

MANAGING MAUI'S DYNAMIC SHORELINES

Maui County IEM Committee
March 20, 2017

James Buika, Keith Scott
Coastal Zone Management Planner
County of Maui Planning Department

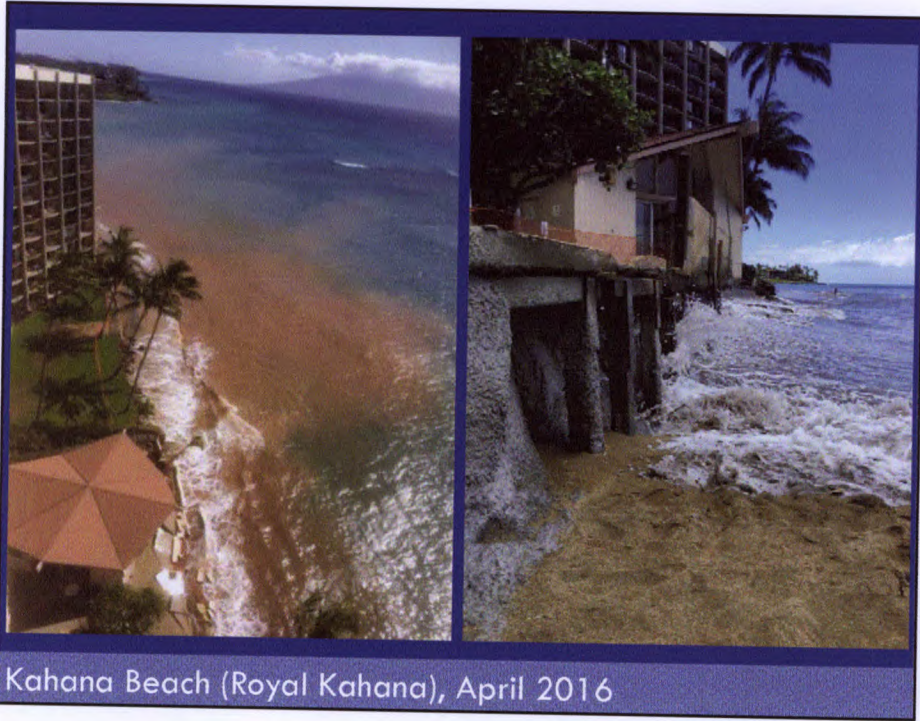
Tara Owens
Coastal Processes & Hazards Specialist
University of Hawaii Sea Grant



04 22 2015



Kahana Beach (Royal Kahana), September 2015





Kahana Beach (Valley Isle), June 2016



North Kaanapali (Kaanapali Beach Club), June 2016



Maui has lost more than four miles of sandy beach in past century — report

By LEE ANNA, Hawaii Editor

10 FEET A YEAR — Eighty-five percent of sandy beaches on the island lost 4.7 miles, the study by the U.S. Geological Survey and University of Hawaii report showed the loss.

Those percentages were the highest in the report, citing a 100 percent loss of beach area on "beachfront erosion" on Maui, Oahu and Kauai.

"The study shows that erosion is occurring on a wide range of beaches, which is a concern because it is affecting the ability of the island to absorb the impact of climate change and sea level rise," said Charles Fletcher, executive director of the U.S. Geological Survey's Pacific Coastal and Estuarine Science Center and lead author of the report. "National Assessment of Beaches Change identified dramatic declines in beach area on Maui, Oahu and Kauai."

WALLS NO MATCH FOR WAVES

New research predicts a doubling of coastal erosion by mid-century in Hawai'i

March 23, 2016 - HAWAII ONLINE - Comments

New research from scientists at the University of Hawaii at Manoa and the Hawaii Department of Land and Natural Resources brings into sharper focus just how dramatically Hawaii's beaches might change as sea level rises in the future.

Coastal erosion threatens the sandy beaches of Hawaii, leaving beachfront property at risk.

