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New Evidence: Bolinas Lagoon Dredging Would Be Futile
By Gordon Bennett

At the August meeting of the Marin County Open Space District's Bolinas Lagoon "Restoration" Project, scientists presented new and compelling data showing that Bolinas Lagoon is not in imminent danger of filling in and becoming a meadow. The new findings contradict claims long-held by local residents, but vindicate the Sierra Club's contention that the Lagoon has always been shallow and muddy and that dredging is both futile and unnecessary to "save" or "restore" the Lagoon.

Bolinas Lagoon is recognized by the United Nations as a wetland of international significance and is host to over 15,000 migratory birds. Nevertheless, some local advocates for over a decade have promoted a project to dredge the Lagoon. They claimed that activities in the watershed such as logging and over-grazing have filled the Lagoon with sediment and so disturbed the ecosystem that the Lagoon would fill up to become a meadow. Dredging was necessary, they argued, to enhance natural tidal processes that would flush out watershed sediment, retain open water, and restore the ecosystem. However, this argument capitalized on the 99-year human-lifetime memories of the lagoon since 1906, which turned out to be a very unusual period in the Lagoon's 9000-year geological-lifetime.

Politicians, encouraged by paid lobbyists, piled on and the federal money flow culminated in a US Corps of Engineers project to dredge 1.5 million cubic yard of sediment at an estimated cost of $101 million plus $200,000 in annual maintenance costs. The Sierra Club in its 9/30/02 letter stated that the Corps' study was severely biased by "greatly over-stating the needs and under-estimating the risk."

The Study, we pointed out then, was based on "too small a number of core samples over a too short a period of time to be reliable." In fact, the Corps study turned out to be based on a single coring sample and bathometric data going back only 40 years. Although the Corps dredging project was scientifically unjustified and would have resulted in the largest destruction of wetlands since the passage of the Clean Water Act, local advocates nevertheless stated, "We are totally behind this project and looking forward to getting it authorized by the federal government by the end of the year," (SF Chronicle 6/20/02).

The Sierra Club believed that the Corps proposal to dredge several areas in the Lagoon would be infeasible. Dredging in the lower Lagoon near Kent Island would be infeasible, we believed, because re-fill sediment would just flush in from the ocean. Dredging in the upper Lagoon near Pine Gulch Creek would also be infeasible because re-fill sediment would just flush in from the watershed. The only one of these sediment re-fill sources that we believed might be feasible to control would have been at the source in the watershed.

The new coring evidence, presented by Roger Byrne (UC Berkeley), confirms our concern that dredging anywhere in the Lagoon is infeasible. Based on extensive samples going back over

1,000 years, the corings show that the vast majority of the sediment in Bolinas Lagoon is not from the watershed but is flushed in by the tides from ocean. Major earthquakes in 1906 and in 1200 both lowered the floor of the lagoon, which increased sedimentation as ocean sands flushed in to fill the "sediment trap." Dredging, like an earthquake, would simply cause more sediment to be flushed in to refill the dredge site by stripping adjoining beaches of sand and undermining the already-eroding Bolinas bluffs. Thus, dredging not only is futile and unnecessary, but also a threat to adjoining properties.

By its well-documented opposition to the flawed Corps project, the Sierra Club not only saved the American taxpayer over $100 million, but we have saved Bolinas Lagoon yet again. Saving the Marin-Sonoma Coast by Marty Griffin chronicles his role in the defeat of the 1960's attempt by the Bolinas Harbor District to "save" Bolinas Lagoon, which the district claimed then would fill in and die within 40 years without dredging. But now those forty years have passed and the Lagoon remains a vibrant ecological treasure.

In the centuries after each earthquake, the new evidence shows, sedimentation gradually declines and reaches a long-term equilibrium. This equilibrium for lagoons dominated by ocean sediments like Bolinas, noted Dan Danmeier (Phil Williams Associates), preserves open water they may fill in, but they do not fill up to become meadows. This should be good news to those local residents concerned that retaining open water views would also retain their property values. Nevertheless, local advocates continue to dredge this new data to renew their claim that "intervention" is necessary, this time to keep the Lagoon mouth open. Yet the scientists said they could find no evidence that the mouth of Bolinas Lagoon has ever closed.

