Bair Island Monitoring Plan
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Notes from Presentations

The Biological Opinion of January 2006 and HT Harvey Plan of 2006 call for much more monitoring than the project can afford. Clyde referred to situation as a crisis: cost of monitoring as planned through these reports would prohibit project for going forward.

Clyde wants permits within two months and Andree is willing to try to make that happen.

RB2 wants to use Hamilton as a template or model for sediment testing. Montezuma is too restrictive.

Andree and Clyde suggest using "performance targets" rather than "performance criteria" to allow for flexibility. A range of acreage targets for major habitat types may be appropriate.

Process: Andree will take input from the Monitoring Group to produce a draft letter to Clyde; Monitoring Group will review draft letter from Andree and provide comments to her; Andree will provide final letter to Clyde and SFEI will post the letter on the WRMP web site.

Clyde will use Andree's letter to re-negotiate Biological Opinion.

Clyde is looking for most cost-effective monitoring effort. Project might afford $200k per year. Cost of sediment testing will be covered by "tipping fee" to private sediment sources, including perhaps Stanford University. Sediment sources are likely to be non-bay. Cost of monitoring pubic use and dog use is covered by existing resources.

Primary need from Monitoring Group is advice on monitoring project performance toward goal of healthy tidal marsh.

Collins's Recommended Monitoring

1) Phase 1: Physical Processes Channel behavior
    i) A model of tidal flows and velocities was used to design the project. This model exists with URS and needs to be available to USFWS at minimal cost. The model should be used to forecast project performance as a physical system based on minimal input data from physical process monitoring. USFWS will need to find out what input data are needed to run the model. Those data will need to be collected.
    ii) Rather than monitoring tidal heights, flows, and velocities, the project should just monitor channel cross-section. The number of cross-sections to monitor will depend on what is needed to run the model. It is likely that cross-section will be needed along both major channels (Steinberger and Redwood Creek), plus the breaches (these will happen sequentially over time), and along the major cross-channels (those that interconnect Steinberger and Redwood Creek). It is expected that these major channels will scour. Their change in cross-section should be compared to what the model predicts, and perhaps used as input data to re-run the model to see how the forecast of flows and velocities changes based on the observed scour. If no problem is indicated, then no corrective actions are required. If the cross-sections and model indicate a threat to adjacent land uses, then corrective actions may be necessary. This can be determined in consultation with the Monitoring Group (see part 1d below). NOTE: the cross-sections should be run based on the regional protocol that is ebbing developed this year through the WRMP under Prop 50.
    iii) The evolution of small channels and drainage networks within the project should be tracked by mapping these features using the Wetland Tracker online mapping tool. This is a cost-effective way to develop the map that is needed later to stratify the site for ecological monitoring.
    iv) The project calls for the creation of drainage divides at the barotropic convergence zones of channels that otherwise cross the site. These areas of fill within the channels will need to be monitored to make sure they don't erode away. The monitoring can be done using erosion stakes (i.e., stakes placed at regular intervals in a line along each the divide to measure erosion rates).

b) Water Heights and Flows
    i) Unless the hydrology model requires them, I suggest not collecting any tide height data or flow data. These data are very expensive and the flow data (velocity or tidal prism) are especially difficult and expensive to collect well. The immediate end result of changes in prism and velocity id change in channel cross-section, which can be measured as described above at minimal cost.
    ii) The concern is that the project might lead to flooding of adjacent land uses. This risk can be tracked by simply installing peak water height recorders at the likely locations of flooding, or having someone observe the tide heights relative to the protective levee tops, during the wintertime period of greatest risk.

