National RSM Workshop

Honolulu District Update

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11 August 2011

US Army Corps of Engineers

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TOPICS

- MAUI RSM WORKSHOP
- KAUAI RSM WORKSHOP
- FY11 FUNDING
- TECHNOLOGY TRANSFER:
  - WIS LOOK-UP TABLES
  - FORWARD SHORELINE CHANGE MODEL
- KAELEPULU STREAM
- NEXT STEPS
  - HAWAII-WIDE RSM ASSESSMENT
  - REGIONAL SEDIMENT BUDGETS

Maui RSM Workshop

19 January, 2011

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PUBLIC CONCERNS

- Q: In general, what are the erosion maps being used for?
- A: The erosion maps are being used to determine setbacks on all shoreline properties. Depth of setback is based on erosion rate with a little added for future uncertainties.
- Q: Are you evaluating the vegetation zone?
- A: Not currently, but selected regions have been evaluated previously, but are not being used by Maui County.
- Q: Have other nonlinear approaches been used?
- A: Yes, but results show that there is not sufficient data for nonlinear approaches.

STATE OF HAWAII PERESPECTIVE

- State of Hawaii endorses beach nourishment over hardening of the shoreline.
- State of Hawaii finds it critical for project stakeholders to work hand in hand to maintain water quality standards.
- State of Hawaii is constantly reaching out to other agencies to improve project monitoring activities. Adequate monitoring plans facilitate coordination and permitting actions with agencies such as Hawaii Department of Health and the National Marine Fisheries Service.
- It is important to include all of the stakeholders in the coordination of coastal projects, because there is often a dichotomy in beliefs about the importance and success of a project.

Kauai RSM Workshop

20 January, 2011

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PUBLIC CONCERNS

- Q: How did you determine what regions were studied?
- Q: To what extent was there consideration for biological issues when doing these studies and identifying projects?
- Q: Some of the locations on the coast that may be considered for projects may be adjacent to kuliana lands and these issues tend to be addressed more on a local level than through NEPA.
- Q: The consideration of native Hawaiian issues used to happen prior to the NEPA process; however, the current process tends to address these considerations too late in the process now.

STATE OF HAWAII PERESPECTIVE

- State of Hawaii partners with Office of Hawaiian Affairs at the start of planning for projects such as the Waikiki beach nourishment project. It is crucial to include these types of organizations upfront in the planning process.
- State of Hawaii is supportive of beach nourishment as long as the sand to be used is beach quality, which means that the nourishment sand has characteristics as the sand at the proposed project site.
- State of Hawaii supports the Kikiaola Harbor sand bypassing project and has also been working with some downdrift homeowners in the area. The point of the bypassing project is to restore the natural flow of sand along the coastline; however, from a federal perspective the main reason for the project is to keep the sand out of the harbor.

