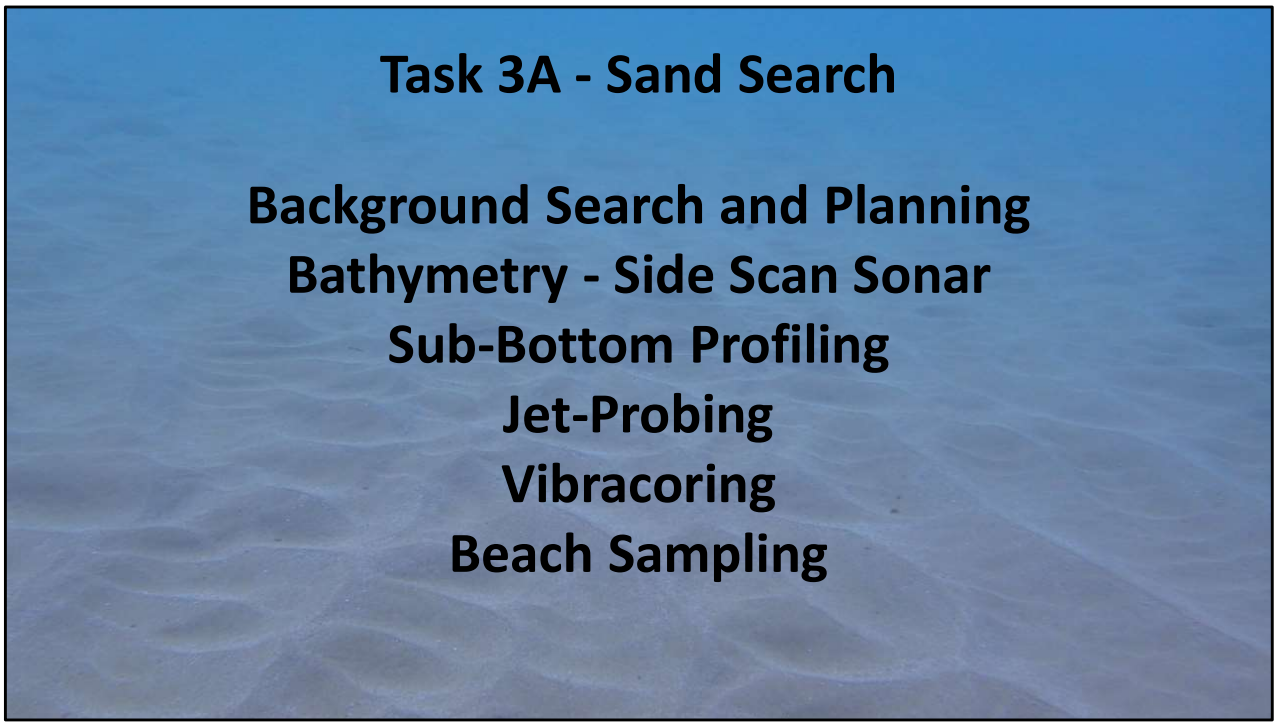
Ma’alaea Village Coastal Resilience and Erosion Management Plan

