

January 2008

TEFAT Guidance Committee

Re: Tijuana Estuary Beach Sediment Fate and Transport Study - Biological Monitoring Outline, Revision 1

One of the 'gaps' identified for the Tijuana Estuary Beach Sediment Fate and Transport study is related to the collection of data related to project impacts on affected biological communities. The current study (as described in the USGS Science Plan [October 2007]) includes a number of monitoring elements which can best be described as relating to coastal geology. Some of these elements could be easily adapted to components which simultaneously monitor parameters of primary interest in a geological sense but which also provide valuable biological data. For example, USGS photographs of the seabed could be assessed in terms of both sediment characteristics and also for biological inhabitants. However, it has been recognized that the project offers an opportunity to study effects of the proposed project on several other biological communities which currently utilize the project site.

It has also been recognized that a primary purpose of the Tijuana National Estuarine Research Reserve is to promote scientific understanding. However, it is also recognized that the usual academic partners would likely be reluctant to coordinate efforts since the project 1) does not generally rise to the level of a dissertation topic (i.e., for Ph.D. candidates) and 2) that a thesis-level study (i.e., for a Masters-level student) would require a convergence of a number of factors for it to work (e.g., a student with interest and sufficient academic foundation needing a topic this spring, and being available for several years for follow-up work on a broad spectrum of topics). The following ideas were assessed for the need to monitor, but are not recommended without significant external support: 1) benthic invertebrates offshore (effort and experimental replication necessary would make effort prohibitively expensive) and 2) Assessment of impacts to reefs in Mexico (logistical challenges would be difficult to overcome).

Therefore, it is proposed that the following efforts be conducted during the construction period and over a longer 3-year monitoring period (or shorter, if data suggests that baseline conditions have returned). Each of the monitoring provisions would need to incorporate:

- Assessment of pre-deposition conditions
- Assessment of at least one control location for comparison purposes
- Where applicable, an assessment of temporal and/or seasonal factors

Construction Monitoring and Impact Studies (0 to 3 months)

1. Intertidal Biota. Assessment of construction phase impacts to benthic invertebrates in the intertidal at the placement site, upcoast and downcoast sites, and at control sites should be assessed. Assessment shall include, at minimum, benthic invertebrate samples collected using sieves and beach walks to enumerate any evidence of beach infauna mortality (e.g. clams, especially *Tivela stultorem*).
2. Shorebird and Seabird Monitoring. Due to the population of over-wintering snowy plovers on the southern side of the Tijuana River Mouth, monitoring will at minimum need to include construction monitoring to ensure that there is no 'take' per the Endangered Species Act as defined in USFWS and/or USACE permits. In addition, potential changes of bird behavior in the vicinity of the beach deposition area are to be studied with respect to bird foraging and other behaviors. Foraging by shorebirds (e.g. plovers) and/or seabirds (e.g. terns) during construction will be compared to control, pre-construction, between-placement periods, and post-construction periods.

3. Bacteria. Bacteriological testing of waters during deposition activities will be undertaken on a weekly basis, (including at minimum weekly collection of three replicate water samples and three replicate sediment samples to be tested for total coliform, fecal coliform, and enterococcus bacteria). Results will be compared to samples collected from the deposition site one month following completion of placement activities and to bacteriological data from the sediment source (stockpile).

Long Monitoring and Impact Studies (3 months following deposition activities up to 3 years)

1. Intertidal Biota. The intertidal benthic community will be monitored for recovery at the placement location and in adjacent areas twice per year (late spring and early fall) for a period of 3 years. The goal of the monitoring will be to document recovery of the infaunal community in areas of direct placement and areas where subsequent deposition is possible, and compare both these areas to a control site. Both grab samples and beach walk approaches will be utilized. In order to monitor the Pismo clam (*Tivela sulutorum*) population in particular, beach walks will be conducted four times per year.
2. Shorebirds. Shorebird foraging studies will be undertaken to monitor long-term impacts of beach placement activities (placement, adjacent, and control areas) and also to relate foraging activity to the benthic community conditions. Surveys will occur three times per year (winter, late spring, and early fall).
3. Sand Dollar *Dendraster excentricus*. Sand dollar bed dynamics will be evaluated with respect to their distribution with depth and in relation to size-frequency distributions. The goal of this monitoring will be to evaluate immediate population changes due to deposition and changes to the population structure potentially caused by changing the habitat substrate conditions. Monitoring activities will take place in late spring and early fall using diver transects. *Dendraster* distribution and population data will be compared to available turbidity data, sedimentation rate data, and/or other available hydrodynamic modeling data.
4. Macroalgae. Red understory algae has been recorded in the nearshore environment offshore and to the north of the Tijuana River mouth. As changes in deposition rates may impact the cobble environment necessary for this type of habitat, and in light of the lack of similar habitat in the vicinity (and therefore a control site), the community characteristics will be monitored for a gradient effect. Monitoring will occur at least once per year using SCUBA transects, algal biomass, or other techniques as appropriate. Offshore kelp beds areas will also be assessed qualitatively for impacts due to sedimentation. Macroalgae data will be compared to available turbidity data, sedimentation rate data, and/or other available hydrodynamic modeling data.