

## CAR.Committee

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**From:** Tara Owens <taram@hawaii.edu>  
**Sent:** Sunday, May 31, 2020 2:50 PM  
**To:** CAR.Committee  
**Subject:** CAR-9 presentation

Please see link below for presentation in .ppt and .pdf formats. The .ppt file is too large for email. The .pdf will be best for the presentation to support the animations.

<https://drive.google.com/drive/folders/1tbqHJm5KH6fO70HI7ehCsTawHESF3L9I?usp=sharing>

Thanks!  
Tara

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# Working Toward Community Resilience on Maui in the Face of Sea Level Rise

Maui County Council  
Climate Action & Resilience Committee  
June 1, 2020

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



## PRESENTATION TOPICS

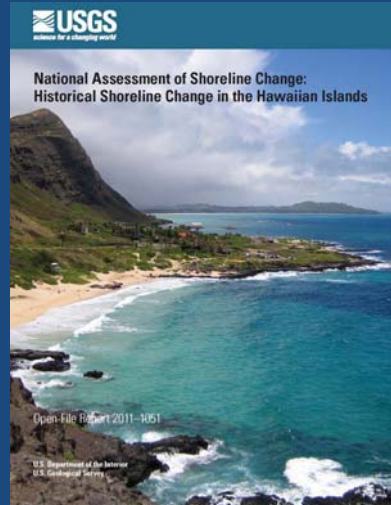
- Coastal erosion trends and causes
- Incorporating sea level rise information into plans and assessments
- Solutions and responses to impacts from high waves and erosion
  - New research products for wave impacts in West Maui
  - Dune Restoration Program
    - Sea Grant Dune Management Coordinator (County Council funding)
    - Ongoing and upcoming projects
  - Proposed Beach Restoration Projects



South Kihei Road

## 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

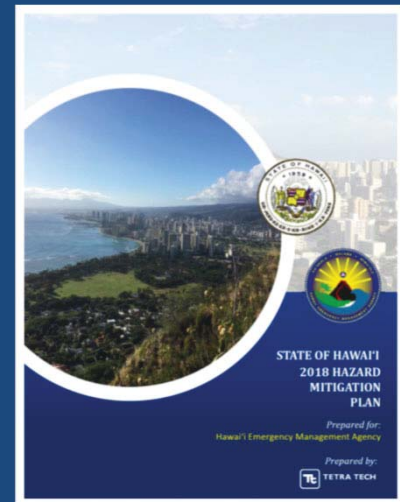
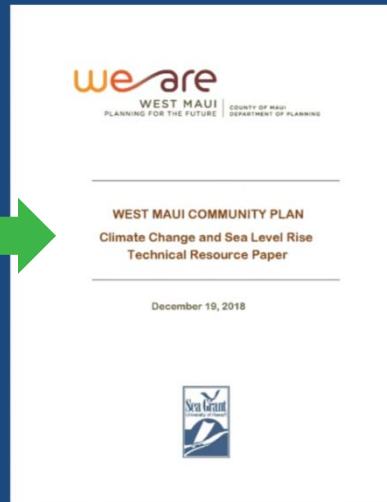
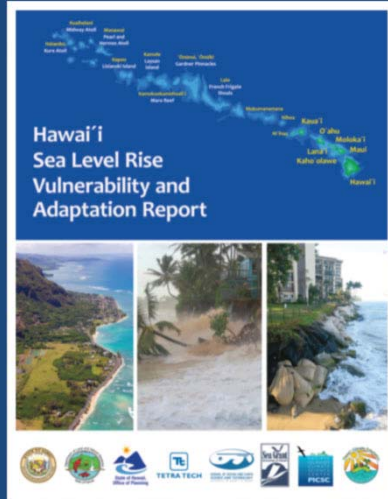
Combination of:

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, Nohonani Condominiums, 2014

# INTEGRATING SLR INFORMATION ACROSS PLANS



# RESPONSES: COASTAL MANAGEMENT TOOLBOX

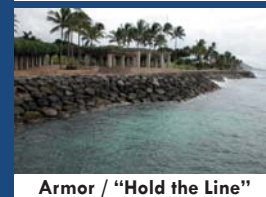
- preferred strategies
- Do nothing
  - Managed retreat  
(i.e. setbacks, relocation)
  - Adaptation  
(i.e. elevate, reconfigure)
  - Beach and/or Dune restoration
  - Temporary erosion control  
(i.e. sand pushing, natural or geotextile bags, erosion blanket)
  - Armoring  
(i.e. permanent rock revetment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