Ma’alaea Village Community Fact Sheet

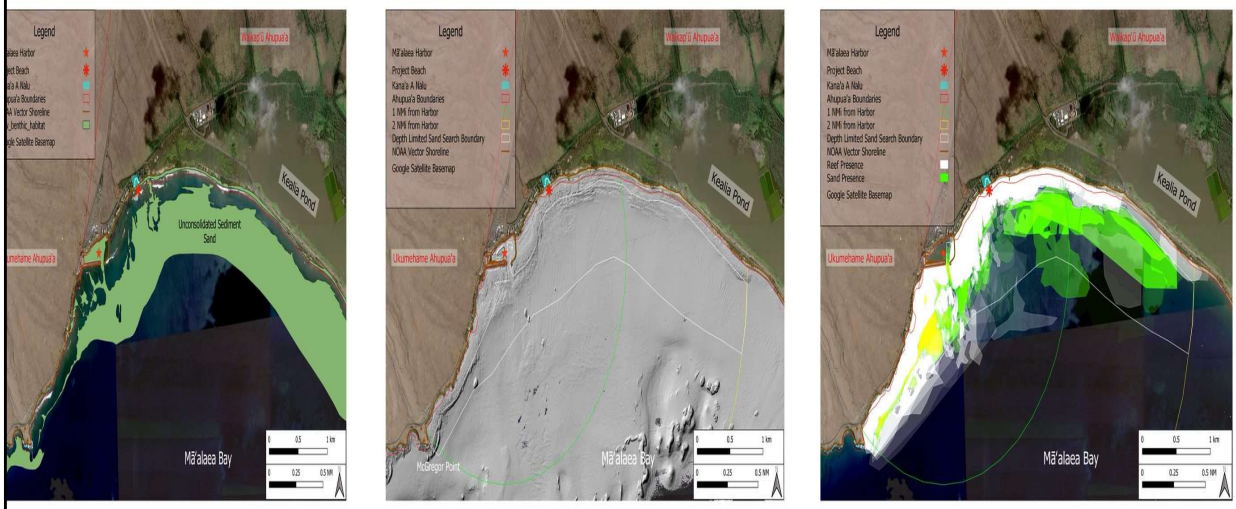
Introduction to the Ma’alaea Village community



These are the sub tasks to be undertaken by Rising Tide Engineering Inc. working for Moffatt & Nichol for the County of Maui – Planning Department project . The focus of this Task 3A is to fill in a known gap in existing studies that is the lack of targeted sand studies to identify, characterize, and quantify any possible sources of offshore sand that would support beach restoration options for Maalaea Bay Beach. The background search or desktop study is being completed to kick off further geophysical investigations of prioritized sand sources to determine the quantity and quality relative to the Department of Land and Natural Resources beach sand quality guidelines.

Explain each technique briefly.

Background Data

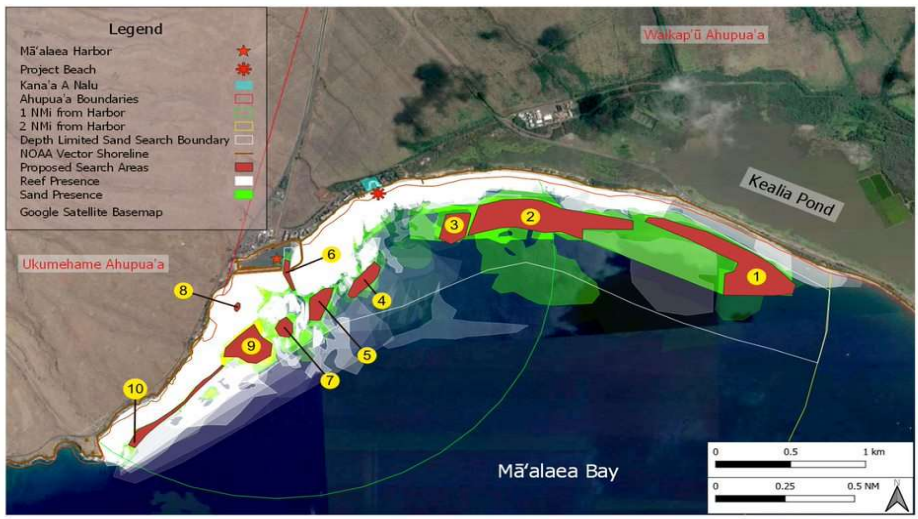


Left panel shows the benthic classification done by Jeff Dollar Study MRC showing the sand, coral and rock

Center panel shows the LiDAR or light detecting and ranging imagery for subsurface mapping to create a digital elevation model shown to help identify potential sand areas in catchment basins in low spots,

Right panel shows the combination of LIDAR and aerial photography overlapped over multiple years to identify the presence of possible sand and reef.