EROSION LIKELY RESULT OF SUPERMOON TIDAL INCREASES RATHER THAN STORMS

Star Advertiser

WEDNESDAY, March 23, 2016

LAHAINA NEWS

West Side beaches and properties face erosion from large surf

LAHAINA — A large storm surge on March 21, a day after a softening and another high, low-tide morning, has been blamed for the erosion of beaches on the west side of Maui and the loss of a portion of Lahaina's sandy coastline.

A combination of strong north-easterly winds associated with a low-pressure system and a new, high, low-tide morning on March 21, a day after a softening and another high, low-tide morning, has been blamed for the erosion of beaches on the west side of Maui and the loss of a portion of Lahaina's sandy coastline.

Hotel tax might be tapped to fix eroding beaches

LAHAINA — A plan to use a portion of the hotel tax to fund beach restoration projects is being considered by the Maui County Council.

The plan, which would allow the county to use up to 10 percent of the hotel tax to fund beach restoration projects, is being considered by the Maui County Council.

June 5, 2016

The Maui News

SUNDAY, June 5, 2016 \$2.00

**als
s
na
e**

Building D

Rising tides and strong waves ended part of the Royal Kahana Resort's pool deck, sloping water to pour into its cabana building in April.

'Beach-quality sand' discovered as erosion reaches 'crisis' level

Mayor says county not responsible for threat to West Maui condos

By CHRIS BUCKINGHAM, Staff Writer

KAHANA BAY — Maui County executive planner on "Friday" after discovering more than 200,000 cubic yards of "beach-quality sand" off Kahana Bay, which could replenish the beachfront of numerous condominiums that have been

September 22, 2016

Mobile: mobile.lahainanews.com

LAHAINA NEWS

Your Community News Opinions Features Sports Class

Local News

Rotary Club of Lahaina Sunri... County to hold meeting on r...

State hears public concerns over highway seawalls

September 22, 2016
BY LOUISE ROCKETT · Lahaina News

Save | Post a comment |

WEST MAUI - Driving to Lahaina is a gamble these days, with Honoapiʻilani Highway, between Puamana and the Pali, under attack from fire, flooding, landslides, reckless drivers, road closures, sinkholes, seawalls, high tides, waves and gridlock.

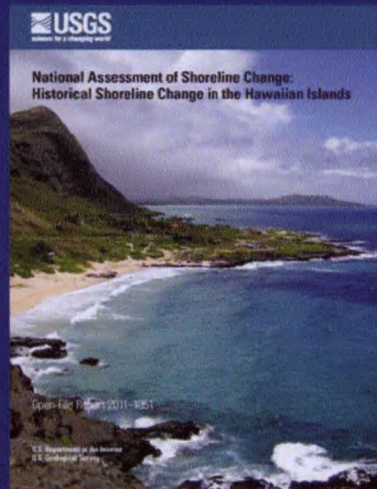
But now a positive, enlightened force has come forward to lead the way and forge a new path.

Occupy Olowalu," a West Side social media phenom, has taken a land. For the past week (as of deadline Sept. 19), the determined activists have camped out on the shoreline just south of Awalaia, and miraculously their messages, posted on signs along the roadside and on Facebook, are being heard: #nomoreseawalls, #protectourshorelines, #movetheroad.

Article Photos

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%).

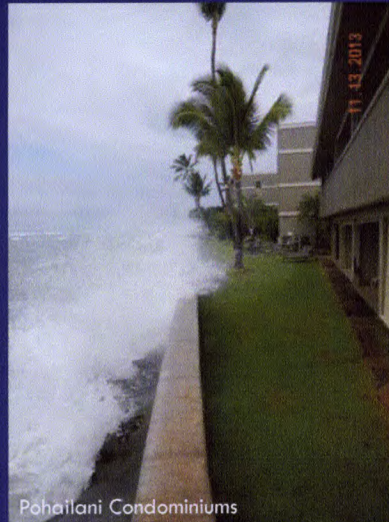


Fletcher, Charles et. al., 2011. *National Assessment of Shoreline Change: Historical Shoreline Change in the Hawaiian Islands*. U.S. Geological Survey Open-file Report 2011-1051, 55p.

