MANAGING MAUI'S DYNAMIC SHORELINES

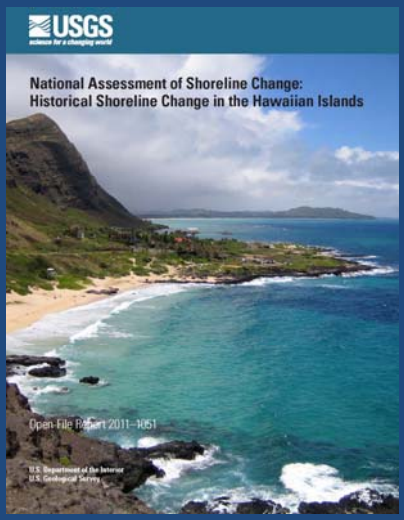
What are the erosion response options?

Maui County Council Planning Committee Discussion
October 6, 2016

04.22.2015

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.


Maui has lost more than four miles of sandy beach in past century — report
The Maui News
SUNDAY, March 15, 2015
Forces of nature threaten roadway
Hauling sand to erosion 'hot spot' on S. Kihei Road studied as option
Star Advertiser
THE PULSE OF PARADISE
SHINING A LIGHT
WALLS NO MATCH FOR WAVES
Wednesday, March 30, 2016
LAHAINA NEWS
West Side beaches and properties face erosion from large surf
New research predicts a doubling of coastal erosion by mid-century in Hawai'i
Hotel tax might be tapped to fix eroding beaches
HANDIWORK OF GRAVITATIONAL ATTRACTION
Erosion likely result of supermoon tidal increases rather than storms

June 5, 2016


e Maui News
Winner of 14 SPJ Hawaii 2014 Excellence in Journalism Awards
SUNDAY, June 5, 2016
$2.00
Rising tides and strong waves eroded part of the Royal Kahana Resort's pool deck, allowing 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 SUGIDONO, Staff Writer

September 22, 2016

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 *(chronic erosion)*

Pohailani Condominiums

EROSION RESPONSE OPTIONS

- 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)*

preferred strategies

Do Nothing

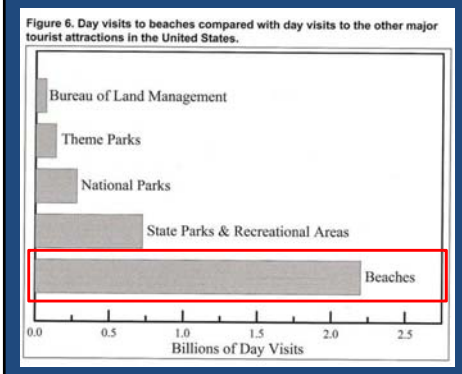
Adaptation

Armor / "Hold the Line"

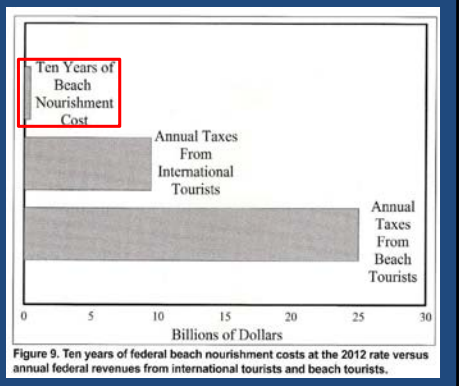
RECENT ARMORING DECISIONS

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

ECONOMIC VALUE OF BEACHES



Beaches are the leading tourist destination in the United States (day visits = 2.2 billion per year).

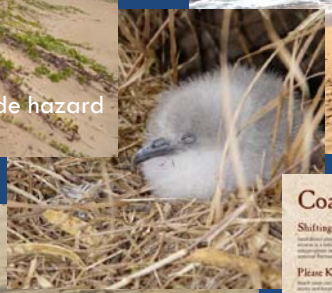


Beach nourishment is a good return on investment (cost = small fraction of tax revenue from tourist dollars).

Houston, James, 2013. The economic value of beaches – a 2013 update. *Shore & Beach*, 81(1), 3-11.

ECOSYSTEM SERVICES OF BEACHES

beaches and dunes provide hazard mitigation



beaches and dunes provide habitat for turtles, seals, shorebirds, plants and more

TAKEAWAYS SO FAR

- Existing development is threatened by chronic and worsening coastal erosion.
- Armoring (seawalls) has been the primary response to protect threatened development, causing beach loss.
- Beach restoration (sand nourishment) is the only engineering tool that can protect both the built environment and the natural environment.
- In appropriate cases, response can shift to beach restoration as an alternative to armoring.

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.

KAHANA BAY IN 1949

KAHANA BAY IN 1975

KAHANA BAY IN 1997

Kahana Beach (Royal Kahana), September 2015

Kahana Beach (Royal Kahana), April 2016

Kahana Beach (Hololani), May 2016

Kahana Beach (Valley Isle), June 2016

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.

