

HAWAII

REGIONAL SEDIMENT MANAGEMENT

NATIONAL RSM WORKSHOP

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29 August 2012

Portland, OR

TOPICS

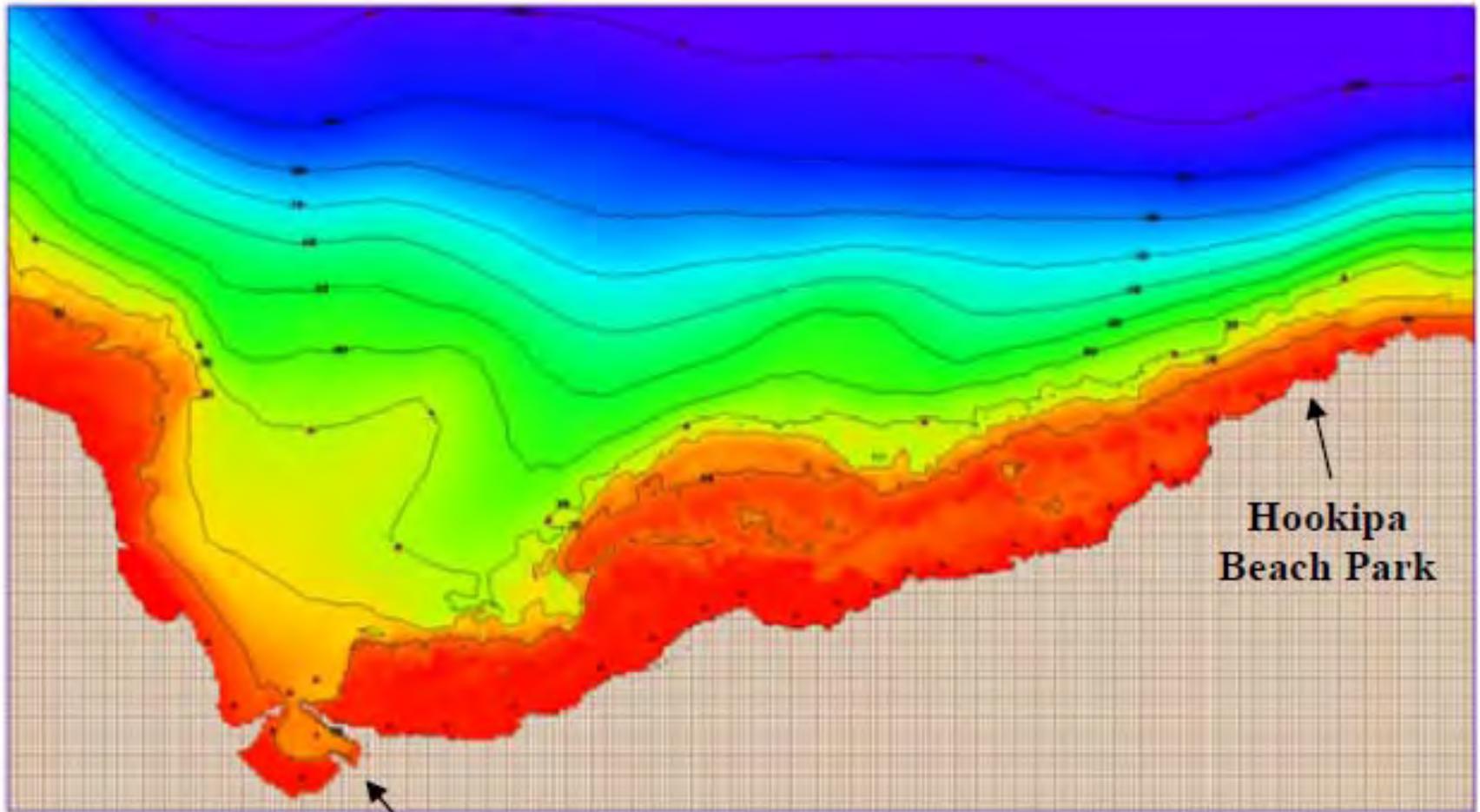
- Task 1: Kahului Regional Sediment Budget
- Task 2: Kekaha Regional Sediment Budget
- Task 3: Innovative Sediment Delivery Systems
- Task 4: Hawaii RSM Needs Assessment

TASK 1 and Task 2

- **BLUF:** Develop and document a methodology for determining regional sediment budgets based on shoreline change measurements.
- **Title:** Kahului and Kekaha Regional Sediment Budgets
- **Description:** The proposed FY12 work entails correlation of transformed wave data to the historical beach volume changes to resolve regional sediment budgets.
- **Goals:** Advance the state-of-knowledge of regional coastal processes in Hawaii and improvement of sediment management. Develop RSM technical note.
- **Issue:** Lack of bathymetric and profile data.

Kahului Region, Maui

- 24 years of WIS hindcast data used to establish wave climate
- Over 300 combinations of wave H, T, & Direction were run in STWAVE
- Developed 3-year nearshore time series based on offshore (WIS) time series

