Hawaii Regional Sediment Management Program
Maui Workshop Meeting Minutes
19 January 2011

I. Purpose

A workshop was held on 19 January 2011 to present the findings of the Hawaii Regional Sediment Management (RSM) Program, focusing on Maui in the Kihei and Kahului regions. The meeting started at approximately 1:00 PM in the Sanctuary Learning Center, 726 South Kihei Road, Kihei, HI 96753. Sections IV through XIII below summarize the technical presentations and group discussions that took place at the workshop. These presentations are available on the U.S. Army Corps of Engineers Honolulu District public website at the following location:

http://gis.poh.usace.army.mil/rsm/index.htm

The workshop agenda is presented in Attachment A.

II. Attendees

The list of attendees is presented in Attachment B.

III. Introductions

Tom Smith, U.S. Army Corps of Engineers (USACE), Honolulu District, Technical Lead, presented introductory remarks to welcome everyone to the workshop. Representing the non-federal sponsor for the RSM Program was Chris Conger, University of Hawaii, Sea Grant Extension agent and technical advisor for the State of Hawaii Department of Land and Natural Resources, Office of Conservation and Coastal Lands (OCCL). Mr. Conger, who was standing in for Sam Lemmo, administrator of the OCCL, briefly thanked the USACE, University of Hawaii, governmental agencies (local state and county), and private consulting firms for their support of this project, Jackie Conant, USACE Project Manager, then gave a brief introduction for the technical experts who gave the technical presentations discussed below.

IV. Regional Sediment Management Overview (Presented by Tom Smith, U.S. Army Corps of Engineers, Honolulu District POH Technical Lead)

The remarks made by Tom Smith have been summarized below.

The U.S. Army Corps of Engineers' nationwide RSM Program has an integrated approach to sediment management taking a holistic view of coastal, estuary, and river sediments on a regional scale in the planning and maintenance of water resource projects to achieve balanced and sustainable systems. The program started in 2000 in the U.S. southern region – USACE, Mobile District, and over the past 10 years has spread throughout the east, west, and gulf coasts as well as in southeast Lake Michigan. Although there is not as much sedimentation in Hawaii and therefore not as much opportunity for RSM, the Honolulu District has gained funding for this initiative in Hawaii. For the Southeast Oahu (SEO) RSM study, there were about 30 miles of

coast covered on the island of Oahu: the first spanning from Mokapu Point to Makapuu Point and the second RSM study spanning from Diamond Head to Pearl Harbor (D2P), which includes Ewa Beach. Regional sediment budgets, historical shoreline change, modeling results, and GIS platforms have been compiled and have led to a RSM plan and identification of potential RSM projects.

The purpose of the SEO/RSM study was to optimize the use of sediment resources by gaining an understanding of complex sediment transport pathways; studying large portion of critically eroded shorelines; investigating armored shorelines; and discovering economical sand sources yet to be identified. Ultimately the goal of the study was to increase understanding of littoral processes with intentions of preserving and restoring beaches in the region with potential applications elsewhere.

It was discovered that in this region, the shoreline is highly variable due to seasonal changes causing sand loss. The University of Hawaii Manoa, School of Ocean and Earth Science and Technology (SOEST) is conducting various research efforts to support the Hawaii RSM Program. To identify offshore sand sources, graduate students have analyzed jet probe data (up to 10 feet in depth) to determine how thick the sand is in areas of Kailua Bay, Lanikai Beach, and Bellows Beach at Bellows Air Force Station. It was discovered that the sand in the Kailua stream channel is a major component of why the beach is so stable in this region. There are a number of isolated patches of sand that may be available for beach nourishment. Investigations further offshore are recommended for future study.

Wailea Point sediment sand transport analysis: This analysis was conducted by using the basic concept that sediment becomes better sorted in the direction of the transport. UH took grab samples and using various methods of analysis, such as the Gao-Collins (1992) and Roux method (1994), it was demonstrated that sand has historically been transported south to north around Wailea Point, with reversals in the southern portion of Lanikai beach. By combining the two analytical methods, it is understood that there is a northward transport and that Lanikai has historically received sand from the Bellows Beach area. Using historical analysis, modeling, and sediment trend analysis, the results indicate the following:

- In the 1950s, Bellows acted as a source for accretion in South Lanikai.
- In the 1970s, revetments stabilized Bellows and South Lanikai eroded.
- From 1970 to the present, Lanikai has a northern sediment transport without replenishment.

