APPENDIX 4A
REVIEWER COMMENTS TO DRAFT REPORT

REVIEWER 1: DR. KATHY ROSE (ENVIRONMENTAL SCIENTIST, SANTA ANA RWQCB)

Review of Draft Report - The Impact of Pollutant Bioaccumulation on The Fishing and Aquatic Life Support Beneficial Uses of California Water Bodies: A Review of Historic and Recent Data

By Kathy L. Rose, Ph.D.,
Environmental Scientist, Santa Ana Regional Water Quality Control Board

I have had limited to time to thoroughly review the document, but offer the following comments:

The report indicates how bioaccumulation monitoring was used to assess water quality impairment on a statewide basis, but how can this be used on a local basis to evaluate impairment (i.e., determine whether a finding of impairment is warranted for a specific water body due to bioaccumulative pollutants). The protocol for defining impairment (e.g., maximum median concentration among species at a given location) is different than the protocol outlined in the State's listing policy.

RESPONSE: We needed a uniform assessment methodology that could be applied across the state. A subcommittee of the Roundtable agreed that our approach was appropriate, given inconsistencies in applying the listing policy across the regions. The data can be used on a local basis by either reviewing the data as presented in the report, or by obtaining the database we compiled and querying it for the data of interest and performing your own analyses, or (if the request is simple) we could query the database for you.

How do you anticipate that recommended bioaccumulation monitoring will be used in the 303(d) listing process? It seems like an obvious application of SWAMP methodology would be in the listing process…

RESPONSE: Statewide bioaccumulation monitoring is currently being designed (beginning with a survey of lakes and reservoirs), and a primary objective of the work is to provide information needed for 303(d) listing.

Section 2.1 Creating the Database

Line 18 – What RMP does this refer to?
RESPONSE: RMP refers to the San Francisco Estuary Institute's Regional Monitoring Program for Water Quality in the San Francisco Estuary. The text was revised to clarify this.

I did not see that Bay Protection and Toxic Cleanup (BPTCP) data were used in the report. Is there a reason?

RESPONSE: BPTCP fish data collected in 1994 were reviewed for this report. They were provided in SFEI's RMP fish dataset. We were not aware of any other fish or bivalve tissue data collected by this Program.

Section 2.2 – Data Analysis

I have found that different studies have used different definitions of sum DDT and sum chlordane. Lines 5-13 define total DDT, total chlordane, and total PCBs. However, the SMWP defined total DDT differently (o,p-DDT + p,p-DDT + o,p-DDE + p,p-DDE + o,p-DDD + p,p-DDD + p,p-DDMS + p,p-DDMU) as well as total chlordane (alpha-chlordene + gamma-chlordene + cis-chlordane + trans-chlordane + cis-nonachlor + oxychlordane + trans-nonachlor). How do these differences affect interpretation?

RESPONSE: We used the definitions that OEHHA has used in comparing data to screening values. The differences between OEHHA sums and SMW sums are minor. p,p'-DDMS and p,p'-DDMU are minor components of sum DDTs in fish samples, as are alpha-chlordene and gamma-chlordene.

Lines 25-30
A change in OEHHA GTLs will have a profound effect on TMDLs for organochlorine pesticides and PCBs that are currently under development, as well as on assessments of impairment for making 303(d) list recommendations. Currently OEHHA SVs for protection of human health are being used for assessing impacts to fishing BUs, and the present values are as much as an order of magnitude lower than those that are about to be proposed (see Table 3.2.3). It is conceivable that, for certain individual water bodies, a finding of impairment would not be supported and TMDLs would be unnecessary, using the updated GTLs. Are there GTLs being proposed for toxaphene? Toxaphene is not included on Table 3.2.3, but we have found local impairment due to that particular OC pesticide.

RESPONSE: It is correct that OEHHA's draft GTLs are quite different from some of their old screening values. However, these are still draft. In the final report we are relying less on the draft GTLs (which are still draft), given uncertainty surrounding whether they will be changed in their final form, and to avoid the impression that we are providing consumption advice. The draft GTL document does include values for toxaphene.

It looks as though data were lipid normalized for assessing long-term trends, but were not lipid normalized for comparison with OEHHA GTLs. Is that true? Long-term trends in the Newport Bay watershed are pretty pronounced even without lipid normalizing.

RESPONSE: That is true. Lipid-normalizing generally provides a better signal for evaluating trends in organics data. Much of the variation among fish is driven by variation in lipid. GTLs are expressed as wet weight concentrations, since this relates better to human exposure, so for comparison to GTLs we used wet weight data.

Table 2-2.
Excluded Studies. What SCCWRP data were excluded? Same question for other excluded data. Can you provide a year or some other indication what which data you are referring to?

RESPONSE: SCCWRP data collected in 1994 and 1998 from the Southern California Bight were excluded. We will add a reference to data year and expanded study name to Table 2.2

Section 3.2
Net Impacts. I think I stated the question previously, but will repeat. How will bioaccumulation monitoring in the SWAMP program be used on a site-specific basis, if at all?

RESPONSE: Future monitoring by SWAMP will be designed to provide data that are useful for 303(d) listing. Consistent application of 303(d) listing policy across the state may also be a by-product of the statewide program.

Page 3.2-2, 303(d) Listings, Line 13
I would argue that, for regional purposes, the 303(d) lists are the ultimate indicator of pollutant impacts, not "another important indicator." Line 34 states that the 303(d) lists are imperfect indicators, because the state has not had complete coverage. While this is true on a "net" basis, it is not true on a local basis.

RESPONSE: We agree with that, but we were doing a statewide evaluation.

Section 3.2.3 Summary and Recommendations, Line 44-46.
Do you mean by "classified as impaired," as being on the 303(d) list? What percentage of the lakes are listed as impaired?

RESPONSE: 1) Yes. 2) We will include this information in the final version of the report.

Page 3.2-6, Line 14-15
What are the SWAMP assessment questions?

RESPONSE: They are provided in Table 1.1.

Table 3.2.2 Listed Water Bodies
For R8, Newport Bay and San Diego Creek are not included on the table. I believe Newport Bay was on the 2002 list for organochlorine pesticides (general) and PCBs. Those water bodies are having TMDLs developed for OCs.

RESPONSE: Specific contaminants reviewed in this report are not indicated in the 2002 303d list for Newport Bay or San Diego Creek. Rather, "pesticides" and "metals" are named.

Page 3.4-7, Newport Bay
High PCBs in fish have been found recently in the TSMP monitoring: 172 ppb in Upper Newport Bay in 2002; 148 ppb in Santa Ana Delhi Channel in 2001; and 347 ppb in Rhine Channel in 1997. While concentrations have declined, there are still a substantial number fish tissue samples with high concentrations of PCBs. The paragraph seems to imply that there is no longer a problem; however, Newport Bay is currently impaired for PCBs and TMDLs are under development. Rhine Channel, a small offshoot of the Lower Newport Bay, has been classified as a "toxic hot spot," in part because of high concentrations of PCBs.

