Southeast Oahu Regional Sediment Management
Diamond Head to Pearl Harbor Region
Workshop Meeting Minutes
08 September 2010

I. Purpose

A workshop was held on 08 September 2010 to present the findings of the Diamond Head to Pearl Harbor (D2P) Regional Sediment Management (RSM) Program. The meeting started at approximately 1:00 PM in the Laulima Room at the Hale Koa Hotel at 2055 Kalia Road in Honolulu, Hawaii. Sections IV through XIII below summarize the technical presentations performed during the first phase of the workshop. These presentations are available on the U.S. Army Corps of Engineers Honolulu District public website (http://gis.poh.usace.army.mil/rsm/index.htm) and on the 2010 RSM project ftp site. Please contact the EA Engineering, Science, and Technology, Inc. Project Manager Brenda Nuding for ftp site access information (bnuding@eaest.com). Summaries of the discussions that followed during the subsequent breakout sessions performed with smaller groups of attendees are presented in Section XIV.

II. Attendees

The list of attendees is presented in Attachment A.

III. Introductions

Todd Barnes, U.S. Army Corps of Engineers, Chief of Engineering and Construction Division Honolulu District presented introductory remarks to welcome everyone to the workshop. Sam Lemmo (State of Hawaii Department of Land and Natural Resources) followed by briefly introducing the first RSM Plan prepared for the region of Oahu from Makapuu Point to Mokapu Point and then the RSM region from Diamond Head to Pearl Harbor. The RSM study has been expanded statewide in 2010 to address areas on Maui and Kauai.

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

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 that takes 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 the US southern region and over the past 10 years has spread throughout the east, west, and gulf coasts as well as in southeast Lake Michigan. For the Southeast Oahu (SEO) RSM study, there have been 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. Regional sediment budgets, historical shoreline change, modeling results, and GIS platforms have been compiled, which have led to a RSM plan and have identified potential RSM projects.

The purpose of the SEO/RSM study is to optimize the use of sediment resources. Issues that were encountered during this project included complex sediment transport pathways; large percentage of critically eroded and armored shorelines; and economical sand sources yet to be identified. Ultimately the goal was to increase understanding of littoral processes with the goal of preserving and restoring beaches in the region with potential application elsewhere. It was discovered that in this region, the shoreline is highly variable and much sand was lost due to seasonal changes.

Through research conducted by the University of Hawaii Manoa (UH), jet probing (up to 10 feet in depth) was conducted in order to understand how thick the sand is in areas of Kailua Bay. It was discovered that the sand in the Kailua stream channel is a major component of why the beach is so stable. Investigations further offshore still need to be conducted. Offshore sand sources were also investigated in north Bellows Beach and south Lanikai.

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 the various methods of analysis demonstrated that sand has historically been transported south to north around Wailea Point. The composite of these analyses show that there is in fact northward transport and that Lanikai has historically received sand from the Bellows 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.

Ultimately by studying volume and direction and sediment transport the goal is to produce a regional sediment budget. Using the Mokapu Point to Makapuu Point offshore gauges, nearshore conditions at 10 points over the past 7 years have provided data for analyzing gross transport direction and net transport direction that show the direction sediment is moving.

Although the Hawaii regional sediment budget is small compared to mainland budgets, in the Kaelepulu Stream there are 22 cubic yards a year of loss and 1,000 cubic yards moving toward Lanikai. There are also longshore losses to the north and groins on either side of the Waimanalo stream.

Potential RSM projects: Future projects may include Kaelepulu Stream, Bellows Air Force Station, Kaupo and Kaiona Beaches, and Lanikai Beach. Although the funds to perform these projects have not been identified, it is important to identify the projects with the highest potential importance to regional sediments. For example, Kaelepulu Stream is plugged with sand and there is dune erosion downdrift. At Bellows Air

Force Station, the beach is wide to the south and narrows to a hardened shoreline in the north.

This work has been summarized in the RSM document for this region, which is available on the following website: http://gis.poh.usace.army.mil/rsm/index.htm

V. Waves and Currents in D2P Region (Presented by Jessica Podoski, U.S. Corps of Engineers, Honolulu District Coastal Engineer)

Using the Costal Modeling System (CMS), which integrates the CMS-Flow and CMS-Wave models, the project team has been able to simulate tidal and wave generated currents between Diamond Head and Ewa Beach and quantitatively describe littoral transport pathways in the region. It was discovered that since there is a small tidal range, it is mainly the waves that generate sediment transport in this region.