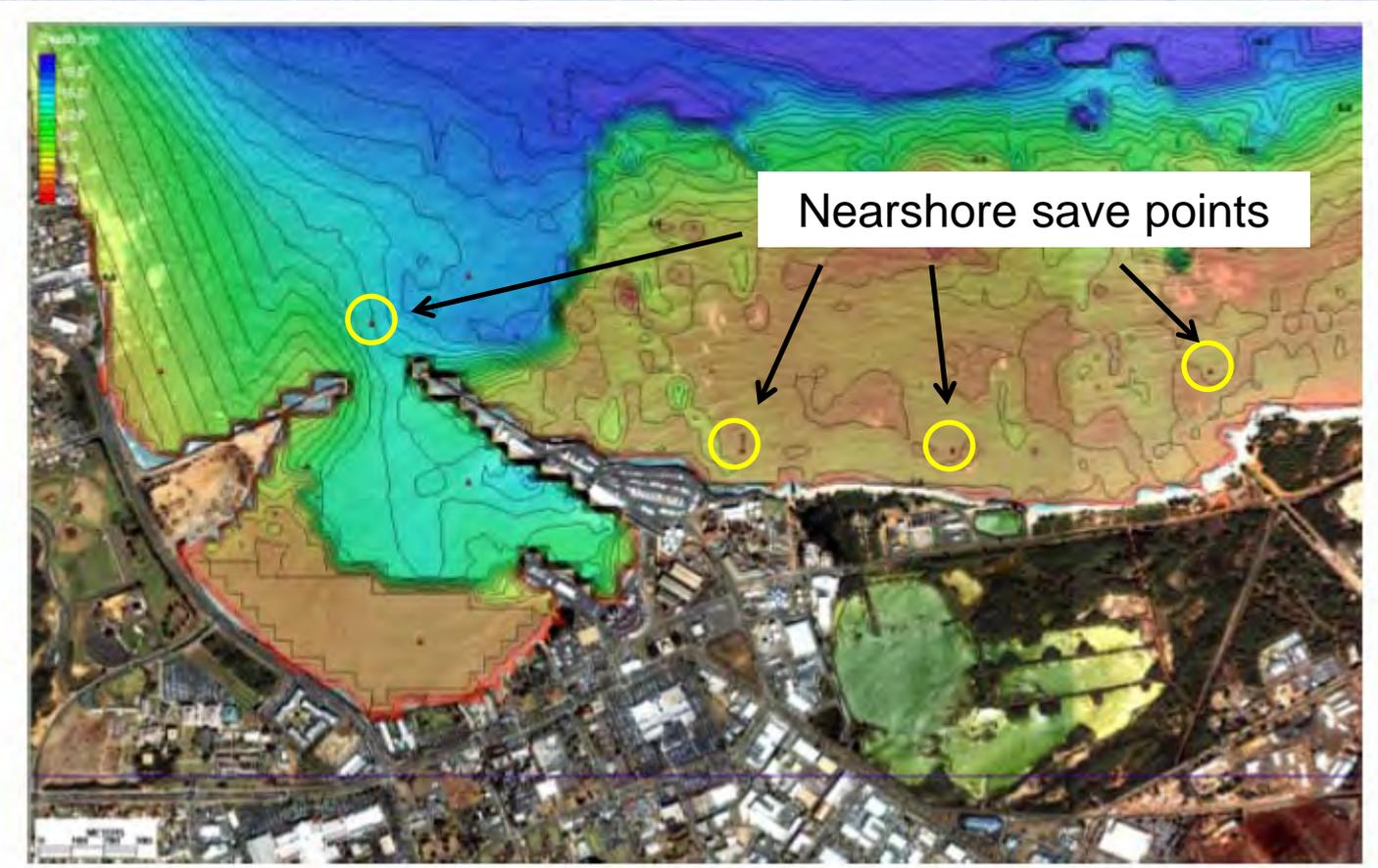


Kahului

**Hookipa
Beach Park**

Wave Transformation Modeling Using STWAVE

- 3-year time series extracted at various save points along the shoreline (~3m depth)
- Direction and wave height used to input into “CERC equation” for transport volumes



Wave Transformation Modeling Using STWAVE

Wave height histograms developed at each save point to visualize dominant transport direction and wave height frequencies

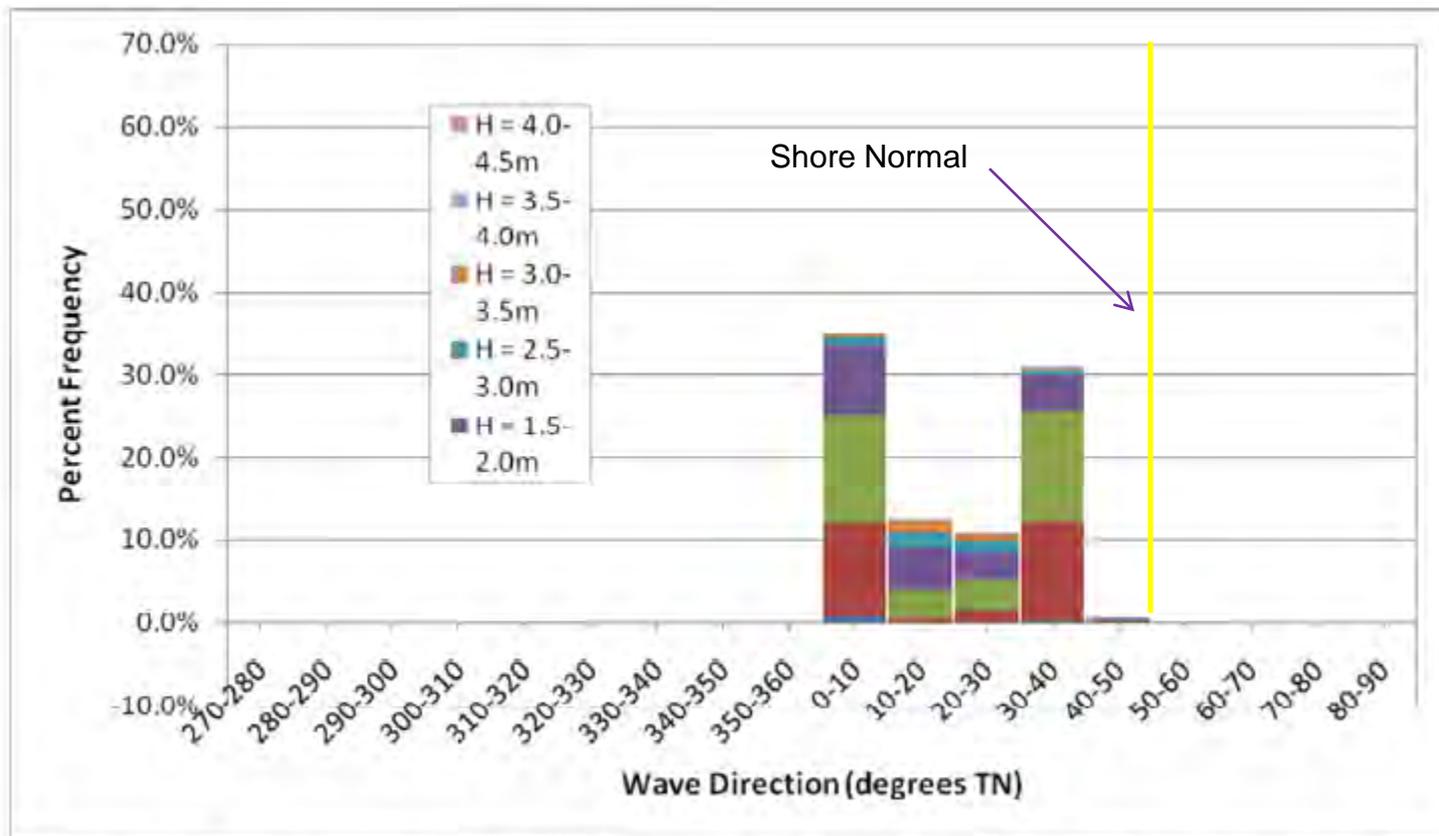
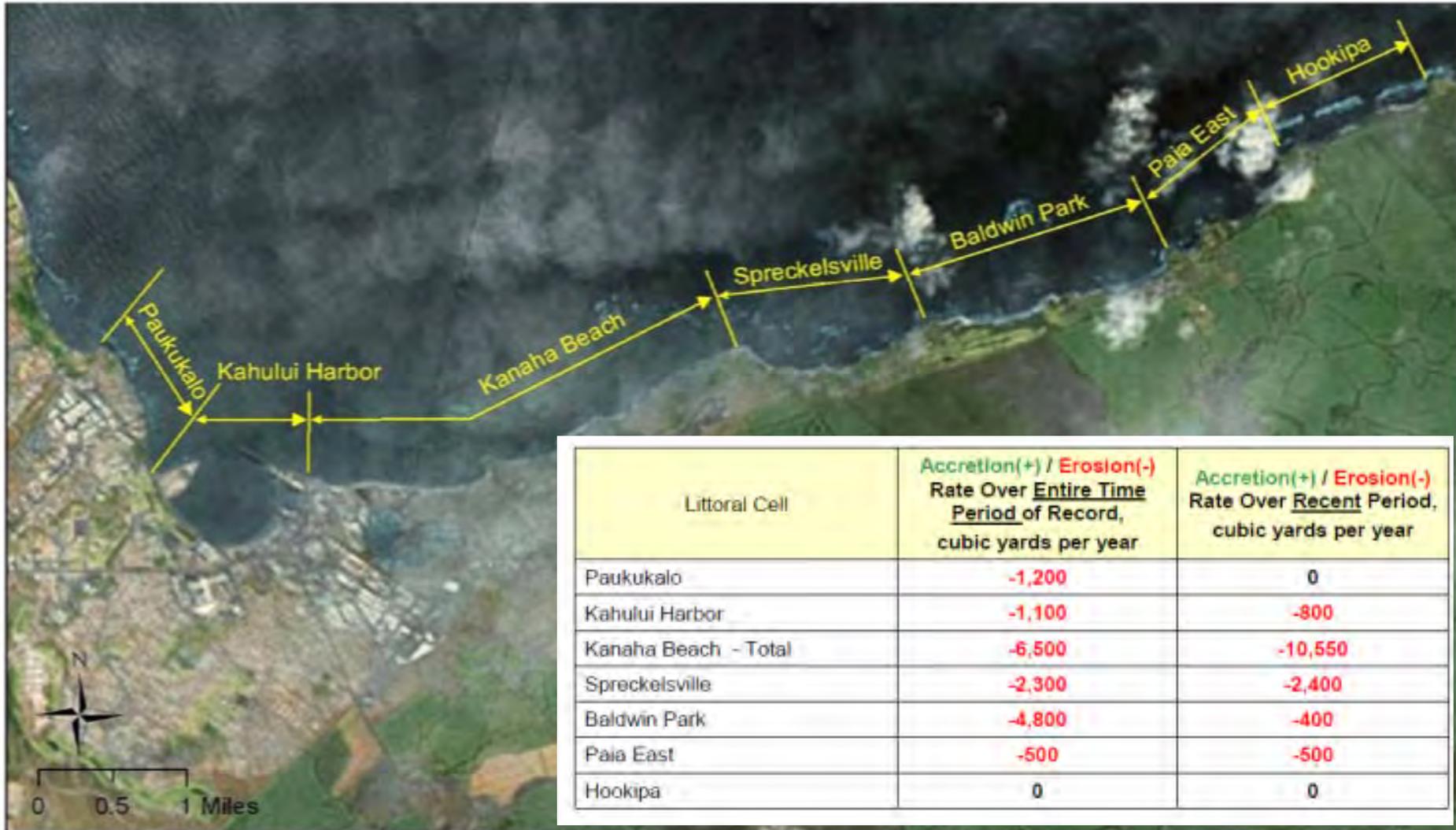