RESPONSE: Good point. The text was revised accordingly. These data are in the database. The values given above are correct for the locations named. However, these values don't have much influence on the maps presented because they are for one sample in one year for one species. When taking the maximum median over all species at each location in the time period, it is not as high, as the fish are quite variable. E.g. 1998 – 2003 in upper Newport, fish range from 0 to 172 ppb for Aroclors.

Section 3.5.1 Introduction, Line 19
Was DDT really restricted in California in 1963? Seems a little early…on page 3.5-3, line 16, you state that the ban began in 1969…

RESPONSE: Text was clarified to indicate that a reduction of DDT use in California began in 1963 due to the potential health effects and ecological concerns. EPA issued a Federal ban on DDT in 1972.

Page 3.5-5, Line 13
Newport Bay at Crows Nest is in proximity to Rhine Channel in Lower Newport Bay; this is not an important discharge point for DDT, as most inputs occur from San Diego Creek discharges into Upper Newport Bay.

RESPONSE: Remove Newport Bay at Crows Nest from discussion of bivalve DDT concentrations in relation to discharge points.

Page 3.5-1, Line 38-39
Doesn't the DDT –DDD –DDMU pathway occur under anaerobic conditions? Is it an overstatement to say that buried contaminants do not degrade?

RESPONSE: This pathway does occur under anaerobic conditions, mediated by anaerobic bacteria. However, bacterial activity becomes quite low in buried sediment that is out of the zone of macrobenthic activity. I am not aware of DDMU becoming a dominant form at depth.

Section 3.5.3 , Impact of DDT…
You could cite the SCCWRP report from Sutula, et al. (2005) regarding potential impacts to clapper rail due to DDE in Upper Newport Bay.

RESPONSE: Citation will be added and results of this study will be mentioned.

I'm sorry this is as far as I was able to get; I did not look closely at sections on dieldrin or chlordane. I can take more time to review at a later date if you like.

REVIEWER 2: ROBERT HOLMES (ENVIRONMENTAL SCIENTIST, CENTRAL VALLEY RWQCB)

Exec Summary

Page 4 – Lines 7 – 8
Please modify "….a spatial randomization would be better suited for answering the SWAMP statewide proportional assessment questions."

RESPONSE: Text will be revised.

Page 4 – Lines 14 – 18.
Please modify "… augmentation of a targeted sampling design for long-term trends will allow for continuation of valuable time series", may be best suited for regional status and trends assessments, and assisting the Water Boards on decisions related to listing, delisting, or continuing 303d listings. A combination of targeted sampling and weighted randomized designs will create a more robust SWAMP statewide program that has increased utility at the Regional level.

Please clarify that randomized designs may be best suited for statewide probabilistic proportional type assessment questions and discuss limitations of random designs.

RESPONSE: Text will be revised, clarifying the need for non-random design components.

Page 1-2 – Lines 22 – 25.
Please modify – "This exercise has provided a substantial amount of information about present and historical impacts of pollutant bioaccumulation on beneficial uses in California, and also highlights areas where improved sampling approaches can better address different assessment questions." Also it is not clear that there are "improved" approaches to sampling – rather there are new and different approaches that are more suited to answering different assessment questions. Don't like the word "improved". Same comments apply to Section 3.2-6 Summary and Recommendations.

RESPONSE: Text will be revised.

Page 3.2-8. Table 3.2.2
"EPA Region" should be changed to "Water Board Region".

RESPONSE: Revision will be made.

Page 3.5-2 – Lines 37 – 39.
Impact of DDTs on fishing in California – 303(d) Listings and Consumption Advisories –
"Due to the limited number of advisories in place across the State, the assumption is that DDT levels (in areas other than those listed) do not currently pose a threat to human health." In Region 5 the Delta and the San Joaquin River are the only 303d listed waterways for DDTs (there are no consumption advisories). Please note there is currently not enough data to conclude that there is not a possible threat to human health in other watersheds of the Central Valley until new data are analyzed. A current SWAMP project funded by Region 5 LSAC is addressing the lack of data for tissue concentrations of OC's and PCB's and is directed at addressing both 303d listings and OEHHA fish consumption advisory questions in the Central Valley including the Sacramento and San Joaquin River Watersheds and the Delta.

RESPONSE: Add reference to SWAMP Project in Region 5 to fill data gaps. Clarify that lack of listing and advisories may partially represent areas not sampled.

REVIEWER 3: DR. ROBERT BRODBERG (OEHHA)

OEHHA Comments on Draft Report:
"The Impact of Pollutant Bioaccumulation on the Fishing and Aquatic Live Support Beneficial Uses of California Water Bodies: A Review of Historic and Recent Data, March 15, 2006"

General comments
Thanks for the opportunity to review this draft. This is an ambitious attempt to review and interpret data from past Water Board monitoring programs in a consistent manner and discuss how historical data shows pollutant impacts for two specific beneficial uses. While the report is able to meet the objective of performing a statewide evaluation of the fishing beneficial use by using OEHHA's draft GTLs, it is not able to

perform an equivalent assessment for the aquatic life beneficial use. As noted on Page 3.2-1 this is because there are not established threshold values for aquatic life impacts. Consequently, aquatic life impacts are discussed on a local or regional basis where they have been assessed through other studies. This is a real challenge in trying to meet the report objectives and also will be a challenge when establishing a statewide monitoring and assessment program. You might consider the ecological effects thresholds from Canada that Jim Allen has used in southern California to see if these could be used for aquatic life in some habitats.

RESPONSE: Canada has established thresholds for DDT, methylmercury, and PCBs as TEQs (http://www.ccme.ca/assets/pdf/trg_summary_table.pdf). California doesn't have enough data for PCBs as TEQs, so these thresholds can't be used. Discussion of the thresholds for DDT and methylmercury will be added to the text.

The report attempts to use three methods to evaluate the impact of pollution on the fishing beneficial use: advisories; 303(d) listings; and OEHHA's draft GTLs. Creating assessment subcategories based on OEHHA's draft GTLs works best because they can be applied in a consistent manner to whatever old and new data are available. Using advisories and the 303(d) list should be good ways to evaluate the impact of pollutants because these are examples of "known" impairments. However, they don't yield good statewide assessments because they both involve additional evaluations beyond the scope of the report. Another problem, as the report notes, is that the 303(d) listings process has not been consistently applied statewide. Regardless, because of the regulatory importance of the 303(d) list, the report should attempt to establish a relationship between the assessment categories used in the report for assessing the fishing beneficial use and the categories used in the 303(d) listing process. This may be difficult because there are four 303(d) list categories: fully supporting, threatened, partially supported, not supported. Since these individual categories are not shown in the tables in the report it is difficult to tell which of them may have been combined in how the 303(d) listings are shown in the report tables. There should be some information with 303(d) tables that explains the category(ies) used to compile the tables.