c) Sedimentation
    i) There is no obvious reason to measure sedimentation rates at this project. At other projects, rates of sedimentation are needed because the sites are very subsided and

some forecast of the elapsed time to get marsh habitat is needed (e.g., Napa salt ponds), or estimates of sedimentation rates are needed from one site to extrapolate to other nearby sites (Tolay Creek), or they are needed to calibrate sediment fate models (Island Ponds). None of those criteria apply to this project. Montezuma Project) of the time at this project. The immediate end result of sedimentation will be a change in the rate of channel scour (it will slow and eventually stop unless sea level rise drives it into the future), and colonization by marsh plants. The channel cross-sections and habitat mapping (see 3a below) will account for sedimentation.

d) Physical Process Check-up

i) The physical processes monitoring results should be brought into the Monitoring Group for review and interpretation after the first year of monitoring. The Monitoring Group will need to be populated with modelers and hydrology experts. The relationship between the SBSPRP Science Team and the WRMP Monitoring Group will need to be worked out to maximize their coordination on this and other projects.

2) Phase 2: Ecology

a) Habitat Mapping

i) The Wetland Tracker should be used on-line to routinely map the extent of channels large and small, the vegetated plain, and any pannes within the vegetated plain. The mapping rules about minimum mapping units, threshold of plant cover, etc., provided on the Wetland Tracker should be followed. The mapping should be done on geo-rectified aerial imagery of $1m^2$ pixel resolution taken annually in August during a spring series low tide.

b) Vegetation Mapping

i) It is not certain at this time that any detailed maps of vegetation are needed. Maps might be needed to determine the extent of habitat for CCR or SMHM, since their habitat depends on certain kinds of plants and plant architecture. I suggest that detailed vegetation mapping is not needed, given that CRAM can be used to assess habitat condition including the plant community more generally (see 3d below) and the CRAM results can be interpreted in terms of CR and SMHM habitat. If vegetation mapping is necessary, then it should follow the protocol provided on the WRMP web site. This protocol requires on-the-ground transects to determine plant species composition of vegetation patches mapped using aerial photography.

c) Bird Monitoring

i) The overall avian community should be monitored using the protocol developed by PRBO Conservation Science and provided on the WRMP web site. The purpose of this monitoring is to document bird use of the site in the most general terms. The monitoring will begin early and then be triggered by the habitat mapping. The habitat maps will be used to stratify the site for bird monitoring.

d) CRAM

i) The California Rapid Assessment Method for Wetlands and Riparian Areas (CRAM) should be used to track overall habitat condition throughout the life of the monitoring effort. USFWS field staff or whoever will collect field data will need to be trained in CRAM. All CRAM results should be managed through the CRAM web site.

e) Ecology Check-up
   i) The ecological processes monitoring results should be brought into the Monitoring Group for review and interpretation after the first five years of monitoring. The Monitoring Group will need to be populated with expert ecologists. The relationship between the SBSPRP Science Team and the WRMP Monitoring Group will need to be worked out to maximize their coordination on this and other projects.

3) Phasing and Triggers
   a) Monitoring should initially focus on physical processes and then the focus should shift to ecology. The monitoring tasks should not accumulate; rather, the physical processes monitoring can be replaced over time with ecological monitoring. Some physical monitoring, such as channel cross-sections, may overlap with ecological monitoring, but even the number and frequency of cross-sections should decrease over time, based on the advice and review of the Monitoring Group.
   b) Monitoring on the marsh or mudflat plains (i.e., habitat mapping, vegetation mapping if it is needed, bird monitoring, and CRAM) should be triggered by breaches. This monitoring should only be conducted on areas that are affected by a breach, and only after the breach has occurred. Each "breach area" (i.e., the area of marsh or mudflat that is affected by a given breach) should be delimited as the area drained through that breach, and should be used as a "geomorphic unit" for monitoring. Each of these units should be treated as a separate project for the purpose of monitoring. In essence, the effects of each breach are monitored separately. The geomorphic units must be mapped on site imagery.
   c) The channel cross-section data will trigger new model runs, and these will trigger any decisions about corrective design or operational changes in the project.
   d) For any geomorphic unit, the evolution of at least 25% cover of vegetation as indicated by the habitat mapping, will trigger bird monitoring. It will also trigger vegetation mapping if such mapping is required. The degree to which habitat mapping continues after bird monitoring begins will be decided after year five in consultation with the Monitoring Group.