By studying volume and direction of sediment transport, the ultimate goal is to produce a regional sediment budget. Using the Mokapu Point to Makapuu Point offshore wave gauge data collected over the past seven years, nearshore conditions at ten points have provided input for analyzing gross and net sediment transport directions. Using the results of this information, maps have been created for each stretch of beach illustrating sediment erosion and accretion along the shoreline.

Potential RSM Projects (PRPs): PRPs identified in the region included Kaelepulu Stream, Bellows Air Force Station, Kaupo and Kaiona Beaches, and Lanikai Beach. Although the funds to perform these projects have not been secured, it is important to identify the projects with the highest potential for improving regional sediment issues. For example, Kaelepulu Stream is plugged with sand and there is shoreline erosion downdrift. At Bellows Air Force Station, the beach is wide to the south and narrows to a hardened shoreline in the north. Sea Engineering worked with the USACE on a pilot beach restoration project involving the construction of two geotextile fabric groins along with up to 10,000 cubic yards of beach fill adjacent to the Pokole Way beach access in Lanikai.

This work has been summarized in the RSM document for this region, along with interactive mapping capabilities, available on the following website:

http://gis.poh.usace.army.mil/rsm/index.htm

V. Maui Wave Climate Overview (Presented by Jessica Podoski, U.S. Army Corps of Engineers, Honolulu District Coastal Engineer)

Jessica Podoski, has been working with wave information study (WIS) hindcast database to generate nearshore wave information for the Kihei and Kahului study regions.

There are WIS savepoints located throughout the Hawaiian Islands that provide hourly wave hindcast parameters for the 24-years from 1981 – 2004.

Wave modeling has been generated using computer models and observed wave fields, it has been compared to actual wave gage data for accuracy and provides a much longer term data set that is useful for establishing wave climate. Station 102 Kahului deepwater WIS Station was selected for comparison.

Wave roses show waves from 90 degrees to 300 degrees (shown from WNW clockwise through the East) and large waves (5-6 m) from most directions. The wave roses also capture tradewind seas (ENE directions) and long-period swells (N&NW) directions. Data were truncated to capture only energy moving toward the island (270 degrees through 90 degrees). Three representative years (1984, 1992, and 1994) were transformed to the 100 meter contour using linear shoaling and diffraction, which were then analyzed in order to select most common wave cases.

For the Kahului region, 422 discrete wave cases were transformed to the nearshore using the numerical model STWAVE. Wave data were saved at specific nearshore "savepoints" along coastline at areas of interest. Results were used to develop histograms of the nearshore wave parameters in order to identify potential sediment transport directions.

For the Kihei region, data from deepwater WIS Station 113 were extracted for the same three years in the WIS hindcast database. However, the WIS station is much less exposed than for the WIS station used for the Kahului region.

Wave roses show waves from all directions and mid-range wave heights (2-3 m) from most directions. The wave roses capture both tradewind seas (ENE direction) and long-period swells (N&NW directions and South). Data were truncated to capture only energy moving toward the region (90 degrees through 270 degrees). Again, WIS data was used for three representative years (1984, 1992, and 1994) and transformed to 100-meter contour using STWAVE. The analysis was able to capture the influence of sheltering by Kahoolawe as waves propagate into the waters offshore of the Kihei region.

For Kihei, 118 discrete WIS cases were transformed onto the reefs within the study region. Wave data were saved at specific nearshore "savepoints" along the coastline at areas of interest and results were used to indicate relationship between nearshore wave conditions and sediment transport.

For both study regions, wave roses developed for nearshore locations will help to identify the dominant wave directions. From this information, the direction of longshore sediment transport can be determined along the study area and this will provide valuable information for development of the regional sediment budgets.

Questions:

Q1: Why were the three years 1984, 1992, and 1994 chosen as representative years from the WIS hindcast database?

A1: These dates were chosen because they represent low, medium, and high wave energy years. It may be possible in the future to analyze all of the available WIS data; however there was not sufficient time or funds in the FY10 budget to do so in this

Q2: Have you been able to select any nearshore data?

A2: Instrument data is needed to verify nearshore trends and it was not included as part of this study.

