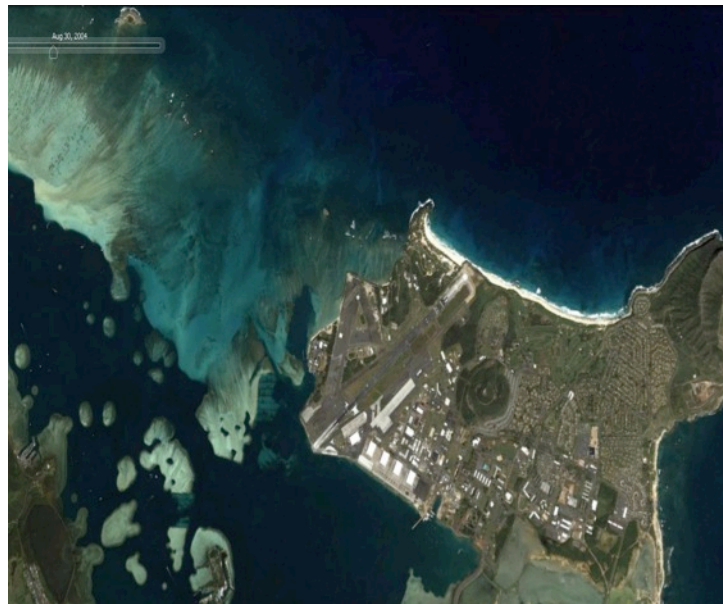
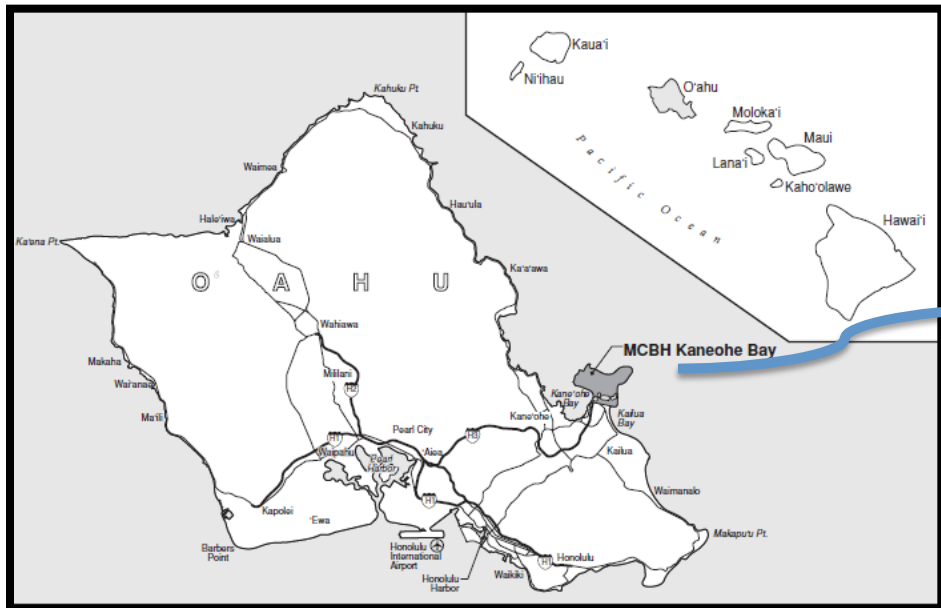




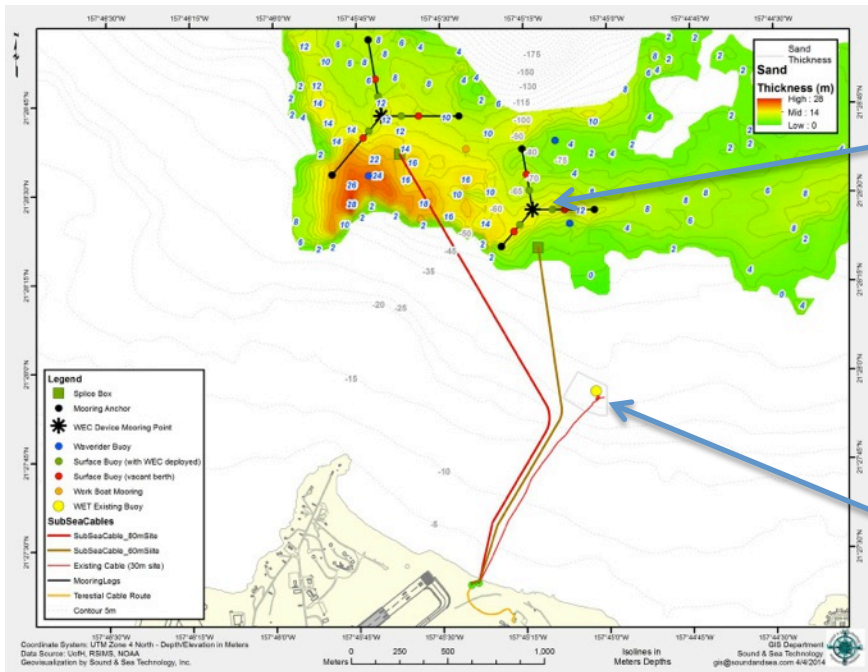
Navy's Wave Energy Test Site Environmental Monitoring