FY11 FUNDING

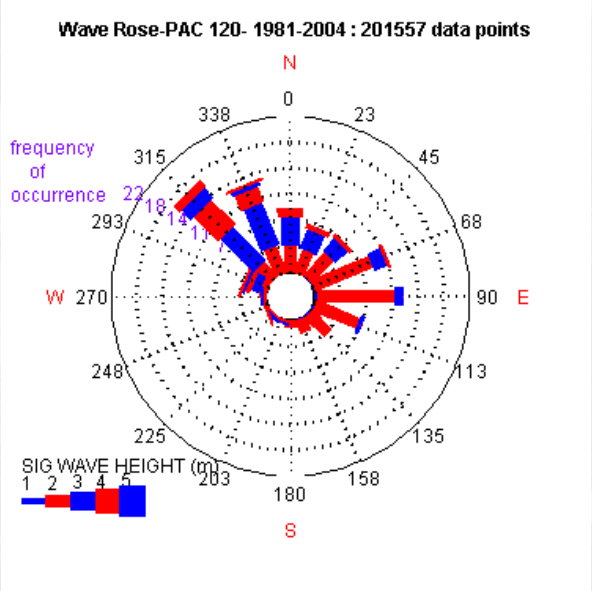
$0.00

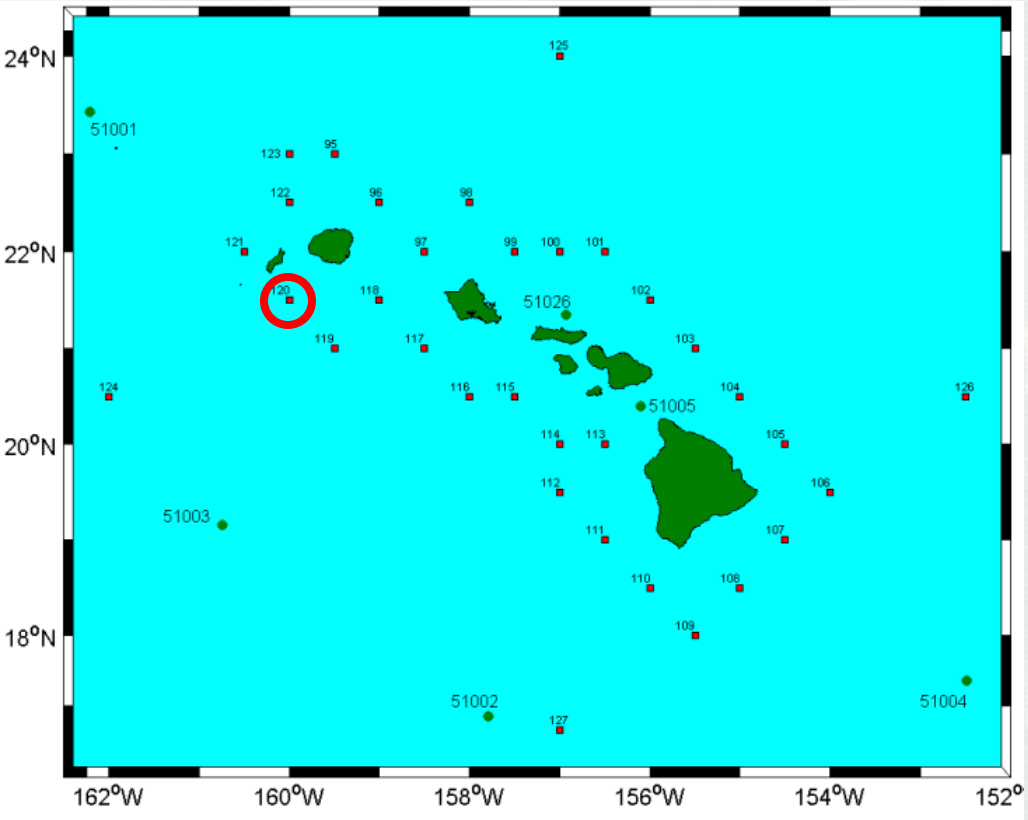
TECHNOLOGY TRANSFER

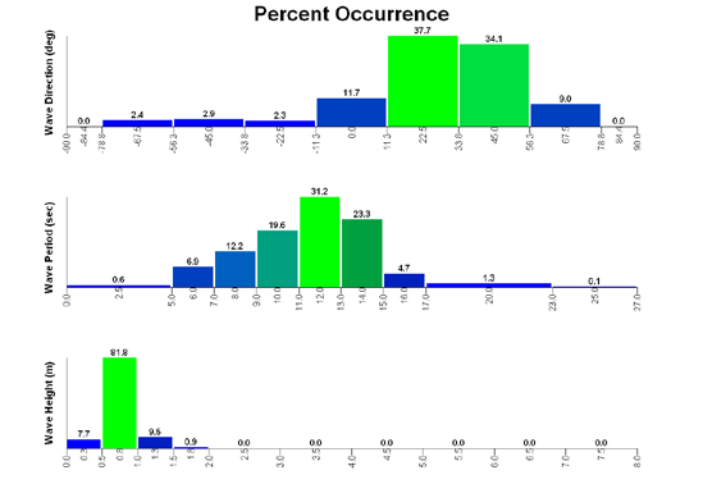
WAVE INFORMATION STUDY
LOOK-UP TABLES

WIS Data for Hawaii Station 120 (1981-2004)

- High/Medium/Low Years Selected (1994/1992/1984)
- Truncated spectra for energy toward project (102.5 º – 277.5 º)
- Analysis with CEDAS to determine H, T, Dir distributions
- Select run cases based on parameters that show up







Typical Run Cases for Kekaha – 412 conditions represented

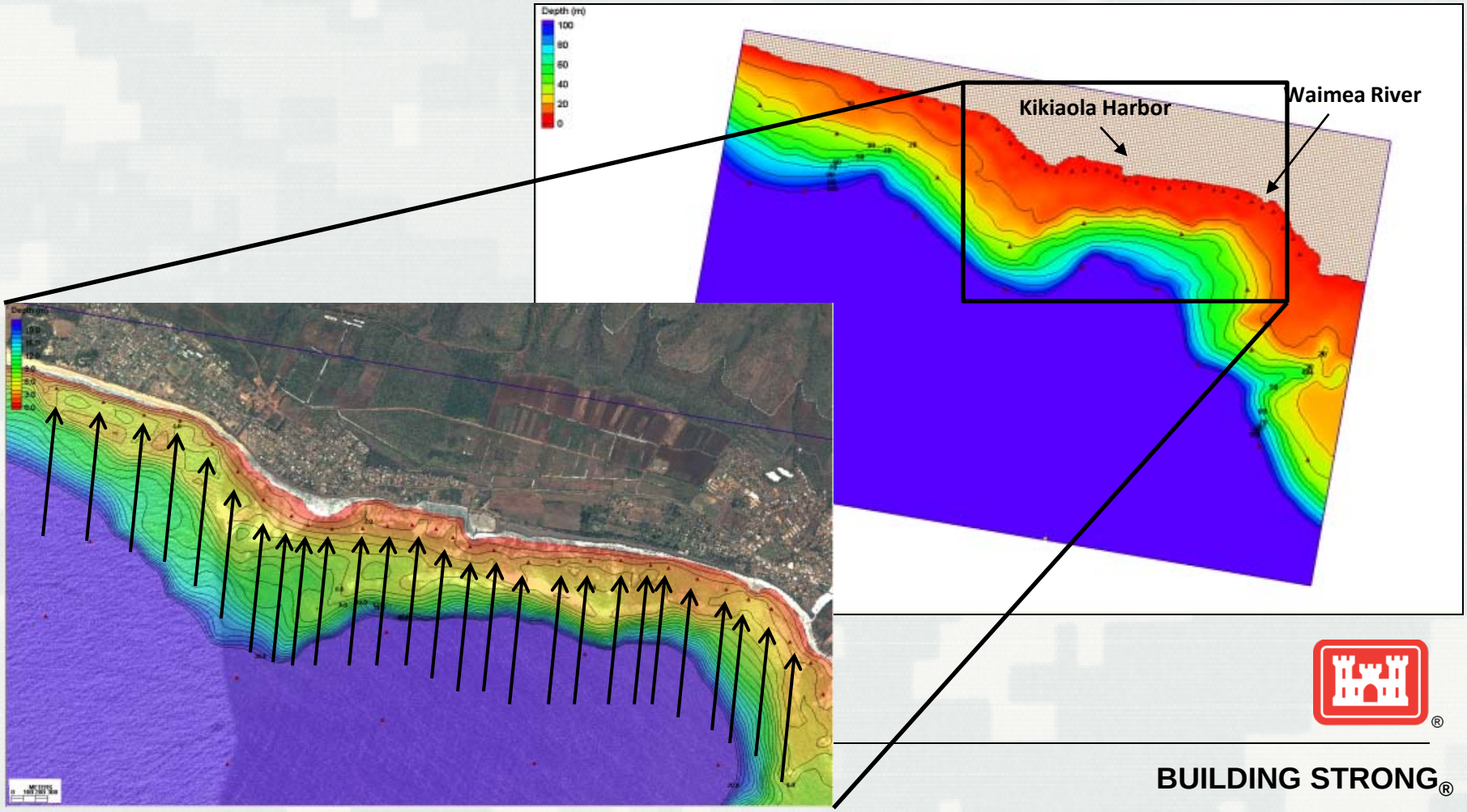
Table 2. Typical Conditions (392 conditions)			
Significant Wave height, m	Wave period, sec	Wave Direction, deg from grid x-axis	Wave Direction, deg meteorological convention
0.5 (1)	6 (1)	-67.5 (1)	from 257.5 deg
1.0 (2)	8 (2)	-45 (2)	from 235 deg
1.5 (3)	10 (3)	-22.5 (3)	from 212.5 deg
2.0 (4)	12 (4)	0 (4)	from 190 deg
2.5 (5)	14 (5)	22.5 (5)	from 167.5 deg
3.0 (6)	16 (6)	45 (6)	from 145 deg
	20 (7)	67.5 (7)	from 122.5 deg