VI. Kihei and North Shore Shoreline Change Studies (Presented by Tara Miller-Owens of UH Sea Grant as a representative of Chip Fletcher, University of Hawaii, SOEST)

Maui was one of the first islands to map shoreline changes and Maui is currently working on updating those maps. This is a 10-year effort and there are numerous stakeholders that have supported this project including USACE, DLNR, Maui County, USGS, the Castle Foundation, FEMA, Hawaii CMZ, and Sea Grant. Information gained through these studies will aid coastal managers in identifying coastal areas facing an increased risk of future beach erosion.

UH has been investigating long-term shoreline changes that have occurred over the past few decades, and has been measuring change using historical shoreline positions mapped from aerial photographs and coast charts from as far back as the 1920s. Data are used to orthorectify and map historical shoreline positions.

Transects are generated at 20 meter intervals and combined with the historical shorelines shows movement over time. Uncertainties are determined based on season variation of shoreline and other variables. These uncertainties are taken into account when running the shoreline linear regression analysis, in which the slope of the line (m/yr or ft/yr) with a positive or negative uncertainty indicates either advance or recession of the shoreline.

Sea level rise and vulnerability maps are also being created for the Maui Planning Department in every area where shoreline change is being mapped. To be consistent with NOAA Coastal Services Center, 1-foot contour intervals are being used and the previous 25-centimeter increments are being revised. These maps will show lowlands where the water table is likely to produce flooding and areas where inflow from the ocean through tidal ditches will expand tidal wetlands.

For Kihei, 1,011 transects (about 20 kilometer) were used for the study area, which shows a beach loss of 2.1 km (about 11%). The long-term average rate was about -0.13 ± 0.01 m/yr with 83% erosional and 16% stable shoreline. Short term (1940-present) shows an average rate or -0.12 ± 0.02 m/yr with 77% erosional and 20% stable shoreline.

Maps have been created to show beach accretion and erosion starting north from Maalaea Harbor and moving south along the Kihei coast. In most cases, there is overall beach erosion from the south to the north except in the case of a manmade structure, such as a groin or a fish pond, which obstructs the transport of sediments and causes localized accretion/erosion patterns.

Based on new data for the north shore shoreline, 903 transects were analyzed (about 18 km) showing beach loss to be about 0.9 km (about 6%). The long -term average rate is about -0.26 ± 0.02 m/yr with 87% erosional and 12% stable shorelines. The short term (since 1940's) average rate is -0.22 ± 0.03 m/yr with 74% erosional and 16% stable shorelines.

Maps have also been created for the north shore of Maui; however, the data are currently being updated. In general the region is erosional with the exception of obstructions to sediment transport which cause localized accretion. Kihei area has lots of erosion except where manmade structures have inhibited longshore transport. Historically erosion is Kona storm related when winds and storm waves arrive from the southeast through the southwest.

Project information is also used to create flood inundation zones.

Questions:

Q1: For the linear regression plots, how does the construction of a revetment effect the calculations?

A1: These features are accounted for when interpreting the data: is rate change due to a newly constructed structure impeding sediment transport or is it due to lack of sediment available for transport.

Q2: In general, what are the erosion maps being used for?

A2: 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 uncertainty of the future.

Q3: Are you evaluating the vegetation zone?

A3: Not currently, but selected regions have been evaluated previously, but are not being used by Maui County.

Q4: Have other nonlinear approaches been used?

A4: Yes, but results show that there is not sufficient data for nonlinear approaches.

Q5: What does County use to determine to develop setback?

A5: County uses shoreline change maps to develop setback amount based upon erosional rate.

VII. Maui Reef-top Sand Field Studies (Presented by Terra Miller-Owens as a representative for the work of Chip Fletcher, University of Hawaii, SOEST)

The purpose of this study was to identify the areas of offshore sand sources for potential use in future beach nourishment projects. This section of the presentation uses Waikiki to demonstrate the methodology of comparing old aerial photographs with modern aerial photographs to identify “stable” sand fields that are potential targets for further testing.

Once sand sources are identified in modern imagery, they are compared with historical imagery to determine where the sand has been stable over time. A final map is created to depict three classes of sand – modern, historic, and stable sand. The process of mapping these sand sources is dependent on water clarity and photo quality and therefore, the lack of sand source mapping offshore may not be due to lack of sand but it is due to poor photograph and/or water quality. Stable areas indicate extent of potential borrow areas; however more studies would be needed to determine available sand volumes and characteristics.

