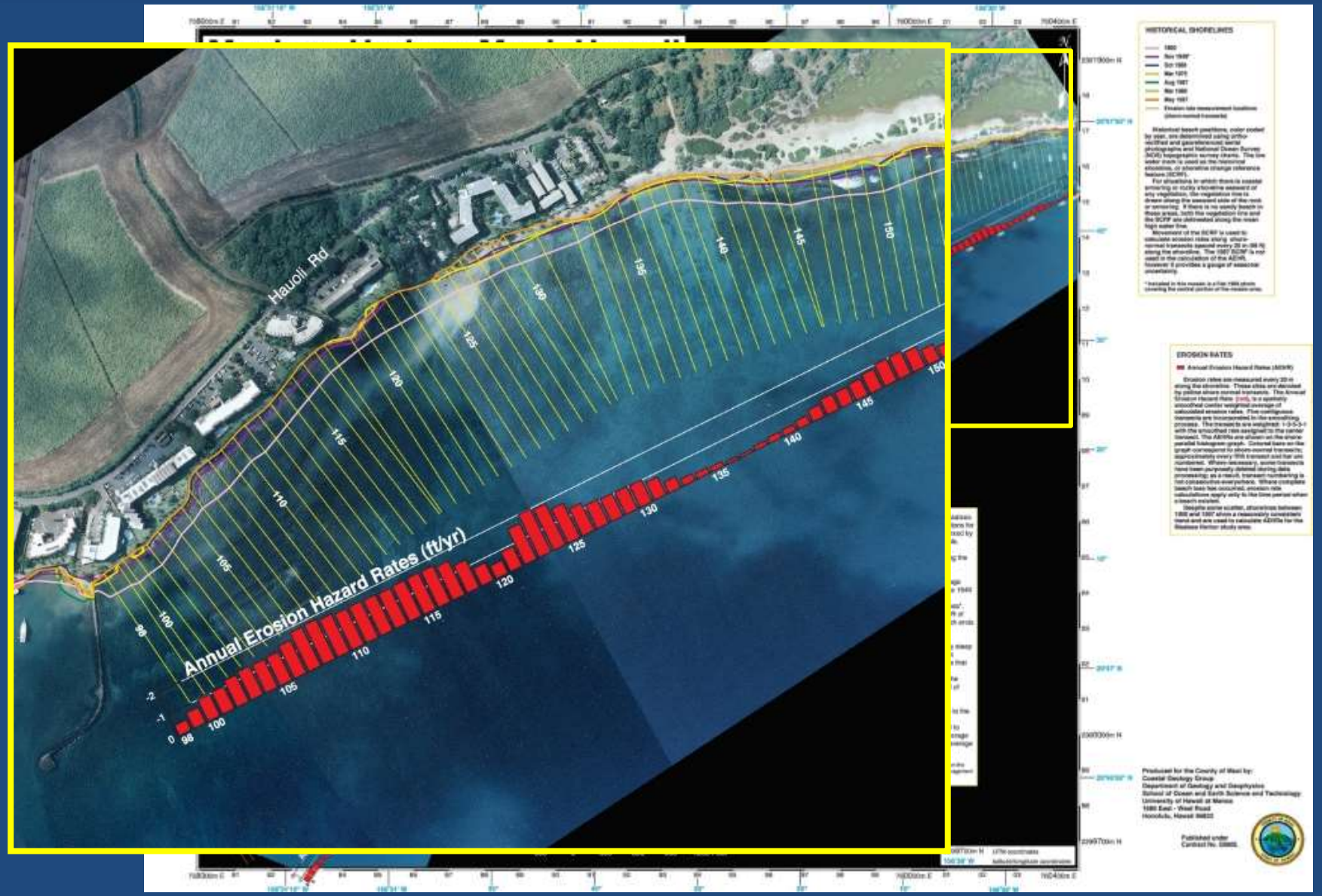
Combination of:

1. Sea-Level Rise
   (chronic erosion)
2. Seasonal Wave Conditions
   & Storms that Move Sand
   (episodic erosion)
3. Human Interventions –
   seawalls, revetments, and
   sand mining

