SCIENTIFIC SUB-COMMITTEE OF THE
WORKING GROUP OF THE SANCTUARY ADVISORY COUNCIL OF
GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY FOR THE
BOLINAS LAGOON ECOSYSTEM RESTORATION PROJECT
Marin County Civic Center
4th Floor, Administration Wing, 410-B
3501 Civic Center Drive
San Rafael, California
9:00 a.m. – 12:00 p.m.
Wednesday, January 23, 2008

Meeting Summary
(Collins's notes)

Attendees
Scientific sub-committee members present: Brannon Ketcham, Gary Page, Josh Collins, Ted Grosholtz
Staff: Sage Tezak, Bill Carmen, Bill Brostoff

Indicators of key physical processes were discussed throughout the meeting. The next meeting will focus on key ecological processes. The discussion of processes led to a discussion of related indicators.

1. *Criteria for determining physical factor indicators*
   These indicators either help track changes in key physical processes that control the distribution and abundance of key habitats or they directly track habitat change.

2. *Define key physical processes of Bolinas lagoon*
   The key physical processes can be separated into two categories: tidal and fluvial.

3. *Define key habitats affected by the key physical processes.*
   The key habitats were not specified in the meeting but might be inferred from the more general discussion as shown in the following table.

Habitat Class	Major Habitat Type or Feature	Primary Subtype or Feature	Habitat or Feature Elements
Tidal	Subtidal (habitats below MLLW)	benthic sediments	sediment facies and patches, bathymetric depth intervals, etc.
		subtidal water column	subtidal water depth intervals, water density layers, etc.
	Intertidal	tidal flat (habitat between MLLW and vegetated foreshore or MTL where vegetation is absent	intertidal channels, sediment facies, depth intervals, eel grass beds, bat ray hollows, shellfish beds, etc.
		low marsh (MTL to MHW)	emergent plant species patches, tidal channels, etc.
		high marsh (MHW to backshore or MHHW)	emergent plant species patches, tidal channels, natural levees, pannes, etc.
		backshore (MHHW to max tide ht)	tidal-upland ecotone, wrack, etc.
		Head-of-Tide (upstream limit of tidal influence on fluvial hydrology or salinity)	brackish water salinity, vertical water salinity strata, sediment facies
Fluvial	Channel Pools	benthic sediments	sediment facies and patches, bathymetric depth intervals, debris jams, etc.
		water column	water depth intervals, submergent macrophytes, etc.
	Channel Riffles and Glides	benthic sediments	sediment facies and patches, bathymetric depth intervals, debris jams, etc.
		water column	water depth intervals, macrophytes, etc.
	Active Floodplain	plain	interfluves, depressional wetlands, secondary channels,

	(area above bankfull inundated about every 2.5 yr)		sediment splays, etc.
		vegetation	trees, shrubs, forbs, bare ground, debris piles, etc.
	flood-prone Area (area on either side of channel with width = 2x max bankfull depth)	plain	wetlands, terraces, paleo channels, etc.
		vegetation	trees, shrubs, forbs, bare ground, debris piles, etc.
	Sediment Sources	in-channel sources	bans, beds, confluences, etc.
		hillside sources	debris shoots, landslides, stormdrains, etc.

4. *Begin identifying key indicators.*
   The broad discussion about physical process indicators might be summarized with the follow table. It was noted that any management action that changes the distribution or abundance of key habitats would have performance indicators that might or might not include some of the following indicators that are intended to monitor the physical system as a whole.