The methodology used in Oahu was also applied to the Kahului and Kihei regions. The Kahului conditions (water quality, turbidity and large waves) caused issues with the mapping process and the study area lacks historical imagery offshore. In the Kahului region, the results of this cursory analysis indicate that there is not a lot of sand available. However, due to the lack of waters clarity in these image sets, the results for this region are inconclusive. While these images are the best available at

this time, many of the areas need to be field checked to distinguish between sand, gravel, and hard bottom. For example, in the Kahului region, it is known that there is a large sand field off the entrance of the harbor, but UH was unable to find photographs to support the methodology. However, there are other studies that exist, such as work done by Sea Engineering, that define the large sand field.

Questions:

Q1: Is it better to take from the ephemeral or non-ephemeral (stable or unstable) sands?

A1: There is no definitive answer to this question; however, it may be better to take from the ephemeral sand sources to reduce environmental impacts. On the other hand, the stable sand source areas may be the only viable locations due to the high cost of dredging.

Q2: Have these data been compared to the NOAA data circa 2002?

A2: No this information has not been correlated.

Q3: Who controls the offshore sediment?

A3: The State has jurisdiction over the offshore resources, but any activities offshore are subject to federal regulation and permitting. The sand up to three miles off the shore falls under jurisdiction of the Office of Conservation and Coastal Lands but is considered a public resource. These resources can be used for activities such as dredging, as long as it is not used for private economic benefit. As a caveat, a private entity can use the offshore sediment resources; however, the use has to ultimately benefit the public (answer from Chris Conger).

Q4: Is there a streamlined process for beach nourishment permits? Sometimes there is an urgent need to address public safety or other pressing concerns that may require immediate response.

A4: State tried to consolidate permitting under a small scale nourishment permit for small projects. Beach nourishment permits originally involved ten separate permits that were later combined into one permit. However, now this permit has been broken up into three separate permits that involve a somewhat streamlined process in which the same submittal package can be used for all three permits. The process for getting permits approved can take up to three years but in some cases can take as little as one year (answer from Chris Conger).

Q5: Have you considered using coastal charts or ocean depth maps to identify potential area of sand offshore?

A5: Not at this time.

Q6: Should stable or nonstable sand be used for beach nourishments?

A6: Stable, as it is more likely to be thicker and not a veneer.

VIII. Maui Preliminary Regional Sediment Budget (Presented by Rob Sloop, Moffat and Nichol [M&N])

The study areas were separated into different cells that are interrupted by some sort of barrier to sediment transport between the cells. For the Maui regions, the littoral cells are broken into fairly large areas of study. The RSM project is regional in scope and not small scale.

Beach volume is defined as the beach between the stable back beach line and the mobile shoreward toe line. First, sand sources were identified using UH erosion hazard maps that depict sand released by beach erosion, USGS beach profiles, historical records of beach nourishment, and reef production (the process and volume are poorly understood and estimated from reef area). These data were used to calculate beach widths for available historic shorelines and then beach area was calculated by multiplying the average beach width by the cell shoreline length. Volume changes were calculated by multiplying the local shoreline change rate by a factor of 0.40 and multiplying the resultant by the length of shoreline under consideration. The results were then depicted on graphs showing beach volume changes over time.

Beach volume change rate is determined by selecting time periods of interest based on line graphs and historical events within each littoral cell. Change rates are calculated for each time period and over complete period of the record. Rates are calculated using regression analysis and least squares fit, and factors in seasonal variations and other uncertainties. Rate is corrected for any historical beach nourishment. For sand pathways, some sand sources and sinks have been identified but sediment transport directions have not been defined or quantified.

For each cell, the study first aims to identify each of the shoreline features using GIS. Next, each cell is analyzed for beach volume history. Then plots are compiled on the maps to show the beach loss and direction per year. Seasonal changes, in some cases, are greater than the overall change over the past 100 years.

The Kanaha Beach WWRF area and Baldwin Park beaches have historically high erosion rates. However, since around 1976, Baldwin Park erosion rate is relatively low and the Kanaha Beach erosion rate has continued to worsen. For Baldwin Park there was a large sand deficit that has been affecting each of the proceeding cells downshore as well.

Sprecklesville and Paia East have relatively constant erosion rates over the period of record. The Paukukalo cell beach volume has been stable since around 1960. The Hookipa area is affected mainly by seasonal changes due to strong reef and strong headlands. For Kanului Harbor, there has been about 800 cy/yr sediment loss.