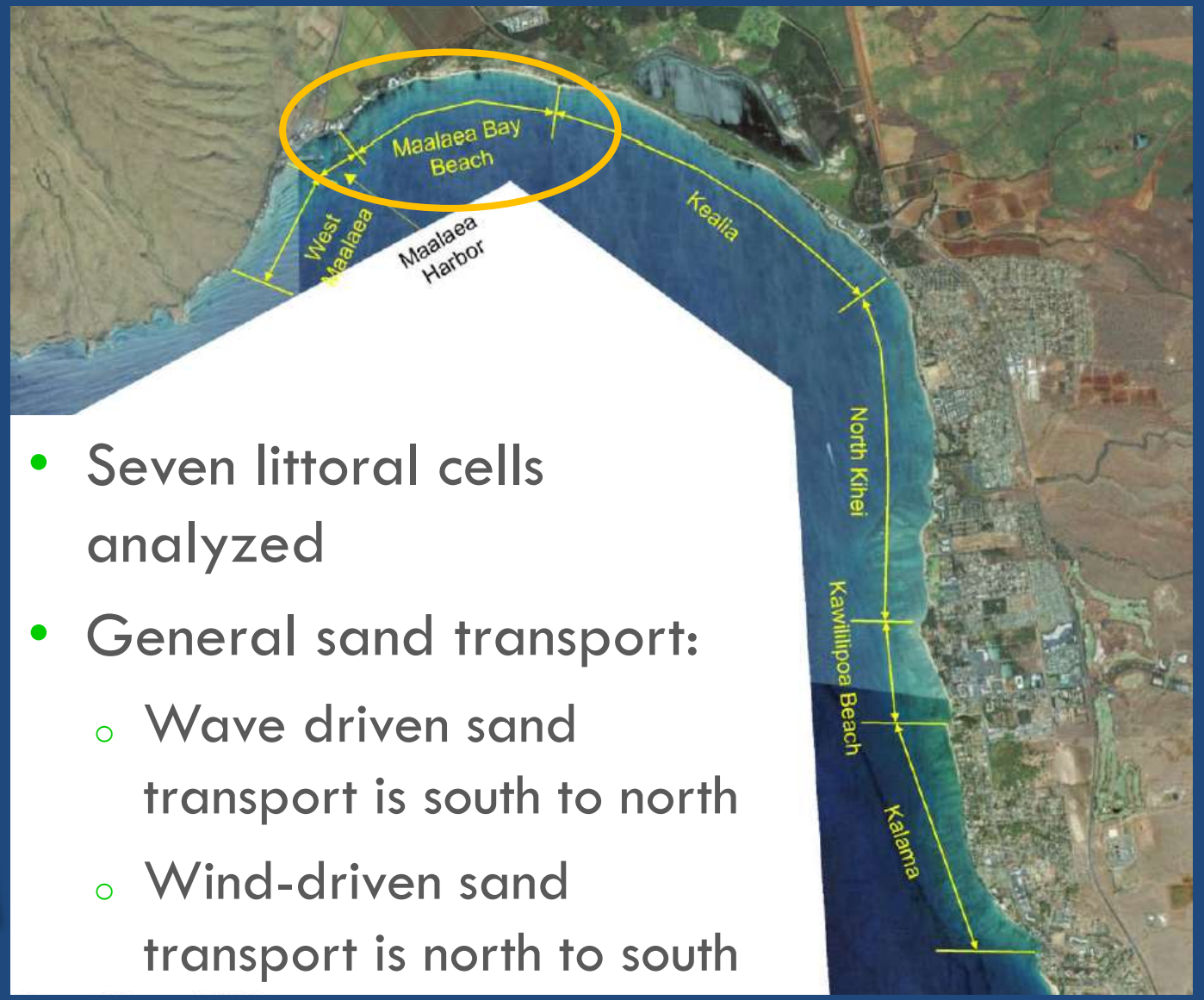
West Maui, Pohailani Condominiums

MAALAEA LONG TERM EROSION TRENDS

- Erosion rates up to 2 ft/yr over the long-term



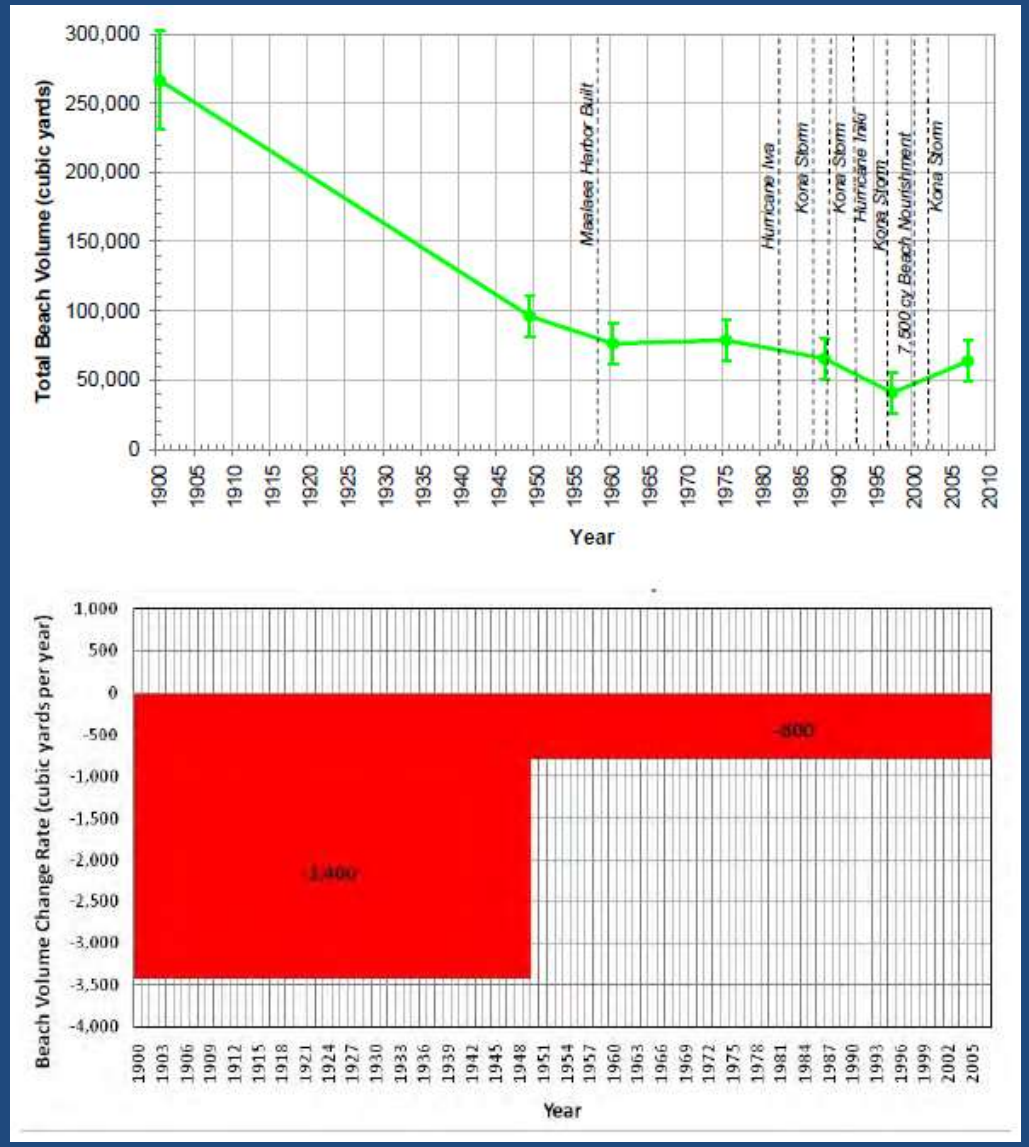