Table 3. Extreme Conditions (16 conditions)			
Significant Wave height, m	Wave Period, sec	Wave Direction, deg from STWAVE axis	Wave Direction, deg met convention
4 (7)	10 (3)	22.5 (5)	from 167.5 deg
5 (8)	12 (4)	45 (6)	from 145 deg
6 (9)	14 (5)		
7 (10)			
8 (11)			

Table 4. Long-period Conditions 4 conditions)			
Significant Wave height, m	Wave Period, sec	Wave Direction, deg from STWAVE axis	Wave Direction, deg met convention
0.5 (1)	25 (8)	22.5 (5)	from 167.5 deg
1.0 (2)			

STWAVE used to transform waves from deep water to nearshore

- Grid resolution = 50m
- Well-resolved bathymetry of reefs, channels, etc. from SHOALS data
- WIS parameters used to generate wave spectra using TMA spectra option
- Nearshore observation points at 1 – 3 meters depth at approximately 400m spacing along shore



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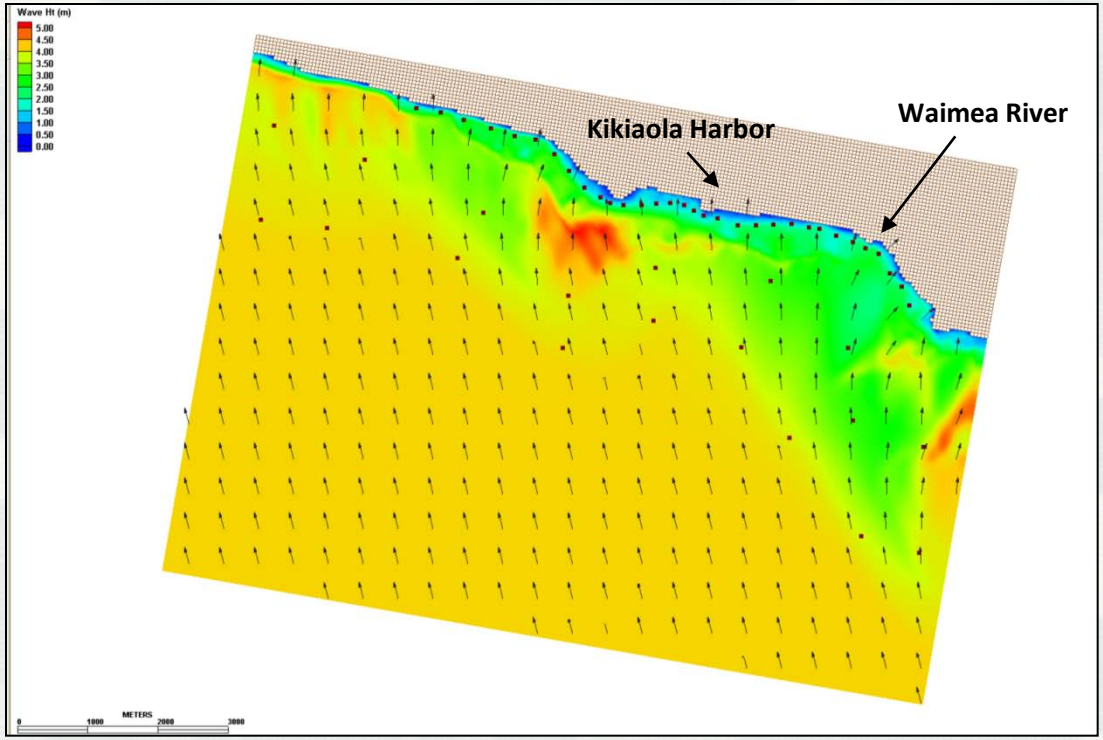
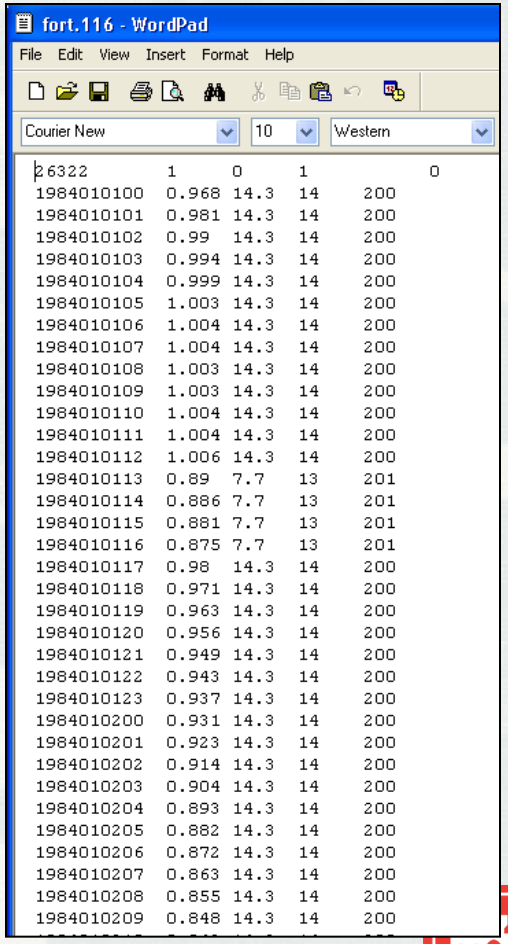
Lookup table program to automate offshore/nearshore wave correlation