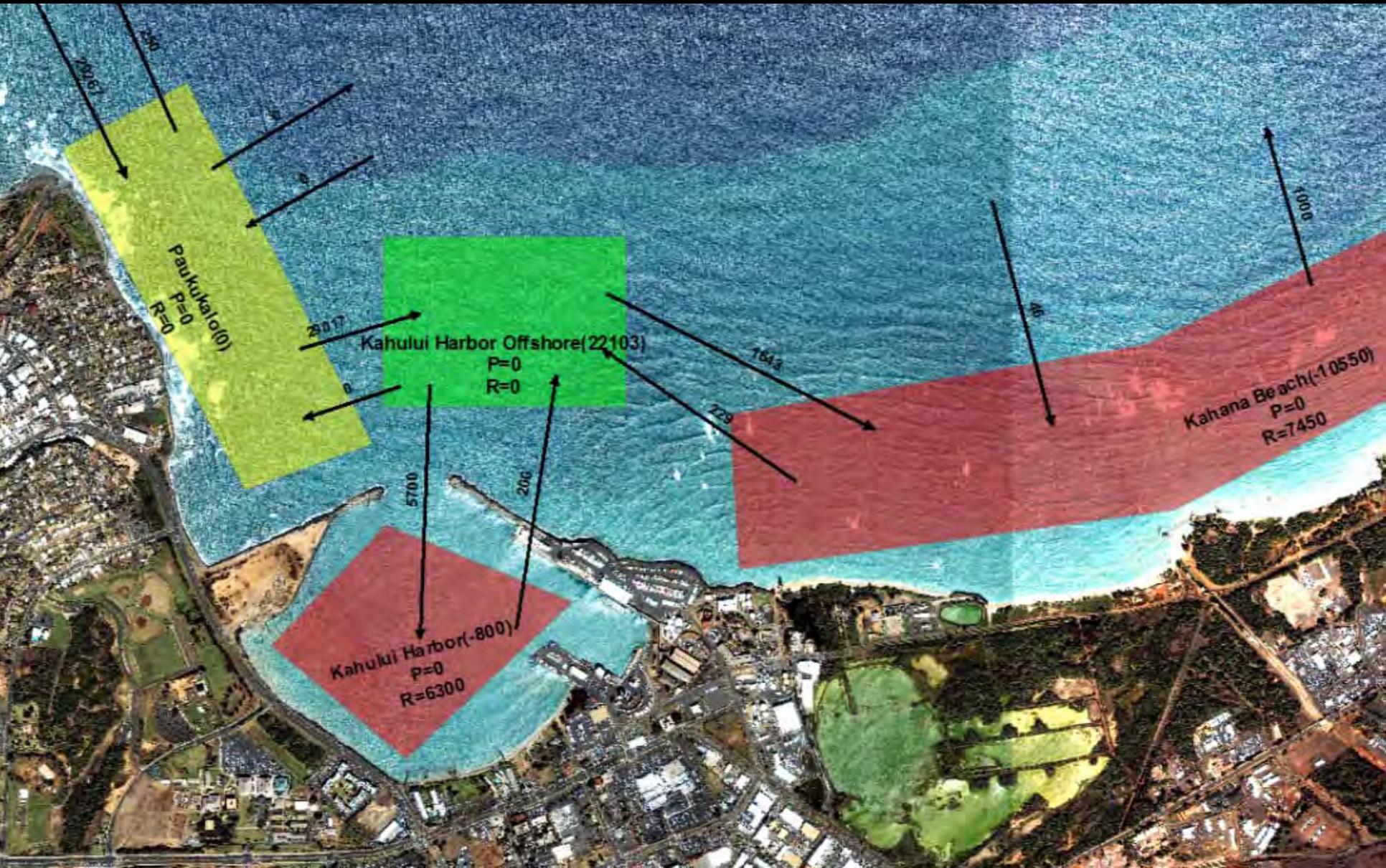
Figure 25. Histogram of Wave Height and Direction at Nearshore Observation Point at Entrance to Kahului Harbor (Shore normal = 55 degrees TN)