COASTAL EROSION

Combination of Causes:

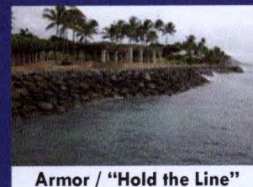
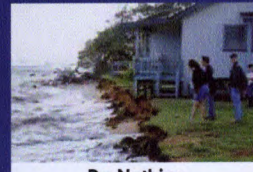
1. Sea-Level Rise
(chronic erosion)
2. Seasonal Wave Conditions & Storms that Move Sand
(episodic erosion)
3. Human Impacts to Sand Supply & Transport



EROSION RESPONSE OPTIONS

preferred strategies

- Do nothing
- Managed retreat (*setbacks*)
- Adaptation (*elevate, reconfigure*)
- Beach nourishment and/or Dune Restoration
- Temporary or permanent erosion control (*sand pushing, geobags, groins*)
- Armoring (*permanent rock revetment or seawall*)



RETREAT: MAUI'S SHORELINE SETBACK

- Setback is the greater of A or B:

A. Erosion-based Setback

Current Calculation:

50 yrs x AEHR + 25 feet

Example if AEHR = 1.4 ft/yr:
 (50 yrs x 1.4 ft/yr) + 25 ft =
 95 ft setback

B. Lot Depth-based Setback

Current Calculation:

<i>If lot depth is:</i>	<i>Setback is:</i>
100 ft or less.....	25 feet
100 to 160 ft.....	40 feet
160 ft or more.....	25% of avg. lot depth (150 ft max.)

NOTE: Minimum of 25 ft setback for all shoreline lots.

EROSION SETBACK DEFICIENCIES

$$(50 \text{ yrs} \times \text{AEHR}) + 25 \text{ feet}$$

1. life expectancy of
structure

2. historical erosion

3. minimum setback

1. 50 year multiplier too low: average life expectancy of structures = 70 years (American Society of Coastal Engineers, 2002)
2. Historic erosion rate may not adequately account for episodic events
3. Minimum setback allows structures to exist within 5 feet of "Imminent Threat" classification
4. Sea level rise not a factor in formula

RETREAT: SETBACK RECOMMENDATION

Existing Formula:
(50 yrs x AEHR) + 25 feet



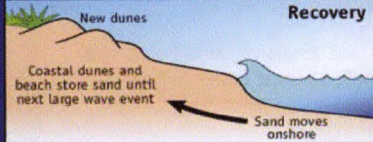
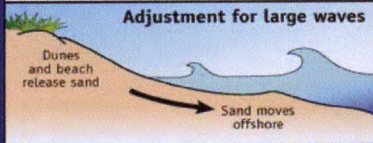
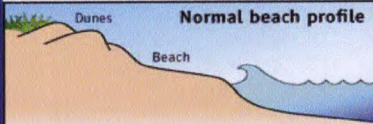
Proposed Formula:
(70 yrs x AEHR) + 40 feet + SLR

AEHR = Annual Erosion Hazard Rate



PROTECT & RESTORE DUNES

Seasonal beach profile adjustments



Large waves, which tend to occur seasonally in Hawaii, cause a beach to temporarily change its profile.



degraded dunes



healthy dunes

Kamaole I Beach Park

DUNE WALKOVERS

Kamaole I



Kamaole III



BEACH NOURISHMENT



Beach and Land Erosion at Project Beach Looking East, 22 August 2006 - before geotube groins.



Beach and Land Erosion Causing Pollution at Project Beach, 4 August 2009 - before geotube groins

Stable Road, North Shore, 2006-2009 (Before Restoration)