Alexandra De Visser
NAVFAC EXWC
21 September 2016

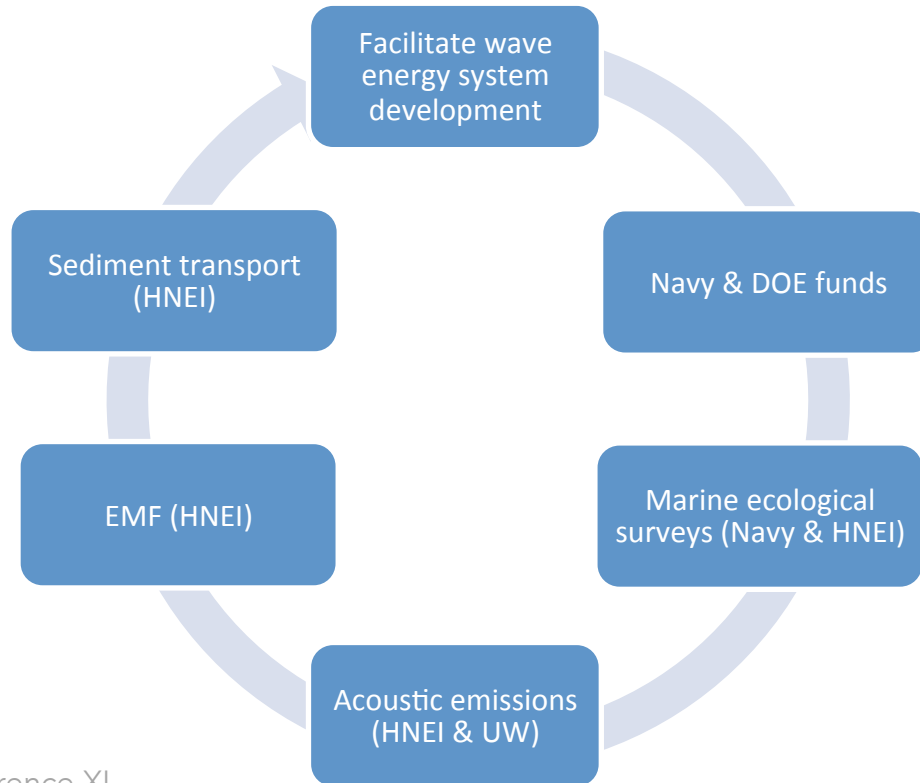
WETS Location



Devices now under test



WETS Environmental Monitoring



- Navy monitoring marine biology (periodically since 2003 at 30m berth). Project not likely to impact resources, though infrastructure may foster aggregation.
- HNEI protected marine species monitoring (ongoing from late 2014 through all WETS hardware installations and WEC device testing), and water chemistry measurements.

