

TWP Meeting 2 April 2008 Notes

PARTICIPANTS

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Root, Mary
Schwartz, Dave
Silberstein, Mark
Smith, Doug
Spear, Brian
Suarez, Becky
Van Dyke, Eric
Von Langen, Peter
Wasson, Kerstin
Windham-Myers, Lisa
Woolfolk, Andrea

Fond hopes for 10 years hence include more marsh in Parson's, marsh restoration experiments in progress, Clapper Rails, Coastal Program for this region, concrete steps taken, permits obtained, no regrets for decisions, Slough serves as model for addressing sediment and sea level issues

Overview(Haltiner)

- Recognition of role of John Oliver and MLML team in beginning studies of erosion and initiating this whole process of further studies
- Bouillabaisse analogy: PWA study has diverse components
- Expression of hope that this investigation will feed directly into decision-making process
- [Great photo of sediment from Salinas in flood year we should use for presentations, Andrea says it's on the Simon webpage]
- Inexorable unidirectional progression of various variables (harbor, sediment loss, etc.) to make this a highly erosional system
- Back of the envelope calculation of sediment losses: something like 10-12 million cubic yards over past 60 years: something like 200 million dollars worth of sediment lost (a huge inadvertent and originally unknown cost resulting from a marine engineering project)
- The alternatives we are considering will address this problem: sediment export can be greatly decreased
- To maintain current salt marshes with current sea level rise (3 mm/yr): 20-30,000 cubic yards per year; with future sea level rise (6 mm/yr): 40-60,000 cubic yards per year
- The alternatives we are considering do not address this problem: current sediment supply not sufficient to keep up with sea level rise
- Exact design of alternatives could be optimized over what we have assumed here: new Hwy 1 bridge is in curve in road but could juggle things to have it in straighter area; sill could be made more effective by having narrow throat created with sand infilling to make something more like a natural sandbar mouth, etc.
- Uncertainty should not create a paralysis in decision-making process: all the indicators show clearly that the system is heading unidirectionally towards a more erosional system
- The alternatives being considered are big and expensive, but not unprecedented in recent state history
- Comment from Kerstin that picture is more complex for biological currencies: the direction it has been going has been good for shorebirds, flatfish, etc., while it's been bad for marsh; response from Haltiner: marsh is more rare on this coast, so value of Slough for marsh is more important

Engineering Design Alternatives (Batallio)

- Process involved site plan, preliminary concepts, and developed opinion of probable costs of physical construction (not of process getting there which costs a lot too) (-30% to +50% accurate, so you have to add a contingency)
- Comment from Kildow that bridge cost needs to be doubled because it doesn't include "soft costs" of working with Caltrans; also costs of environmental impact studies, permits, etc.
- Alt 2: used jetties to prevent mouth migration and to keep the mouth open, prefilled shoal just off mouth: total estimated cost 70 million, with contingency 94 million

- Alt 3a: trapezoidal in planview, abutments on either side, -4.5 feet below MLW, inner core of smaller material, dense, armored with outside of coarser material, about 50 feet across the top, wider at the base, (reversible to the extent you could bring in a crane and remove the rocks), plus several hundred feet of backfill behind it which adds a lot of the cost, total estimate cost 27 million
- Channel fill past seal bend would cost 10-20 million depending on fill elevation, around 10 ft below MLLW (adding sediment in is more expensive than the actual structures such as sills or bridges); the benefit of infilling behind sill is that you would have hydraulic benefits similar to mouth-reroute and improve water quality problems associated with deep water behind barrier (haven't yet determined whether this material would be prone to export, needs further modeling); this option might best be combined with Parson's project (low sill plus dramatic reduction of Parson's prism would give you as much or more effect than mouth reroute)
- Kildow: effect of sill on waves in harbor? Monosmith: bigger problem is that harbor would accumulate more sediment without the Slough's tidal prism to wash it out; Haltiner: but less sediment from Slough moved into harbor too
- Salt Bay Salt Ponds project is around 1 billion dollars for 13,000 acres; Napa Sonoma is 3000 acres for 5 million; Bolsa Chica about 150 million for a fairly comparable project with new Hwy 1 Bridge, new jetties for mouth, etc.