Do Nothing



Adaptation



Armor / "Hold the Line"

# SLR VIEWER: ANNUAL HIGH WAVE FLOODING

[www.hawaiiisealevelriseviewer.org](http://www.hawaiiisealevelriseviewer.org)

**Hawai'i Sea Level Rise Vulnerability and Adaptation Report**

**Annual High Wave Flooding**  
3.2 ft scenario

**BASEMAPS**

**EXPOSURE**

- Sea Level Rise Exposure Area (SLR-RA) (a, b, and c combined area) all major islands
- Passive Flooding all major islands
- Annual High Wave Flooding Kaula I., Maui, and O'ahu only
  - 0.5 ft
  - 1.1 ft
  - 2.0 ft
  - 3.2 ft
- Coastal Erosion Kaula I., Maui, and O'ahu only

**VULNERABILITY**

- Potential Economic Loss
- Flooded Highways

**OTHER OVERLAYS**

expand • collapse • clear • hide

PacIOOS

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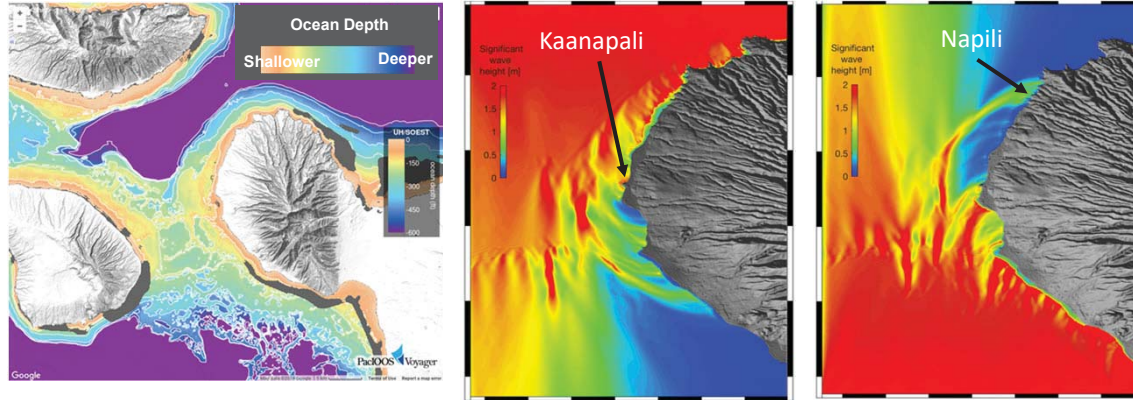
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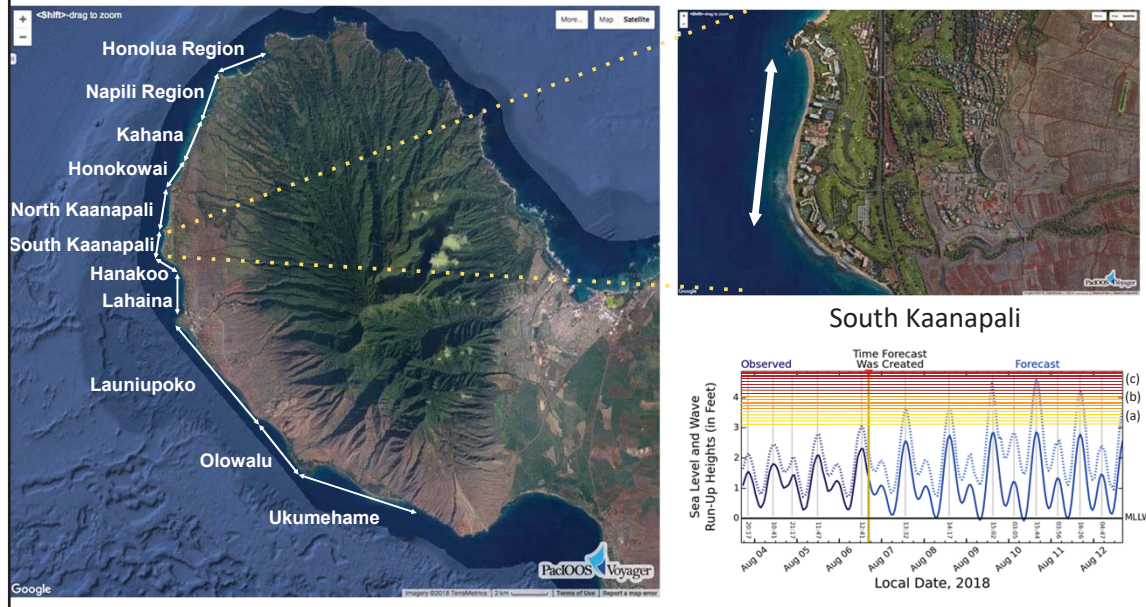
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# West Maui: A Special Case of Wave Impacts