Sediment Volume Changes over the Region



Sediment Budget in SBAS

Detail View 1 : Western Portion of Kahului Region



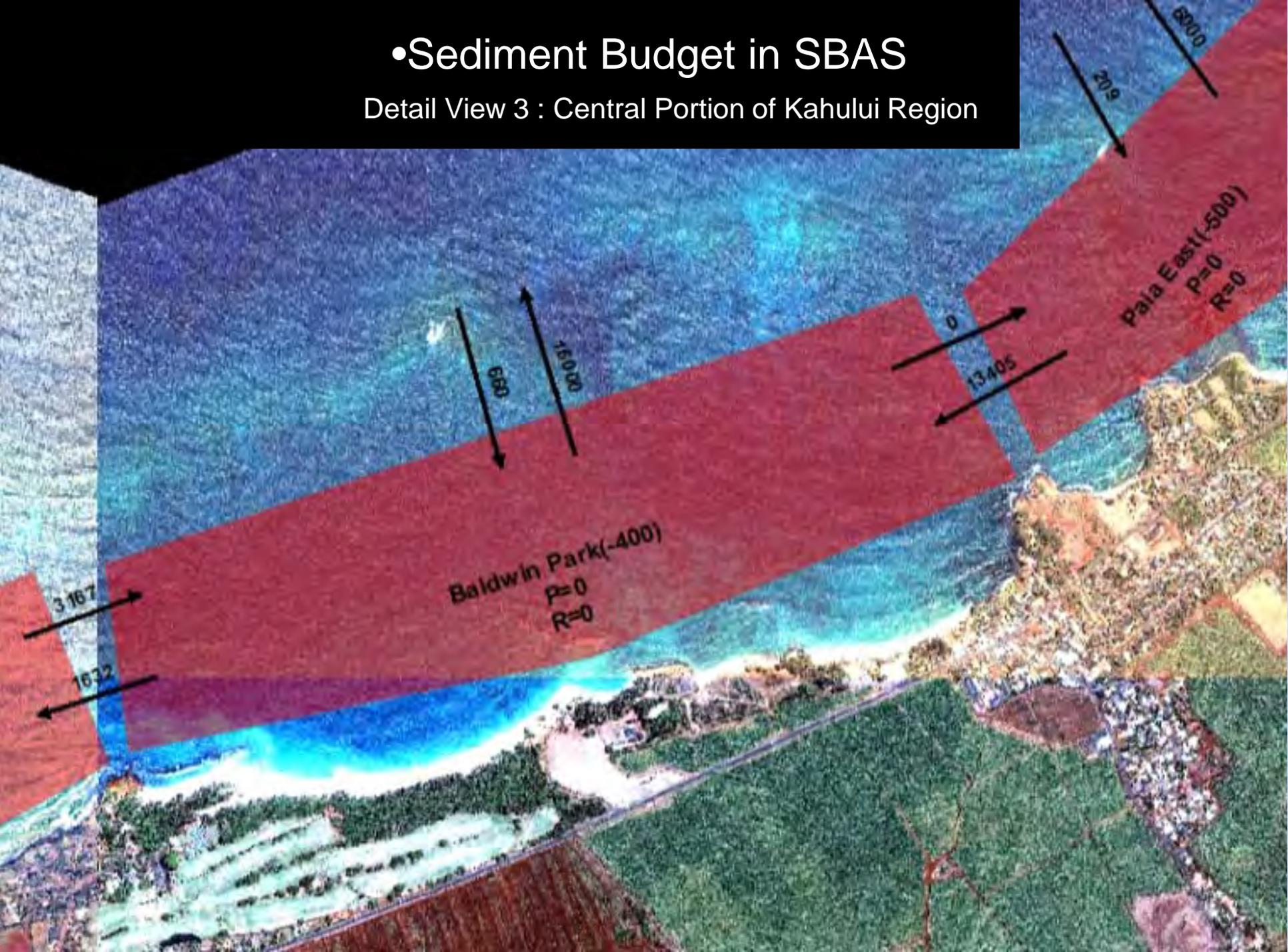
•Sediment Budget in SBAS

Detail View 2 : Central Portion of Kahului Region



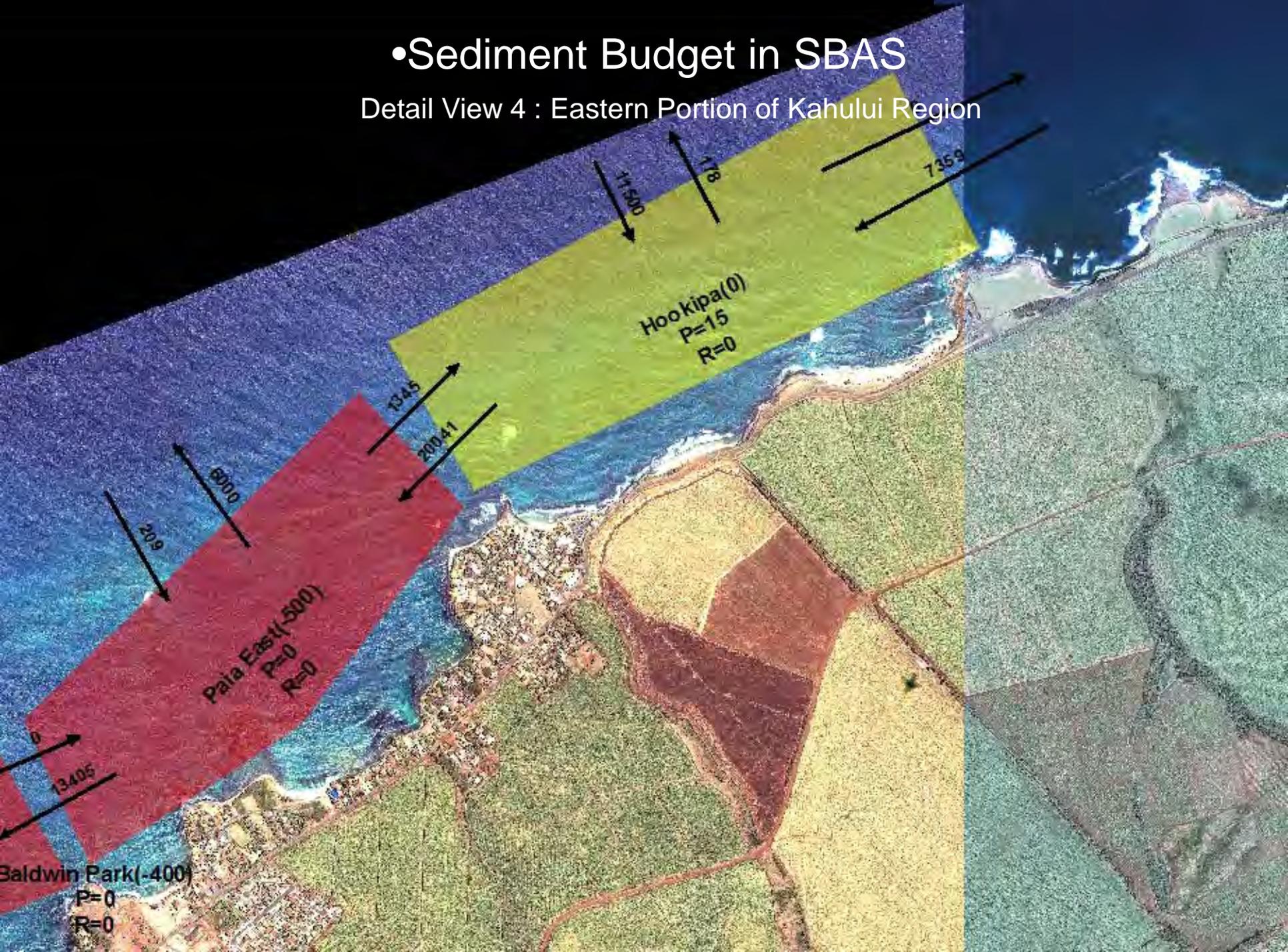
•Sediment Budget in SBAS

Detail View 3 : Central Portion of Kahului Region



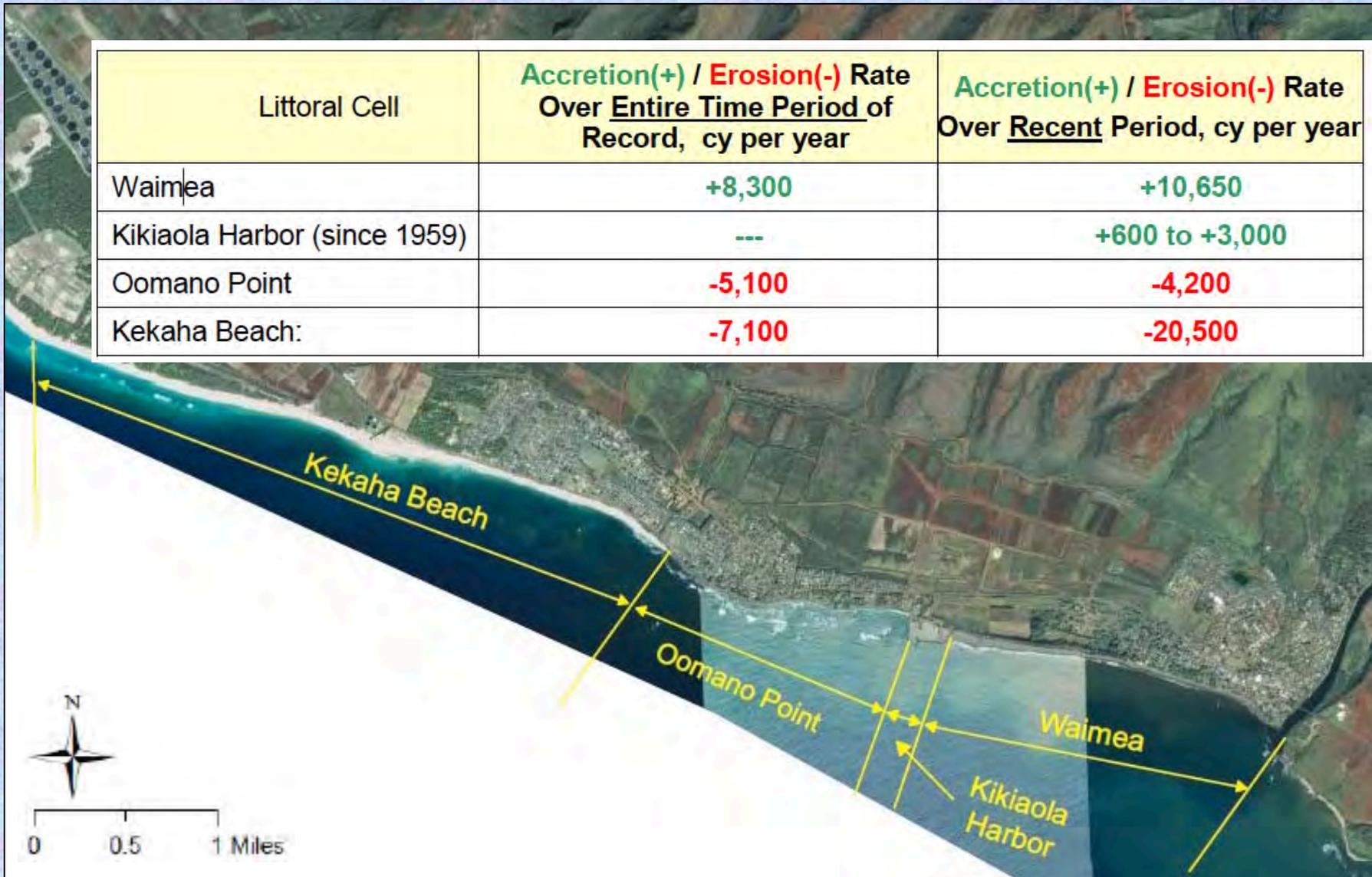
•Sediment Budget in SBAS

Detail View 4 : Eastern Portion of Kahului Region

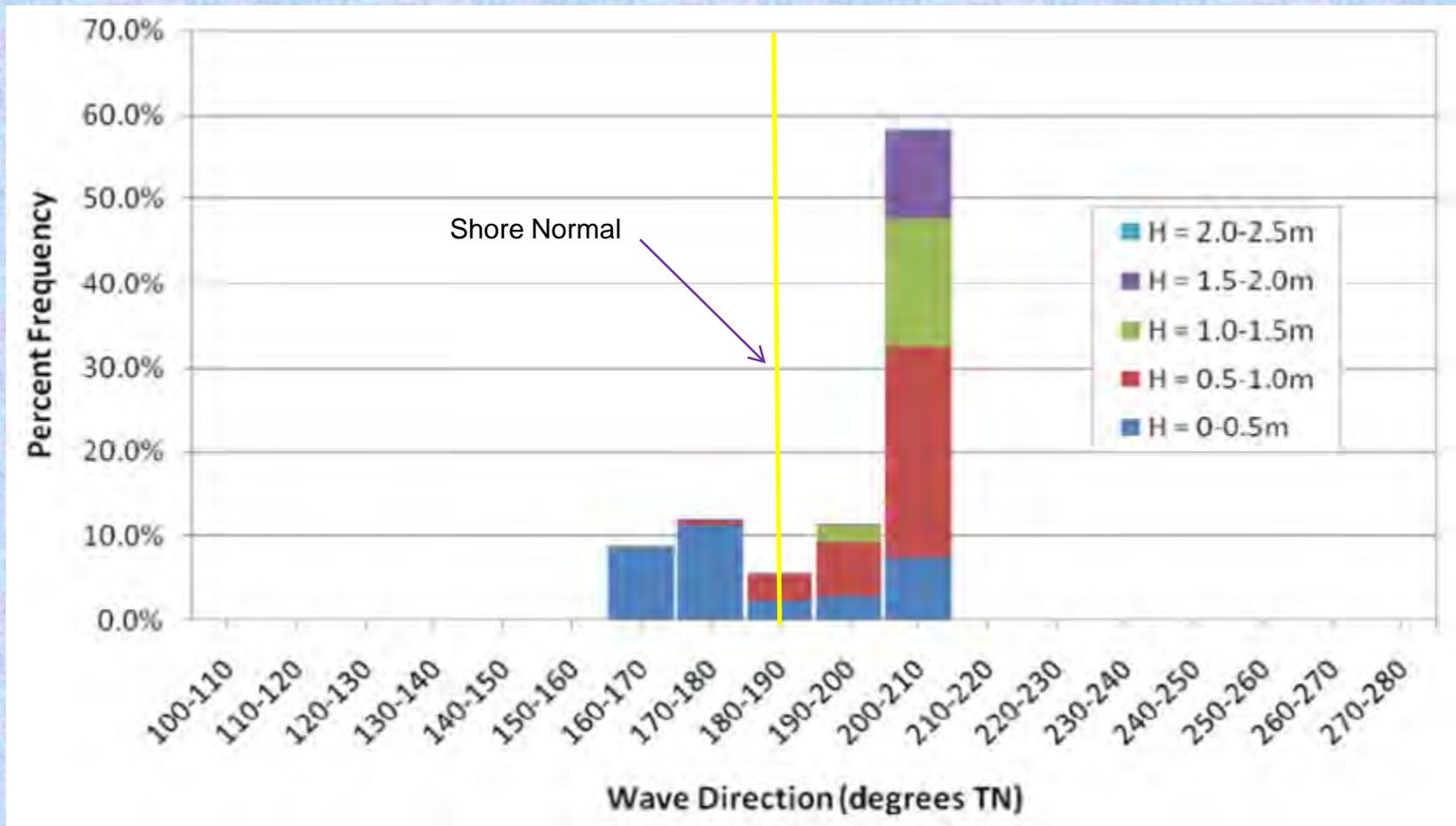


Kekaha Region, Kauai

Littoral Cell	Accretion(+) / Erosion(-) Rate Over <u>Entire Time Period of Record</u> , cy per year	Accretion(+) / Erosion(-) Rate Over <u>Recent Period</u> , cy per year
Waimea	+8,300	+10,650
Kikiaola Harbor (since 1959)	---	+600 to +3,000
Oomano Point	-5,100	-4,200
Kekaha Beach:	-7,100	-20,500



Wave Transformation Modeling Using STWAVE



Histogram of Wave Height and Direction at Nearshore Observation Point East of Kikiaola Harbor
(Shore normal = 187 degrees TN)