The bathymetry data set included information provided by the UH Department of Ocean and Resource Engineering, as well as SHOALS LiDAR data soundings, FEMA topographic information, and UH derived data to fill gaps.

Tide level was forced using NOAA tides information , historical data measurements were taken from the Honolulu Harbor gauge. Offshore wave conditions were obtained from Scripps Institute of Oceanography Coastal Data Information Program Directional Waverider Buoy 146 located at Kaumalapau Harbor on Lanai.

Model domain was about 13 miles across. Field data were collected in August 2007 in the vicinity of the Natatorium with specialized instruments collecting wave and current data in a variety of locations to be used for validation.

The simulations were run for 23 days on a southern swell and largest wave height was 1.3 meters with periods of 12-15 second. Modeling was also conducted on an eight day Kona storm which occurred in 2008. Northwest swell and south-southeast swell were also analyzed under a synthetic case in which the same conditions from the southern swell were used with a 30 degree variation in wave direction. The southern swell case was used because it had the strongest currents and tides. Results indicate that currents under these various conditions show similar overall trends with variability in magnitude and eddy strength. Diamond Head and Fort DeRussy have strong currents with offshore flow and eddies. Along Sand Island and the Reef Runway, the circulation had a clockwise direction. However, for Keahi Point and Iroquois Point, currents were directed toward the Pearl Harbor entrance channel.

In Waikiki there are a lot of offshore currents, while at Ala Moana the mix of currents is more complex. These complex currents are due to influence of manmade channels and abundant nearshore reefs.

Questions:

Q: What was your rationale for using the Kaumalapau gage data vs. the Wave Information Study (WIS) hindcast data?

A: The WIS data only covers the time period from 1980 – 2004. Our nearshore wave data was collected in 2007, so the WIS data would not have provided the correct forcing at the offshore boundary of the wave grid.

Q: At what minimum depth are the results valid?
A: The grid extended to the shoreline (0 ft MSL) but results in depths as shallow as 3 – 4 feet would be considered valid.

VI. SE Oahu Shoreline Change (Presented by Chip Fletcher, University of Hawaii [UH])

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. Shoreline positions are mapped from 0.5 m orthorectified aerial photo mosaics, which typically include one mosaic per decade. These are the best available data for long-term shoreline history. USACE, Harold K.L. Castle Foundation, Coastal Zone Management Program, FEMA, and most of the counties in the State have helped with funding over the years. This information will aid coastal managers in identifying coastal areas facing an increased risk of future beach erosion.

For example, using a 1949 photo mosaic, researchers have gone in with high resolution and digitize the images on screen. Using historical photos and T-sheets, shoreline locations through time have been identified, assigned uncertainty, and results are provided based on linear regression. From east of Diamond Head (from Black Point to Diamond Head cliffs) there has been chronic erosion; however, it is relatively stable. From Diamond Head to Leahi to Makalei Beach Park, the beach has been lost to erosion in the past few decades. The waves break against the seawalls in front of the homes and the only remaining beach at Makalei and Diamond Head Beach Parks is stable to slightly erosional.

Waikiki - This is an urban shoreline with revetments, groins, and sand fills that divide the shoreline into separate littoral cells. Sand movement is inhibited between cells, which results in alternating pockets of erosion and accretion among the structures.

Outrigger to Kaimana Beach – In the 1960s, there was erosion of about one foot per year and beach was being lost near the center from Outrigger to Elks Beach. At Kaimana Beach, there is sand transport to the north and accretion greater than 2 feet per year against the Natatorium wall. Beach is being lost at the south end and has been occasionally graded, with the last grading in February 2002.

Queens Beach to Kapahulu Beach – In 1956, Queens Beach was built with sand fill and central groin; however, beach was lost in southern half from the 1970s to 1980s and the remaining beach has been eroding at a rate of 2 feet per year, with the Natatorium blocking northerly sediment transport. Kapahulu Beach is accreting at a rate of 0.5 to 1.0 feet per year but there may have been sand placed post 1956.

