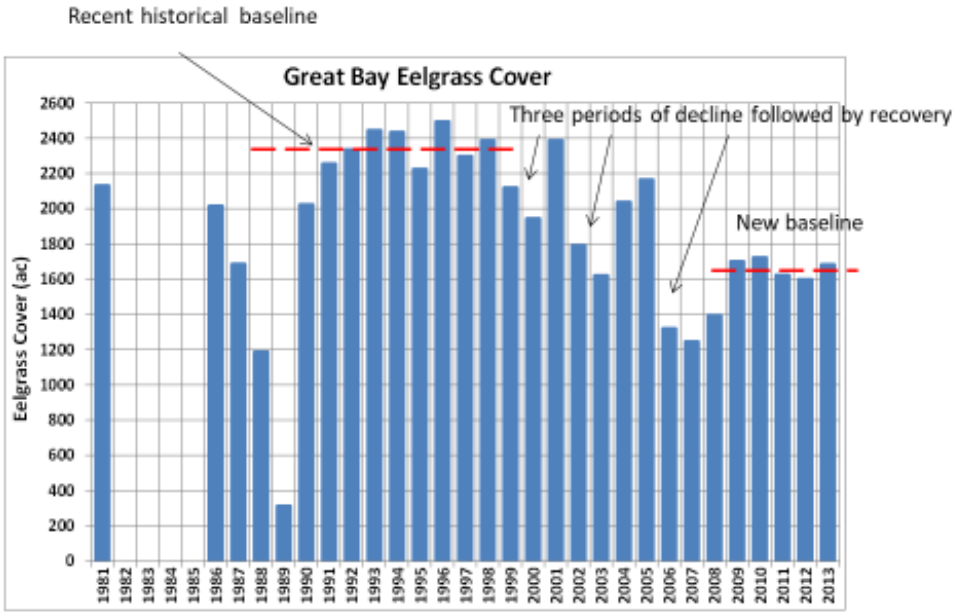
Eelgrass Coverage in Great Bay – Evaluation by Jud Kenworthy



Dean: I want to articulate what I mentioned on the phone about the shifting baselines and recovery of eelgrass. According to the graph in your paper, a period of nearly 10 years of relative stability was followed by three decline and recovery cycles, but in each case recovery did not reach either the previous period or the historical baseline. Changes were on the order of 200 acres. Declines seemed to get larger but also the recovery response was attenuated. Total coverage stepped down. It begs several questions. What prevented recovery from returning to prior coverages? Was it because a percentage of the original baseline habitat (e.g.; substrate or water quality) is now unsuitable? Or perhaps, some stressor is limiting reproduction and dispersal. The plants reproduce asexually (clonal growth) and sexually (flower/seed production and dispersal). Clonal growth is mostly responsible for maintaining the perennial beds and sexual reproduction has several functions; 1) replenish perennial mortality, 2) dispersal into new space, and 3) genetic diversity. It is hard for me to imagine that clonal growth alone could recover 200-300 acres in a single growing season, which occurred in prior cycles. Also, the sexual reproductive component is usually a fixed percentage of the perennial population (15 – 25%), so there is a process of diminishing returns as the perennial population shrinks. As you reduce the overall population size you almost surely reduce the sexual fecundity and the dispersal potential. The recent lowered baseline may be a product of both reduced fecundity and diminished potential habitat. It looks like the historical baseline has a lifetime of approximately 10 years so maybe you will see a spike back up in 2019. But I don't think it would be a good idea to wait that long or even expect it before trying to

figure out what might be responsible for the net decline. A monitoring program should incorporate some measurements that capture metrics of reproduction and dispersal. I would also recommend using a spatial approach and look at whether the lost area was a persistent loss in the same space. In other words, it looks like there is about 700 acres of net loss between the original baseline and the new baseline. How is that 700 acres of loss distributed. Is it persistent in one location and expanding from those locations, or is somehow distributed (random/non random) across the landscape? How is it distributed? When you link this distribution up to candidate factors you think might be causing declines (e.g., N loading, substrate quality, shoreline characteristics, sediment loading) then you may have a clearer picture on how to proceed in designing a monitoring program and a management plan. These areal coverage data are derived from spatially articulated data and have much more useful information than just changes in acres.