Prior to the 1906 earthquake, early Spanish reports and US government navigational guides described Bolinas Lagoon as "bare at low tides and filled with small islets [1869]" and the lagoon's mouth as "a very contracted channel having only one foot upon its bar at low water [1889]." Further, the recent corings showed that the lagoon maintained open water and an open mouth for 700 years between the 1200 and the 1906 earthquakes. Bolinas Lagoon, the scientists concluded, has great resiliency and a natural equilibrium as a shallow, muddy lagoon with both open water and an open mouth. Since 1906, the Lagoon has been and will continue recovering its natural equilibrium-without the need for dredging.

Although the mouth of Bolinas Lagoon is likely to remain open, the scientists noted that records of other lagoons dominated by ocean sediments show temporary closures may occur. Although a local fisherman has said, "At some point, it's going to close off. All the fish and shellfish will die," (SF Chronicle 12/2/01), wildlife has evolved with and adapted to temporary closures of varying duration, which are part of the natural functioning of lagoons all along the Pacific Coast. Closures lasting a few hours to a few days change little in these lagoons. Longer closures can change the mix of wildlife, favoring birds that feed on invertebrates adapted to more brackish water. For example, Pescadero Lagoon and Abbotts Lagoon, both closed all summer, continue to have abundant bird life. Longer closures may displace harbor seals from their summer haulouts, but do not impact salmon. The small lagoon behind Muir Beach, closed all summer, still provides winter passage for salmon to upstream breeding habitat.

Although closures are a natural event, the scientific team computed a linear closure projection based on the current sedimentation rate, while noting that this rate declines as the Lagoon approaches equilibrium. This projection suggested that infrequent combinations of strong storms without rain in El Nino years occurring during neap tides might cause the lagoon mouth to temporarily close about once every 10 years, beginning 40 years from now. The Sierra Club suspects that as this projection is adjusted for the decline in sedimentation rate, what is now a 40-year horizon for the beginning of this unlikely and infrequent possibility will stretch out even further. Even so, a temporary closure should not be cause for dredging to restore the ecosystem. Temporary closures do not harm the ecosystem, they are part of its natural process. As the Sierra Club said in our 2/21/01 letter to the County, the Lagoon "is not in imminent risk from anything other than wide-scale dredging."

The Sierra Club believes that local concern about closure has more to do with facilitating boat access than facilitating ecosystem processes. But now and continuing into the distant future when a temporary closure might be an unlikely possibility, fishing boat access to Bolinas Lagoon will be problem due to lack of channel depth and inaccessible channel location. There is no easy solution in sight. And because Bolinas Lagoon is part of the Gulf of the Farallones National Marine Sanctuary, dredging to restore boat access is prohibited.

Even if it were allowed for boat access, dredging would create a sediment trap that the tides would re-fill by stripping nearby areas and properties. Regular dredging to maintain boat access and moorings in a naturally shallow lagoon dominated by ocean sediments would be a daunting and expensive task. The 99-year window in the Lagoon's 9000-year history, during which boats have had limited access, is slowly closing as the Lagoon returns to equilibrium. A project to benefit the ecosystem that also benefits fishing boat access could be a desirable win-win, but may not be possible. In that case, a decision may have to be made between adapting to the Lagoon's natural tidal processes or fighting forever against these tides.

Bolinas Lagoon is a complex system whose history has now proved to confound and contradict the conventional wisdom of local dredging advocates. As the Sierra Club, the Environmental Action Committee of West Marin, American Rivers and other environmental groups have long maintained, there is neither need nor justification for massive intervention to "save" Bolinas Lagoon or "restore" its ecosystem. This is not to say that absolutely nothing can or should be done. However, care must be taken to re-formulate a "Purpose and Need Statement" for any proposed project that gives significant weight to natural processes.

Further research, expected this fall, will indicate whether there may be some opportunity for more modest "tinkering" that could enhance the lagoon, its wildlife, and perhaps incidentally some favored human activities in the Lagoon. The Sierra Club remains willing to work with all parties and would support such tinkering if it is scientifically justified, adaptively managed, and carefully monitored to demonstrate that it is primarily for the benefit of the ecosystem. In the meantime, enjoy Bolinas Lagoon! The twists and turns of its muddy channels mirror the history of attempts to "save" a Lagoon that does not need to be saved and is going to be around for a long, long time.