Waikiki to Kuhio – The last major redesign of Kuhio Beach was in 1972 and smaller fills have been performed in 1975, 1991, 2000, and 2006. In Waikiki, the Royal Hawaiian groin was built in 1927 and there has been long-term accretion, from 1927 to 2005 of around 0.5 to 1.0 feet per year. Short-term (1975 to 2005) there has been erosion at a rate of about 1.0 foot per year.

Grays to Halekalani – Since 1927, at the eastern end (around the Sheraton) the beach has been lost due to erosion. In the central area there is no significant beach, and the remaining beach is approximately stable to accreting.

Fort DeRussy to Kahanamoku –Fort DeRussy Beach was constructed in 1970 with smaller fills in 1975 and 1981. The northern portion has been stable to accreting at a rate of about 1.0 foot per year and the southern portion has been eroding at about 2.0 feet per year. Kahanamoku Beach was constructed in the 1950s and since then the west has been erosive at 0.5 to 1.0 foot per year and the east has been stable to accreting.

In summary the shoreline change has been analyzed at 172 transects, which accounts for 3,762 yards of beach, with total beach loss of about 25 transects equaling around 350 yards.

Ala Moana to Magic Island – These beaches were constructed during the 1950s and 1960s out of dredge fill. At Magic Island there has been erosion to the west and accretion to the east. At Ala Moana, there has been alternating cells of erosion and accretion.

Sand Island – In the 1940s, Sand Island was constructed with dredge fill and since then the central beach has been accreting up to 1.0 foot per year and the east has been eroding at less than one foot per year.

Ewa Beach to Kaehi Point – Keahi to Iroquois Point have been eroding up to 5.0 feet per year. Central and west Ewa Beach has been accreting to approximately stable.

Keahi to Iroquois Point – Erosion rates of up to five feet per year at Keahi Point are some of the highest in Hawaii. 1976 to 1988, beachfront homes were removed and bolder revetments were installed. Erosion rates taper off toward Pearl Harbor Channel in the east but turn rather abruptly to accretion to the west. While shoreline appears to be straightening out, there is eroding at the former accretionary cusp and erosion continues between and around the revetments.

These maps are available for all locations throughout Oahu except for Kaneohe Bay, and can be found online at http://www.soest.hawaii.edu/asp/coasts/oahu. Note that this website is temporary and may be changing soon.

Questions/other notes:

Q: Are the rip currents associated with the groins?

A: They probably are associated with the groins but they dissipate once they get far enough offshore.

There has not been significant fill since 60s and 70s, which may explain the erosion in the recent data set.

Dredged area in front of the beach acts as a sink for sand coming from the beach and alters the natural transport method along the shoreline.

The current study just shows the shoreline changes, which can lead to a follow up study that would analyze why shoreline changes are happening.

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

The study area was separated into six different cells that are interrupted by some sort of barrier to sediment transport between the cells.

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). Since there is not a natural source of sediment from streams, the sediment either comes from reef or from human placement. Next, sand sinks were identified and analyzed for how the offshore losses balance the sediment budget and how small losses occur due to sea level rise, beach rock formation, etc. Also, sand pathways are analyzed using modeling by USACE and earlier studies. Since there is not a lot of variety in seasonal differences in the region, this factor was left out of analysis. Another factor that was not included was explicit modeling of transport rates, which vastly over-predict rates for the sediment-starved beaches in the D2P region.

In the Diamond Head area, the beaches are slightly erosional, and are generally narrow.

From the mid 1960s to the mid 1980s, there was regular beach nourishment causing a growth in Waikiki. However, since them, there has been a net inconsistent loss of 4,000 cubic yards. Currently, this beach is eroding, there is also no reef production, and it is degraded to the point that it is not producing any more sand.

In Ala Moana, there was a beach nourishment program; however, since the program ended, sand has been lost and the beach has been eroding. There is also significant cross shore transport in Waikiki and Ala Moana.

Sand Island is believed to be losing 400 cubic yards offshore and there is very little reef production in this area. There are more interruptions and a curved shoreline in this area, which inhibits transport. However, the Reef Runway area is relatively stable but there are no beach or sand resources at the shoreline.

Iroquois Point is slightly accretional on the Ewa Beach side. Accretion at Iroquois Point can be explained by the wave energy that is spreading around this point. However, the extent of reef production in this area is unclear.