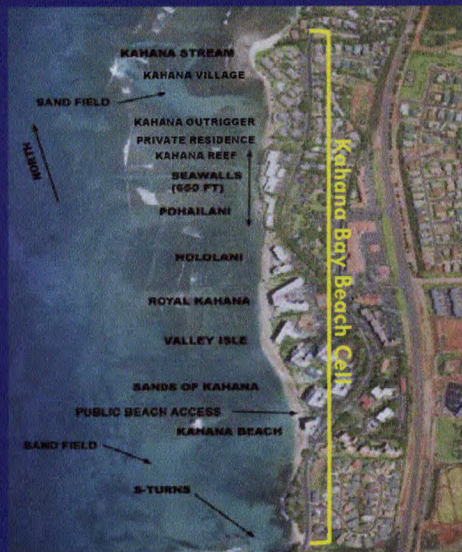
BEACH NOURISHMENT

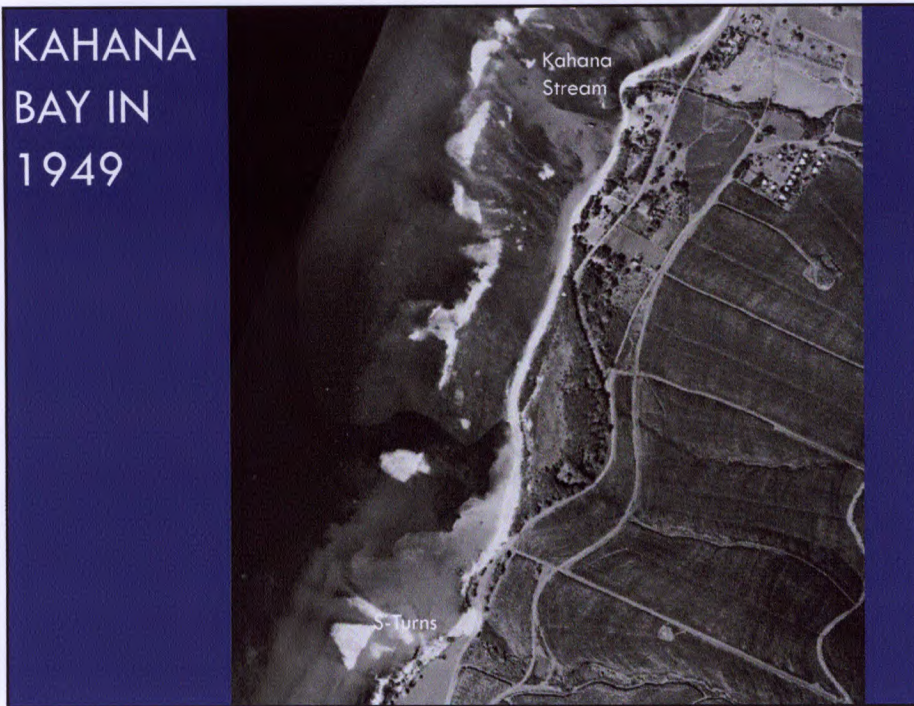


Stable Road, May 2016 (After Restoration)

KAHANA BAY COASTAL EROSION

- Older existing condos were built close to the ocean & are now threatened by erosion.
- Long-term erosion of 0.7 ft/yr has led to narrowed beaches.
- Armoring has contributed to erosion.
- Episodic (seasonal) erosion is now more damaging.
- The formerly wide sandy beach has protected condos through the years.