RESPONSE: We could not find any information on where individual water bodies fit into these categories in the 2002 303d list. This exercise would be a significant amount of work that would not significantly increase the value of the report, since our assessment was based on concentration categories related to the draft GTLs.

If possible the categories created with the draft GTLs should be related to 303(d) categories.

RESPONSE: Unfortunately, this is not possible. Inconsistencies in 303(d) evaluations would make doing this more effort than it is worth. The report is being revised to be less directly related to the draft GTLs.

In addition the caveats noted below concerning use of the draft GTLs should be added.

RESPONSE: The report is being revised to be less directly related to the draft GTLs.

The report is very useful because it shows that, in addition to a better monitoring design, there also needs to be a consistent statewide framework for how the same beneficial use is assessed across water bodies in the state. I hope the comments below will contribute to improving it.

SPECIFIC COMMENTS

P1, L25-27

The report does not explain USEPA's very generous definition of "assessed." If the state has thousands of lakes assigned the fishing beneficial use then I don't think the majority of them have even been sampled. In addition there is a difference between one or two samples of any fish and doing a good assessment. Given the evident mercury problems in California, I don't see how only 6% of the tested lakes could be impaired, as USEPA claims in their assessment. If most of the lakes in the state have been assessed then why would the proposed SWAMP monitoring program need to expend much effort on lakes? Consider a brief explanation and caveat that both the sampling and assessment of lakes may be based on incomplete data when this is introduced in the body of the report.

RESPONSE: This USEPA assessment was based on area – the text will be revised to emphasize this. Further discussion will be added on the numbers of lakes and reservoirs actually sampled.

P1, L29-31

Watch terms such as "highly impacted" and "fully support," which can be very subjective. Consider defining these in the text and in a glossary. Are different terms (or meanings) being used for the 303(d) list and your assessment? If possible use consistent terms and explain differences or similarities between your use and the 303(d) use.

RESPONSE: These terms will be revised. The methods section will explain the categories we use, and consistent, non-loaded terminology will be used throughout the report.

Figure 1, referenced here, should be titled something like "Pollutant Impact on Fishing Beneficial Use."

RESPONSE: The title will be revised.

Delete references to consumption categories from the figure legend and caption. Instead refer to categories of beneficial use. See comment for P2-2, L22-30 for examples of changing this wording. Similar changes should be made to Figures 2 and 3. Actually it may be very hard for the casual reader to understand how you have derived these figures of impact because the detailed explanations (e.g., use of median concentrations, size limits, worst case scenarios for chemicals, categories based on draft GTLs) are found later in the text.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption or beneficial use impact, since these references are tricky and ill-defined.

P1, L30-32

There should be no reference to consumption here. The report objective is assessing whether beneficial uses are supported. Since you are not doing health assessments stay away from terms like health or risk thresholds. Use categories related to the beneficial use (e.g., "not supported, partially supported, and fully supported"). See details in comment for P2-2, L22-30.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption or beneficial use impact, since these references are tricky and ill-defined.

Also have you defined "the most recent monitoring data" in the Executive Summary? Remember people read this first, and some people never read anything else. They need at least some of the explanation here.

RESPONSE: Text will be revised.

P1, L45-46

It will be difficult for someone reading the Executive Summary to understand the reference to 0.93 ppm as a "no consumption" category. There is no explanation of how you are doing this assessment, the source of the value used, or its meaning to the report objective which concerns status of beneficial uses.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption or beneficial use impact.

Consider a brief explanation of your categories in relation to whether the beneficial use is fully, partially, or not supported in the Executive Summary. See suggestions under comment for P2-2, L22-30.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption or beneficial use impact.

Your use of OEHHA's draft seems to assume that the bright lines you have adopted can be equated to hard and fast consumption categories. These are just a framework. Our actual advice may vary depending on other considerations, plus your "assessment" is very unlike what we do for advisories.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption or beneficial use impact.

P2, L22

Again there is no explanation of the "no consumption" category in the text. Some people may only read the Executive Summary. They won't understand how you came to your conclusions. Change to "the extent to which beneficial uses are supported."

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption or beneficial use impact.

P2, L41

Jim Allen used some aquatic life thresholds from Canada for some chemicals. He said they are officially adopted in Canada. Have you considered using these?

RESPONSE: Canada has established thresholds for DDT, methylmercury, and PCBs as TEQs (http://www.ccme.ca/assets/pdf/trg_summary_table.pdf). California doesn't have enough data for PCBs as TEQs, so these thresholds can't be used. Discussion of the thresholds for DDT and methylmercury will be added to the text.

P4, L1-2

It is a shame that so little can be done about assessing the aquatic life beneficial use on a statewide basis. Perhaps you should make a stronger statement that sampling for human health effects and aquatic life typically require different designs (e.g., species, sample preparation, etc.) so that problems encountered with the TSMP data are not repeated.

RESPONSE: A bullet on this will be added.

P1-1, L38

If "many uncontaminated areas" have been adequately assessed and identified perhaps the report should include a list. This seems like a significant finding if it can be supported. Otherwise, tone it down.

RESPONSE: I think this statement, as written, is defensible. It actually says, "many relatively uncontaminated areas". Producing a list would take a significant effort that is beyond our scope.

P1-1, L46

Misspelled Gassel.

RESPONSE: Text will be revised.

P1-2, L7-12

Yes, SWAMP will be a consistent monitoring program, but what about consistent statewide assessment? This is also needed.

RESPONSE: That wasn't mentioned in SWRCB (2000).

P1-4

Is there a reason the fishing and aquatic life use questions are slightly different? The fishing use has three levels (not supporting, partially supporting, and fully supporting) but the aquatic life use has two levels (limited support and fully supporting). It should be possible to show in a table or explain in the text the criteria used in the report to answer the question for each level. That would provide definitions and clarity for these terms in the report. Once defined, be sure to use these terms consistently throughout the report.

RESPONSE: These were draft questions that were subsequently refined. However, the report was written to address these questions, so we are leaving them as they were. The concentration data were not expressed in terms of beneficial use support as suggested by Dr. Brodberg, so this was not critical to the analysis.

Can you also define and use the same terms for the 303(d) listings? You may need to state that how you are using and applying terms may be different than their use and application in the formal 303(d) listing process. It might also be appropriate to note that you doing this assessment only to provide an historical perspective for future SWAMP monitoring, and that you are not actually designating the beneficial use of water bodies. See how the State and Regional Boards suggest handling this or perhaps they don't find it to be a problem.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption or beneficial use impact.

P2-1, L23-24

When you standardized across studies for fish length in mm was this based exclusively on total length or fork length?

RESPONSE: As stated in methods: "Fork and total length measurements were included in the same analyses, because excluding either one would have drastically reduced the sample size for analysis".

P2-1, L39-40

Consider explaining more about what "a review of metadata to assess quality" entails.