USACE REGIONAL SEDIMENT MANAGEMENT STUDY



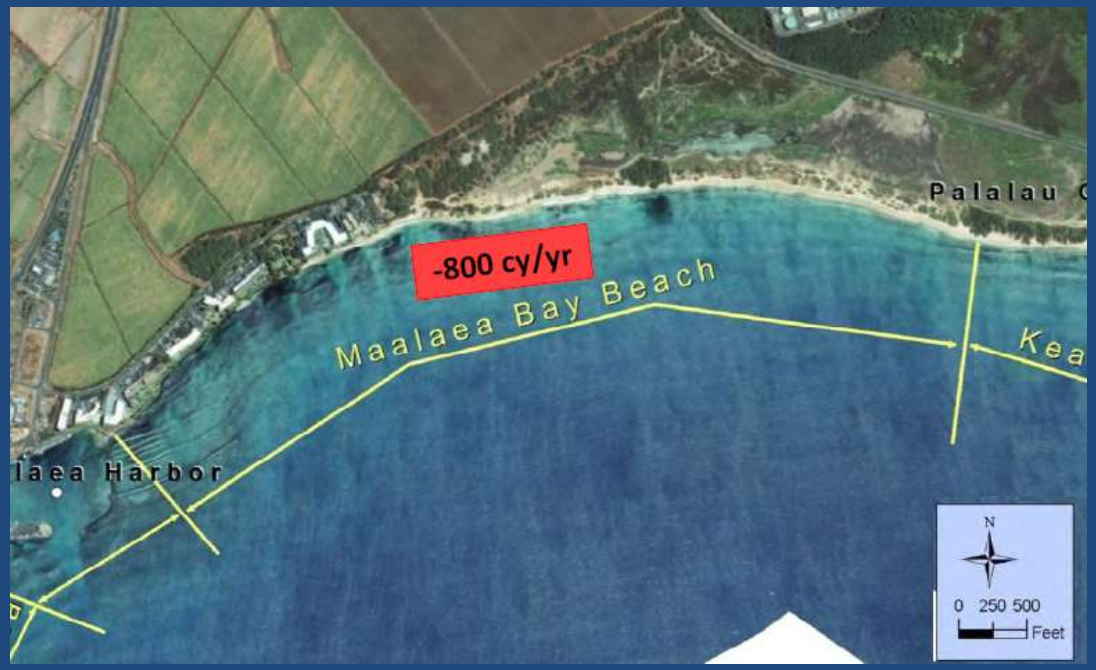
- Seven littoral cells analyzed
- General sand transport:
  - Wave driven sand transport is south to north
  - Wind-driven sand transport is north to south