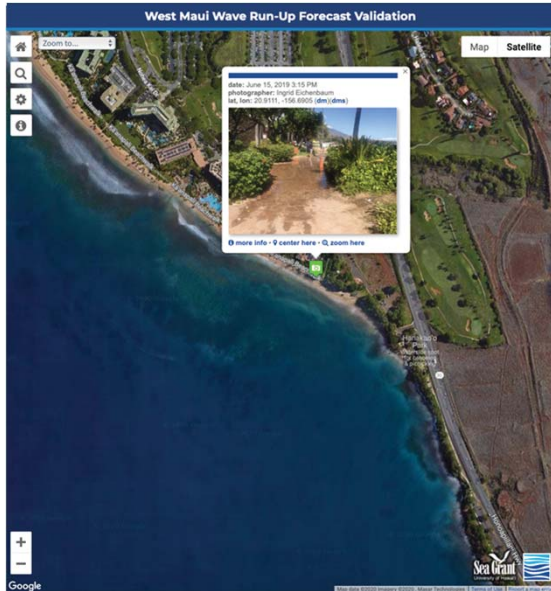
- 2017 NOAA Regional Coastal Resilience Grant award: *“Enhancing Community Resilience with Real-Time Notifications of Hazardous Wave-driven Flooding and Erosion Events”*



# New Forecasts Will Support Resilience Actions



# Community-Based Input Validates Impacts

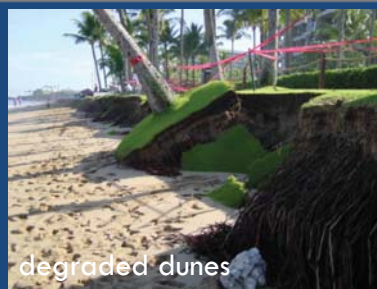
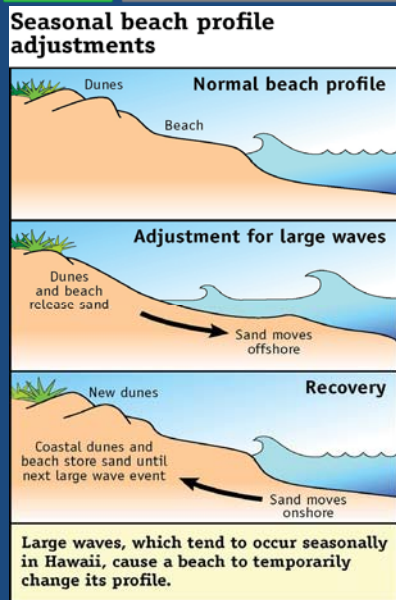


Submit photos:  
[www.pacioos.org/wm](http://www.pacioos.org/wm)

View photos:  
[www.pacioos.org/wmm](http://www.pacioos.org/wmm)



# COASTAL DUNES PROVIDE PROTECTION & MORE



**Coastal Sand Dunes**  
 A Natural Protection

**Shifting Sands**  
 Sand dunes play an important role in protecting shorelines and providing habitat for many of the unique plants and animals found on Hawaii. Coastal erosion is a natural process and the dramatic nature of storms and the frequency of coastal flooding, storm surge, and high winds can erode dunes and remove the natural protection of coastal lands from flooding and the resulting harm to adjacent lands.

**Please Kōkua**  
 Beach users can help restoration by staying off the dunes and keeping an appropriate beach system area free of the exterior vegetation. Kōkua!

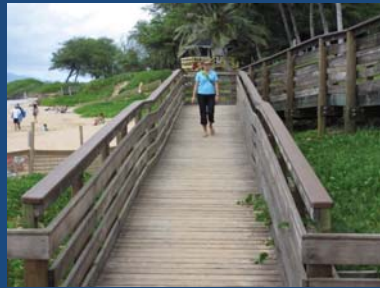
**Restoration**  
 Restoring native dune plants and replanting native plants contribute to the healthy maintenance of sand dunes. Removal of non-native plants can also contribute to the restoration process.

**Why the Boardwalks?**  
 Boardwalks, also called dune walkways, are used to keep foot traffic off of the dunes and to provide high quality access and the plants. Sand dunes are used to help restore natural dunes to allow the dunes to grow.

