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July 8, 2014

To: Steering Committee

From: Philip Trowbridge, Meg Sedlak, and Jay Davis

Re: **Request for Unencumbered Funds and Cancelation of Mesohaline Year II Task**

REQUESTED ACTIONS

1. Cancel Year 2 of the Mesohaline Benthic Index Study and add the remaining funds previously allocated to this study ($90,477) to Unencumbered Funds. *(Recommended by TRC on June 17, 2014)*

2. Allocate $26,000 from Unencumbered Funds for analysis of sediments and seal tissue for perflourinated compounds (PFCs). *(TRC/SC approved modification of S&T elements and analysis of sediment for PFCs was included in recommended action.)*

3. Allocate $23,000 from Unencumbered Funds for a study of selenium in sturgeon tissue. *(Recommended by TRC on June 17, 2014)*

FISCAL SITUATION

Unencumbered Funds Balance: $527,215 (as of 5/31/14)

Due to the reduction in sediment and bivalve sites and analyses this year, we currently are projecting at least $100,000 savings relative to the 2014 Status and Trends (S&T) monitoring budget approved in January of this year. These savings will likely be added to Unencumbered Funds in January 2015 after the 2014 expenses are finalized.

EXPLANATION

Development of Benthic Community Condition Indices for Mesohaline Environments of the San Francisco Bay

The objective of this study is to develop an assessment tool for the mesohaline portions of the Bay. The Southern California Coastal Water Research Project (SCCWRP) is the contractor. The study was originally authorized as a two-year study with a total cost of $125,800 ($35,323 for Year 1, $90,477 for Year 2). Year 2 funding was contingent upon adequate progress (as deemed by the Exposure and Effects Work Group (EEWG) and the RMP Program Manager) and would be authorized through a second contract.

Year 1 of the study is complete and a report has been submitted to the RMP. During discussion of the Year 1 results with the RMP EEWG and interested stakeholders, concerns were raised about the complexity and heterogeneity of the mesohaline portions of the San Francisco Bay. In light of these concerns, the RMP EEWG has suggested to focus the development of a mesohaline index on a smaller area such as the South Bay sub-habitat of the mesohaline San Francisco Bay. Upon successful demonstration of an assessment tool that works in this sub-habitat, its applicability to the other mesohaline habitats could be investigated. As such, the objective of Year 2 of this project will be to develop and calibrate an assessment tool for the evaluation of benthic habitat condition in the mesohaline South Bay sub-habitat of the San Francisco Bay.

The cost for Year 1 of the study was $35,323; the Year I report summarizing the work has been circulated to EEWG and TRC for comment. For Year 2, an additional $90,477 of the study was set aside from 2012 and 2013 RMP funds. SCCWRP has requested an additional $15,702 for Year 2, which would bring the total Year 2 request to $106,179. If this task were approved, the SC would need to authorize a request of $15,702 from RMP unencumbered funds.

At its meeting on June 17, 2014, the TRC did not recommend that Year 2 of the study be funded. The research topic is not a priority for the RMP. However, the study should be brought up as a potential special study for 2016.

Perflourinated Compounds Study

In June, the RMP collected serum samples from harbor seals for the RMP Alternative Flame Retardant 2014 special study; at that time, additional serum sample was collected for pro bono metabolomics analyses and for possible future perflourinated compounds (PFC) analyses. In August, the RMP will be sampling Bay sediment as part of S&T. The objective of this work is to analyze the sediment and harbor seal samples for PFCs.

There are several compelling reasons to conduct PFC analyses. First, perfluorooctane sulfonate (PFOS), a PFC compound widely observed in biota, was classified as a Tier III compound of moderate concern as a result of elevated concentrations observed in Bay birds and seals. Based on the RMP strategy for Emerging Contaminants, Tier III compounds are recommended for consideration for S&T monitoring and/or special studies. Because PFC precursors can degrade to PFOS, the Emerging Contaminant Work Group recommended that both sediments and effluent

be monitored for PFCs and their precursors. A proposal for a 2015 special study monitoring PFC/precursors in effluent is being considered by the TRC. Monitoring sediment would enhance our understanding of the current reservoir of PFCs and precursors in the Bay and possible pathways to the Bay.

The cost to conduct laboratory analyses of PFCs at 27 sediment sites and precursors at 10 sediment sites is approximately $22,000. Precursors will be tested at a reduced number of sites in part due to the cost of the analyses which is approximately double the standard PFC analyses. Monitoring of precursors of PFOS and perfluorooctanoic acid (PFOA) are important, as research to date on a limited number of Bay samples suggests that precursors can in some instances be found at concentrations higher than the terminal degradation products, PFOS and PFOA.