MAALAEA BAY BEACH CELL - EROSION TRENDS

- 6,500 feet of shoreline; western 2,500 feet developed
- RSM study:
  - shoreline change rates converted to beach volume changes
  - chronology of events affecting shorelines
  - significant erosion period in the first half of the 1900s
  - erosion has continued at a lower rate since the 1950s



MAALAEA BAY BEACH CELL - COMPARISON



Littoral Cell	Accretion(+) / Erosion(-) Rate Over Entire Time Period of Record, cubic yards per year	Accretion(+) / Erosion(-) Rate Over Recent Period, cubic yards per year
West Maalaea	-100	+50
Maalaea Harbor	0	0
Maalaea Bay Beach	-1,300	-800
Kealia	-2,300	-2,800
North Kihei	-800	+8,800
Kawililipoa Beach	+1,400	+1,200
Kalama	-1,400	-1,600

POTENTIAL SAND FIELDS FOR BEACH RESTORATION

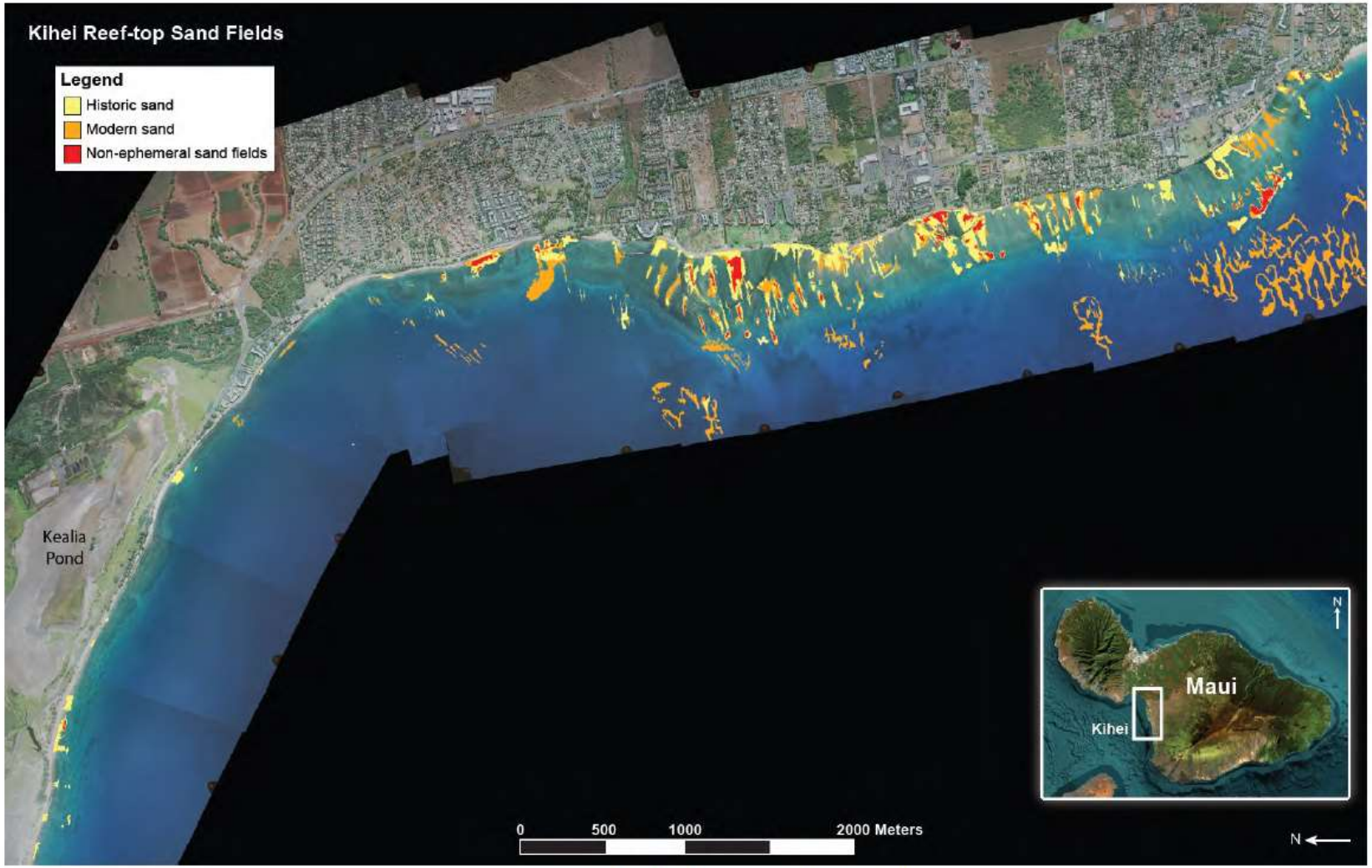
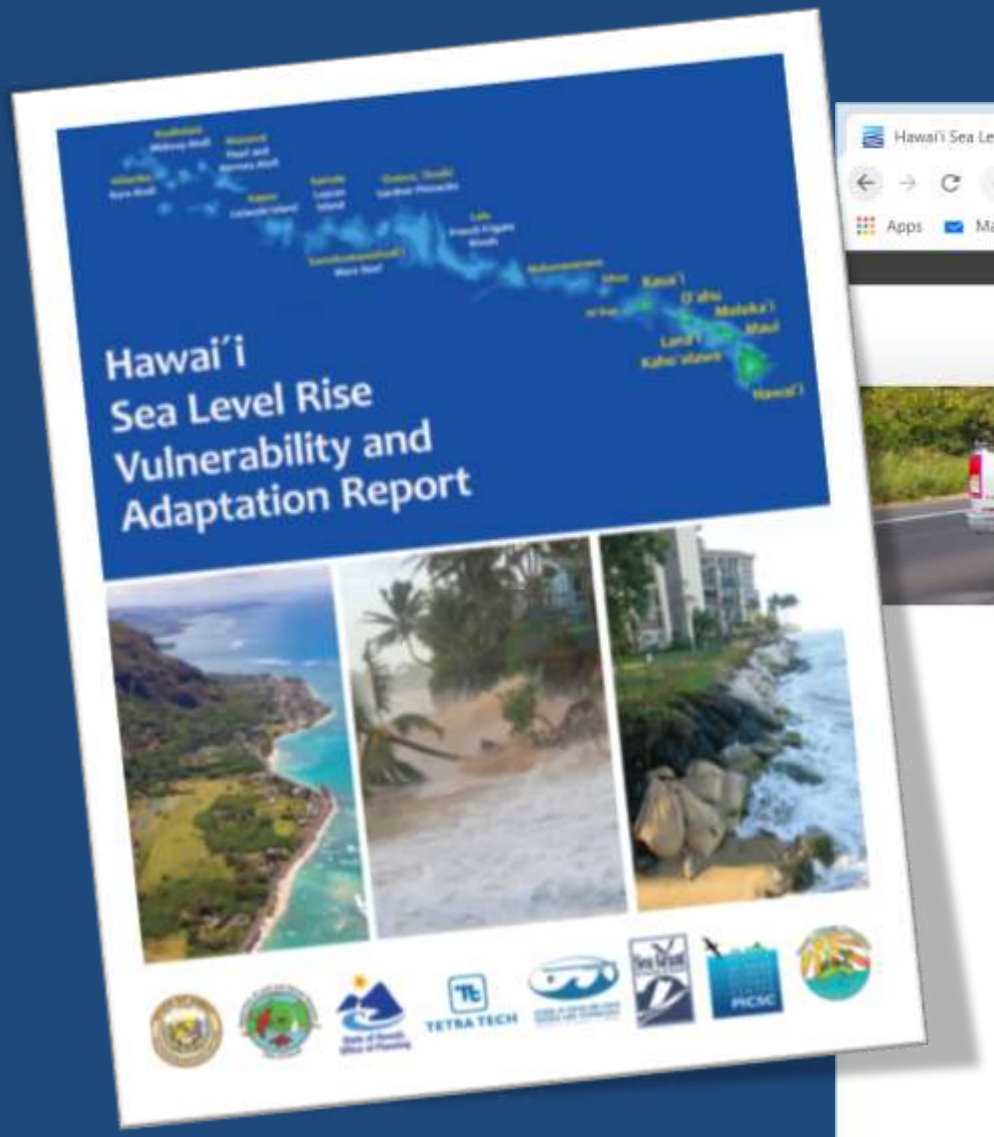