KAHANA BAY SAND SEARCH

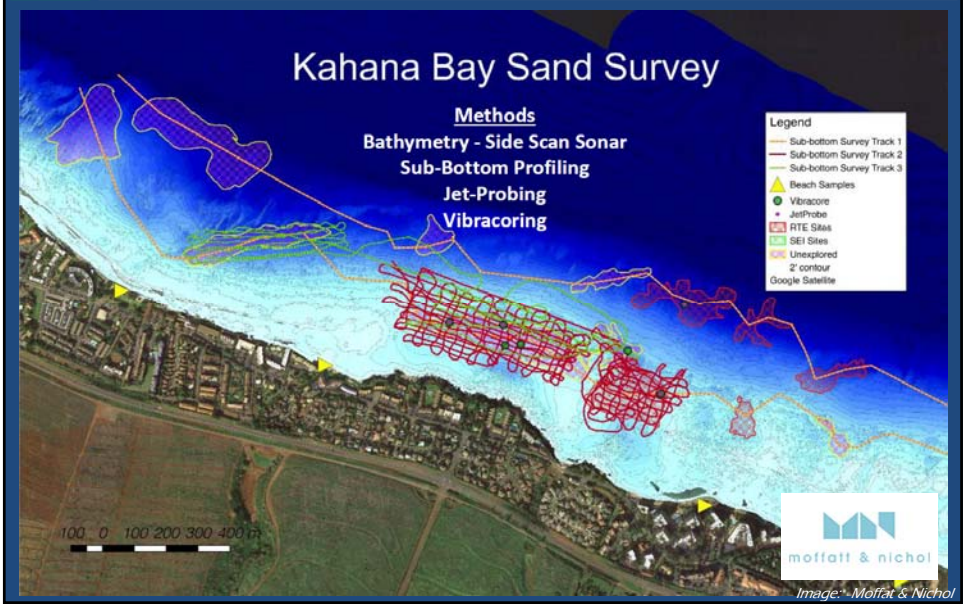


Image: Moffat & Nichol

KAHANA BAY: SAND SEARCH RESULTS

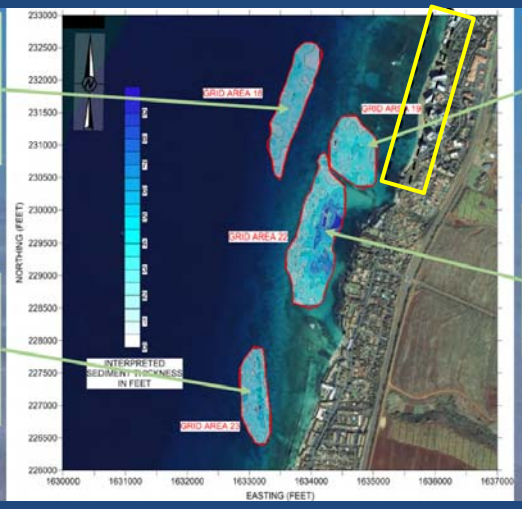
Estimated Sand Volume: 405,000 cubic yards!

Sand Deposit 18
- 69,000 cy
- 16.4 acres
- 2.6' avg thickness
- 45' deep

Sand Deposit 19
- 71,000 cy
- 14.1 acres
- 3.1' avg thickness
- 15' deep

Sand Deposit 22
- 205,000 cy
- 28.5 acres
- 4.5' avg thickness
- 12' deep

Sand Deposit 23
- 60,000 cy
- 12.0 acres
- 3.1' avg thickness
- 24' deep

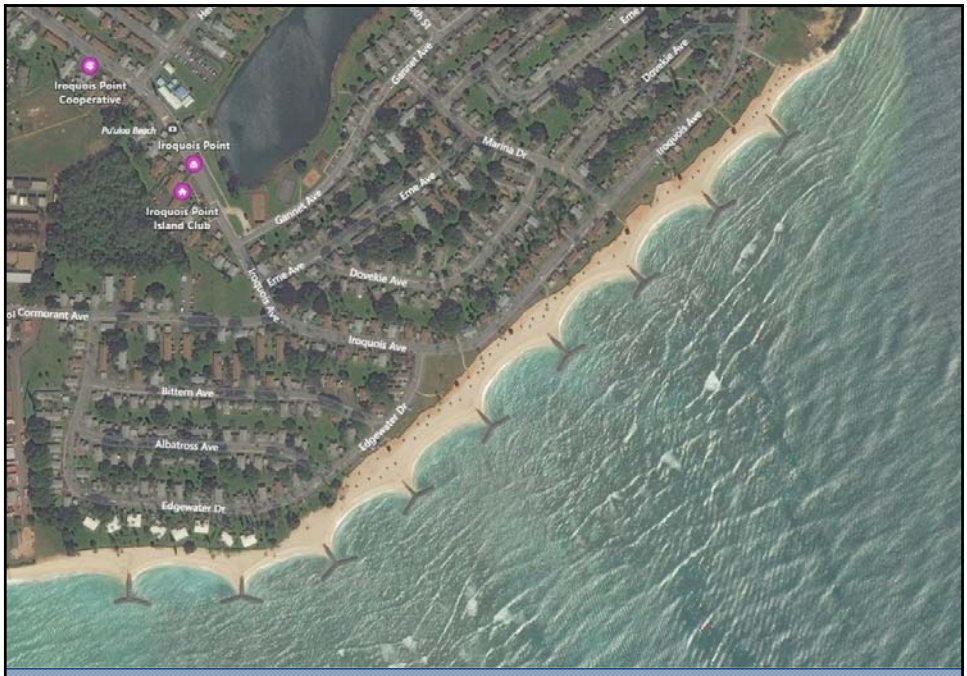


moffatt & nichol

KAHANA BAY: RESTORATION CONCEPTS

moffatt & nichol

Image: Moffat & Nichol



Iroquois Point, Oahu – rock t-head groins

WHAT NOW?

WHAT NOW?

- Partnership building to continue planning, design, permitting, and implementation of a regional beach restoration project.
- "Kahana Bay Restoration Foundation" is forming for decisions, outreach, and project funding.
- EA/EIS is next major step (including other baseline studies, alternatives, and engineering drawings).
  - Cost = ~$600,000
- Two possible implementation paths:
  - US Army Corps of Engineers, Honolulu District, Section 103 Shoreline Protection Program; OR
  - Private consultant approach.

Mahalo Nui Loa

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