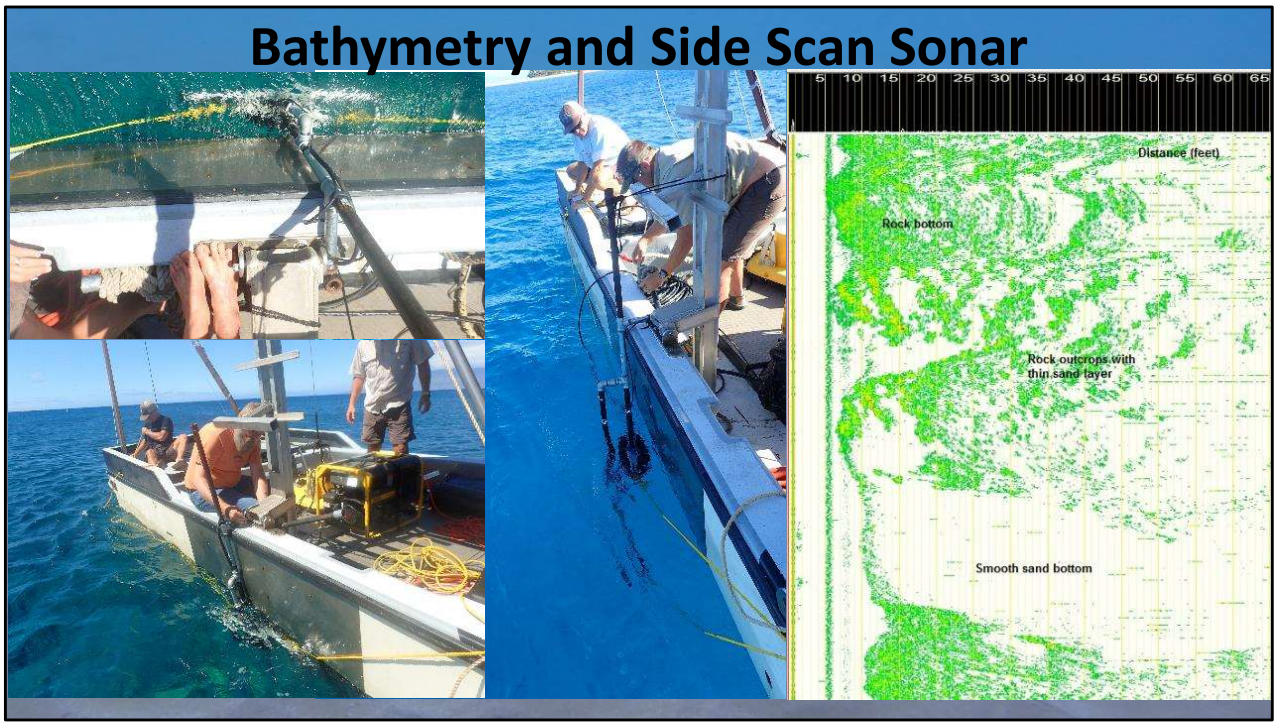
Search Prioritization for sand sites



As you saw the aggregated overlap of sand-covered regions over time, Rising Tide Engineering has prioritized ten possible sand sites that indicate possible sand deposits that were prioritized by deposit site size, water depth (between 10 and 40 feet) reef presence and distance from the harbor with the highest priority zone was located within a one nautical mile (1,852 meters [m]) arc of the harbor and Project beach shown by a green line.

Boat Command Center

This slide shows the boat command center with our senior geophysicist organizing and fine tuning the information his instruments are showing him



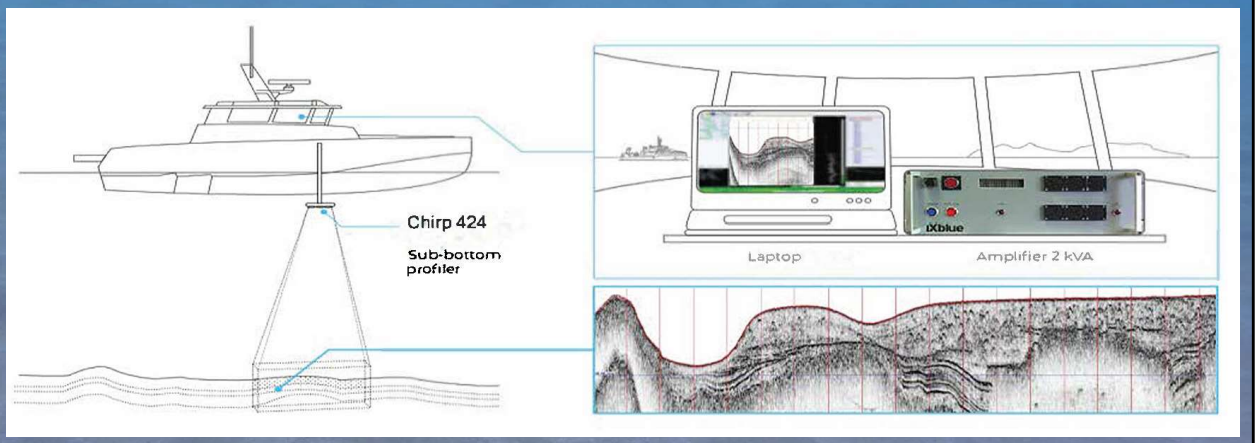
The two main techniques used to map the seafloor are bathymetric profiling and side-scan sonar. Bathymetric profiling is used to determine water depth and map the elevation of the seafloor. It has been used to map seafloor elevation and water depth prior to dredging activity,

