Testing Methods

Case Study – Hamilton Wetlands, San Francisco, CA
San Francisco Bay has lost more than 80% of its tidal wetlands due to decades of diking and farming. The restoration of tidal and seasonal wetlands on the former Hamilton Army Airfield has placed approximately 6,000,000 cubic yards of dredged sediment to raise the land surface elevations suitable for creating tidal marsh.

The Hamilton Wetlands project was chosen as a test site to determine the sustainability benefits derived from TLP.

Testing Methods

Field Analysis & collection of marsh sediment cores

Remote Sensing

Lab Testing

A gamma spectroscopy system is used for $^{210}$Pb and $^{137}$Cs analysis. $^{210}$Pb radiochronology produces a depth-age relationship spanning 50 to 100 years from which accretion rates and mineral and organic accumulation rates can be calculated.

Product

Data from BU and reference natural marshes collected during this research will be used to develop technical guidance on:
1) Expected effects of BU on marsh accretionary processes
2) Standardized methods for measuring marsh accretionary processes using $^{137}$Cs and $^{210}$Pb chronology
3) Best practice measures for measuring accretion in BU marshes

Data produced could be used to parameterize and improve the predictive capabilities of existing marsh accretion models used by USACE to demonstrate the benefit of BU projects and optimize design of the projects.

Thin Layer Placement (TLP)

TLP is the purposeful placement of thin layers of sediment in an environmentally acceptable manner to achieve a target elevation or thickness. Thin layer placement objectives include infrastructure maintenance and the creation, maintenance, enhancement, or restoration of ecological function.

Study Objective

Comparison of the sediment record in TLP and adjacent reference marshes will help determine the trajectory and timeline of recovery of natural accretion dynamics to TLP marshes and any alterations in the accretionary process that should be expected temporarily or long-term. Understanding these processes will squarely address gaps in the USACE’s fundamental knowledge of:
1) Optimizing design of TLP projects
2) How and for how long these beneficial use practices will persist and,
3) How TLP site sediment accretion dynamics differs from natural marsh systems.

Marsh Sustainability

In a healthy estuarine ecosystem, there is a balance between the amount of sediment entering and existing the system. A sustainable marsh is one that maintains it’s natural/functioning elevation and experiences 0 elevation loss.

Beneficial Use (BU)

BU is defined as the use of dredged materials, by placing them where they can maximize the most good, rather than wasting them by disposal. BU embraces the idea that dredged material can be used in a manner that will benefit both society and the natural environment.

If not, then why?
If true, are there conditions?
- Only after X-amount of time?
- Once plants have grown to X-density/height or biomass?
- If wave attenuation measures are taken?
- If X-amount of dredged material was placed?

Results will be used to better inform design and planning.

Questions? Send to brandon.m.boyd@erdc.dren.mil