For further study it will be important to continue to routinely study aerial photography and analyze potential climate change effects in detail. Also, from Diamond Head to Ala Moana, it will be important to investigate sediment transport pathways; look for better understanding of cross-shore transport and circulation; and recommend new field investigations. At Iroquois Point it will be important to investigate modern reef productivity and radiocarbon dating of beach sand. From Honolulu Harbor and Pearl Harbor it will be important to sample sand within the harbors, perform supplemental sand circulation studies, and identify sand sources.

Questions/Answers:
Q: Do we have any of the dredging bathymetry from Pearl Harbor historically to analyze in concurrence with these studies?
A: Recent information from 2000 shows net dredging but there is no information about the quality of the material. It just shows mass quantity.

Comment: In regards to the impact of the groins, primary cross-shore transport is through the channels.

Q: Why didn't sediment budgets look further back to the 1950s.
A: In the 1960s, Magic Island and Ala Moana were put in and this development fundamentally changed this area. Budgets tend to target the last 10-20 years.

VIII. <u>SE Oahu Offshore Sand Sources (Presented by Chip Fletcher, UH)</u>

This task was completed by UH using aerial photography and data collected in the field that verified conclusions drawn about sand bodies. UH also looked at historical sand bodies including 8-10 sand bodies from a 1949 aerial photo. UH then identified how historic and modern sand bodies compare to each other and identified ephemeral and non-ephemeral sand bodies.

Also, a side scan survey was completed in the Waikiki area (can be downloaded from the UH SOEST website). Jet probing was performed to establish stable sand bodies. It was found that there are 680,000 square meter of stable sand in this region.

Questions:
Q: What are the environmental implications between the uses of ephemeral and non-ephemeral sources?
A: Ephemeral sand is thin and not a good investment. In terms of environmental issues, there may not be mature vegetation. However, by using thicker sand, it is possible to dig deeper instead of having to dig across a greater area.

Q: Is there any place where sand could be placed offshore where it would be pushed onto the Waikiki Beach?
A: There are physical barriers that prohibit sand from being transported along the whole shoreline. Also, many of the offshore pockets just hold sand and would not help nourishment.

Q: What is the depth at the sand channel in Kailua Bay where the investigation was cut off.
A: 40-50 feet

Q: If the sand were able to taken out from this channel, would that be possible to use this sand for nourishment?
A: USGS has performed a lot of investigations along Kailua coastline and southeast area of Oahu and found that there is good sand, found in wedges covering the terraces around 120 feet. This is thought to be the best sand source on the island. Investigated dredging this material and stockpiling it on the runway; however, there were too many obstacles.

IX. D2P Regional Sediment Management Plan (Presented by Rob Sloop, Moffat and Nichol [M&N])

There are three existing projects in the area (funded through operations and maintenance division of USACE) – dredging of Pearl Harbor, maintenance dredging of Honolulu Harbor, and a project in Waikiki that has not yet been authorized.

Agencies that are involved in regulating beach nourishment include Department of Land and Natural Resources (DLNR), which works seaward of the certified shoreline; City & County of Honolulu, which works landward of the certified shoreline; USACE, Rivers and Harbor Act, Clean Water Act; US Navy, which regulates nearshore waters within the Pearl Harbor Defensive Area; State Department of Health (HDOH); State Historic Preservation Office; Office of Hawaiian Affairs; U.S. Fish and Wildlife Services; and National Marine Fisheries Service. Inter-agency coordination is critical to efficient permitting.

In 2005, the 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. Consolidated permits within the DLNR include the Department of the Army, SPGP; State Department of Health Section 401 Water Quality Certification; State Coastal Zone Federal Consistency Review and DLNR Conservation District Use permit. However, there are limitations to the SPGP due to the lapse of the HDOH Section 401 Water Quality Certification component and due to the fact that the City & County of Honolulu are outside of the process. Therefore, in the future, the goal is to streamline the environmental permitting process. Additionally, it will be important to participate in local coordination at a sub-regional scale, for example, at Waikiki Beach, it is necessary to coordinate between the hotel industry and the State Tourism Authority.

Technical study results indicate that beach nourishment may be viable and potential RSM projects will therefore be identified, which may include Honolulu Harbor, Waikiki Beach, and Pearl Harbor.