Habitat Projections (Bourgeois)

- Projections are relative (consistent across alternatives, but not very reliable in absolute sense)
- Added 3 cm of sea level rise to PWA predictions for year 10 (which had no SLR); year 50 has 6 mm/yr rate = 30 cm increase
- increase in MLLW = increase in subtidal habitat, decrease in MHHW = recovery of marsh vegetation, so mudflat decreases intertidal mudflat as subtidal and marsh expand, but then if you add 50 years of SLR, there is big expansion of intertidal mudflat because the whole tidal frame is shifted upward, and former marsh plain becomes mudflat
- assumed marsh accretion between -2.5 and +2.0 mm/yr which gives you major net loss of salt marsh under all alternatives at year 50 due to SLR
- assume that loss of elevation from mudflat is much slower than from marsh
- assumed channel widening similar as today, with similar bathymetric profile
- in no action, go from 30% of undiked estuarine habitat as salt marsh to 10%
- in Alt 2, big decrease in mudflat but immediate increase in salt marsh to 35%; but at year 50 you have 20% marsh cover
- Windham question about changes in organic contribution to marsh accretion changing with salinity changes (more with freshwater); Collins: organic contribution variable over site and time at Elkhorn, very episodic, but modeling has to use constant assumptions, may lead to overly dire predictions
- Collins: large uncertainty about marsh accretion mechanisms, sometimes very important role for organic/peat accumulation and sometimes inorganic sediments are critical; if we could get marshes into the sweet spot in the tidal frame or salinity regime maybe they could accrete a lot more due to below ground biomass

and organic production; Haltiner: so if we could shift system to be more depositional and get elevation right you are suggesting we could have marsh sustainable with current sediment budget; Collins: there are some marshes with high organic content that can be sustained, so how could we make Elkhorn more like these

- Monosmith: are there invasive species that might play a new role; Collins: Spartina hybrid swarm would lead to big changes, some desirable, in Elkhorn; Silberstein: what are data from elsewhere and is this worth considering
- Johnson: what are the big factors that we may have omitted from our projections that could make them very wrong?
- Wasson: algal mats which could increase due to nutrients or tidal muting are an example of something not readily included in a range of linear models
- Haltiner: in the face of uncertainty on option is to allow for adaptive management and reversibility

Hydrodynamic Modeling (Matt Brennan, PWA)

- Delft 3D model
- Three targets: yr0 (calibrated with Monosmith and LiDAR), yr10, yr50
- Scenarios: no project / 1943 bathy., new inlet, low sill, high sill, Parsons
- Results simplified for visualization with phase envelope diagrams (water level vs. +/-velocity)
- Low sill not significant improvement from no project
- Envelope eventually expands with all project scenarios
- Percent inundation exceedence estimates
- Predicted annual erosion rates (high sill and new inlet decrease ~90%; low sill and parsons ~50%)

(Lonhart) Is 1943 an appropriate “baseline” or “target”? Wasn’t it more muted than earlier times?

(Haltiner) At least it was a non-erosional period.

(Collins) Should cost estimates include future maintenance cost / cost to stay within project specs. (e.g. adding additional height to the sill in response to sea level rise)?

(Collins) Wouldn’t the 1943 envelope also gradually expand, like the other scenarios, due to sea level rise?

(Collins) Would sea level rise reduce the tendency for mouth closure?