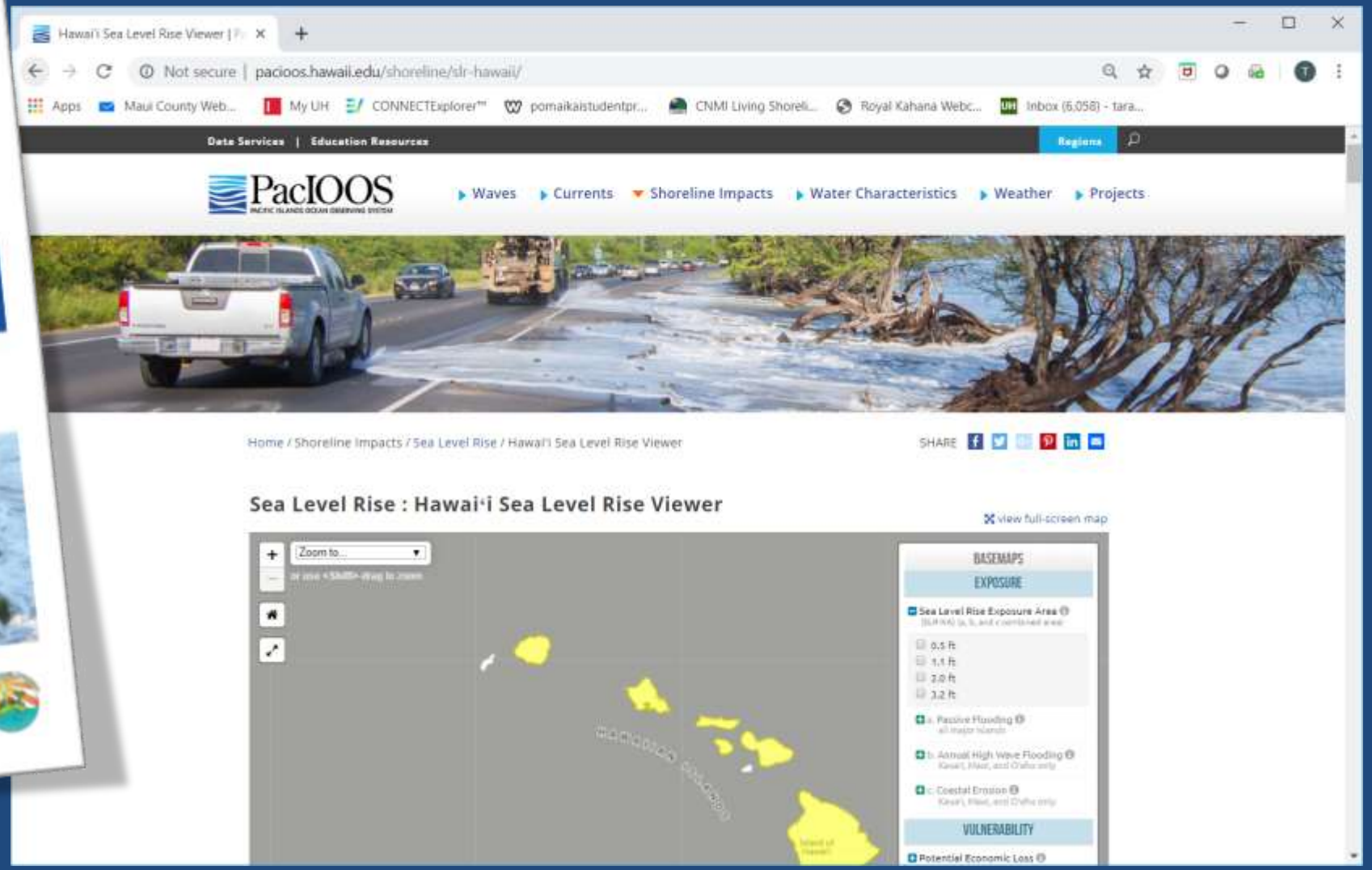
Figure 76. Reef-top Sand Fields Located at Kihei, Maui