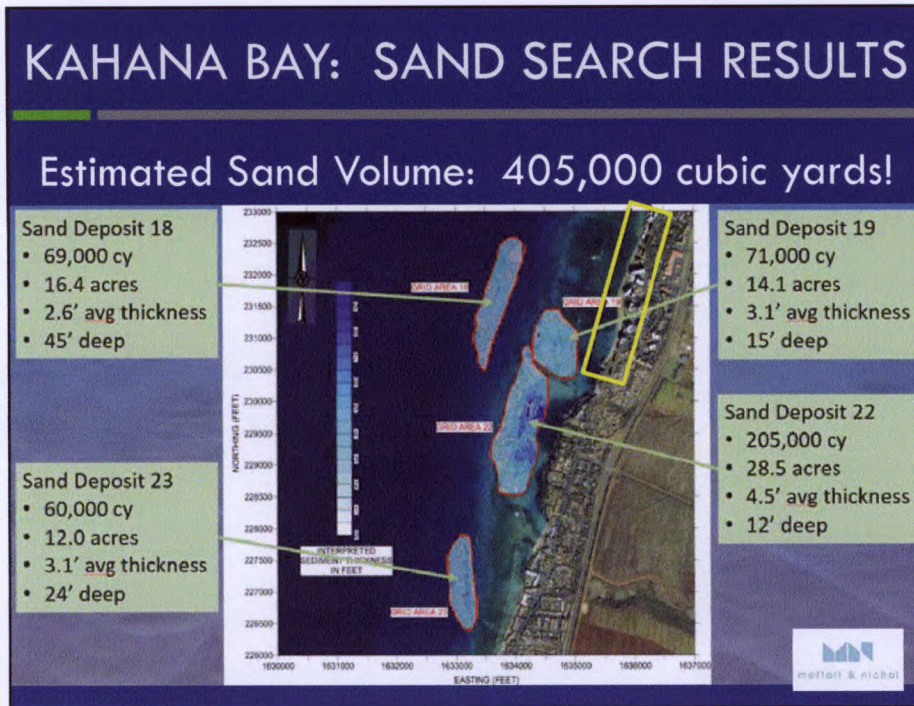
BEACH RESTORATION STUDY

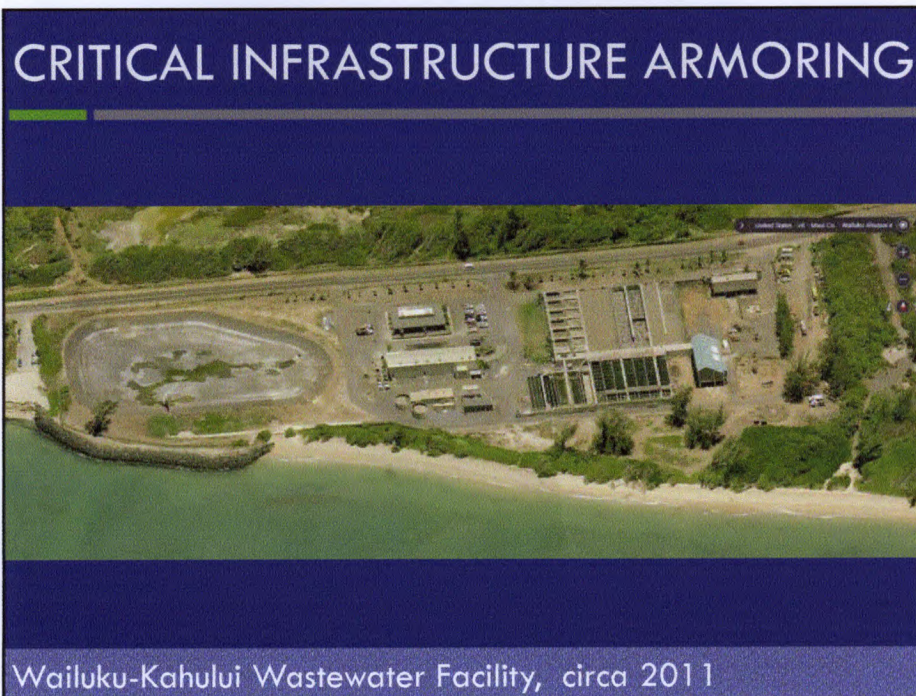
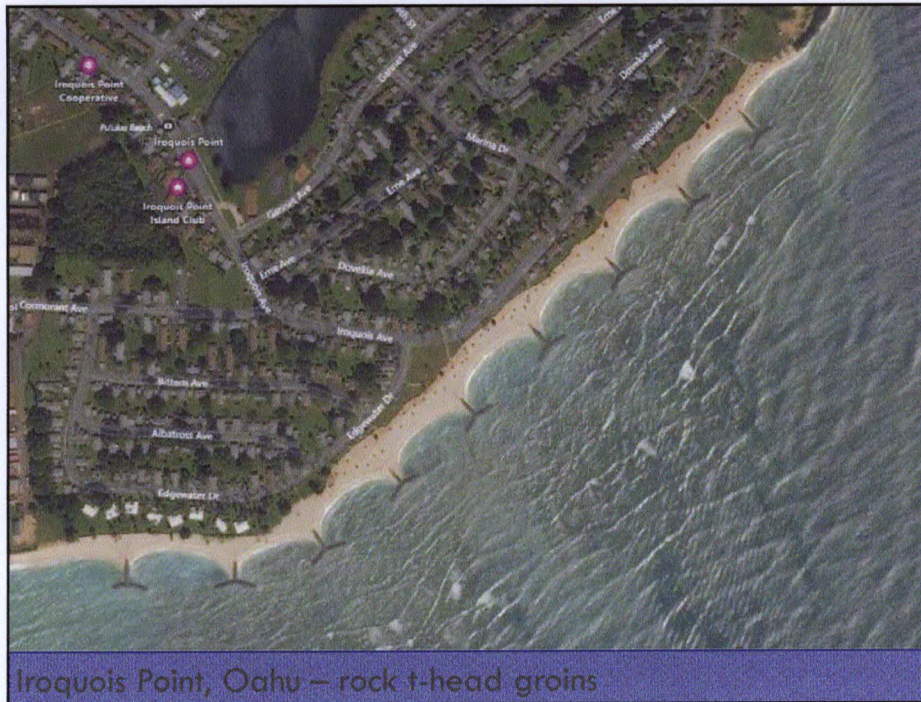
1. Objective was to initiate a Kahana Bay erosion mitigation study* and partnership approach.
2. Solicit owners' support to match \$160,000 committed by the County Council for the 1-yr study.