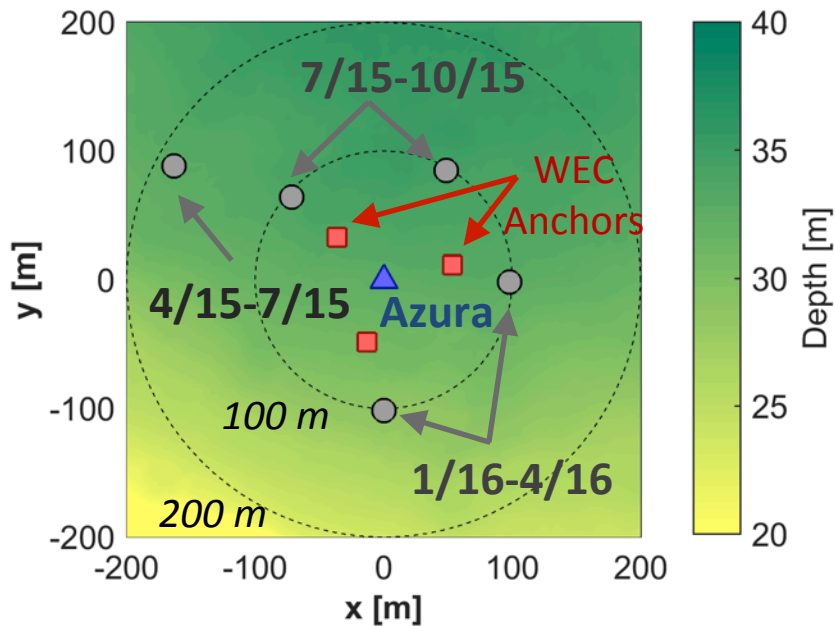
Ecological Surveys



Blue-striped snapper, one of the most common fishes from 2003 to 2011 at 30m berth.

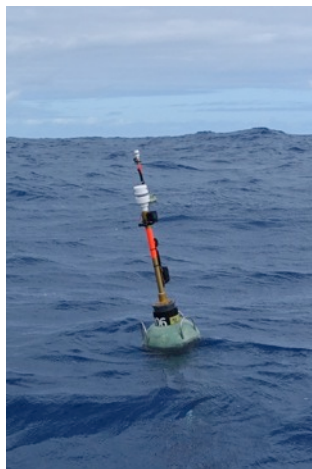
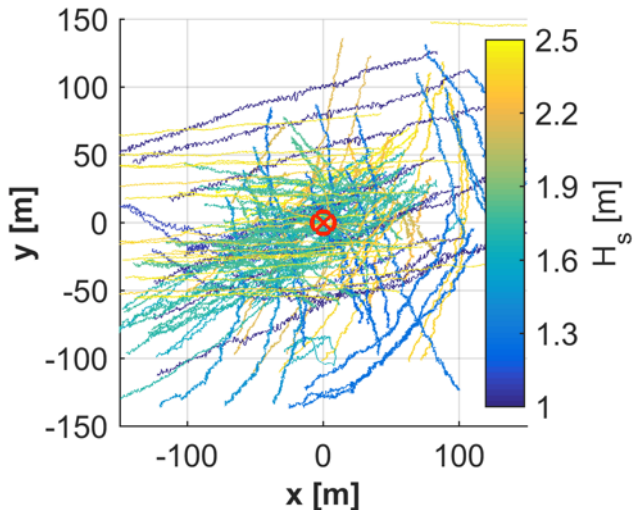
Acoustic Systems

- Bottom-deployed hydrophone measurements (Sea Spider)



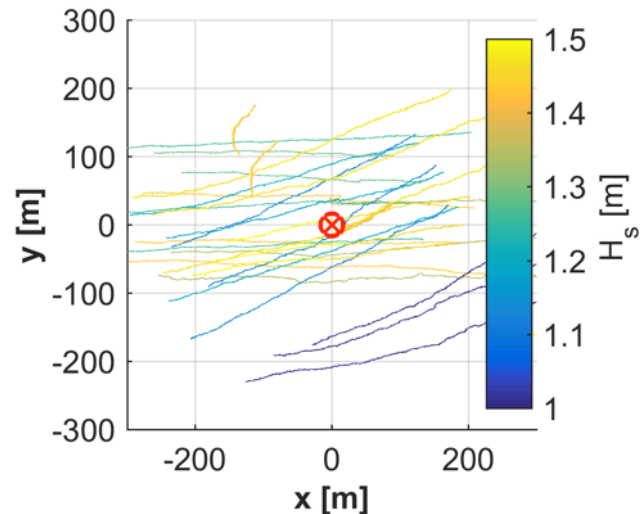
- SWIFT drifting hydrophone measurements

SWIFT drifts near Azura (30 m)