Side-scan sonar emits a fan-shaped sonar pulse from the boat down toward the seafloor. The intensity of the acoustic reflections from the seafloor is recorded in a series of cross-track slices to form an image of the seafloor and objects on the seafloor within the swath of the beam and works to identify reefs etc.

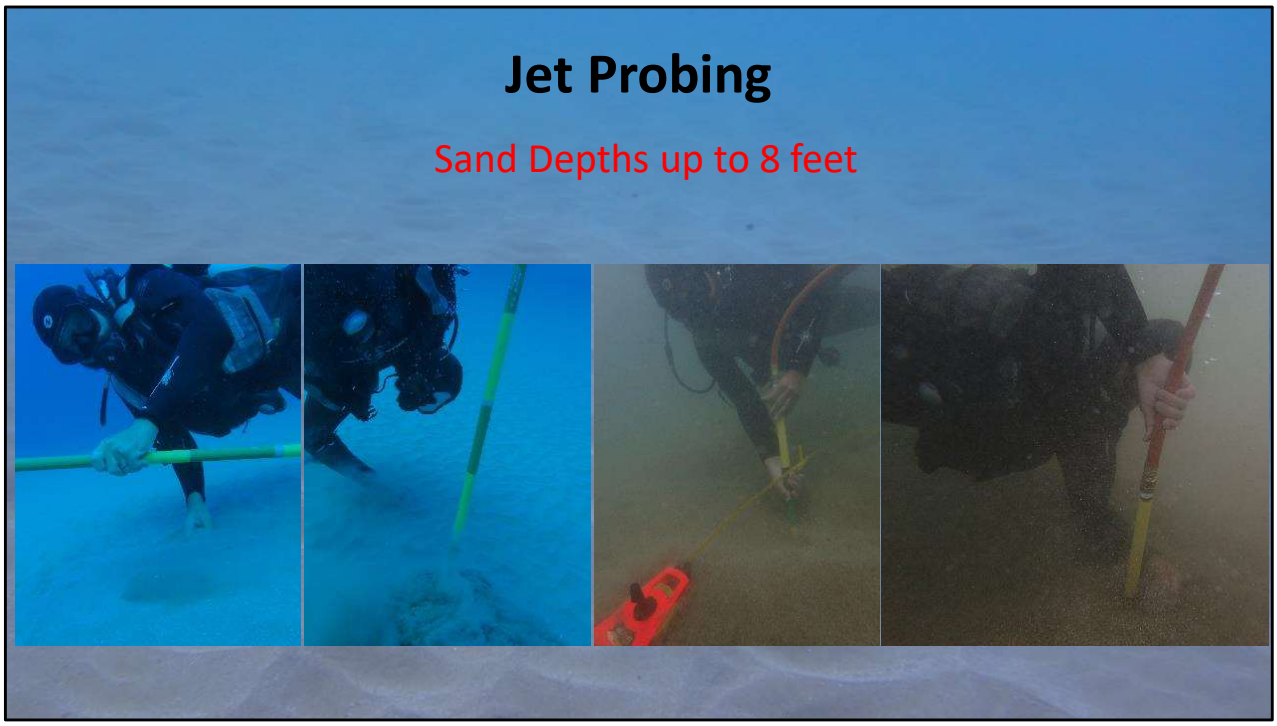
Sub Bottom Profiler

This slide shows a sub-bottom profiler. Sub-bottom profiling systems identify and measure various marine sediment layers that exist below the sediment/water interface. Some of the acoustic signal will penetrate the seabed and be reflected when it encounters a boundary between two layers that have different acoustic impedance. The yellow sub bottom profiler is towed between the boat just below the surface