Issues identified with Honolulu Harbor include limited quantity of sediment and therefore, limited RSM opportunities. This location, however, may still be considered.

Waikiki Beach as a potential RSM project will require coordination among federal, state, City & County of Honolulu, and private property owners. Potential activities based on funding may include geophysical offshore sand source investigations, sediment budget refinement, ongoing RSM workshops, and facilitation of Fort DeRussy sand backpassing.

Potential RSM projects at Pearl Harbor may address the ongoing erosion at the Iroquois Point Housing area. Additionally, future projects should investigate opportunities for sand backpassing and beneficial use of dredged material.

There is a current application for groins to be created at Iroquois Point, and there has been dredging. However, the RSM has identified the potential for backpassing and there is an awareness of the project but no specific action is proposed in regards to the current project.

X. D2P Regional Sediment Management Project Scope (Presented by Brenda Nuding, EA Engineering, Science, and Technology, Inc.)

The scope of study the 2010 D2P RSM investigations will focus on the nearshore region from Diamond Head to Pearl Harbor. The FY2010 scope also includes Waikiki remote camera imagery analysis and shoreline modeling with long shore advection and diffusion from the UH School of Ocean and Earth Science and Technology. These investigations will be further explained by Chip Fletcher in the following presentations.

XI. Sheraton Waikiki Camera Analysis (Presented by Chip Fletcher, UH)

The digital camera is a federal funded project that will quantitatively measure beach morphology and surf zone processes. Images can be found at http://www/soest.hawaii.edu/hioos/hioos_livephotos.php

A digital camera was installed on top of the Waikiki Sheraton with a constant field of view showing an image along the shore from the Royal Hawaiian groin to Kapahulu. There are heavy shadows throughout the day; therefore the movie was created from images that were put together from a frame taken at noon everyday for two years from 2008 - 2010 (with some time gaps).

The shoreline was digitized by correcting camera view images into a geospatially correct “world view.” Then, the data from each location are used to create an algorithm to then create a binary image that identifies saturated sand vs. non-saturated sands.

These data were then put together to create a shore motion graph that shows accretion vs. erosion in which there is accretion in the center and erosion on the outsides during the winter of 2008 while there is erosion during the summer and then accretion during the winter of 2009. The first principal percent of variability is about 68 percent indicating that the shoreline change is accretional during the winter and erosional during the summer. This may be connected to the seasonal tidal changes. Images show that the reef is being covered and uncovered which will give new support to permits to cover this area with sand artificially. The cross-shore shoreline change equals around two to four meters.

The next steps in the investigation will be to quantify cross-shore variability and identify beach response to wave event and nearshore process. The plan is to develop management recommendations and guidance.

XII. Fort DeRussy Sand Backpassing (Presented by Tom Smith, U.S. Corps of Engineers, Honolulu District POH Technical Manager)

Kelly Hupp, representing the Hale Koa, began this portion of the workshop by thanking everyone for coming and identifying some of the issues that the hotel encounters due to sediments in their area of the beach. She mentioned that there is sand building up at the Ewa side of the beach but there is also sand coming up along the racquetball courts. Although the dock at the Hilton Hawaiian village acts as a groin, they constantly have to work to keep the sidewalks clear of sand during the summer.

Tom Smith then began his presentation by defining the concept of sand backpassing, which is a process that reverses the direction of the natural drift, by re-circulating sand from an accreting downdrift shoreline to the updrift beach where the sand originated. The beach on the west side of Fort DeRussy shoreline is extensively wide and is accreting. Sand would be taken from this area and placed back on the updrift shoreline. This process maximizes the use of existing sand resources and eliminates the need to inject costly new sand into the system.

The methodology for performing sand volume analysis involved beach profiles used to determine the cross-sectional areas of the sand cut and fill that were developed based on recent bathymetric and topographic surveys of the area. Volumes were determined by multiplying the average cut and fill areas of adjacent beach profiles by their separation distance and the approximate elevation of the existing beach berm and seawall is +6.0 feet referenced to mean sea level.

USACE dug three test pits and discovered good quality sand and did not encounter any cementation. However, for test pit three, there was heavily compacted from foot traffic in the area and had coarser material; however, it was still considered beach quality sand.