## COASTAL DUNE RESTORATION PROGRAM

### Strategies:

- Move anything in the way (hardscape or encroaching vegetation)
- Stabilize the sand (add sand, fencing, and/or native vegetation)
- Provide access pathways (footpaths or walkovers)
- Educate and monitor



## EXAMPLE: KAMAOLE I PARK DUNE RESTORATION

- Coordination with State (DLNR DOBOR) and County on beneficial use of Kihei boat ramp sand
- Permitting (SMA, Grading, Flood Development)
- Hauling and placement of sand from Kihei Boat Ramp
- Designate shoreline access paths
- Establish native dune plants

May 18, 2020





## NEW PROJECT: BALDWIN BEACH DUNE RESTORATION

- 2019 National Fish and Wildlife Foundation (NFWF) grant award: *“Restoring Maui Coastal Dunes to Improve Community Resilience and Enhance Wildlife Habitat”*



## 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

|                                              |                                                                                                                                                                                                                                                                 |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Scope</b>                         | <ul style="list-style-type: none"> <li>• Restore 1975 beach footprint</li> <li>• Sand Volume = 50,000 to 100,000 cubic yards</li> </ul>                                                                                                                         |
| <b>Sand Study</b>                            | Completed in 2016 – sand source confirmed                                                                                                                                                                                                                       |
| <b>Economic &amp; Environmental Benefits</b> | <ul style="list-style-type: none"> <li>• Protect ~936 shoreline dwelling units</li> <li>• Combined value of \$500+ million</li> <li>• Contribute over \$10 million annual tax revenues</li> <li>• Restore coastal ecosystem &amp; enhance recreation</li> </ul> |
| <b>EA/EIS</b>                                | “EIS-Prep Notice” published July 23, 2019                                                                                                                                                                                                                       |
| <b>Construction Cost Estimate</b>            | \$15-30 million (up from \$9-15 million)                                                                                                                                                                                                                        |
| <b>Funding Mechanism</b>                     | Private funding, with possible Community Facilities District (CFD)                                                                                                                                                                                              |
| <b>Construction Timeline</b>                 | Depending on Draft EIS and supplemental studies                                                                                                                                                                                                                 |

## Kahana: Proposed Community Facilities District



### Community Facilities District (CFD) with bond:

- If cost = \$24,000,000
- 1,200 owners = \$20,000/unit
- 20 year bond life= \$1000/year
- ~\$83/month/owner for 20 years



Kaanapali Beach Hotel, January 2018

photo: Chris Conger (SEI, Inc)

## Kaanapali Scope and Status

|                                              |                                                                                                                                                                            |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Scope</b>                         | <ul style="list-style-type: none"> <li>• Restore 1988 beach footprint</li> <li>• Sand Volume = 75,000 cubic yards</li> <li>• Dry Beach Width Increase = 42 feet</li> </ul> |
| <b>Sand Study</b>                            | 2008; offshore sand available & compatible                                                                                                                                 |
| <b>Economic &amp; Environmental Benefits</b> | Estimated \$2 billion annually in economic impacts<br>Restore coastal ecosystem & enhance recreation                                                                       |
| <b>EA/EIS</b>                                | EIS-PN published July 23, 2018                                                                                                                                             |
| <b>Construction Cost</b>                     | \$11 million                                                                                                                                                               |
| <b>Funding Mechanism</b>                     | Cost-shared by KOA and State of Hawaii                                                                                                                                     |
| <b>Construction Timeline</b>                 | Permits and construction in 2020 (?)                                                                                                                                       |



Napili Bay (Napili Bay Resort), August 2019

## Napili Scope and Status

|                              |                                                                                                                                                                          |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Scope</b>         | <ul style="list-style-type: none"> <li>• Sand Volume = 10,000 cubic yards (more if SSBR allows)</li> <li>• Dry Beach Width Increase = ~20 feet</li> </ul>                |
| <b>Sand Study</b>            | Updated in July 2018                                                                                                                                                     |
| <b>Economic Impacts</b>      | <ul style="list-style-type: none"> <li>• ~670 dwelling units</li> <li>• combined value of \$400+ million</li> <li>• over \$9 million annually in tax revenues</li> </ul> |
| <b>EA/EIS</b>                | Programmatic SSBR EA                                                                                                                                                     |
| <b>Construction Cost</b>     | Estimated at \$1-3 million (?)                                                                                                                                           |
| <b>Funding Mechanism</b>     | Seeking private funds                                                                                                                                                    |
| <b>Construction Timeline</b> | Permits and construction by late 2021 (?)                                                                                                                                |

## Mahalo Nui Loa

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