DIOXIN SYNTHESIS REPORT

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ESTIMATED COST: $40,000
OVERSIGHT GROUP: Dioxin Strategy Team

Proposed Deliverables And Timeline

Deliverable	Due Date
Task 1. Simple numerical models	Mar 2016
Task 2. Draft report	Sep 2016
Task 3. Final report	Nov 2016

Summary

Additional data on dioxin concentrations and loads have been collected in various media since the last dioxin synthesis in 2004. This effort would formally report this new information and evaluate the needs or potential for additional data collection or management action for dioxins. Aside from a set of bird egg data in 2012 and fish data in 2014, much of the data will be 5 years old or older in 2016.

Background

San Francisco Bay was placed on the State of California's 303(d) list of impaired waters in 1998 as a result of elevated concentrations of dioxins and furans (commonly referred to as 'dioxin') in fish. RMP studies of contaminants in Bay sport fish conducted every three to five years since 1994 have found that dioxin concentrations are relatively unchanged over this time period and in some species, continue to greatly exceed screening values for human consumption. The available information for dioxin in the region was synthesized in a conceptual model/impairment assessment report in 2004 for the Clean Estuary Partnership. That report highlighted limited data and significant uncertainties and gaps in our understanding of spatial and temporal distributions of dioxin in Bay waters and sediments, and in estimated loading rates via various pathways. The Dioxin Strategy Workroup and Workplan were established shortly thereafter to identify and address the highest priority data needs. Data on dioxin in ambient open bay sediments has been roughly doubled since then, and the number of water locations characterized increased ten-fold, but the last samples collected in these matrices were in 2011. Dioxin in wetland sediment cores collected in 2006 has also been characterized, suggesting a drastic decrease from recent (post WWII) past concentrations, whereas open Bay cores show more uniform distributions, with concentrations in upper sections higher than in very deep pre-industrial sediments, but generally similar to current surface sediment concentrations. Additional information on loads from pathways such as atmospheric deposition and stormwater runoff in selected watersheds has also been collected.

Together the information collected to date can be synthesized to update our understanding of environmental distributions and processes of dioxin, with the aim of addressing the highest priority dioxin management questions (described below) and identifying remaining data needs or gaps/uncertainties. Although there are no immediate further actions taken or planned to reduce

dioxin risk in the Bay, given the significant effort expended to date to reduce some uncertainties since the last synthesis, the Dioxin Strategy Group recommended that the updated information be documented, even if only in support/justification of continued management following the status quo. An additional consideration for delaying the synthesis until after 2016 but not much beyond that, is the continued plan for dioxin monitoring in biota, which needs evaluation of the needed frequency and sample count for detecting the likely rate of change in those matrices, and is recommended prior to the following planned monitoring rounds of 2018 for bird eggs and 2019 for fish (bird egg sampling will also occur in 2016, but this synthesis would not finish early enough in the year to inform those plans).

Applicable RMP Objectives and Management Questions

The work to be synthesized in the report addresses the following RMP Objectives and Management Questions in the Dioxin Strategy, with the focus on questions identified by the Workgroup as most directly linked to possible management actions underlined:

MQ.1 Are chemical concentrations in the Bay at levels of potential concern and are associated impacts likely?

- Are the beneficial uses of San Francisco Bay impaired by dioxins?

MQ.2 What are the concentrations and masses of contaminants in the Bay and its segments?

- What is the spatial pattern of dioxin impairment?
- What is the dioxin reservoir in Bay sediments and water?

MQ.3 What are the sources, pathways, loadings, and processes leading to contaminant-related impacts in the Bay?

- What is the relative contribution of each loading pathway as a source of dioxin impairment in the Bay?

MQ.4 Have the concentrations, masses, and associated impacts of contaminants in the Bay increased or decreased?

- Have dioxin loadings/concentrations changed over time?

MQ.5 What are the projected concentrations, masses, and associated impacts of contaminants in the Bay?

- What future impairment is predicted for dioxins in the Bay?

Approach

The available (past and more recent data collected over the past decade) information will be applied to a simple one-box mass budget model and bioaccumulation model to identify and prioritize remaining data gaps and/or conflicts with current conceptual models and expectations, in order to evaluate the needs for and possible designs of future monitoring and modeling efforts. Additionally, information on the other data collected (cores, spatial and temporal patterns in biota and ambient concentrations) will be examined to evaluate the likely trajectory of future sources and impairment. In particular the Dioxin Workgroup noted their potential use in modeling ecosystem responsiveness to load reductions and choosing an appropriate sampling intensity and frequency for status and

trends monitoring given the expected rates of change in response to various scenarios of management actions or monitored natural recovery. For example possible benefits of increased wood burning restrictions or controls on diesel emissions can be simulated or bounded using these simple models to estimate the resultant degree and speed of change that might be expected, and determine whether or not we can even detect their effects in the short- and intermediate-term future.

Reporting

Results of applied models and associated monitoring data in various matrices for the estuary will be reported as a RMP Technical Report, with a draft to be delivered in the fourth quarter of 2016 and a final in the first quarter of 2017.

Proposed Budget

Estimated costs for each of the elements are presented. Even if data are not applied to numerical models, information will still need to be considered in the context of conceptual models of contaminant processes and fate, so costs for the first task can be reduced (roughly halved), but not eliminated.

Task	**Estimated Cost**
1. Application of data to mass budget	$10,000
Application of data to simple bioaccumulation model	$10,000
2. Draft report	$15,000
3. Final report	$5,000
Total	**$40,000**