The North Kihei and Kawililipoa cells are currently accretional, although this conclusion is based on limited data points. In Kihei in general most sand is lost to

longshore movement. In the North Kihei region there are a lot of streams that are helping bring sediment to the beaches although they are not helping with ocean water quality. North Kihei cell is going back and forth between accretion and erosion. One theory for the oscillation in sand around the mean is that sand is probably moving back and forth due to wave changes. Therefore, there have been 9,400 cy/yr net gains in sediment most likely due to the construction of groins in this area.

Kawilipioa has had a steady accretion but has had a steady decline in accretion over time. Kealia and Kalama have the highest erosion rates within the Kihei region with sediment in Kalama continuing to steadily decline. This indicates that the transport is moving south to north from Kalama to Kawilipio. In Maalaea Harbor there is no record of channel shoaling. But in the Maalaea Bay Beach cell the erosion rate has slowed since around 1950 but recently this area was affected by a major blow out in the storm drain that is currently being fixed.

Recommendations for further study:

- Complete wave transformation and circulation modeling to define sediment transport directions.
- Develop data on sediment yields (inputs) from streams and rivers.
- Quantify losses associated with winds and dune breaching.
- Analyze grain size compatibility of beaches versus potential sand sources.
- Perform jet probing of preliminarily identified sand sources.

Questions:

Q1: Do you evaluate the inland geology during study (rock vs. sand, etc)?

A1: No, as only available data are be used and this information was not available.

Q2: Will the recommendations listed above for further study be performed?

A2: Further studies depend on federal funding and the simple answer is that currently there is no funding for further studies such as these.

Q3: Will reef production be evaluated in the RSM budget in a manner similar to the D2P report?

A3: The available data are limited, and with large error margins.

Q4: One big question/issue is whether there is a prioritized list of how to determine where to put sediment as it comes available, i.e. should a small amount of sand be put on a small beach where it would make a big difference or on a big beach where it wouldn't be as big an impact?

A4: Review of projects falls to State.

Q5: To what extent are beach nourishment projects hampered by the Clean Water Act (CWA) requirements?

A5: The CWA does potentially block projects. The locale of a project might affect its ability to meet standards at all. Motivation is needed for the State of Hawaii Department of Health to change the permit process.

Q6: Are the cells that are defined in this report the same cells that would be used for Small Scale Beach nourishment (SSBN) permit?

A6: This would be one of the main references for the SSBN permits along with the UH erosion maps.

Q7: Is there any speculation on the overall transport of the north shore sediment transport?

A7: In general, the majority of sediment transport is east to west as long as the sediment can get past the headlands. However, in some regions, for example Baldwin, there has been transport across cells, but there has also been some reversals in this cell as well.

Comments:

Comment 1: Overall volume loss is based on the shoreline change data. One thing the shoreline analysis does not account for are shorelines with large dunes. Rob believes that the losses are actually underestimated.

Comment 2*:* People walking and driving on the dunes and displacing the sediment is having a significant effect on the beaches. Another issue is that much of the sand is produced offshore and the fish that aid this process are decreasing and subsequently the sand sources are depleting. One idea for investigate this is to radio-carbon-date the sand in the different location to see if new sand is no longer being produced.

Response (Comment 2): In the D2P report, reef reproduction of sand sources was quantified, but these data were not available for the Maui report. While the effects of reef production and sediment creation do have implications for sediment budgets and such, they have not been quantified and will not be included in this report.

Comment 3: In the case of the revetments, it seems that they do not affect the shoreline if they are not too steeply sloped. Need to design a structure that can be put in the beach that would lead to accretion?

IX. Maui Regional Sediment Management Plan (Presented by Rob Sloop, M&N)

As part of the RSM Plan for each of the regions in Maui, existing federal projects have been taken into consideration. In the Kahului region, existing federal projects include the Iao Stream flood control project, the Kahului Deep Draft Harbor project, the Kahului Light Draft Harbor project, the Kahului Bay mitigation project, the Kahului wastewater plant shore protection project, and the Kanaha pond sanctuary ecosystem restoration project.

In the Kihei region there is the Maalaea Harbor project, the Kihei Area Erosion study, and the Kihei Beach shore protection (Kalama Park Revetment) project.

