Proposed Assemblages

Assemblage	Locations	Cluster Groups
Polyhaline, mud	Central Bay	8, 9
Polyhaline, sand	Central-, San Pablo Bay	5
Mesohaline	San Pablo-, South Bay	6,7
Oligohaline	Suisun Bay	4
Limnetic	Delta	1, 2, 3

Benthic Work Group
Long-Term Goal

Review, revise, create benthic assessment methods for several SF Estuary and Delta assemblages.

- mesohaline (San Pablo-, South Bay)
- oligohaline (Suisun Bay)
- limnetic (Delta)

Meeting Goals

- Agree on benthic assemblages in San Francisco Estuary
- Finalize plan for best professional judgment (BPJ) exercise
- Begin planning benthic index development for mesohaline and limnetic assemblages

Status of BPJ Exercise

Task 1. Assemble data for mesohaline and limnetic assemblages (Sarah)

Task 2. Assemble “benthic expert” panel

Task 3. Conduct exercise, evaluate results

Why BPJ ?

- A gradient of benthic disturbance is needed to create a benthic index.
- Using benthic metric correlations with single, or several disturbance metrics performs poorly.
- Professional judgment provides a consensus standard gradient.

“Benthic Expert” Panel

- Invitations to evaluate samples sent to 12 experts

  from Bay Area, So. Calif., East Coast

  - 8 for limnetic
  - 11 for mesohaline
  - 7 for both assemblages

- 7 experts agreed to evaluate mesohaline samples
- 4 experts for limnetic

  *** we need at least one, pref. 3, more ***

BPJ Procedure

- Panelists will receive 20 samples from an assemblage.
  - ranked species lists (abundances)
- Panelists will use their experience to:
  - Categorize samples (1 – 4) consistent with SQO benthic category definitions,
  - Rank samples 1 - 20; most disturbed to least disturbed.

- An average benthic disturbance gradient will be created based on results.
- This gradient may be used to:
  - Test correlations with existing indices,
  - Evaluate new sets of benthic metrics that best reflect the BPJ gradient,
  - Test and validate resulting benthic indices.

Summary of Meeting 1

Classification Analysis

Cluster Groups 1-3 are clearly different from Group 4-9

- Grps 1-3 are tidal fresh stations in the Delta with very different species
- Is this one assemblage, or 3 sub-assemblages? Which habitat factors are related to the 3 clusters?

Group 4 is different from Group 5-9

- Grp 4 is mostly located in Suisun Bay. However most species also occur in adjacent groups.

- Is this a ‘real’ assemblage or an artifact of mesohaline and limnetic assemblages averaged over several years of samples?

Group 5 is different from Group 6-9

- Grp 5 samples were from mostly sandy habitats, and had several unique taxa

Groups 6 - 9 represent a gradient of taxa along the estuary salinity gradient

- Are 6 & 7 different from 8 & 9 ?
- Many taxa in groups 6,7 are usually considered to be mesohaline taxa. Are 6 and 7 a separate assemblages or sub assemblages?
- Many taxa in 8, 9 usually considered to be obligate polyhaline taxa.
- Group 8 stations appear to be from the NOAA 00-01 study. We know that the taxonomy for this study may have significant inconsistencies (despite effort to standardize the taxonomy to west-coast standards by NOAA).
- After resolving the NOAA taxonomy issue, is there better resolution of these groups. What habitat factors are related to the differences?

Follow-up Questions and Analyses

1. Are the groups robust in space and time? Test the robustness of the cluster groups, sub-groups. Validate groupings. Re-run random sub-samples of the 501 stations to observe any differences in groupings and if groups are robust.

- Selectively remove and/or add-back samples to check robustness of clusters.

- Can also use different visit replicates.

- For DWR monthly data, evaluate if keeping all four months (dry season) data is warranted or if it dominates the results. Can see if the clusters are different for one month at a time. Ananda will evaluate the clusters and will send the result to Mike Johnson for review and statistical testing using Mantel's test. This test should clarify the proximity of most similar samples.

2. Are the dominant taxa in each group different enough to justify calling a group an ‘assemblage’ or sub-assemblage?

   – Evaluate the taxa that are driving the clustering selectively removing the most similar taxa from adjacent groups, using the PRIMER tool using “SIMPER” (which calculates the per-species contribution of (dis)similarity between groups).

3. Are the habitat factors for each group different enough to justify assemblage designations?

   – Which factors appear to be driving the differences. Evaluate which habitat factors (water year, salinity, sediment type) are significantly different for various different cluster groups. Heather suggests using the annual median of the Net Delta Outflow Index data (QOUT).

Additional Analyses

- Include seasonal data, and more years, as available.
- Run using presence/absence or 4th root transformations to see if dominance influences clusters.
- For Grps 1-3, add May 2008 SQO data, and rerun analyses including the May GRTS samples from 2007 & 2008. (Sarah to provide 2008-05 DWR GRTS data to Ananda. Will also evaluate adding the SQO chemistry cruise ancillary data to the dataset (note that samples were taken on different days up to 14 days apart).