Managing Sea Level Rise in Developed Areas
Todd Herbert, Marine Scientist
Wetlands Program, Center for Coastal Resources Management
Land Use Decisions

- Past and current land use decisions can place constraints or even eliminate some options in the future
- Non-structural approaches allow for more options in the future
- Equal benefits for public and private interests cannot be sustained into the future
Private vs. Public Benefits

• In the face of SLR, our goal is to preserve naturally derived public benefits for as long as possible
• Only a small fraction of land is owned publicly, especially in urban watersheds
• Past land use decisions have resulted in largely private waterfront ownership
• Places the burden on the private homeowner or commercial, industrial entities
Drowning Marsh, steep slope behind prevents marsh retreat

Marsh Retreat. Salt bush now at waters edge, marsh extending landward behind the salt bush
Here are a few examples of a familiar phenomenon in low lying areas where an old bulkhead has given way and allowed for marsh formation behind the old structure. These areas provide an opportunity to restore previously lost ecosystem services. Where there is sufficient distance between these areas and residential structures, we recommend removing the old structures using a living shoreline approach.
Failing bulkhead results in increased tidal influence in backfill area. Now a jurisdictional tidal wetland

Here is an example of a property on Mill Dam Creek in Norfolk. The old timber bulkhead has deteriorated through time (not through erosion) and increased tidal influence has resulted in the formation of wetlands behind the bulkhead. This does not look like a typical marsh area as the property owner has unknowingly continued to mow this area as part of the upland lawn. You’ll notice in the top photo that the boundary of the adjacent marsh is actually landward of this newly formed wetland area, indicating that this area was formerly wetlands that were filled with backfill behind the constructed bulkhead. Originally, the applicant proposed to replace the bulkhead 2 feet in front of the existing failed structure and backfilling the entire area behind it, which would have resulted in a large, permanent loss of jurisdictional wetlands.
Is there opportunity to regain lost ecosystem services?
After several revisions, the applicant proposed a compromise, where an alternative bulkhead arrangement would result in the filling of half of the wetlands and would leave the other half in front of a new bulkhead. The new wetland restoration area was created by cutting the old bulkhead off at the marsh substrate and planting with appropriate marsh vegetation. This approach was a compromise that reduced some wetland impacts and created some marsh habitat. Ultimately however, this marsh will disappear with sea level rise as the new bulkhead behind it will not allow for marsh retreat into the upland area.
Even placing structures landward of wetlands creates a problem in the future when sea level rises. The revetment and bulkhead in this example will prevent the retreat of marsh into upland that is necessary for marsh areas to adapt to higher sea level elevations.