RSM FY12 IPR

Honolulu District, Regional Sediment Budgets

District PDT Members

- Jackie Conant, Project Management (PM)
- Nani Shimabuku, Project Management (O&M)
- Jessica Podoski, Engineering and Construction
- Thomas D. Smith, Engineering and Construction
- Justin Goo, Engineering and Construction
- Peter Gallagher, Regulatory Branch
- Eric Bjorken, Geotechnical Engineer

Stakeholders and Partners

- Sam Lemmo, State of Hawaii, non-Federal Sponsor
- Dr. Chip Fletcher, University of Hawaii, Shoreline data
- Arnold Liu, State of Hawaii, Harbors Division
- State of Hawaii, Department of Boating and Ocean Recreation
- Maui County, Various Departments
- Kauai County, Various Departments

Leveraging/Collaborative Opportunities

funding, data, tools, models, etc
with Other Projects, Programs, Partners, etc

- University of Hawaii, SOEST
- USACE, Wave Information Study
- USACE, RSM Program, Previous Studies

Milestones/Deliverables

- Numerical Modeling, 31 August, 100%
- SBAS, 15 September, 70%
- RSM Technical Note, 30 September, 40%

RSM FY12 IPR

Honolulu District, Regional Sediment Budgets

Approach

- Infer volume change from shoreline change
- 24 years of WIS hindcast data used to establish wave climate
- 300 to 400 of the most frequent combinations of H, T, Dir run in model
- Development of 3-year nearshore time series based on offshore (WIS) time series

Models, Tools, Databases, etc Used

- UH SLC Analysis
- WIS
- ADCIRC
- STWAVE
- CERC Equation
- Dartboard
- Expert Elicitation

Benefits to O&M, FRM, Environmental

- Identification of problem areas within the region
 - Identification of placement areas
 - SBAS debugging
- Another tool for the regional sediment budget toolbox

RSM FY12 IPR

Honolulu District, Regional Sediment Budgets

Opportunities to Take Action

Volume of Sediment Moved

Accomplishments

- Successfully coupled STWAVE and ADCIRC
- Refined regional sediment budgets for Kahului and Kekaha regions
- Prepared RSM technical notes with the hope of supporting other districts and stakeholders