RESPONSE: The review of metadata consisted of evaluating the data collection (e.g., compositing similar sized fish, clean techniques), lab methods (e.g., duplicates, method spikes etc.) and data quality (QA/QC of final data). This will be expanded in text.

P2-2, L10

Is it true that you did not sum all the PCB congeners that the Water Pollution Control Lab reports? You just used the RMP 40?

RESPONSE: True. See Methods Section 2.2 Data Analysis.

P2-2, L11

The Gunther reference is not given with the references for this section. Add it.

RESPONSE: Citation will be added

P2-2, L12

Can you provide a reference or table for the RMP criteria for summing parameters?

RESPONSE: Summing information is already explained in the methods (Section 2.2 Data Analysis).

P2-2, L18

This is a different way to set size limits for selecting samples to include in the data set. Not necessarily right or wrong. Good that you clearly state it.

P2-2, L22-30

We are very sensitive about the use and application of the draft GTLs; and how "evaluations" based on them are presented. We would be happy if you did not use them, but I recognize that they are the only "assessment tool" available that is intended for consistent application throughout the state. This paragraph does not adequately explain how you are using the draft GTLs (including cutoff concentrations and how they are used to assess beneficial use impact/attainment). It seems more appropriate to explain this fully here in the Data Analysis section than scattered in the Mapping and Results & Discussion sections, where the reader is then referred to a series of figures based on your application of the draft GTLs to available data. A critical objective of this report is to determine the status of the fishing beneficial use and the degree to which it is supported. Your use of the draft GTLs should be presented and used in this context in the text and figures. So, as used in this report, values above a 0.93 ppm cutoff for mercury are interpreted as showing that the fishing beneficial use is not supported; values between 0.12 and 0.93 are interpreted as a partially supported fishing use; and values below 0.12 are interpreted as a fully supported fishing use. Once you establish this all discussion and figures should be about the beneficial use attainment interpretations, not "consumption categories."

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact. This will be explained in the Methods section.

We also suggest that you provide clear statements that: 1) you are using values from a draft document and values and procedures could change in the final GTL document; 2) the draft GTLs are a framework that OEHHA will use as part of developing advisories (i.e., they are not "triggers" and your statement that they are should be deleted); 3) OEHHA will determine consumption recommendations in advisories; 4) your assumptions for this document are not equivalent to those that OEHHA uses for advisories; and 5) that none of the evaluations and figures in this document should be interpreted as consumption advice. You are using the draft GTLs to provide a consistent statewide perspective not consumption advice, but you keep talking

about consumption advice. Note that the draft GTLs represent current science and that you are applying them to a range of data including older historic data. While this provides a current perspective, it is somewhat misleading because assessments concurrent with the data analysis might have used different criteria and reached different conclusions.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P2-2, L29-30
You don't need multiple citations since all the draft GTLs are in one document that is available as you revise this, but still a draft.

RESPONSE: Text will be revised.

P2-2, L32
Have the DFG labs used a consistent lipid method through the years? Lipid methods yield different results and can create inconsistencies when normalizing.

RESPONSE: Dave Crane says that lipid content analysis changed in October 1998. He thinks more lipid may get extracted with the new method (he hasn't done a comparison) but the differences are unlikely to be significant.

P2-2, L39-43
Didn't the FMP Review Panel have some concern about this method of analysis?

RESPONSE: FMP Review Panel did not have any issues with the methods for long-term trend analysis.

P2-3, L9-12
Concentrations should not be displayed by "consumption categories." The objective of this report is not to display maps of consumption categories; it is to assess fishing (and aquatic life) beneficial uses throughout the state. The use of the draft GTLs to interpret and assign use categories can be explained one time as noted above in comments for P2-2, L22-30. For the maps the color scheme then becomes "not supported, partially supported, and fully supported." And the figures can be titled something like "Pollutant Impact on Fishing Beneficial Use." This is directly related to the report objective.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P2-3, L17-21
Again don't use the consumption categories, use the impairment categories in this example.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P2-4, Table 2.1
Our Clear Lake report is now available.

RESPONSE: Will cite Clear Lake report.

P3.1-1, L6
While I agree that the areas with fewer studies probably show biases in the spatial coverage, is there any way to highlight water bodies to make more visible so that it is easy to see that a lot of water bodies are not near sample sites? It seems that there may be a lot of "small" lakes that don't show up well. The rivers show up better, and I suspect that your maps do not include stream layers. I am just trying to find a way to make your point more evident to the reader.

RESPONSE: The background map was revised to better show water bodies.

P3.1-2, Table 3.1.1
You should define the study acronyms in this table as footnotes to the table or somewhere. Why not include the studies in the Literature Cited where applicable.

RESPONSE: We will add a sentence to the caption indicating where full study information can be found (Table 2.1). We chose not to add studies to literature cited as not referenced in text.

P3.1-4, Table 3.1.2
Good table. You separate fish into "sport" and "small" in the table but I don't recall any discussion in the text that refers back to this and points out that "sport" fish are most useful for assessing the fishing beneficial use and the "small" fish are most useful for the aquatic life use. This might help make the point that different monitoring designs might be needed for these different uses.

RESPONSE: The use of the different species in this table will be mentioned in the text (e.g., in summary information Section 3.1).

P3.2-1, L40-41
I agree that resource limitations play a predominant role in limiting development of advisories, but I think that the lack of comprehensive data for more species (and both trace metals and organics) also has had a significant role in limiting development of advisories. Although the report mentions many important factors it doesn't quite cover this. I suggest adding it.

RESPONSE: This will be added.

P3.2-2, L6-8
I suggest deleting this sentence. It isn't really about the report objectives. And we still can't tell how comprehensive the FMP data will be. We certainly won't be able to complete advisories for all of it until past 2008.

RESPONSE: Text will be revised.

P 3.2-2, L26
Are the "impaired" 303(d) listings to which you are referring all "not supported" or are some "partially supported or threatened?" Clarify categories used or combined.

RESPONSE: This information wasn't readily available.

P 3.2-2, L20-32
As noted in the comment for P1, L25-27: the report does not explain USEPA's very generous definition of "assessed." Consider a brief explanation and caveat of what they consider "assessed" so that later it is clear why more sampling in these water bodies is needed.

RESPONSE: This USEPA assessment was based on area – the text will be revised to emphasize this. Further discussion will be added on the numbers of lakes and reservoirs actually sampled.

P 3.2-2, L43-46 and P3.2-3, L1-4
Delete this paragraph. Establish your categories once in the Data Analysis section and then talk about the impacts on the beneficial use in this section on Impacts of pollutants. See discussion in comment for P2-2, L22-3.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.2-3, L6-20
This is further discussion of how you are analyzing and presenting the data. Do it once and completely in the Data Analysis section and then talk about the impacts on the beneficial use in subsequent sections. See detailed discussion in comment for P2-2, L22-30: Figure 3.2.3 through 3.3.3: should be titled something like "Pollutant Impact on Fishing Beneficial Use." And references to consumption should be removed from the legend and caption. See detailed comments for P1, L29-31 and P2-2, L22-30:

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.2-3, L21-46
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.2-4, L35
Suggest saying that some dioxin levels in San Francisco Bay were above old screening values, but current values have not been established for dioxins.