Preliminary findings included net sediment transport to west; eastern shoreline eroded to seawall; western shoreline over 250 feet wide; material is fine to coarse gain calcium, carbonate; no cementation found; and up to 12,000 cubic yards of sand available.

Questions:

Q: Theoretically would it even be possible to have one continuous beach in Waikiki with no controlling structure?
A: The beach is not set up that way and there is no one project that would be able to cover the whole beach.

Q: There has been a lot of interest in sorting sediments by grain size, what are some of the techniques for doing this?

- Washing sand down to sort out the sand (an effective process)
- Hydrocyclone – expensive and effective
- Washing, all of the containments are concentrated in the effluent. Contamination is also concentrated in the sand since the bulking has been reduced.

XIII. <u>Beneficial Use of Dredged Material (Presented by Richard A. Price, USARDC Environmental Laboratory)</u>

USACE is not a regulatory authority for agricultural, industrial, and urban discharges of soil and their associated contaminants and unfortunately these activities impair the USACE mission to maintain commercial and recreational navigation to federally authorized depths. Watershed erosion, left unabated, remains to be the main reason for dredging in waterways.

Regional sediment management is the use of sediment resources removed in dredging operations for shoreline habitat or structure, land development, or as a raw material in construction and soil material products. It has been found that of the 300 million cubic yards of sediment that has been dredged by USACE, around 5 to 10 percent is contaminated (NRC, Committee on Contaminated Marine Sediments, National Academy Press, 1997). Of that total amount of dredged material, 40 percent was used beneficially in 2008 and at least 68 percent was placed in open water or wetlands.

Some of the uses for dredged material have been for beach nourishment, construction fill, agriculture or forestry, recreation, wetland habitat and shoreline protection, island habitat, mine land reclamation, dredged material recycling, construction material, blending with cellulose, biosolids or industrial by-products to make specialized products, and landscaping.

The biggest problem encountered in these projects is that there are so many stakeholders and each group wants to go a different way. This tends to cause a traffic jam when deciding how to use dredged material. Other issues include misperceptions due to not having a solid understanding of the science; lack of clear regulatory guidance; uncertainty dealing with contaminants; and fear of product liability. However, dredged material may not be toxic waste and many of our foods and personal hygiene products contain higher levels of chemicals such as benzo(a)pyrene and arsenic. Therefore, products made from dredged materials should be evaluated for risk of toxic ingredients and use should be restricted when risk is unacceptable.

USACE and USEPA have developed a guide entitled, *Evaluating Environmental Effects of Dredged Material Management Alternatives – A Technical Framework*, as well as testing guidance manuals for both inland and upland uses of dredged materials. The *Summary of Available Guidance and Best Practices for Determining Suitability of Dredged Material for Beneficial Uses* (USACE) also provides valuable comprehensive guidance and adequate decision support tools to enhance beneficial use.

Some of the major issues associated with dredging and RSM are that excess erosion and contaminant discharges impair beneficial use of dredged sediments and watershed management takes place on the dredging end instead of in the watershed. Also, there are state and federal restrictions on dredged material placed in the littoral zone and returning dredged sediments to upland reuse is often prohibited by cost.

In order for beneficial use to be successful, it will be important to become more knowledgeable on technical feasibility, legal and regulatory concerns, economics (such as sharing cost and responsibility) and it will be important to gain more public support.

Helpful online resource include:

- Dredging Operations Technical Support: http://el.erdc.usace.army.mil/dots/dots/html

- Beneficial Uses of Dredged Material: http://el.erdc.usace.army.mil/dots/budm/budm.cfm

- Dredging Operations and Environmental Research Program http://el.erdc.usace.army.mil/dots/doer/doer.html

Dredged material management issues still up for discussion include federal standard for selection of disposal alternatives (i.e. least cost, meets environmental compliance, and meets sound engineering practices), beneficial use, and acceptable risks.

XIV. Breakout Sessions

Beneficial Use Group Discussion

Pearl Harbor is currently evaluating the feasibility of various disposal options for dredged material and it was determined that sediment from the inner harbor would not meet water quality standards. There is a general permit for dredging in Pearl Harbor but isn’t clean enough for offshore disposal and is therefore will only be able to be disposed of in a confined, onshore location. However, the dredged material from Honolulu Harbor may be disposed offshore. Section 404 regulates the disposal of the dredged material but there are some ocean approved dumping sites in Hawaii that may have been used for the disposal of materials from the dredging of the Ala Wai canal.