Lessons Learned

- Very small sediment quantities (K value in CERC formula $\ll 1.0$)
- Seasonal wave climate => often bi-directional transport dependent on storms and tradewinds
 - Dramatic changes to shoreline orientation over short distances
 - Many littoral barriers (headlands) creating sub-cells within each littoral cell
 - Cross shore sediment transport across reefs is likely a major sediment sink

TASK 3

- **BLUF:** Prepare a technical note documenting innovative sediment delivery systems and potential USACE applications.
- **Title:** Innovative Sediment Delivery Systems
- **Description:** This task consists of researching and documenting advances in sediment delivery systems that have the potential to reduce project costs and result in more sand on our nation's beaches.
- **Goals:** Provide a concise description of emerging innovations in sediment delivery along with identification of potential applications within various USACE business lines.
- **Issues:** Environmental and logistics constraints on existing sediment delivery systems often hamper efforts to conduct dredge and fill operations.

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TACOMA PROJECT VIDEO







Brooks Baehr
Waikiki Beach

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EASTMAN

AGGREGATE ENTERPRISES, LLC



Sand Transfer System







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Honolulu District, Innovative Sediment Delivery Systems

District PDT Members

- Jackie Conant, Project Management (PM)
- Nani Shimabuku, Project Management (O&M)
- Jessica Podoski, Engineering and Construction
- Thomas D. Smith, Engineering and Construction
- Justin Goo, Engineering and Construction
- Peter Gallagher, Regulatory Branch
- Eric Bjorken, Geotechnical Engineer

Stakeholders and Partners

- Sam Lemmo, State of Hawaii, non-Federal Sponsor
- State of Hawaii, Ports Department
- State of Hawaii, Department of Boating and Ocean Recreation
- Hawaii Counties
- Other USACE
- Private Sector

Leveraging/Collaborative Opportunities

funding, data, tools, models, etc
with Other Projects, Programs, Partners, etc

Milestones/Deliverables

- Draft RSM/TN, 15 September, 60%
- Final RSM/TN, 30 September, NA

RSM FY12 IPR

Honolulu District, Innovative Sediment Delivery Systems

Approach

- Investigate air and conveyor belt techniques
- Search for additional technologies
- Document findings in a draft technical note
- Prepare final RSM technical note

Models, Tools, Databases, etc Used

Benefits to O&M, FRM, Environmental

- Investigate new and emerging sediment delivery techniques
 - Identify environmentally sensitive
- Provide options to hydraulic and clam shell dredge and fill
 - Overcome “beach access” issues
 - “Hot Spot” control

RSM FY12 IPR

Honolulu District, Innovative Sediment Delivery Systems

Opportunities to Take Action

- Next POH dredging event (new work or O&M)

Volume of Sediment Moved

Accomplishments

- TBD

Lessons Learned

- New technologies may take a long time to become “bulletproof”
- Existing technologies are apparently “least cost”, but there may be overwhelming associated costs
 - Need for alternative placement methods may become more prevalent in the future

TASK 4

- **BLUF:** Identify and prioritize future RSM activities in Hawaii
- **Title:** Honolulu District RSM Needs Assessment
- **Description:** Conduct a state-wide assessment of the various RSM opportunities in Hawaii through in-house and stakeholder coordination.
- **Goals:** Develop a strategy for future RSM activities in Hawaii. Prepare a technical note prioritizing RSM needs throughout Hawaii.
- **Issues:** Limited RSM funding and the difficulty of linking Federal navigation and coastal storm damage reduction projects.