RESPONSE: Text will be revised.

P3.2-5, L6-34
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.2-5, L44
Again there needs to be a caveat about how well the lakes of the state have been assessed.

RESPONSE: Text will be revised.

P3.2-7, Table 3.2.1
The advisories for both Lake Berryessa and Putah Creek are now final. We now have draft advisories for the Cosumnes and Mokelumne Rivers, the lower Feather River, and Lakes Sonoma and Mendocino if you want to update the table.

RESPONSE: Table will be updated.

P3.2-11, Table 3.2.3
This table of draft GTLs needs to be referenced earlier as part of the Data Analysis section. The headings are misleading/incorrect. At zero ppm of any chemical one could consume fish three times a day if it didn't bore you. So the range you have in your "8 meal/month" column is really 8 meals a month or more. The range you have in your "1 meal/month" column is really for seven to one meals/month. Add in the beneficial use attainment categories: fully, partially, not supporting. In the few cases where you might need to refer to the OEHHA draft GTLs in the revised report remember to refer to them as DRAFT GTLs. (Unless our final document is out before this report.)

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.2-12, Table 3.2.4
Get rid of all these references to consumption and replace the headings with the beneficial use attainment categories.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.2-13, Figure 3.2.1
Note that the figure is from OEHHA.

RESPONSE: Note will be added.

P3.2-14, Figure 3.2.2
This figure should be about data related to the fishing beneficial use not fish/seafood consumption.

RESPONSE: Changes will be made.

P3.3-2, L8-10
Again I would delete the sentence about future advisories as in the comment for P3.2-2, L6-8.

RESPONSE: Text will be revised.

P3.3-2, L12-43
This does a good job of discussing some of the vagaries of the 303(d) listings.

P3.3-3, L9-31: get rid of all these references to consumption and talk about the degree to which the beneficial use is supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.3-3, L15
Why is Elkhorn Slough a suspected hot spot for mercury?

RESPONSE: An occasional hydrologic connection with the Pajaro River could have allowed legacy mercury from mining in that watershed to be deposited in Elkhorn Slough. However, since the frequency and extent of that connection is not known and may not be great, the reference to Elkhorn Slough has been removed.

P3.3-5, L3-19
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.3-5, L26-27
Good time series for a number of water bodies would be "valuable information." Unfortunately, you only have a couple of limited cases for examples. Consider re-wording and/or noting the importance of a good monitoring program to establish base-lines for good trend analysis and selecting trend sites.

RESPONSE: Text will be modified.

P3.3-6, L11
I think that 0.3 ppm mercury was either the old screening value or the USEPA water quality criterion. It was never a consumption threshold. It is called a screening level on Line 15. Be consistent.

RESPONSE: Text will be modified.

P3.3-7, L28-29 and 43
Get rid of references to "no consumption" and "caution" and talk about the degree to which the beneficial use is supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.3-8, L2-3 and 12-13
Although I don't think a mercury or gold mine has been identified upstream of Lake Pillsbury I believe that Margy found references to mining activities in the area that might have "released" natural mercury. This is mentioned in her report.

RESPONSE: The text will be modified to reflect possible sources noted in a comment letter from the North Coast Water Board regarding the 3030(d) list and information from Margy's fact sheet.

P3.3-8, L1-7 and 15-23
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.3-8, L45

What is the biological definition of a "small" fish? Consider a table for the various TMDL targets (and the organism they protect) and biological thresholds used in the report so the reader can follow them.

RESPONSE: Text will be modified to include the small fish definition (in this case it's < 5 cm, which is what least terns typically eat). We chose not to add a table, as there is only one TMDL target for wildlife protection related to mercury.

P3.3-9, L41-46

This does not explain why the TMDL target (0.03) is lower than the effects threshold for fish (0.2). If this is a good effects threshold for fish why not apply it statewide? I suspect the target is for birds but that is not clear here. I suggest you clarify this.

RESPONSE: The TMDL target was calculated for protection of the least tern and is considered to be inclusive of all other wildlife. This information is given in section 3.3.3a Overview of the Mercury issue for Wildlife, which immediately precedes the section commented on by the reviewer (3.3.3b).

P3.3-11, L21

Get rid of all the references to a specific consumption level (e.g., a few meals a month) and restate that evidence suggesting the potential for limitations on fish consumption shows that beneficial uses are not supported or only partially supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.3-12, Table 3.3.

We now have draft advisories based on mercury for the Cosumnes and Mokelumne Rivers, the lower Feather River, and Lakes Sonoma and Mendocino if you want to update the table.

RESPONSE: Table will be updated.

P3.3-18, Table 3.3.3

Get rid of all these references to consumption categories and replace the headings with the beneficial use attainment categories.

RESPONSE: Table will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.4-3, L3-26
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported. Also fix Figures 3.4.2 through 3.4.4 as above with the mercury figures, replacing titles, legends, and captions.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.4-4, L16
Replace "thresholds for concern" with "thresholds for beneficial use attainment."

RESPONSE: Text will be revised.

P3.4-4, L26-45
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.4-7, L28-32
Replace "threshold for concern" with "threshold for beneficial use attainment."

RESPONSE: Text will be revised.

P3.4-9, L6-44
So how are the PCBs in bird eggs measured? As Aroclors or congeners? Mostly curious.

RESPONSE: The older studies measured Aroclors, the newer ones measured congeners.

P3.4-11, L44
How do you define "moderately significant" for California water bodies? Are these enough case studies to extrapolate to California water bodies in general?

RESPONSE: It's an admittedly subjective descriptive term. The text will be revised to explain this further.

P3.4-11, L44-46
Get rid of the references to consumption categories and talk about the degree to which the beneficial use is supported.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.4-15, Table 3.4.2
Get rid of all these references to consumption categories and replace the headings with the beneficial use attainment categories.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.5-3, L1-7
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported. Also fix Figures 3.5.1 through 3.5.3 as above with the mercury figures, replacing titles, legends, and captions.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

P3.5-3, L4-5
There remains an advisory based on selenium for the Salton Sea, so it is not correct to say that there are no advisories for this area.

RESPONSE: Clarify in text that there are no current advisories in the Salton Sea for LPs.

P3.5-4, L15-30
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported.

RESPONSE: Again, reference to consumption will be removed.

P3.5-5, L19
Can an "improved status" be related to beneficial use attainment?

RESPONSE: Revise text to reflect concentrations not status.

P3.5-10, L40-45
I don't find a clear summary statement about the effect of DDT on aquatic life in the summary section. Is there still an impact due to DDT?

RESPONSE: Add aquatic life to summary of DDTs.