Currently the Kealia and Lalama cells have the highest erosion rates. North Kihei accreted from 1997 to 2007 (but this information is based on only two data points); and previous to 1997, this cell had erosion rates of -2,400 cy/yr. Since the 1950's, erosion rates for West Maalaea and Maalaea Bay Beach cells have improved. The UH sand investigation results show that the Kahului region offshore sand sources are about 7.8 acres, not including additional areas offshore from Kahului Harbor and about 1.3 acres of offshore sand sources in the Kihei region.

Beach nourishment projects involve a number of different laws and regulations, including federal (Clean Water Act and Harbors Act under the USACE, and USFWS, and NMFS); State (Coastal Zone Management Act, work offshore of certified shorelines under DLNR, the Department of Health Clean Water Act, Historic Preservation Office, Office of Hawaiian Affairs, Department of Transportation, Highways and Harbors Divisions; and local (including County of Maui, Public Works, Planning Department and Planning Commission). Inter-agency coordination is critical to efficient permitting. However, there are a variety of regulatory and coordination issues that arise in regards to beach nourishment projects.

In 2005, DLNR and USACE issued a State Programmatic General Permit (SPGP) to streamline small-scale beach nourishment (<10,000 cubic yards) in the State of Hawaii. However, the State Department of Health Section 401 Water Quality Certification component has lapsed. Therefore, there is now a consolidated permit within the DLNR which includes the Department of the Army, SPGP; the State Department of Health, Section 401 Water Quality Certification; the State CZM Federal Consistency Review; and DLNR Conservation District Use Permit.

In Maui there has been some local coordination, such as the Sprecklesville Beach Restoration Foundation completion of beach nourishment project. The County of Maui Wastewater Reclamation Division at WWRF has been coordination on projects as well.

The intent of the RSM Plan is to give federal, state, and local agencies and groups more information to pursue sediment management projects. The Maui RSM Plan contains the following information for each region that can be easily accessed in the reports online at the USACE website:

- Existing federal projects
- Coastal processes
- Wave climate
- UH Shoreline erosion maps
- Beach profiles
- Shoreline features (maps and descriptions)
- Beach volume graphs
- Beach volume change rates
- Historical events chronology
- Ocean sand sources
- Potential RSM projects

In summary, beach nourishment may be viable and the RSM projects that have been identified through these studies do have the potential to be implemented in the future, but require more study and analysis. For example, Sea Engineering investigated the Kahului Harbor and found around two acres of potential sand sources; however, the quality of the sand in unknown. For sediment management on a statewide level, since the Hawaiian Islands are so remote but relatively close to each other, there is the possibility for sand sources to be used in areas other than the region where it came from; however, the impacts must be well understood before we enter into projects such as these.

Potential RSM project in the Kihei region may include Kihei Beach hurricane and storm damage reduction/beach nourishment. This area has a high potential for hurricane and storm damage reduction benefits. Beach nourishment may consist of 358,000 cy over approximately five miles of shoreline. There is federal interest in pursuing a shore protection project in Kihei, but a cost-sharing non-federal sponsor has yet to be identified that has the financial capability of providing the required items of cooperation.

Federal Input:

The is an authorized project for Maalaea Harbor which has not been constructed due to multiple issues that include impacts to surf spots and environmental concerns.

The Kihei Area Erosion Study looked at storm damage reduction. In the 2004-2005 time frame, federal interest in the project was demonstrated but there was no local support and therefore it never moved passed the study phase.

State Input:

While projects to take sand from one location and use it in a separate county, or another island could be presented to the DLNR, they would also be examined by the public and other regulating agencies.

In the Maalaea area, the UH Sea Grant studied water quality before, during and after beach nourishment. The sand sources covered up a clay basin on this portion of the coast and it reduced turbidity and improved overall water quality.

Questions:

Q1: Could RSM actually help with quantifying the sediment loads in streams?

A1: EPA and the USACE have similar projects going on in South Maui with watershed planning projects and maybe these efforts will work together to generate findings for sediment loads to streams.

Q2: To what extent are efforts to take some of the material that has been modified and discussed today and put it on shoreline area and to what degree has that been limited by DOH water quality limitations in different regions?

A2: A monitoring standard was developed for DOH and the county complies with their pre- and post-construction standards; however, it may be challenging

for other counties to comply with these standards. From the conservation district perspective, the first thing to evaluate is the sand source through sediment sampling. Analysis of sand sources should follow USACE standards, which are justifiably stringent.