Kekaha/RSM

Kaua'i

Poipu/RSM

O'ahu
Honolulu

SEO/RSM

D2P/RSM

Moloka'i

Lana'i

Kahului/RSM

Kihel/RSM

Kahoolawe

Hawai'ian Islands

Hawaii

Island of Hawai'i

Hilo

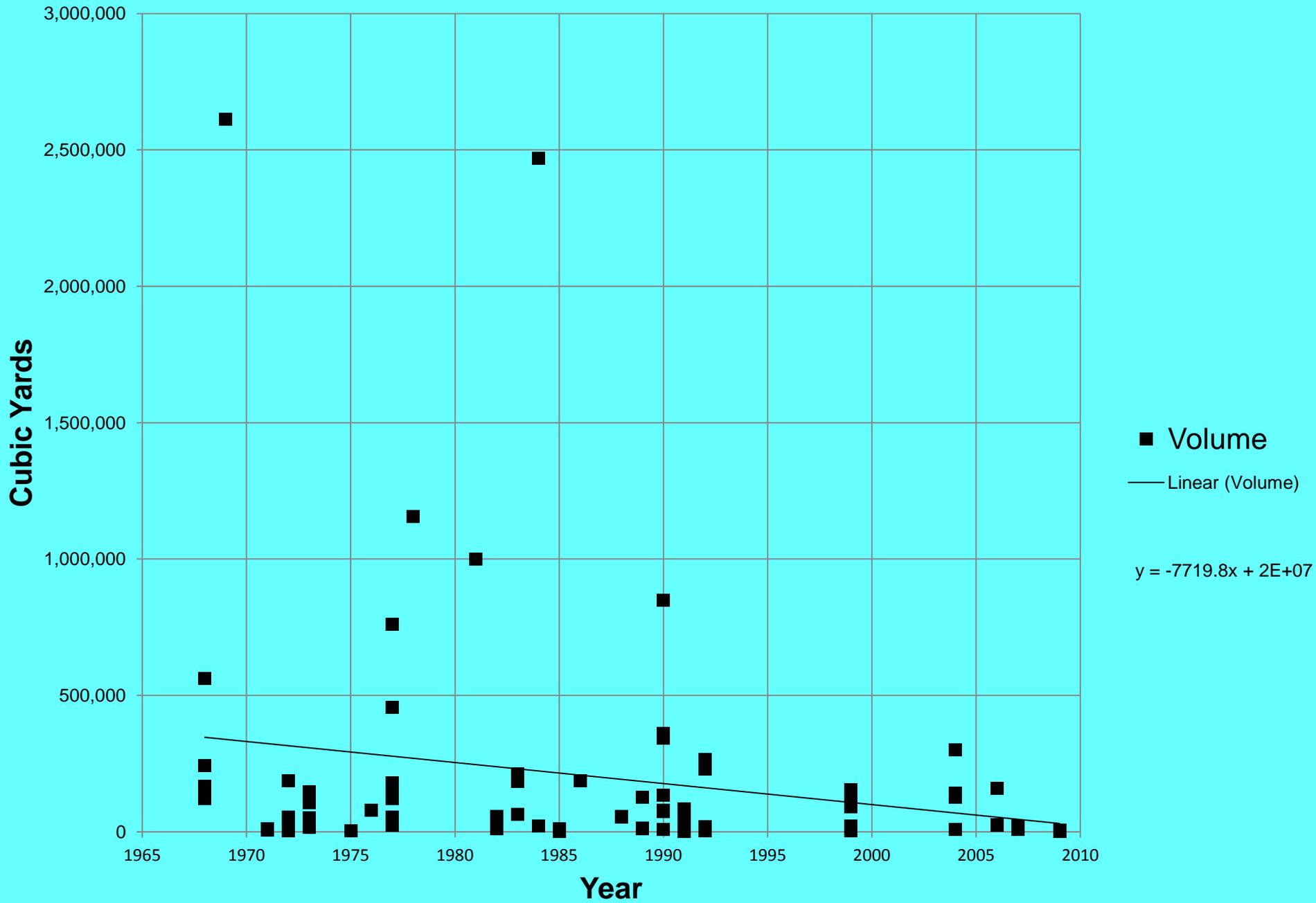


Kauai, Hawaii

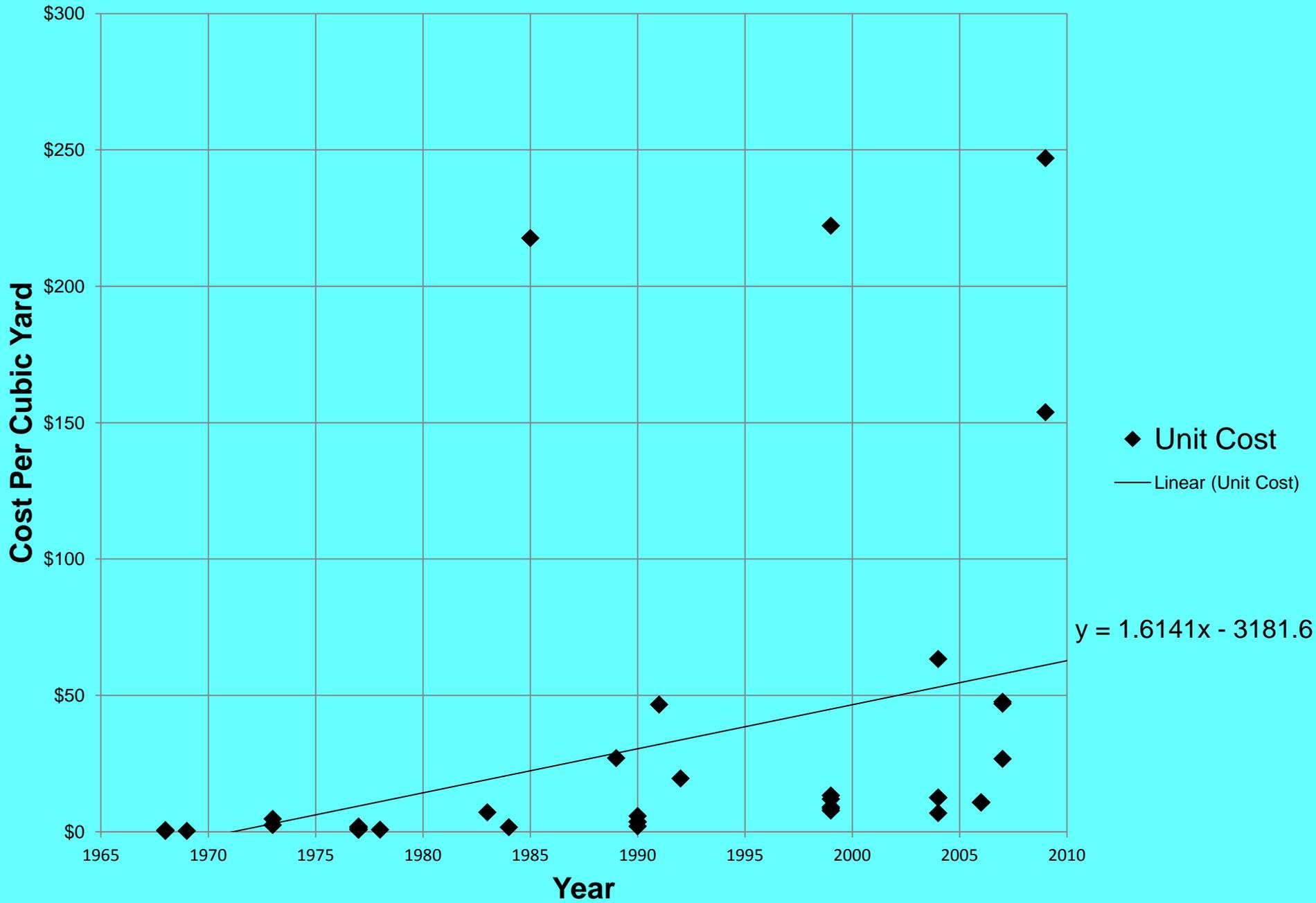
LEGEND

-  Navigation
-  Shore Protection
-  Sediment
-  Erosion
-  Off Limits

POH Dredging: Volumes



POH Dredging: Unit Prices



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Honolulu District, RSM Needs Assessment

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- Sam Lemmo, State of Hawaii, non-Federal Sponsor
- State of Hawaii, Ports Department
- State of Hawaii, Department of Boating and Ocean Recreation
- Hawaii Counties

Leveraging/Collaborative Opportunities

funding, data, tools, models, etc
with Other Projects, Programs, Partners, etc

Milestones/Deliverables

- Draft RSM/TN, 15 September, 70%
- Final RSM/TN, 30 September, NA

RSM FY12 IPR

Honolulu District, RSM Needs Assessment

Approach

- Document past dredging events
- County-by-County needs assessment
- Meet with non-Federal sponsor
- Meet with County representatives
- Prioritize future RSM activities

Models, Tools, Databases, etc Used

Benefits to O&M, FRM, Environmental

- Provide strategy for future RSM efforts in Hawaii
 - Identify cumulative effects
- Facilitate preparation of out year O&M budgets

RSM FY12 IPR

Honolulu District, Needs Assessment

Opportunities to Take Action

- Next FY

Volume of Sediment Moved

Accomplishments

- TBD

Lessons Learned

- POH annual dredging volume is decreasing while unit prices are increasing dramatically
 - Much of the Hawaii coastline is “off limits” to RSM for one reason or another
 - County concerns do not necessarily align with USACE missions

THANK YOU