- FORTRAN program
- Hourly time series of WIS data from 1984/1992/1994 converted to nearshore 3 year time series





fort.116 - WordPad

File Edit View Insert Format Help

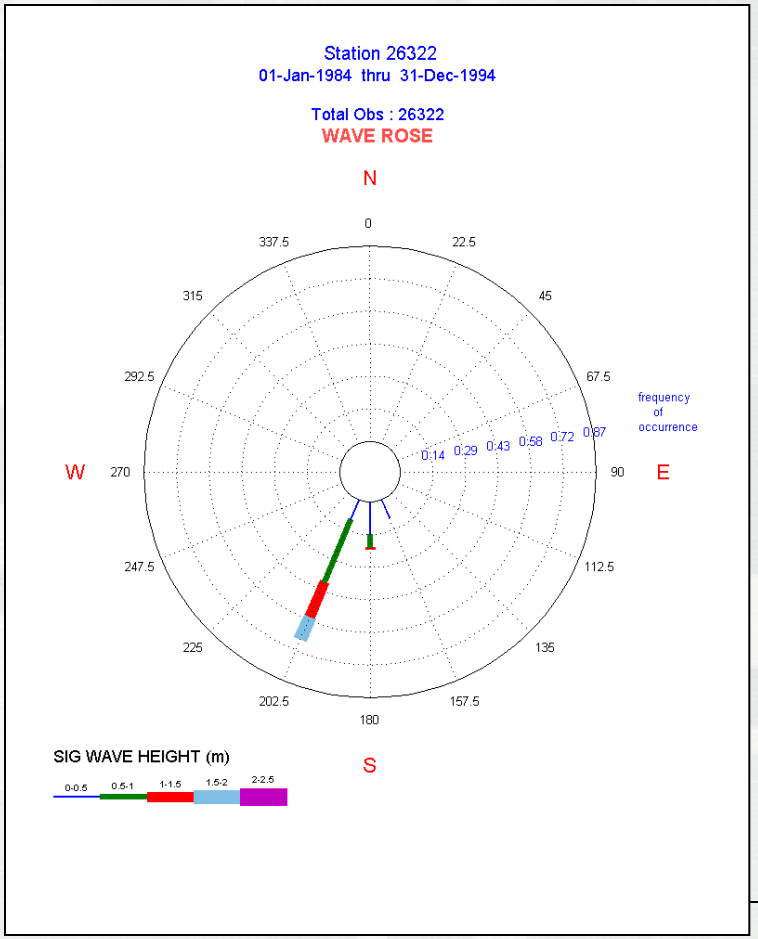
Courier New 10 Western

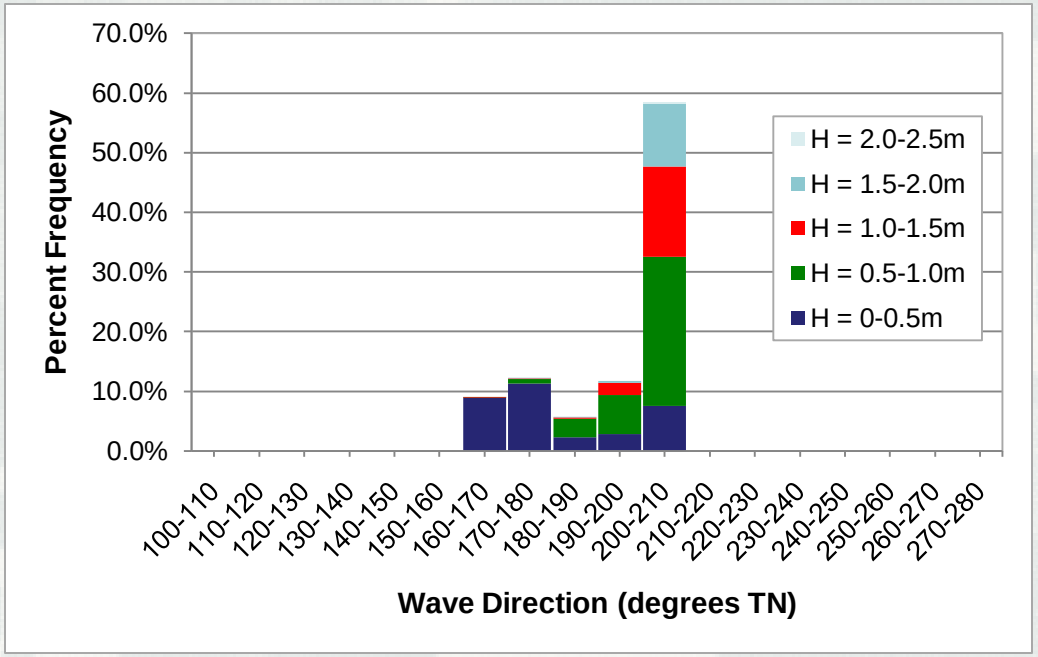
```
26322        1     0     1          0
1984010100   0.968 14.3  14    200
1984010101   0.981 14.3  14    200
1984010102   0.99  14.3  14    200
1984010103   0.994 14.3  14    200
1984010104   0.999 14.3  14    200
1984010105   1.003 14.3  14    200
1984010106   1.004 14.3  14    200
1984010107   1.004 14.3  14    200
1984010108   1.003 14.3  14    200
1984010109   1.003 14.3  14    200
1984010110   1.004 14.3  14    200
1984010111   1.004 14.3  14    200
1984010112   1.006 14.3  14    200
1984010113   0.89  7.7   13    201
1984010114   0.886 7.7   13    201
1984010115   0.881 7.7   13    201
1984010116   0.875 7.7   13    201
1984010117   0.98  14.3  14    200
1984010118   0.971 14.3  14    200
1984010119   0.963 14.3  14    200
1984010120   0.956 14.3  14    200
1984010121   0.949 14.3  14    200
1984010122   0.943 14.3  14    200
1984010123   0.937 14.3  14    200
1984010200   0.931 14.3  14    200
1984010201   0.923 14.3  14    200
1984010202   0.914 14.3  14    200
1984010203   0.904 14.3  14    200
1984010204   0.893 14.3  14    200
1984010205   0.882 14.3  14    200
1984010206   0.872 14.3  14    200
1984010207   0.863 14.3  14    200
1984010208   0.855 14.3  14    200
1984010209   0.848 14.3  14    200
```