When dealing with dredged material, economic and environmental issues need to be analyzed. Sometimes there are added costs for preparing or transporting material to a beneficial location and therefore, the costs, which are not easily assumed by any party, is the deal breaker for these types of projects.

The City of Honolulu has a plant on Sand Island that can take the sewage component out of materials in a process called pelletizing.

Historically there was a church that was built out of coral that was part of the dredged material. What if we could create building materials for low income housing? There is a problem with arsenic in the islands but if it were used as building material, then it may not have to meet the same standards as it would for dredged material. However, the grain size of the dredged sediments may not meet the requirements for use in building materials. It is possible to use dredge material for base course or asphalt.

Basically if a project is beneficial to the community, everyone will come together to figure out a viable beneficial use project.

The most effective use of the sand would be to dredge it and deposit it directly on the beach; however, there are problems with the quality and when you get into problems with cost and who will pay for it, when you have to go through the process of cleaning it and decontaminating it.

Q: What is the difference between offshore sand that is not a problem when it stays in place, but becomes “contaminated” when it is dredged?

A: There is no USACE permit for dredged material placed on land but a 404 permit just comes into play when disposal impacts a water body (which does not regulate the material’s impact on groundwater).

Hydrocycloning- This is a process that separates the fluids and the contaminants. However, cost varies and depends on water availability at the location.

For transportation of dredged material, slurry and pumping are the best options in Honolulu. Using a barge is also an option. However, transporting materials oversees requires a USACE permit if it is material taken from waters of the US.

Requirements for disposal of dredged material that is dewatered and put on the beach

- Dredging from navigable water falls under Section 10 of the Waters and Harbors Act.
- USACE regulates up to the high tide line, so if it is above the mean high tide it would not be under USACE jurisdiction.

Waikiki Video Group Discussion

Frequency of photos is hourly; however, the video was created by putting together one frame from each day at noon which gives the best clarity for the video.

An expansion plan for the data set may include Ewa end, which may just be a pilot program, or at the natatorium. Cost benefit analysis should be completed.

Q: Who owns the camera?
A: The Sheraton owns the camera and may install another. If three cameras were installed in a triangulate, then the volume of sand could be determined. It would also be nice to have more data, i.e. data for the next 20 years would be valuable.

A method for monitoring sand offshore is needed. Also financial justifications for RSM project need to be developed. Tourism is one of the main financial justifications for RSM projects. Increasing the width of the beach could also be used as an argument for RSM projects so that beach capacity could be increased. Additional UH research involvement or initiating additional measurements to be taken simultaneously could also justify RSM projects.

Q: Can surf camera images be used to gather data?
A: If they are orthorectified.

Need to determine where sand covering reef in video is going. Information on reef cover by sand and sediment would be valuable for environmental considerations. Sand activity is happening at 25% in either direction in the reef area. It would be better to couple data with submerged sand.

There may be an opportunity to couple lidar data with Waikiki video info. Infrared camera could count tourists or gather information at night. DBEDT and HTA may find this information valuable. DOBOR (DLNR) would find video/image info valuable for assessing beach use and vessels coming and going from the beach.

After the next beach nourishment project, it will be interesting to view the video and see the changes in the beach and sediment movement.

Beach width analysis from a historical prospective is important. Beach width analysis should take into account both that there is a higher shoreline and that the hotels are growing closer to the shoreline. Waikiki is an engineered/man-made area so maintenance is required.

Another camera could be added near the corner of Kalakaua or Kapahulu or at the natatorium or on top of Diamond Head. Issues to consider for new cameras include power, range, reflection, resolution, height, maintenance, and weatherproofing. Camera projects should be combined with beach nourishment projects.

Q: Can cameras be multi-purpose and be used for such things as security or traffic? Processing data is costly.

Q: How much did the current 2-year project cost?
A: It needs to be determined how much the current camera and data analysis costs, and the projection for how much a new camera and analysis will cost.

Fort Derussy Backpassing Group Discussion

In deciding how far to widen the beach, there are engineering vs. environmental considerations as well as issues related to the historical shoreline. Therefore, it will be important to analyze and determine which trend to follow.