ACCOMPLISHED!!

*The 1-year study would evaluate a regional beach nourishment solution by:

- 1) Investigating potential offshore sand sources (sand = options);
- 2) Assessing alternative structure configurations.





CRITICAL INFRASTRUCTURE ARMORING



Image: Goodfellow Brothers

Wailuku-Kahului Wastewater Facility, 2015

MITIGATION: DUNE RESTORATION



Wailuku-Kahului Wastewater Facility, 2016

CRITICAL INFRASTRUCTURE ARMORING



Honoapiilani Highway, August 2012

CRITICAL INFRASTRUCTURE ARMORING

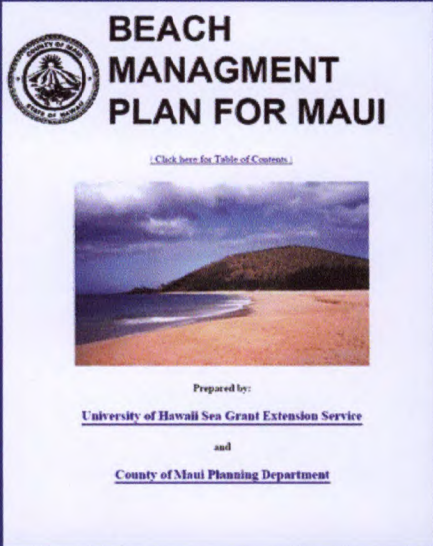


Honoapiilani Highway, January 2013

RECENT ARMORING DECISIONS

YEAR	LOCATION	DECISION	COST
2016	Hololani Condominiums (West Maui)	approved, conditions to restore beach and remove	\$3 million
2016	Argyropoulos property (North Shore)	approved, not yet built	\$0.5 million
2015	Wailuku-Kahului Wastewater Reclamation Facility (North Shore)	approved and completed	\$5.8 million
2013	Honoapiilani Highway at Launiupoko (West Maui)	completed under emergency proclamation	\$6 million
2012	Honoapiilani Highway at Ukumehame (West Maui)	completed under emergency proclamation	\$7 million
2011	Honoapiilani Highway at Olowalu (West Maui)	approved, put on hold (2016)	\$2 million