- Coverage Area: Kalama Beach to Kealia Pond (excludes Maalaea)
- 13.8 acres (55,821 m^2) of stable sand on the reef flat

HAWAII SLR REPORT & VIEWER

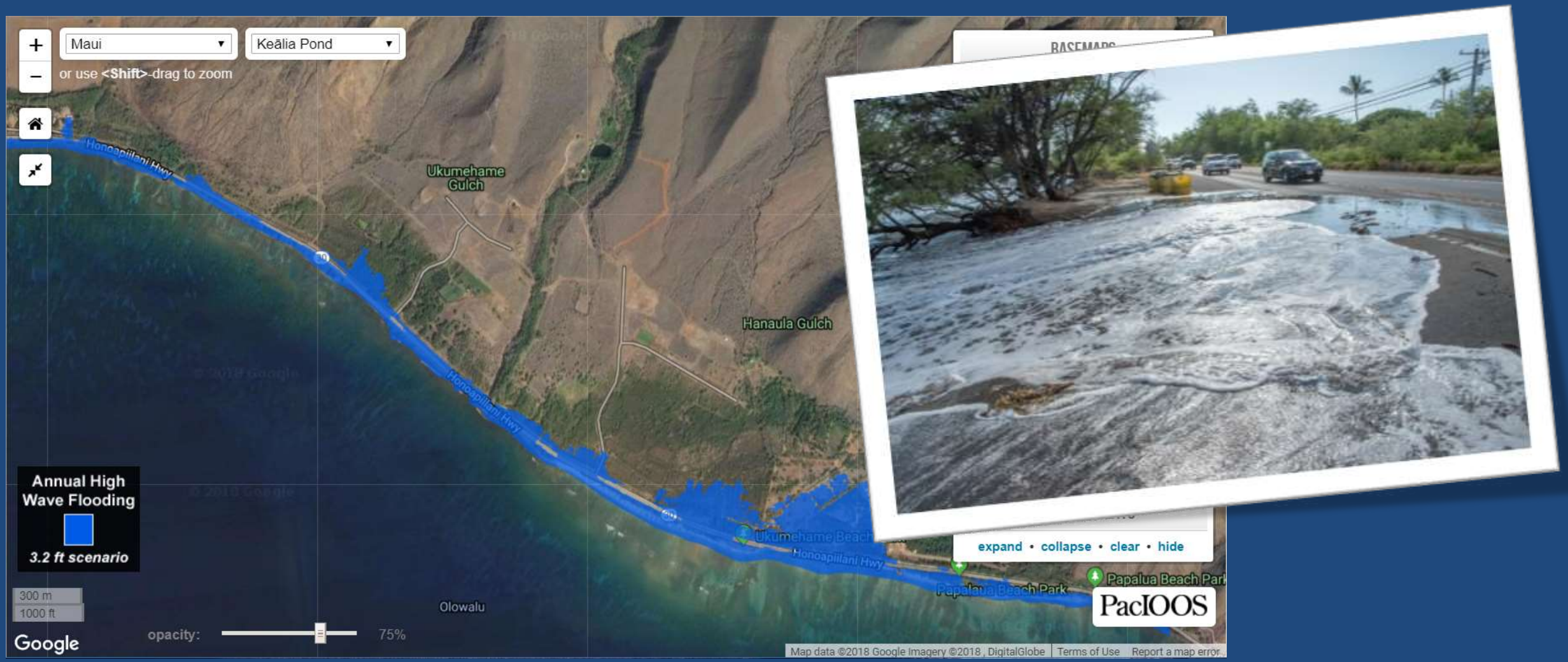
www.hawaiisealevelriseviewer.org





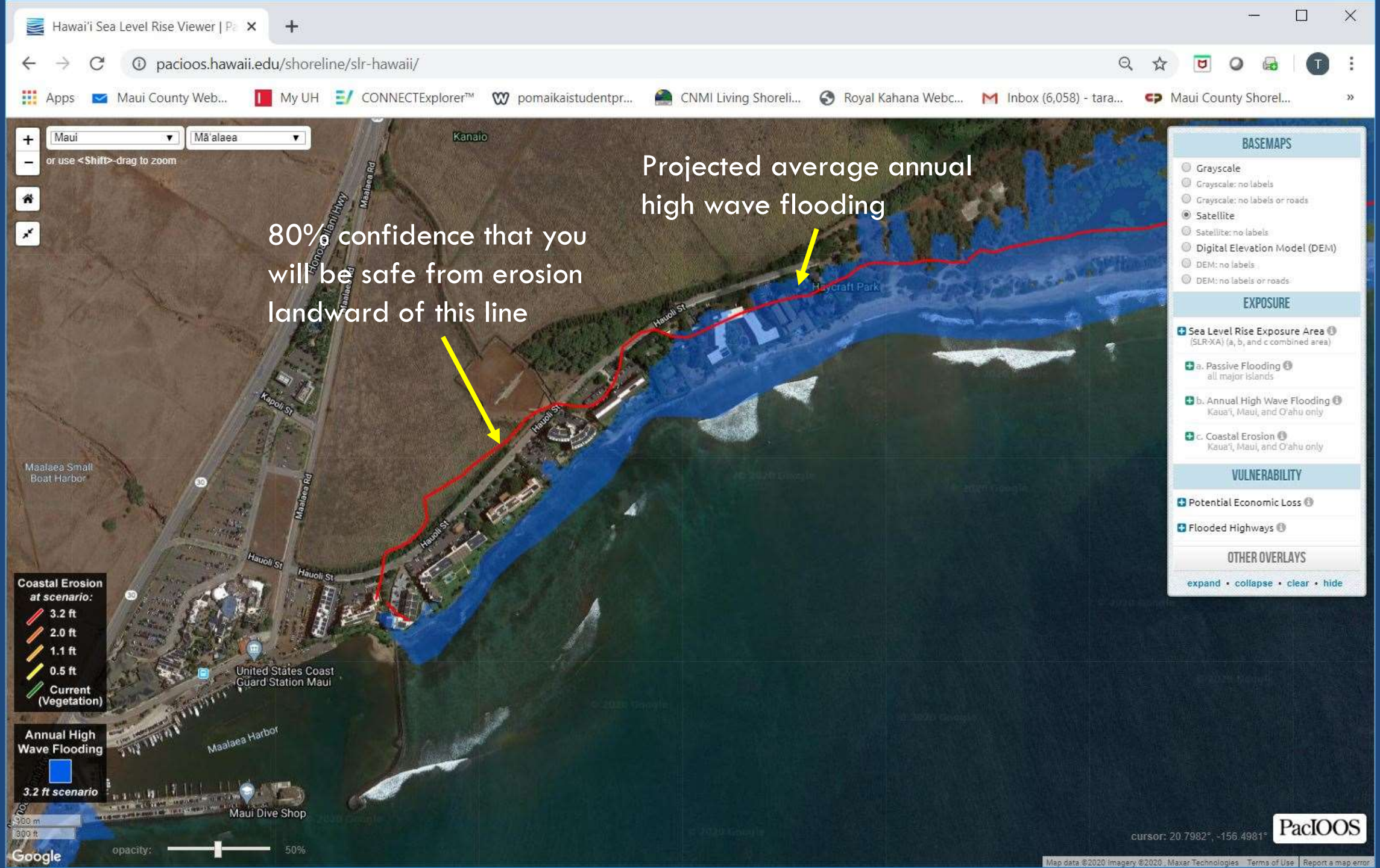
PASSIVE (STILL-WATER) FLOODING

ANNUAL HIGH WAVE FLOODING



COASTAL EROSION*

*Only the erosion model (aka “the red line”) is used in the proposed setback rules