Response of Barrier Estuaries to Sediment Supply (Matt Brennan for Steve Crooks)

- Elkhorn is fairly unique to have so much marsh; barrier estuaries are typically largely mudflat and open water (e.g. Morro Bay)
- Why is Elkhorn different? It had larger regional sediment supply (Salinas, Pajaro)
- Loss of the Salinas River moved the system away from “endmember state” (drowned river valley filled with sediment)
- Crooks and Orr model of marshes at various tidal elevations: *all* eventually begin to lose to sea level rise

(Collins) What if marshes were higher in the tidal frame and then hit by sudden drowning event with harbor opening?

(Bourgeois) Crooks and Orr model doesn't take into account differing rates of organic accretion/biomass accumulation

Sediment Budget

- There is not enough sediment to sustain the marshes (“unless we relax BMPs throughout the watershed!”)
- Our marshes appear similar to sediment starved degrading UK marshes
- No Action alternative: System will switch state from extensive vegetated marsh to extensive mudflat
- Management alternatives w/o sediment addition will delay this state switch, but the switch will eventually occur due to sea level rise
- Large interventions *with* long-term sediment management: May (or may not) remain in marsh dominant state (much uncertainty)

Conclusions

- All management actions reduce rate of sediment loss, and rate will diminish with time, but it may take 50 yr to equilibrate
- New inlet and high sill are the most effective
- New inlet, low sill, and high sill all buffer sea level rise somewhat, but none indefinitely

(Von Langen) Question for biologists: Can habitats tolerate/recover from burying by large-scale sediment addition (e.g. inverts.)

Open Discussion: Uncertainties in Modeling (Largay)

- (Lonhart) Wouldn't discovery of archaeological sites (e.g. at Hwy 1 or new mouth alternative) stop or delay the project?
- (Batallio) That's why such a big “contingency” is included in our “order of magnitude” cost estimate. These are typically not engineering issues (archaeology, endangered species, Caltrans inertia, ...)
- (Cann) What maintenance obligation would DFG be inheriting at the salt ponds with the new mouth option? Our levees were not designed for tidal flow (nor are Packard's on other side)
- (Batallio) We designed the new channel oversize to reduce flow to 3ft/sec to prevent erosion; we also included 1000ft of armoring (both are probably overkill). Thus you shouldn't expect a lot of maintenance or channel migration.
- (Lonhart) How might marine mammal behavior (otters, sea lions) be altered by the various projects? Might the projects adversely affect managed species?
- (Martin) Tidewater gobies are also a concern; which alternatives affect them and how?
- (Kildow) What's the societal/economic value of trying to return to salt marsh or some particular place in time?

- (Largay) We would need to revisit the previously agreed upon TWP goals before deciding to abandon salt marsh for mudflat
- (Root) We need to look at the more global scale (subtidal habitats are not declining statewide; salt marshes are)
- (Collins) The goals were well thought out from the beginning, considering both the global and regional. But we will need to clarify the rationale behind them for the public. We shouldn't be scared by cost; people will vote with their pocketbooks if they're convinced. We have more information than most projects (including S. Bay Salt Ponds).
- (Harvey) Do we know where equilibrium (the final outcome) is for the no project alternative? Will it end up mostly mudflat or all subtidal or ...?
- (Lonhart) Matt's graphs are sobering: delaying the inevitable. Might an alternative goal be to maintain "reserves" of salt marsh? This would violate our goal of minimizing ongoing maintenance costs for the long-term, but might be a viable tradeoff to maintain a habitat mosaic while minimizing total cost.
- (Suarez) The railroad berm provides an existing engineered structure for this type of managed project (i.e. N. Marsh and Parsons). What would the graph of marsh gain/loss look like if we abandoned the unrestricted marshes and instead focused on restricted areas (including with Moro Cojo)?
- (Lacy) A focus on managed areas would also allow us to test restoration options / adaptive management. We still don't know exactly what is causing the marsh loss; this would allow us to gain more confidence before spending a ton of money on possible failure
- (Collins) Agreed, but we needed to study and estimate costs for the "big fix" options whether or not we proceed with one of these or focus on small/restricted area projects.