Case 754: Ho = 4m, T = 14s, Dir = 190 TN

Time series at each observation point => wave roses and histograms

- Shows frequency of occurrence by wave direction and wave height in bins
- Used to determine dominant direction of wave approach in nearshore
- Next task is to use this information to infer dominant sediment transport direction and input to sediment budget





TECHNOLOGY TRANSFER

FORWARD SHORELINE CHANGE MODEL

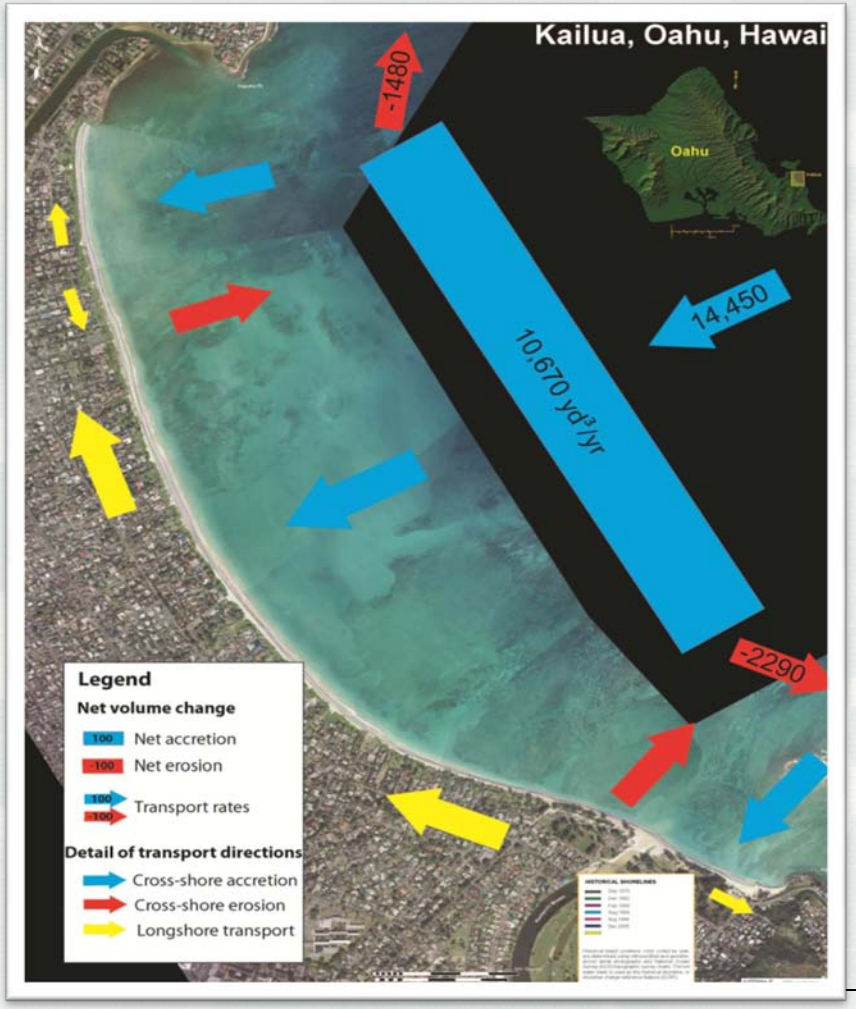
FORWARD MODEL

- Pelnard- Considère (1956) planform evolution equation with a linear regression model of shoreline change, and a term describing the rate of sand transport (advection).

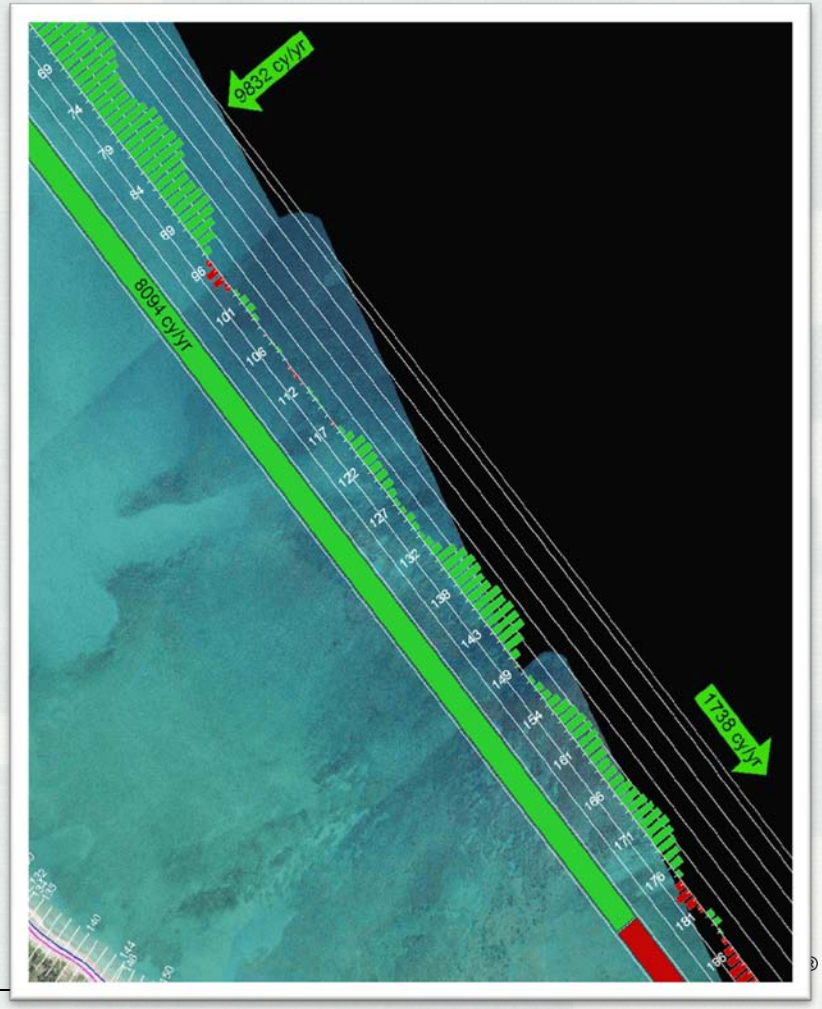
- The model uses an inversion procedure to extract optimal values describing alongshore and cross-shore sand transport to resolve the series of historical shorelines.