P3.5-11, L35 to P3.5-12, L4
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported. Also fix Figures 3.5.12 through 3.5.14 as above with the mercury figures, replacing titles, legends, and captions.

RESPONSE: Remove consumption reference.

P3.5-12, L1
Change DDT to dieldrin.

RESPONSE: Typo in text to be changed.

P3.5-12, L24-38
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported.

RESPONSE: Remove consumption reference.

P3.5-15, L4-12
I don't find a clear summary statement about the effect of dieldrin on aquatic life in the summary section. Is there still an impact due to dieldrin?

RESPONSE: Add aquatic life to summary of dieldrin.

P3.5-16, L29-39
Get rid of all these references to consumption and talk about the degree to which the beneficial use is supported. Also fix Figures 3.5.21 through 3.5.23 as above with the mercury figures, replacing titles, legends, and captions.

RESPONSE: Remove consumption reference.

P3.5-18, L34
It seems that the statement that chlordane bioaccumulation is not a significant threat to aquatic life beneficial uses in California should go in section 3.5.10 the Summary of Chlordanes.

RESPONSE: Remove text from lines 33-34 and add to section 3.5.10.

P3.5-24, Table 3.5.4
Get rid of all these references to consumption categories and replace the headings with the beneficial use attainment categories

RESPONSE: Remove consumption reference.

REVIEWER 4: TOM KIMBALL (CALIFORNIA SWRCB DIVISION OF WATER QUALITY)

Jay et al-

This is in RESPONSE to your request for comments on your report "The impact of pollutant bioaccumulation on the fishing and aquatic life support beneficial uses of California waterbodies" a review of historic and recent data". Overall I thought this was a well done and largely comprehensive review of the issue. I am happy to have this as a resource and it represents a lot of work on you behalf, good job.

It would be a great resource to have access to your MS Access (or even excel spreadsheets) data base with all of the combined data, is this possible?

RESPONSE: Yes, the Access data base can currently be obtained by emailing Letitia@sfei.org.

Are you thinking of inserting this data into a larger database such that it is available for other users (e.g. SWAMPs' database).

RESPONSE: Yes. The database will be converted to SWAMP format.

What I am thinking is that this collection of data is very important, and is there some way to package this for future users (whom may want a closer look at the data, or have different questions they want to try to answer with this data set)?

We are going to pursue making the flat file available online, on the SFEI web site. We have to check with the investigators for their permission to do this.

How should this report convey risks to consumers of fish? It would seem that the data lends itself to be used to alert fishers about the risks of eating fish from certain waterbodies, yet is not sufficient for a formal advisory. I think that the public is entitled to hear (and see) this information if we have it. Importantly, while the water boards understand beneficial use, the public will have no clear way to interpret this type of language. Consider:

- On the maps, using symbols instead of colors (for those that are colorblind or b&w printing) that relate risk to consumers.

RESPONSE: I am sympathetic to colorblindness – my two sons are color-blind. But we think the benefits of color outweigh the drawbacks.

- A discussion of calculations such as cancer risk factor used (10-4 vs. 10-6), average body weight, and contribution of Hg from other fish consumed, such that public can interpret results more easily.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact. OEHHA's draft GTLs are still draft and subject to change, and we are not applying them in the way OEHHA would in developing consumption advice. No other thresholds are available for application on a statewide basis.

- Present data in tabular form as well as in the maps, especially so we can see each site specific data (e.g. location, fish species, risk for each chemical pollutant).

Such a table would be way too large to include in the report. We will pursue making the raw data available online, as mentioned above.

- In the case that multiple pollutants are found in fish tissue, is there a way to relate the additional risks due to additive effects (e.g. hazard quotient)?

RESPONSE: I am not aware of any way of doing this.

- Placing other columns in the tables that list other pollutants found in fish tissue (other than bioaccumulatives) that may be of concern.

RESPONSE: That would be beyond the scope of this report.

Individual Comments

Page 1, line 25
Could you site this EPA report?

RESPONSE: This was an unpublished graph.

Page 3, line 35
With the first mention of the bioaccumulation programs should you list these?

RESPONSE: Text will be revised.

Page 4, line 4
It might be useful to add here "lacking due to…" to clarify reason for lacking.

RESPONSE: An explanation of this would not fit in this space.

Page 4, line 16
See above comment, if some time series are valuable then time series are be lacking in other ways?

RESPONSE: Text will be revised. There are a few decent time series.

Page 1-1, line 8
Remove "are actually entering" and replace with "contaminate"

RESPONSE: I prefer the original wording, which highlights the distinction between presence in water or sediment and entry into the food web.

Page 1-1, line 37-38
Inform the reader as to what "relatively uncontaminated" means.

RESPONSE: Text will be revised.

Page 2-2, line 15-20
As I read this paragraph I had a hard time figuring out what exactly you did to combine data. You might consider a more thorough explanation. Was this individuals or composite data? If composite was average length used, is this representative in all cases? THg or MeHg data? Whole or filleted? Did you chose to eliminate small fish based on the 75% rule and if so were all large fish included but small fish eliminated (thus biasing towards large fish)? Was this by site or by combining all data?

RESPONSE: A more thorough explanation of data combination will be given in 2.2 Data Analysis section that considers these comments.

Page 2-3, line 7
Does the highest median concentration reflect the size normalized data? Was this for each species, or only the species with highest concentrations?

RESPONSE: Yes, size limits were applied to all species, but for mercury only. Therefore, the highest median concentration reflects these limits for mercury. However, for PCBs and LPs, median concentrations reflect all data.

Page 2-3, line 17
I think this may be a continuation of previous comment. This is more of a question really: what I understand is that this method is a worst case scenario based on a variety of pollutants surveyed…BUT what it does not do is assess the net impact of the combined affect of multiple pollutants at a given site/species combination. (e.g. risk to consumers due to multiple contaminants). Consider clarifying the need for this.

RESPONSE: Text will be revised to mention this topic.

Page 3.2-1, line 9
Again, net impact refers to beni use, not risk to humans eating the fish. But to identify the true "net impact" you would need to consider the possibility of cumulative impact of multiple pollutants risk to humans.

RESPONSE: Text will be revised to mention this topic.

Page 3.2-1, line 40
Consider citation for "fraction of waterbodies likely to need them".

RESPONSE: This report is probably the best one.

Page 1, line 20-32 (think he meant page 3.2-2)
These numbers differ from those in the exec summary, maybe I'm missing something. Consider commenting on the accuracy of this review. I went to the 305(b) report for 2002 and tried to come up with the same numbers. I got a different answer: Bays and est > 90% assessed, coastline about 80% assessed, lakes about 70% assessed, Rivers/streams about 25% assessed, and wetlands 0% assessed. Which one to believe? Consider a discussion of how these numbers were derived and their relative importance to the issue. If these numbers are true, why are we considering a lake study? Are there new numbers for the new 303(d) list that just came out? It would be great if this report could be cited for when we choose to conduct a lake/reservoir bioaccumulation study (if this happens). A needs assessment would do this for us and may fit well here, BUT, at a minimum a discussion of what the EPA report means with respect to fishing beni use statewide assessment would really help here (ie what are the uncertainties/caveats with respect to the numbers EPA cites).