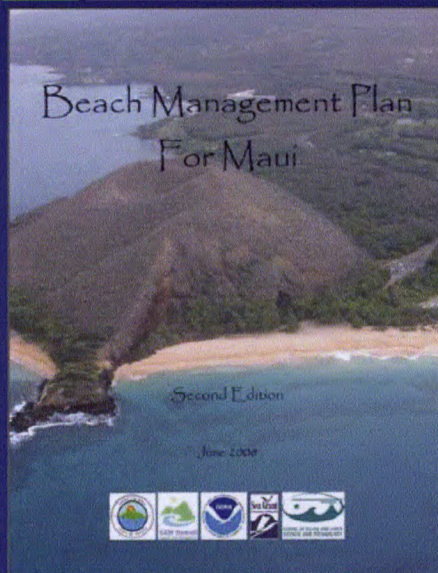
BEACH MANAGEMENT PLAN



[Click here for Table of Contents](#)

- First edition published in 1997 and adopted by Maui County Council
- Recommended erosion rate-based setbacks and revisions to Maui County Code to protect coastal dunes
- Many recommendations not implemented; guidance document w/o the force of law

BEACH MANAGEMENT PLAN



- New concepts and tools to move away from ad-hoc approach to CZM
- Promotes beach preservation and natural asset management
- Identifies 13 focus areas recommendations for each
- Incorporated by reference into the Maui Island Plan

13 TOPICS WITH RECOMMENDATIONS

1. Develop Regional Beach Management Plans
2. Guidelines for Shore Protection Measures
3. Plan for Sea Level Rise
4. Promote Beach Nourishment
5. Promote Dune Restoration
6. Reduce Impacts to Coral Reef Ecosystems
7. Improve Shoreline Setbacks & Hazard Data
8. Proactive Conservation of Coastal Lands
9. Inter-agency Coordination
10. Establish Beach Management Districts
11. Increase Public Awareness and Education
12. Fund Research
13. Establish Funding Mechanisms

STATUS OF 91 BMP RECOMMENDATIONS

Topic		Recommendations	Done	- Completed * Still Needed
1	Regional Plans	2	1	- Important Rec Lands w/HILT
2	Shore Protection	8	3	- SM3 time limits & fine amounts * Rapid response method & material
3	Sea-level Rise	5	in work	* ID at-risk infrastructure
4	Beach Nourishment	8	2	- Offshore studies - Restricting sand exports
5	Dunes	6	4	* Buy/stockpile inland sand * Preserve Sea Grant staff
6	Coral & Water	11	1	MNMRC/HDOH Sampling * BMP Workshop
7	Setbacks & Hazards	9	2	* Expand SMA to ocean * Establish Cliff / Bluff setbacks

Topic		Recommendations	Done	- Completed * Still Needed
8	Land	9	3	- Pre-consultation w/Experts * Discourage slab-on-grade construction
9	Multi-agency Bureaucracy	7	3	- ORMP - Olowalu seawall
10	Beach Districts	3	1	- Stable Road SSBN - Improvement Ordinance
11	Education	5	2	- Paia Bay, C.Young, Kam III community restoration - Outreach through Sea Grant cost-share position
12	Research	11	2	Offshore sand resources
13	Funding	7	1	* Direct SMA fines to beach restoration * Beach Mitigation Bank * Beach management in the CIP budget
Total		91	25	27%+ complete