BUDGET COMPARISON

FORWARD MODEL



HYBRID CERC EQ. TECHNIQUE



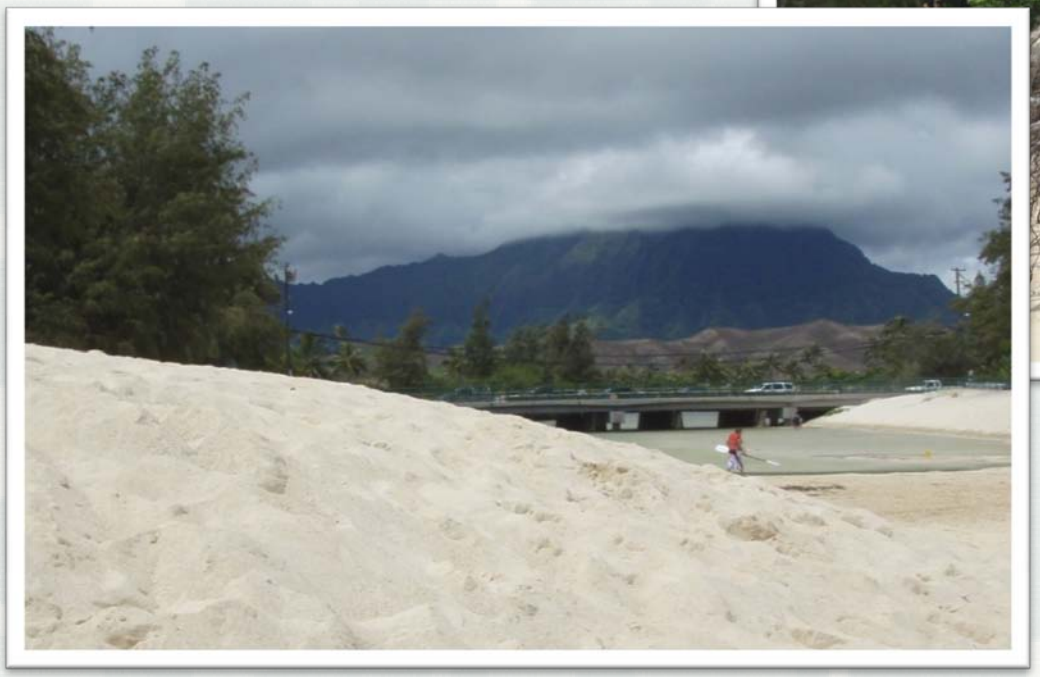
KAELEPULU STREAM

RSM

PROJECT

KA`ELEPULU STREAM

Dune Erosion Downdrift

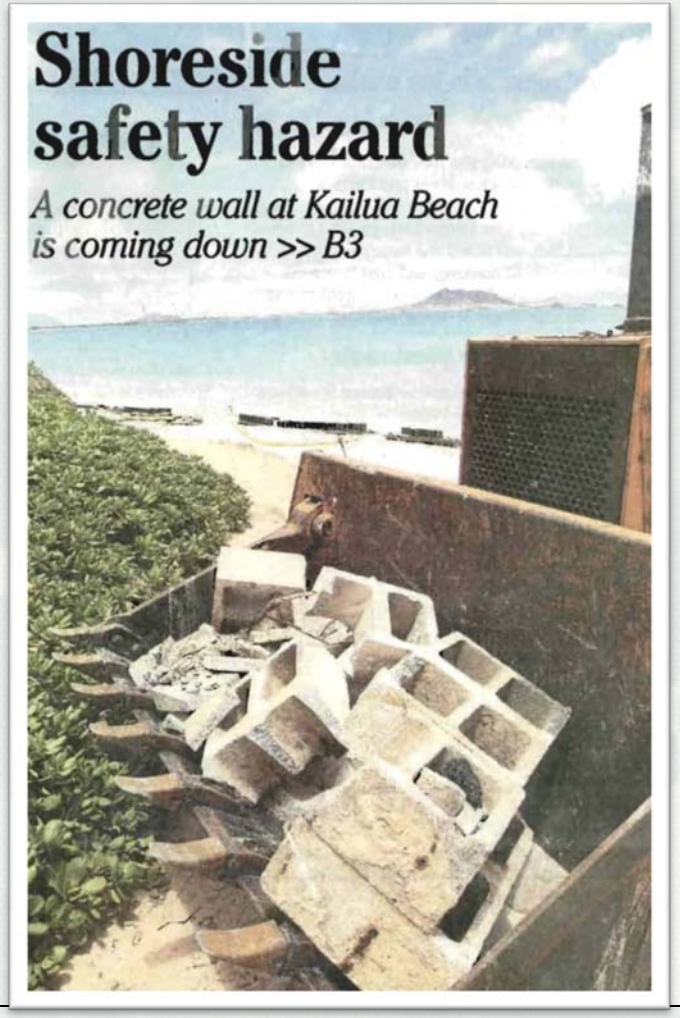


Stream Plugged with Sand

BREAKING NEWS

EXPOSED “SAND GRABBERS”