Process	Indicators	Needed Data	Data Source	Frequency of Data Collection
Tidal Exchange (flood and ebb of tidal water)	Tidal Prism (Volume of water between MHW and MLLW)	Surveys of subtidal bathymetry relative to MHW datum. Note: subtidal aggradation or scour might be most sensitive indicator of spatial shifts in tidal energy or sediment transport, or change in sediment supply. Changes in volume of subtidal water would not be expected to affect tidal range.	surveys along fixed transects across subtidal areas of major tidal channels and basins and extending into adjacent lower intertidal zone	annual (special surveys following major events are not needed since they are not "major" unless their measurable effects persist for two consecutive annual surveys)
		LIDAR (http://en.wikipedia.org/wiki/LIDAR) 50cm pixel resolution for lagoon and its attending watersheds timed at last minus tide before onset of heavy winter rains, when tidal flats are at their annual lowest and least extent. Output data must be referenced to local MLLW and NAVD 88	private or public providers; cost-sharing with other clients if possible	every 5 yrs or as required to assess major change as indicated by change in tidal range
	Tide Range	Max and min tide heights relative to MLLW for each tide cycle inside the lagoon but near its inlet where full tidal range can be measured	NOAA	continuous
	Tidal Datums (MLLW, MLW, MHW, MHHW)	Continuous tide heights for each tide cycle inside the lagoon but near its inlet where full tide range can be measured. Note: Accurate reckoning of tidal datums is essential to estimate tidal range, extent of mudflats, and elevation of other key habitat types.	NOAA	continuous
	near-shore wave energy field	wave height, period, direction and propagation for Gulf of Farallones Note : these data might be needed along with other tidal data identified above as input to model for predicting inlet behavior.	NOAA	continuous
	Distribution and abundance of tidal flats	LIDAR (http://en.wikipedia.org/wiki/LIDAR) 50cm pixel resolution for lagoon and its attending watersheds timed at last minus tide before onset of heavy winter rains, when tidal flats are at their annual lowest and least extent. Output data must be referenced to local MLLW and NAVD 88	private or public providers; cost-sharing with other clients if possible	every 5 yrs or as required to assess major change as indicated by change in tidal range
	Distribution and abundance of key intertidal habitats other than tidal flats	1-m pixel resolution natural color georectified imagery (horizontal datum to be determined).	private or public providers; cost-sharing with other clients if possible	every 5 yrs

Fluvial Flooding in Selected Watersheds	Stage Frequency, Flood Frequency, and Storm Hydrograph for Pine Gulch Creek	stream gauge for water height and flow in Pine Gulch Creek above Head-of-Tide	??	continuous
	Stage Frequency and Flood Frequency for local streams other than Pine Gulch	stream gauge for water height in selected watersheds to support modeling to predict stage frequency and flood frequency	??	continuous for 1-3 yrs
	Distribution and abundance of active floodplain	LIDAR (http://en.wikipedia.org/wiki/LIDAR) 50cm pixel resolution for lagoon and its attending watersheds timed at last minus tide before onset of heavy winter rains, when tidal flats are at their annual lowest and least extent. Output data must be referenced to local MLLW and NAVD 88	private or public providers; cost-sharing with other clients if possible	once to establish basemap on which hydrology can be superimposed
		Estimates of bank full stage at reference reaches based on stream gauge output where available and Regional Curves or field indicators otherwise	??	every 5 yrs
	Distribution and abundance of flood-prone area	LIDAR (http://en.wikipedia.org/wiki/LIDAR) 50cm pixel resolution for lagoon and its attending watersheds timed at last minus tide before onset of heavy winter rains, when tidal flats are at their annual lowest and least extent. Output data must be referenced to local MLLW and NAVD 88	private or public providers; cost-sharing with other clients if possible	once to establish basemap on which hydrology can be superimposed
Sediment Sourcing	Distribution and abundance of major bank and hillside erosion features	LIDAR (http://en.wikipedia.org/wiki/LIDAR) 50cm pixel resolution for lagoon and its attending watersheds timed at last minus tide before onset of heavy winter rains, when tidal flats are at their annual lowest and least extent. Output data must be referenced to local MLLW and NAVD 88	private or public providers; cost-sharing with other clients if possible	every 5 yrs
Sediment Transport	benthic sediment D50 and D84	standard pebble counts at reference reaches	??	every 5 years
Sediment Fate	aggradation of channel bed, floodplain, intertidal delta	Surface Elevation Tables (SETs) on floodplain of selected reaches	??	every 5 years
		marker horizons on floodplains of reference reaches and on intertidal deltas of selected watersheds	??	every 5 years
		thalweg profiles for reference reaches	??	every 5 years
Water Retention	Runoff Coefficients	rainfall in selected watersheds	??	continuous for 1-3 yrs
		stream gauge for water height in selected watersheds to support modeling to predict stage frequency and flood frequency	??	continuous for 1-3 yrs

There was much discussion of the value of modeling for various purposes. There seemed to be agreement that a model is needed “on-call” to forecast inlet behavior and there were questions about what model might be best and what additional data might be required for the model.

There was also a discussion about having a more formal discussion about the costs and benefits of modeling circulation for the system as a whole, such that the effects of various management actions (such as removing the PGC Delta) on circulation might be investigated.