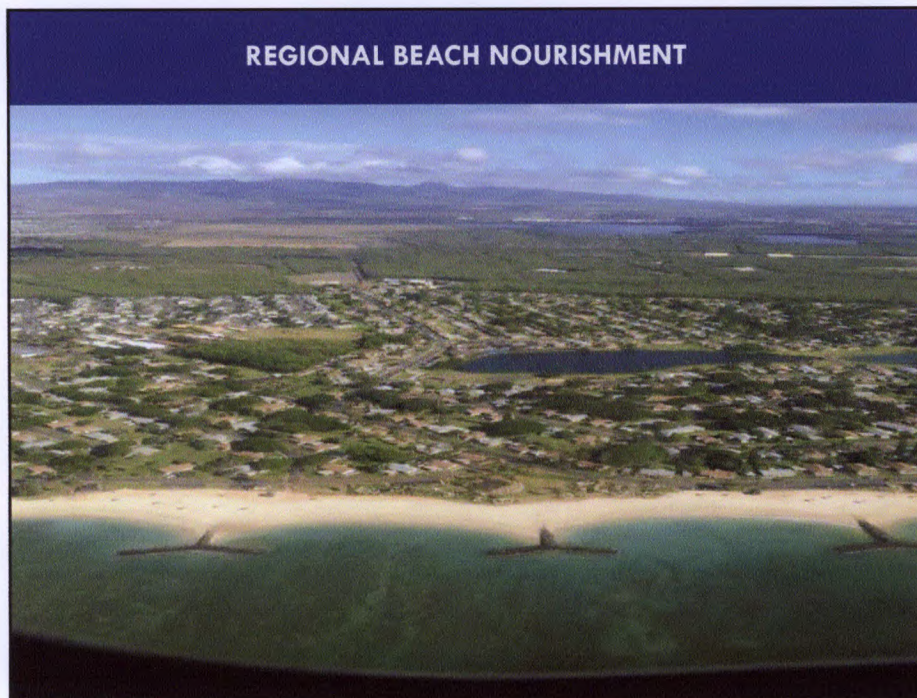
TOPIC 13. FUNDING MECHANISMS

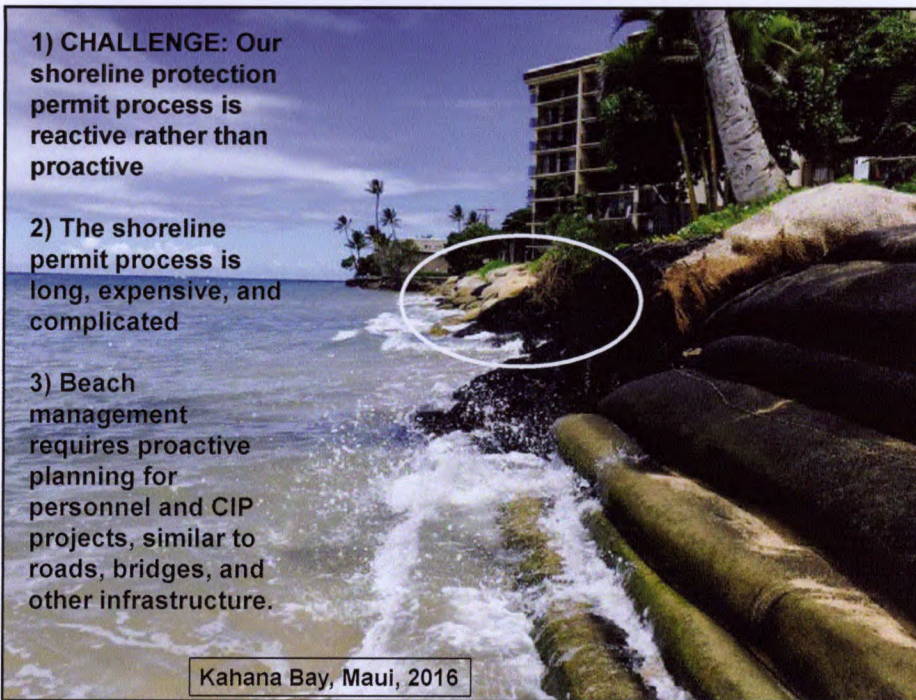
- For regional beach management, Hawaii's beaches should become a capital investment.
- Selected Beach Management Plan Recommendations:
 - Allocate a portion of annual budget for land banking, shoreline access, and restoration.
 - Pass an ordinance to direct revenue from fees, fines, penalties, after the fact SMA permits.
 - Pursue funds from outside agencies.



Beach Management Options

1. Reactive vs. proactive
2. Shoreline now managed by parcel
3. Shift to regional beach cell approach
4. Public-private partnerships required
5. Proactively restore beaches where possible





Federal Funding for Coastal Zone Management Program may be Cut



KAMA'OLE III
DUNE
WALKOVER

Maui Coastal Zone Management Team

Jim Buika, Coastal Resource Planner

Keith Scott, Coastal Zone Mgmt Planner

Tara Owens, Coastal Hazards Specialist, UH Sea Grant

Jeffrey Dack, Environmental Section Supervisor