Lastly, as part of the 2014 Alternative Flame Retardant special study, the RMP was able to collect seal serum from 10 seals located in the South Bay in June of 2014. Serum samples were archived for PFC analyses. The estimated cost to analyze these samples is approximately $4,000. To date, seal serum samples from the South Bay have had some of the highest PFC concentrations observed worldwide. The last seal sampling event was 2011.

Results of the PFC projects to date were summarized in the 2013 Pulse and presented at the State of the Estuary/ RMP Annual Meeting. The TRC/SC approved the monitoring of PFC in sediments as part of the revision of the S&T element.

Selenium in Sturgeon Muscle Plugs Study

In April 2014 the RMP formed a Selenium Strategy Team to evaluate information needs that can be addressed by the Program in the next several years. The charge given to the Team by the RMP Steering Committee was to focus on low-cost, near-term monitoring elements that could provide information that provides high value in support of policy development and decision-making. A TMDL for the North Bay is in development by the Regional Water Board, with a staff report in preparation.

The TMDL will establish a target concentration in white sturgeon muscle tissue as the basis for evaluating impairment. White sturgeon is a bottom-feeding species that is considered to be at substantial risk for selenium exposure in the Bay (Beckon and Mauer 2008). White sturgeon are particularly at risk because their diet consists primarily of the overbite clam (*Potamocorbula amurensis*), which are selenium-rich relative to other prey (Stewart et al. 2004). Other increased risk factors for sturgeon include their longevity (they can live over 100 years), their year-round resident status, and long egg maturation times (several years) (Beckon and Mauer 2008). Green sturgeon are also considered to be vulnerable to selenium but their exposure could be limited. Adults and sub-adults spend a large portion of their lives in coastal marine waters outside of the estuary, and are only briefly exposed to high selenium diet during their infrequent spawning migrations through the Bay. In addition, green sturgeon are a threatened species and fishing for them is prohibited.

White sturgeon have been routinely sampled (in 1997, 2000, 2003, 2006, 2009, and 2014) by the RMP sport fish S&T monitoring element since 1997. However, the number of fish collected in each round of sampling has been small (12 fish per round), and the collections are currently

being performed on a five year cycle. The upper end of the distribution of concentrations measured in North Bay sturgeon exceed the target under consideration for the TMDL, but this determination is based on a relatively small number of samples. Identifying a means to obtain a larger number of white sturgeon muscle samples on a more frequent basis has been identified as a high priority by the Selenium Strategy Team, both to obtain a more precise understanding of impairment and to track inter-annual trends.

In the 2009 RMP sport fish sampling, an effort began to establish a nonlethal and efficient method of collecting sturgeon muscle through the use of plugs. Concentrations in plugs were found to correlate well with concentrations in muscle fillets for the 12 fish sampled. Another round of evaluation of this correlation will occur with the 12 sturgeon to be collected in the 2014 sport fish monitoring (note these fish are separate from the fish to be sampled in this proposal). This correlation is opening the door to an opportunity to obtain a larger number of sturgeon muscle samples, non-lethally, through a collaboration with a California Department of Fish and Wildlife annual tagging program that is tracking population trends (DuBois and Harris 2013; more information at http://www.dfg.ca.gov/delta/data/sturgeon/bibliography.asp).

This proposal is requesting funds to perform collaborative plug sampling in 2014. Performing this work in 2014 may result in the data being incorporated in the TMDL staff report that is currently in preparation.

This objective of this study is to obtain a relatively large number of sturgeon muscle samples (30 white sturgeon and, if possible, 10 green sturgeon) both to obtain a more precise understanding of impairment and to begin to track inter-annual trends.

The study would be performed in collaboration with CDFW and USGS. SFEI staff would plan the study, train CDFW staff and perform sampling, manage the data, and write a brief technical report. USGS (Robin Stewart and her team) would perform analysis of selenium and stable isotopes of C, N, and S in the plugs. The stable isotopes provide information on diet and habitat use by the sturgeon. The sampling would occur during the course of the CDFW survey in August through October 2014. The budget for the program is $23,000.

At its meeting on June 17, 2014, the TRC recommended that this study be funded.

References

Beckon, W. and T. Mauer. 2008. Species at Risk from Selenium Exposure in San Francisco Estuary. Final report to the USEPA. US Department of the Interior, Fish and Wildlife Service. http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/northsfbayselenium/Species_at_risk_FINAL.pdf

DuBois, J. and M.D. Harris. 2013. 2013 Field Season Summary for the Adult Sturgeon Population Study. http://www.dfg.ca.gov/delta/data/sturgeon/bibliography.asp

Stewart, R.A., S. Luoma, C. Schlekat, M. Doblin, and K. Hieb. 2004. Food web pathway determines how selenium affects aquatic ecosystems: a San Francisco Bay case study. *Environ. Sci. Technol.* 38. 4519-4526.