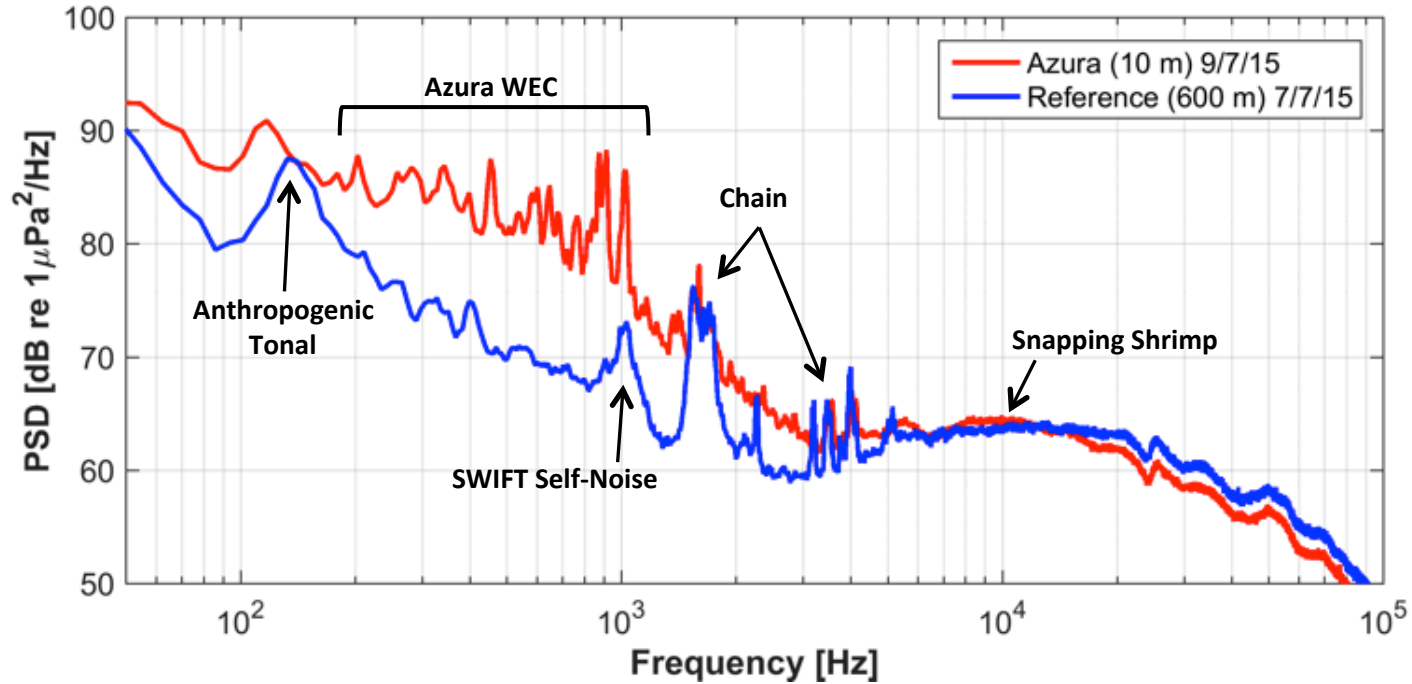


SWIFT deployed by UW

SWIFT drifts near Lifesaver (60 m)



Representative Acoustic Data



Environmental Findings to Date

- Acoustics
 - Azura exceeds ambient noise only below 5kHz, very close to source
 - Azura sound emissions are sea state dependent
 - Drifting and fixed sensors are comparable, except for flow noise <200 Hz with SWIFT drifting system.
 - Lifesaver sound characteristics differ significantly; analysis is underway.
 - Extensive data has been collected as part of the ongoing measurement program; more extensive characterizations of ambient and WEC sounds are in process.
 - *Note: no sound recorded to date has approached prescribed NMFS thresholds that would require immediate reporting.*

Environmental Findings to Date

- Ecological Surveys
 - 5 dives completed to date to augment NAVFAC efforts begun during Ocean Power Technologies deployments at 30m berth.
 - *Note: no detectable negative impacts noted in fish populations, coral growth, or other impacts.*
- Water Chemistries
 - *Note: no detectable impacts/changes.*
- EMF
 - *Note: no measurements made to date (studies elsewhere indicate no impacts at much higher transmission levels; levels at WETS will be relatively quite low).*

Environmental Findings to Date

- Sediment Transport
 - *Note: minor scour areas observed at both deep berths, apparently due to natural prevailing WSW current. Observations continue near mooring infrastructure.*
- Protected Marine Species Monitoring
 - Routine observations recorded during all at-sea operations.
 - Dedicated and trained observers monitor during WEC deployment operations and periodically from shore.
 - *Note: periodic sightings of humpback whales (during winter) and sea turtles (no apparent impacts).*