RESPONSE: This USEPA assessment was based on area – the text will be revised to emphasize this. Further discussion will be added on the numbers of lakes and reservoirs actually sampled.

Page 3.2-3, line 20
Add (data not shown).

RESPONSE: Text will be revised.

Page 3.2-3, line 23
Add at beginning of sentence "For at least one species" or, " when ranked using most polluted species data" to clarify that a location is not placed into multiple categories if for instance there were two species, one in red and one in yellow (if you included a tabular format for this data, then multiple species could be listed for multiple pollutants – I think fishers would find this type of information very informative).

RESPONSE: Text will be revised. Adding a tabular summary would be useful for fishers, but fishers won't be reading this technical report. We will consider this for a nontechnical summary of this information.

Page 3.2-3, line 38-39
About the color scheme, consider a discussion of how the numbers were derived in the GTL with respect to other methods. Are these representative of the true dimension of the problem? I am thinking about use of Rfd's, Rsc's et cetera. Are the colors meant for women of childbearing age and children, or other adults? If other fish from the market is consumed I think that some of the yellow sites would jump to red, is this relevant? Consider a discussion of what this consumption advice means to the users.

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

Page 3.2-4, line 12-22
The discussion about reservoirs and lakes not well represented seems in contrast to previously statement that EPA thought lakes and reservoirs well assessed? Further information regarding this topic may very well come in handy if we later decide to operate a lakes/reservoirs bioaccumulative study. Importantly, is the coverage of reservoirs/lakes lacking when considering the majority of fishing occurs in these waterbodies? Or is there equal or greater fishing pressure in rivers/estuaries/bays and coastline? Discuss fishing pressure in CA by waterbody type/region may fit well within this report (even just a paragraph to help set the stage).

RESPONSE: Further discussion will be added on the numbers of lakes and reservoirs actually sampled. We don't have information to cite on fishing pressure by water body type.

Page 3.2-4, line 28
Which species? Or if this is a variety of species then are the data directly comparable?

RESPONSE: It's a variety of species. They aren't truly directly comparable, but that's all we've got.

Page 3.2-6, line 26
Consider a conclusion that outlines the highest priorities for the state with respect to this issue.

RESPONSE: This text will be revised to be consistent with the developing plans for statewide monitoring in summer 2007.

Page 3.2-11, line 6
Consider a fourth category (1 meal per week). This may be a good place to outline the calculations used to get these numbers (this may clarify for both technical reasons, and for public seeking to interpret results). Could give other numbers from other sources/methods? May want to add a bit about what a meal is, and that these numbers are for if you do not have exposure from another source (e.g. store fish, or fish caught at another location).

RESPONSE: Text and figures will be revised and based on evaluation of concentrations without direct reference to consumption, GTLs, or beneficial use impact.

Page 3.3-3, line 36
Consistency - I noticed that Hg chapter has 303(d) listing section yet the PCB chapter does not. Also, Hg chapter does not have long term trends, sport fish, or Bivalves section. There is Hg data for bivalves correct, why was this not included (may be ok not to include but should include reasons for not including in the text)?

RESPONSE: The PCB chapter does have a 303(d) listing discussion (page 3.4-2). The Hg chapter does have a Long-term Trends section, starting on page 3.3-5, which discusses sport fish trends. A subheading for sport fish will be added. Bivalves are not a good indicator for mercury, unless methylmercury is measured, and this generally hasn't been done. A subheading for bivalves with a brief explanation of why appropriate data are not available will be added.

Page 3.3-4, line 15
What is the list of management actions? Do these all belong in the same category?

RESPONSE: The list of management actions (from the previous paragraph) is as follows: "Current management actions of importance include TMDLs, wetland restoration, mine clean-up activities, and consumption advisories." The list is not categorized, but the actions all relate to each other in that they are human activities that could significantly affect mercury bioaccumulation, including in humans.

Page 3.3-4, line 18
The Davis et al citation is the review, not the science, maybe say "as reviewed in"?

RESPONSE: Text will be revised.

Page 3.3-4, line 45
Bring home the 3 management actions you have targeted with respect to future considerations for a program design to address bioaccumulation issues.

RESPONSE: Text will be revised.

Page 3.3-5, line 46
Expand information concerning point source, which one, what type, where was this, was there similar cessation where you say the trend?

RESPONSE: Text will be revised.

Page 3.3-6, line 17
Are striped bass good indicators of trends in space? Consider what you mean by broad scale space (to address striped bass low site fidelity).

RESPONSE: Text will be revised to more clearly define broad-scale space.

Page 3.3-8, line 3
I'm remembering a conversation with someone from region 1 – and I think that there is a mine above lake Pillsbury?? I may not be a Hg mine, but could have released naturally occurring HgS as a byproduct.

RESPONSE: The text will be modified to reflect possible sources noted in a comment letter from the North Coast Water Board regarding the 3030(d) list and information from the OEHHA fact sheet.

Page 3.3-8, line 9-13
Clarify this paragraph; What do you mean by "mining is coupled with industrial sources…". Careful with Lake Pillsbury. And for san Pablo…was it that atmospheric deposition was identified, or that no other source was identified so atmospheric deposition is assumed. Where does the water that fills the reservoir come from? Are there other sources than atmospheric that could be identified if a source study were to be conducted? Consider combining paragraph on lines 25-28 with this one (lines 9-13).

RESPONSE: This paragraph discusses the potential sources that are given in the 303(d) listing (Appendix 1). The authors do not attempt to verify or expand on those potential sources; such an analyses would be beyond the scope of our project. The text will be clarified and reorganized.

Page 3.3-11, line 26
These three management actions do not include wetlands (as included on page 3.3-4). Consider including or re-wording category that wetlands is in.

RESPONSE: A sentence on wetland restoration will be added.

Page 3.3-19
Consider key for species names acronyms, and inclusion of r squared and p values. Discussion of uncertainties? How residuals were used?

RESPONSE: Species names will be written out in the figure. R-squared and p values are discussed in the text, but will also be added to the figure. Uncertainties are discussed in the paragraph that refers to this figure (Long-term Trends, Sport Fish section). The residuals were used in a regression for the long-term time trend analysis, as discussed in the figure caption, the text of that section, and the methods.

Page 3.4-5, line 26
Bivalves

Page 3.5-2, line 43
This line is discrepant with first paragraph, consider revising. Is DDT impacting fishing or not?

RESPONSE: Clarify that concentrations in 1998-2003 across most of the State are below the thresholds applied in this report.