Q: David Smith (DS) - In relation to Waikiki nourishment general question, how wide should the beach be? Using engineering standpoint interpretive process or use regulatory viewpoint?

Discussion: First idea was to use historical shoreline, or large wave events such as the 1982 hurricane.

Q: At Fort DeRussy, what is feasible to perform? A: Backpassing rather than nourishment of Waikiki.

Oliver Vetter commented that we could use an ongoing process of pumping sand from one end to another. However, Tom Smith believes that logistically it will be a onetime event.

Tom Smith commented that waste management will be a problem and that return waste cannot be left or returned to system and fluidized sand will be separated. However, this process will create turbidity.

Adaptive Management/Proof of Concept

One idea is to have a backpassing plant that would be a semi-permanent pumping system. However, issues to consider with this alternative would include issues with slurry and returned water. This may be a viable option if it was done above the high water line because it would involve less permitting since CWA regulations will not allow fill in water. However, this may result in high dune on water line.

Consideration should also be given to property owners, such as the Hale Koa, since there will be heavy equipment on the beach. Also, downshore neighbors may also have concerns about loss of sediment.

At Kuhio Beach nourishment used to be less than $150 per cubic yard (cy) and now it cost equal to or greater than $150 per cy.

Using larger volumes of sand causes less interruption and are longer lasting due to economy of scale. However, regulatory issues include potential coral hard ground covered, turbidity and water quality issues, and post construction monitoring. Environmental concerns also include the elimination of habitat due to sand covering hard rocks (although this covered by sand already). Turbidity issues may also include sediment settling out on the coral. There will also be an argument to review existing conditions before proceeding with any project.

There has already been backpassing at Kaimana beach above mean high water line (MHW). However, when project activity enters the water, a plethora of regulatory issues are ignited.

Permits are needed for in water placement or large scarps above MHW. Is there any middle ground?

Q: Is water quality standard the same? Discussion: benthic monitoring can be done, but water quality issues are still of great concern.

Q: Backpassing is ‘better’ than beach nourishment. Can any consideration be given to this?
A: No. Although backpassing is better than bringing in new sand, there is no difference from a regulatory standpoint.

Q: Why is the beach nourishment struggling in Hawaii? The local interpretation of Clean Water Act (CWA) has been challenged in court. There seems to be different interpretations here and why are there issues performing these necessary projects in high volume areas such as Waikiki?
A: CWA implementation and public participation are not always efficient and slow down the process.

Q: When was the last backpassing?
A: Tentatively decided that this occurred in the early 80s. Beach fill was done in the early 90s and maintenance may have been performed in 1987 or sometime in the 90s.

Sam Lemmo has a broad perspective of Waikiki projects and stressed the importance of planning for regulatory concerns. There are lots of hazards to be considered such as wildlife, tourists, etc. in the vicinity of the work.

The 2007 Waikiki Project at Kuhio Beach is a success story because the contractor was closely monitored and a solid monitoring plan was established before the work was conducted. Therefore, new projects should require monitoring plans which should be approved prior to project work and should include plans for technical quality, water quality, ecological monitoring, preconstruction baselines, and procedures to be followed both during and after construction. Todd Barnes commented that we need to plan, engineer and schedule to deal with regulator reality and even get counsel for consultant if necessary.

An argument could be made that the Fort Derussy project is mitigating natural impacts.

Whether there are positive or negative impacts, it is necessary to address all the issues. For example, what would be the impact to beach users during construction? Is the sand blowing technique an option or is it too loud?

A potential option (brought up by Thorne Abbott of TEC Inc. in a post workshop email) is a technology that some of the hotels along Kanata beach in Maui were exploring which involves a slow-rotating auger type device that is contained within a pipe that is submerged in the beach. The auger slowly moves dry sand from one extent of the littoral cell to the other (for example, seasonally from the Sheraton to the Kaanapali Alii is beneficial in that it can move dry sand and thus no dewatering is involved. It may be easier to permit because it is placed above the shoreline and at the back of the beach which is subject only to DLNR OCCL and/or County jurisdictions. Finally, it may have aesthetic benefits in that it is not visible for most of its length above the surface of the beach and doesn't represent a safety hazard for tripping, etc. Jeff Halpin of the Kaanapali AliI hotel association may have initiated cost/benefit analysis of this system and it is encouraged that those who are interested should contact him.