GONE AT LAST


Shoreside safety hazard
A concrete wall at Kailua Beach is coming down >> B3

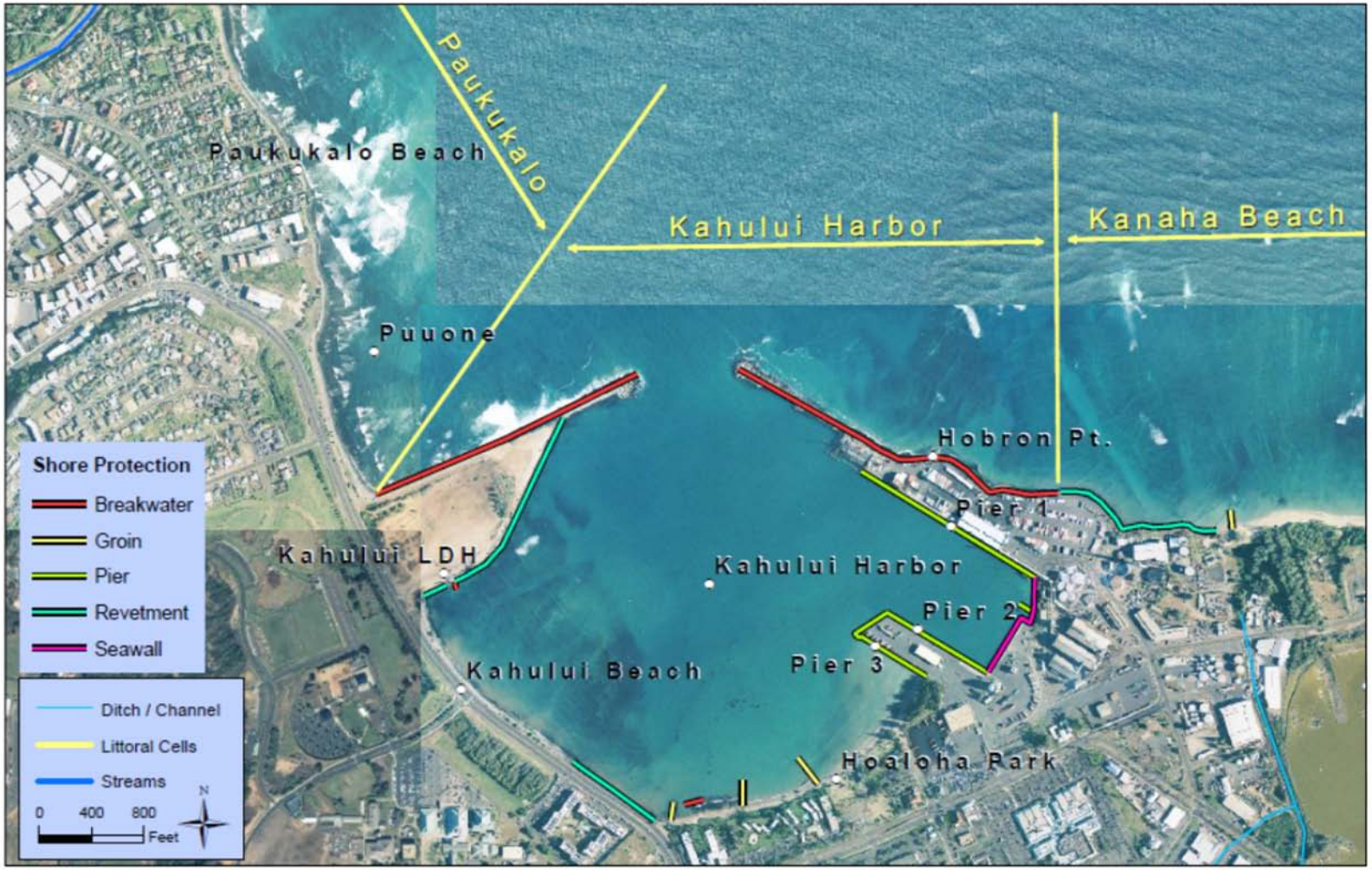
SAND SOURCE

HAWAII NEWS NOW KGMB
Beach Beautification
City to Remove Sand Grabbers

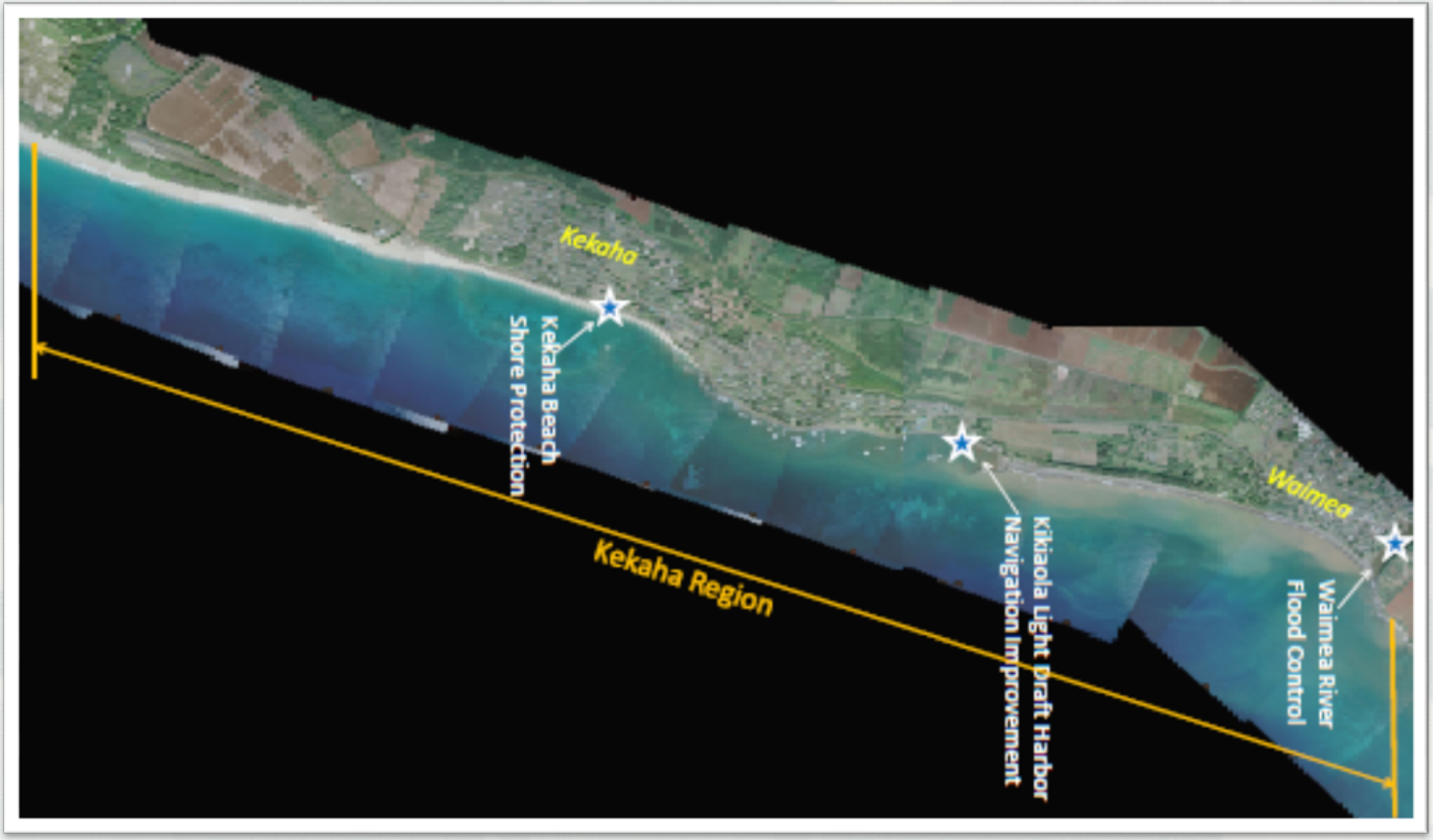
NEXT STEPS

HAWAII-WIDE RSM ASSESSMENT
REGIONAL SEDIMENT BUDGETS

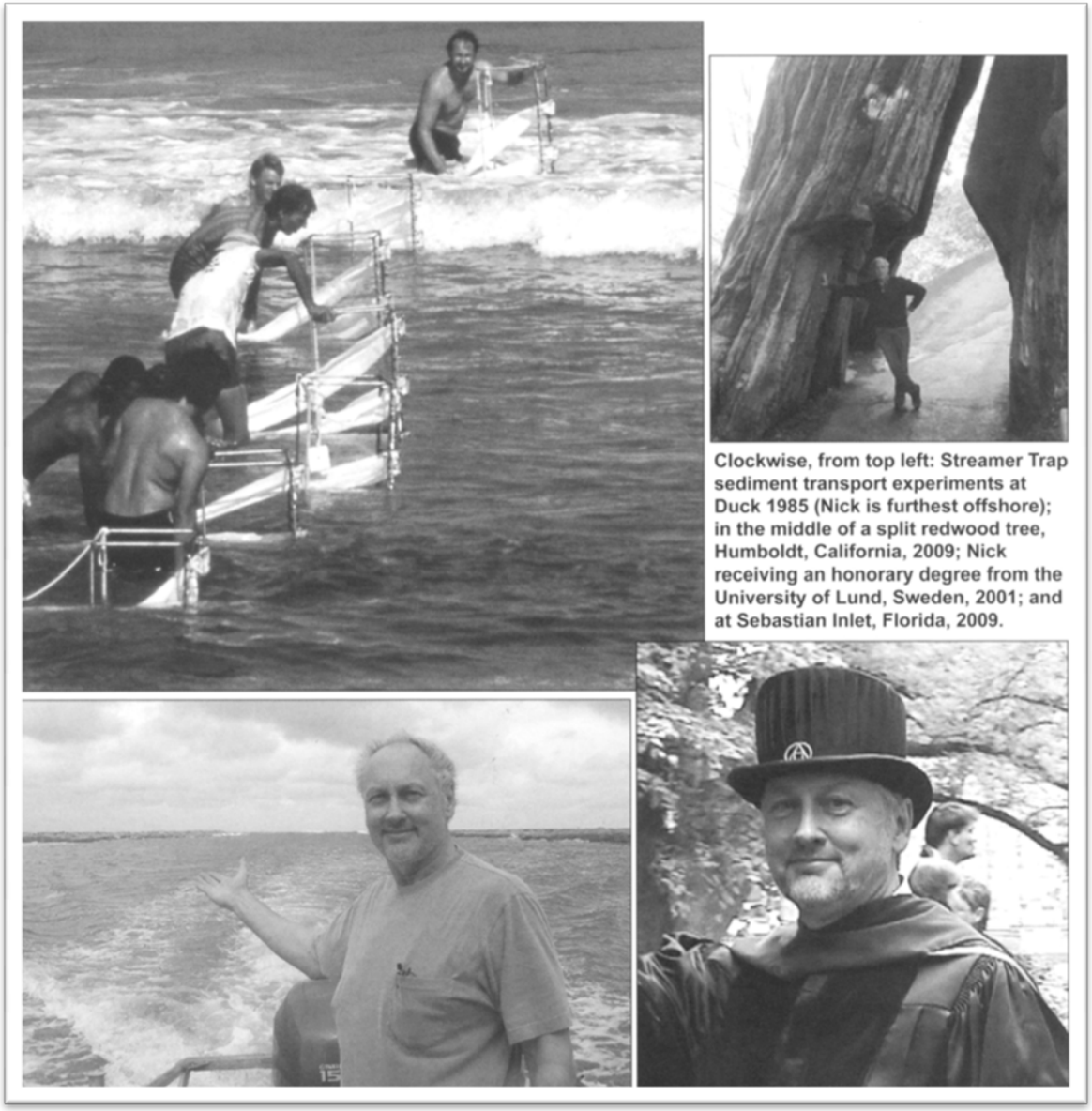
KEKAHA SUB-REGION



KEKAHA REGION



THANK YOU



Clockwise, from top left: Streamer Trap sediment transport experiments at Duck 1985 (Nick is furthest offshore); in the middle of a split redwood tree, Humboldt, California, 2009; Nick receiving an honorary degree from the University of Lund, Sweden, 2001; and at Sebastian Inlet, Florida, 2009.

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