Q3: Can you explain why gain size analysis is important?

A3: Grain sizes and energy in the environment have to be matched so that when the new sediment responds naturally to the energy of the environment it stays in equilibrium. Edging to courser grain is better and more likely to get accepted for permitting than finer grained sediment. There are also areas in the rest of the world that have mixed (silica and carbonate) sediments but it has never been attempted in Hawaii and it would be a very hard sell. There is a need to evaluate the grain size of the borrow material against the native material at a beach. This is important because if it's not matched well, the sand will not stay in place. If matched, there will be a longer residence time. It is recommended to error on the larger size for borrow

Q4: Is there natural turtle nesting in some of the different beaches in the study area and is this factor taken into account in the report, as it may indicate some stability in the beach?

A4: ESA protects the historic nesting beaches, which may affect beach nourishment. There may be instances where you cannot do nourishment because there are historic nesting locations, but in many cases where there are manmade structures, if they are affecting the beach so that it will become completely eroded, then the structure may have to be taken out to protect the turtles. Turtle nesting areas should be of special concern because turtles may adapt to current sand where they were hatched, and not lay eggs in sand that is different. Rob Sloop commented that the lack of maintenance of sand areas could be a problem with endangered animals.

Q5: Would removing the road through Kealia pond in north Kihei help to rebuild the beach and improve the environment in this area?

A5: If you could prove that this area could be built up with dunes so that it was a protection system for the pond then you may be able to protect the ecosystem there.

Q6: What happens if there is a large hurricane or tsunami that takes out some of the beaches?

A6: Right now there are no rules or regulations that guide the redevelopment. It may be a two part solution in which you are allowed to place a revetment at a public beachfront for double protection.

Comment: One idea is to have the community move forward in obtaining a blanket permit for a large area or large cell so that there are guidelines for the

nourishment and then individual entities can obtain specialized permission for small projects within the blanket permitted region.

A potential RSM project in the Kahului region may include a Wailuku Kahului Wastewater Reclamation Facility (WWRF) Beach nourishment project. It has been decided that the facility will not be relocated; therefore, it is mandated that it must be protected. For the Environmental Impact Statement for this facility, it is the government's preferred alternative that the revetment will be extended without having to extend the beach. However, there are two beach replenishment alternatives with may include (1) a 3,800 ft reach, 40 ft wide berm with about 105,000 cy initial amount of sediment, with 21,000 cy per eight years of maintenance or (2) 2,400 ft reach with 40 ft wide berm and about 65,000 cy initial sediment and 16,000 cy per eight years of maintenance. Coordination would have to occur between federal and State government and the County of Maui including the County of Maui Wastewater Reclamation Division. Potential funding may provide the opportunity to characterize specific sediment sources and permitting of the work.

Federal Input:

The USACE is in charge of keeping the Kahului Harbor navigable and performing maintenance dredging. The last time that it was dredged was 1998, and the USACE has to go through all of the permitting and approval processes that anyone else would have to go through. However, as a result of the project, the USACE is responsible to potentially utilizing the dredged material elsewhere.

> *Comment*: In the permitting process at the Kealia Pond, there is a medical center that wants to go in next to the pond. They went through the permitting process with DOT (who owns the land) and they wanted to do a restoration of the marsh and take out invasive species, but DOT revoked the project because they didn't want more birds in the area since it would increase the treat of bird strikes associated with airport traffic.

State Input:

Long term the state would like to see beach nourishment instead of hard structures. The state is evolving their monitoring programs. Waikiki beach nourishment has a $2M budget that will include significant monitoring. There needs to be more monitoring upfront, during, and after. Also, DLNR is constantly reaching out to other agencies to assist in helping to improve their monitoring activities. A lot of the monitoring reports are developed by criteria from other agencies such as Department of Health and the National Marine Fisheries Service and as long as they are meeting the determine criteria, the monitoring reports are considered adequate.

It is important to include all of the stakeholders in all of these projects, because in some cases, there can be a dichotomy in beliefs about the importance and success of a project. Beach nourishment should also consider water quality and encourage agencies working on water quality issues to work hand in hand.

Chris Conger provided closing remarks and gave his thanks to all that participated.

Meeting was adjourned at 5:25pm

Attachment A: Meeting Agenda

Attachment B: List of Attendees

Attachment A
Meeting Agenda

Attachment B
List of Attendees