Sub-Bottom Profiling - Typical



This slide shows a typical set up for the sub bottom profiler. This device shown in the previous slide produces a 2-dimensional stratigraphic cross section by using acoustic energy to image sub-surface features in an aquatic environment. In our case the imaging is of sand, reef and rock. If the bottom sediments are soft or loosely consolidated then some percentage of the ping will continue to travel through the bottom and into the sub-surface. As the sound energy passes through different materials (sands, clays, mud) some of that energy is reflected back towards the tow-fish. Based on the intensity of the returning signal and the time it took to return to the fish, we get an image of how thick the sediment package is at a given location, and what that package might be able to tell us about the site.

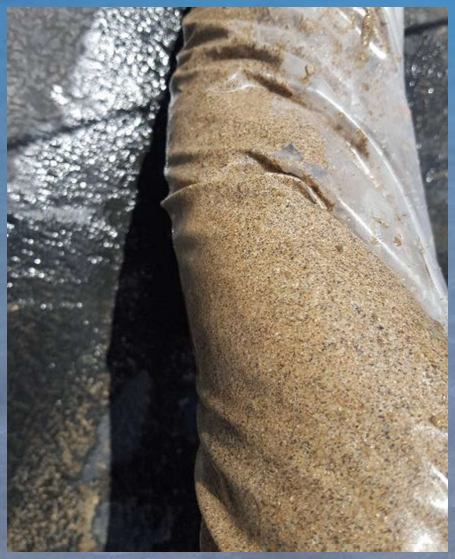


After defining the outline and thickness of the sand or soft sediments as well as reef and rock, we need to confirm that the deposit is all sand and that dredging it won't pose an environmental impact. Also, we need to ensure that the depth that the sub bottom profiler is showing is correct. We do this by jet probing the sediment using divers. These same divers and marine biologists that also take photos to identify areas of sensitive benthic habitat as well as taking sand samples.

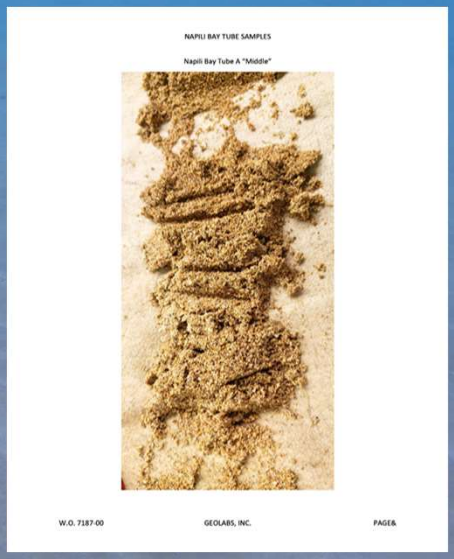
Vibracore

Vibracoring is a sediment sampling methodology for retrieving continuous, undisturbed cores in our case sand and sediment. This mechanical drilling technique is used to collect core samples (referred to as either vibracores) from unconsolidated, loosely compacted, or semi-lithified materials by driving a tube with a vibrating device into the subsurface materials..

Vibracore and Beach Samples



Vibracore sand sample from nearshore deposit



Sand sample from beach

The sand and other material from the Vibracore are compared with beach sand and analyzed in a lab for grain size, color, fines coarse content and stratification to determine if the offshore sand is of similar quality to that found on the beach. We take small samples of beach sand along and across the entire beach.

Once we have tested all the potential offshore sand deposits Ma'alaea Bay we categorize and rank the best deposits for size of areal extent, sand thickness, environmental setting, quality of sand and distance to the Ma'alaea Village and the eroding shoreline


Thank you for listening !!