Hawai'i Sea Level Rise Viewer
pacioos.hawaii.edu/shoreline/slr-hawaii/
Apps
Maui County Web...
My UH
CONNECTExplorer™
pomaikaistudentpr...
CNMI Living Shoreli...
Royal Kahana Webc...
Inbox (6,058) - tara...
Maui County Shorel...
Maui
Mā'alaea
or use <Shift>-drag to zoom
Projected average annual high wave flooding
80% confidence that you will be safe from erosion landward of this line
Kanaio
Honoapi'ilani Hwy
Maalaea Rd
Kapoli St
Hauoli St
Haycraft Park
Maalaea Small Boat Harbor
United States Coast Guard Station Maui
Maalaea Harbor
Maui Dive Shop
Coastal Erosion at scenario:
3.2 ft
2.0 ft
1.1 ft
0.5 ft
Current (Vegetation)
Annual High Wave Flooding
3.2 ft scenario
BASEMAPS
Grayscale
Grayscale: no labels
Grayscale: no labels or roads
Satellite
Satellite: no labels
Digital Elevation Model (DEM)
DEM: no labels
DEM: no labels or roads
EXPOSURE
Sea Level Rise Exposure Area
(SLR-XA) (a, b, and c combined area)
a. Passive Flooding
all major islands
b. Annual High Wave Flooding
Kaua'i, Maui, and O'ahu only
c. Coastal Erosion
Kaua'i, Maui, and O'ahu only
VULNERABILITY
Potential Economic Loss
Flooded Highways
OTHER OVERLAYS
expand • collapse • clear • hide
opacity:
50%
cursor: 20.7982°, -156.4981°
PacIOOS
Google
Map data ©2020 Imagery ©2020 , Maxar Technologies
Terms of Use
Report a map error

COASTAL MANAGEMENT TOOLBOX

preferred strategies

- Do nothing
- Managed retreat
  (i.e. setbacks, relocation)
- Adaptation
  (i.e. elevate, reconfigure)
- Beach nourishment and/or Dune Restoration
- Temporary erosion control
  (i.e. sand pushing, natural or geotextile bags, erosion blanket)
- Armoring
  (i.e. permanent rock revetment or seawall)

Do Nothing

Adaptation

Armor / "Hold the Line"

Mahalo Nui Loa

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University of Hawaii Sea Grant
taram@Hawaii.edu

Ongoing Beach Restoration Initiatives

1. Kahana Bay (regional scale)
2. Kaanapali Beach (regional scale)
3. Napili Bay (small scale)

- Existing Conditions
- Sand Source
- Project Scope & Status

4. DLNR Small Scale Beach Restoration (SSBR) Program

Kahana Beach (Valley Isle Resort), April & June 2016

Kahana Scope and Status

Project Scope	• Restore 1975 beach footprint • Sand Volume = 50 to 100,000 cubic yards
Sand Study	2016; offshore sand available & compatible
Economic Impacts	• ~1,000 dwelling units • combined value of $500+ million • over $10 million annually in tax revenues
EA/EIS	EIS-PN published July 23, 2019
Construction Cost	$15-30 million (up from $9-15 million)
Funding Mechanism	Private funding, with possible Community Facilities District (CFD)
Construction Timeline	Depending on Draft EIS and supplemental studies

Kaanapali Beach Hotel, January 2018

photo: Chris Conger (SEI, Inc)

Kaanapali Scope and Status

Project Scope	• Restore 1988 beach footprint • Sand Volume = 75,000 cubic yards • Dry Beach Width Increase = 42 feet
Sand Study	2008; offshore sand available & compatible
Economic Impacts	Estimated $2 billion annually in economic impacts
EA/EIS	EIS-PN published July 23, 2018
Construction Cost	$9+ million
Funding Mechanism	Cost-shared by KOA and State of Hawaii
Construction Timeline	Permits and construction in 2020 (?)

Napili Bay (Napili Bay Resort), August 2019

Napili Scope and Status

Project Scope	• Sand Volume = 10,000 cubic yards (more if SSBR allows) • Dry Beach Width Increase = ~20 feet
Sand Study	Updated in July 2018
Economic Impacts	• ~670 dwelling units • combined value of $400+ million • over $9 million annually in tax revenues
EA/EIS	Programmatic SSBN EA
Construction Cost	Estimated at $1-3 million (?)
Funding Mechanism	Seeking private funds
Construction Timeline	Permits and construction by late 2021 (?)