4) Performance Trajectories and Targets
   a) The monitoring data will be used by the Monitoring Group of the WRMP to assess the progress and trajectories of the project for each geomorphic unit and for the project as a whole when the Monitoring Group meets in years 1 and 5, subsequently as needed based on the requests of the project managers or the Regional Water Board.
   b) Given that this project is not a compensatory mitigation project, and given that its primary objective is to create or restore health tidal marsh, then the performance target should be a general measure of marsh health. The success or completion of each geomorphic unit should be declared when the average CRAM scores for the unit falls within the 75th percentile of the ambient CRAM scores for saline estuarine wetlands within San Francisco Bay. The ambient CRAM scores will be based on the probabilistic survey of estuarine wetland conditions in the bay during 2005-2008.

5) General Observations
   a) An essential aspect of monitoring is routine and frequent site visits for the purpose of looking for problems. Whoever has the job of being on-site to reconnoiter should keep a journal of observations and have a well established line of communication through project and site management such that on-site problems that might be missed through

formal monitoring are encountered and addressed. Copies of journal entries should be included in monitoring reports.

6) Standard Methods and Data Management
   a) To the extent possible, the methods of data collection should follow protocols developed by the WRMP and available through its web site. Some protocols that might be useful on this project, such as for cross-sections and bird monitoring, will be revised during 2007. Protocols for vegetation mapping, habitat mapping, and CRAM exist now.
   b) To the extent possible, after the monitoring data have passed through the Qa/Qc procedures outlined in the protocols, the data should be copied into the WRMP database at the Regional SWAMP data Center. This will be facilitated by the standard data sheets and file transfer forms available with the data collection protocols. In essence, the WRMP will co-manage the monitoring data.
7) Timing
   a) Chanel Cross-sections
      i) Establish baseline for all cross-sections one year before first breach. Existing data collected within past five years will suffice, if they are for the same areas for which that new cross-sections will be required based on modelers advice.
      ii) Re-occupy all cross-sections every year for first 5 years, or as frequently as deemed necessary after year one consultation with the Monitoring Group.
   b) Water Heights
      i) Heights relative to tops of protective levees at selected places of maximum risk of flooding of adjacent land uses should be assessed using peach stage recorders or direct observation during winter storms each winter for first 5 years, or as frequently as deemed necessary after year one consultation with the Monitoring Group.
   c) Habitat Mapping within Each Geomorphic Unit
      i) The recent updates of the State Wetland Inventory are available from SFEI and should be used as the baseline for habitat mapping. Habitat mapping should be conducted online each fall through the Wetland Tracker using the annual aerial imagery as Habitat mapping should specified in 2a above. Unless the Monitoring Group advices otherwise, habitat mapping can stop in each geomorphic unit after the overall percent cover of vegetation within the unit reaches 25%.
   d) Vegetation Mapping within Each Geomorphic Unit
      i) It is not certain that detailed vegetation mapping is required. If it is deemed necessary, then it should begin when the overall vegetation cover within the geomorphic unit reaches 25%, and then it should be conducted every 3 years for the next 15 years, unless the Monitoring Group advices otherwise.
   e) Bird Monitoring within Each Geomorphic Unit
      i) Bird monitoring should begin within each geomorphic unit one year before it is breached, and then it should not be done again until the overall vegetation cover within the geomorphic unit reaches 25%, and then it should be conducted every 3 years for the next 15 years, unless the Monitoring Group advices otherwise.
   f) CRAM within Each Geomorphic Unit
      i) CRAM assessments should be conducted within each geomorphic unit one year before it is breached, and then it should not be done again until the overall vegetation cover within the geomorphic unit reaches 25%, and then it should be conducted every 3 years for the next 15 years, unless the Monitoring Group advices otherwise.