REVIEWER 5: ROSS NORSTROM (CARLETON UNIVERSITY)

SWAMP Monitoring Plan or Research Proposal REVIEW Sheet

Title/Version: The Impact of Pollutant Bioaccumulation on the fishing and Aquatic Life Support Beneficial Uses of California Water Bodies: A Review of Recent and Historical Data

Author & Affiliation: J.A. Davis et al., San Francisco Estuary Institute

Reviewed By: Ross J. Norstrom, Carleton University, Ottawa, ON, Canada

Review Date: November 27, 2006

General guideline for evaluating proposals

- Does the background provide sufficient information to understand the problem?
- Are monitoring objectives clearly defined?
- Is the monitoring/research question(s) clearly formulated?
- Is the monitoring design appropriate to answer the question?
- Are the data appropriate to answer the question?
- Are the data collection methods appropriate?
- Are the data analysis methods appropriate to analyze the data and interpret results?

Reviewers' recommendation

Recommend to approve as is
X Recommend to approve with minor changes
Recommend to approve with major changes
Do not recommend to approve

Comments:

This report summarizes a rather formidable project, to bring together data from several disparate mercury and POPs monitoring programs in California which had different goals and spatial resolution, took place over a long period of time, and make sense out of them. Although the focus was on three SWRCB initiated programs (TSMP, SMSP and CFCP), other relevant published and unpublished data were included. A good attempt has been made to exclude data which do not meet QA criteria, and to categorize the remaining data in a geographically coherent manner.

It is disturbing that so much of the information is in reports relatively unavailable to those not connected to these programs in the state. It would have been good to see more of this information in the peer reviewed literature. Note that there are some references used in the text that do not appear in the reference list. I did not make a list of these. Someone needs to go through the final draft carefully and check each reference against the list.

RESPONSE: We will go through and check references.

Generally, the report succeeds in providing a basis for assessing how well the various monitoring programs address the questions asked in the Draft objective and assessment questions for SWAMP. The division of the data into three time periods seems appropriate given the lack of consistency in sampling (species, size, geographical location, etc.) over time. The graphical presentation of many of the data as bars on a map of the state is an effective way of making the data digestible.

One point that was adequately made is that long term trends are virtually impossible to determine from the data set with very few exceptions, e.g., the mussel watch program, where consistent sampling at given sites over time has provided a robust measure of time trends for some marine sites. Fresh water trends can only be determined in very broad terms with very few exceptions.

I did not have time to get into the derivation of the limits for beneficial use, but my cursory view is that they need to be revisited, especially for beneficial use of aquatic life. Assuming that this includes fish-eating birds, the no-consumption limit of 6670 ppb for DDT is completely out of line for protection for egg-shell thinning in sensitive bird species. Fish to bird egg BMFs for DDE are in the order of 50, which would result in 330 ppm in bird eggs at this limit! Even for occasional human consumption, I find it difficult to believe that 830-6670 ppb DDTs in fish would be acceptable.

RESPONSE: The points made by the reviewer will be discussed.

It is likely that the PCB no-consumption limit of 270 ppb is also above the no-effect level for fish eating birds, since this would result in concentrations in eggs in the order of 10-15 ppm total PCBs. The same is likely true for sensitive species such as sea otters. The summary on page 3.4-11 on effects of PCBs on wildlife is correct in pointing out that additive effects (e.g. TEQs from all sources) and lowering of immunity to diseases are other hazards that need to be considered when setting thresholds for protection of wildlife.

RESPONSE: The points made by the reviewer will be discussed.

It needs to be made clearer in the report that the graphs cannot be used as an indication of protection of aquatic life beneficial use.

RESPONSE: The text will be revised. A paragraph has been added to the end of the introduction in each of the chapters to address this issue.

PCB data in fish included both Aroclor equivalent and sum of congener methods. Although there are potential problems with this, if care is taken to match Aroclor combinations with the patterns actually seen in fish, it appears that the two methods give comparable results (privileged, unpublished information). Note that this procedure cannot be used for birds and mammals because of selective biomagnification of congeners.

RESPONSE: Comment noted.

It appears (bottom of page 2.2) that fish size was only considered important for mercury. Size/age is also important for DDTs and PCBs, possibly less so for dieldrin and chlordanes.

RESPONSE: This will be discussed in the text.

The concerns expressed in the second paragraph, page 3.2-4 that the distribution of sampling effort was uneven and non-systematic is valid, but it is not clear that it resulted in a skewed assessment of the impact of pollutants on fishing. While I agree that it is not good that so many areas of the state have not been sampled, use of these water bodies for fishing beneficial use is also a criterion. We find on page 3.2-6 that the authors are in favor of a probabilistic, random spatial sampling design that includes fishing intensity as a criterion. Is it known how many of the unsampled water bodies have significant fishing activity?

RESPONSE: The discussion will be revised to address this better.

I agree that wetland restoration would pose a significant risk of methylmercury mobilization.

There is a glaring absence of PCDD/F and dioxin-like PCB congener data, and assessment of TEQs. This appears to be excused (bottom of page 3.2-4) on the basis that GTLs do not exist for dioxins (and therefore TEQs), and there does not appear to be a problem with dioxins in San Francisco Bay. This is a leap of faith. Future monitoring plans should provide better assurance than this that PCDD/Fs are not a problem. Remember that TEQs in most cases are dominated by contributions from PCBs, so if there is a problem already with PCBs, this will be exacerbated by any additional exposure to other Ah-active compounds.

RESPONSE: Available data for San Francisco Bay actually do indicate a problem with dioxin exposure, as described in the text, it's just that regulators have considered this a low priority since concentrations are comparable to rural areas and there are no easily controllable sources. More explanation of this will be provided in the text. Future monitoring will take evaluation of dioxins into consideration.

On page 3.4-4 it is stated that the trend comparison in Table 3.4.2, Figures 3.4.3 and 3.4.4 provide a "general picture of PCB impact over the long-term, [while] inconsistencies over the years interfere with finer scale comparisons." On page page 3.4-5 it is stated that the trend dataset has many shortcomings. Frankly, even these may be overstatements. The fish data, with one exception, cannot be used to say anything definitive about trends.

RESPONSE: Agreed.

I am uncomfortable with the extrapolation of the mussel watch data for San Francisco Bay (page 3.4-6, Figure 3.4.7), despite the caveats. Single exponential declines with half-times of a few years are usually quite good descriptors of bioavailable PCBs changes once active sources cease in highly contaminated aquatic ecosystems. This was certainly the case in the Great Lakes and the Baltic Sea where PCB trends have been well-defined since the early 1970s. However, over the long term, processes such as land runoff, recycling from sediments and atmospheric deposition (local urban sources as well as global) begin to dominate the kinetics. This results in a tendency to balance losses with inputs, and the initial rate of decline begins to

slow at some point. The extrapolation in Figure 3.4.7 should therefore be considered as a best case scenario. It is also necessary to consider whether the mussel watch data are representative of other guilds. This is brought out by the lack of PCB trends in shiner surfperch, 1997-2003.

RESPONSE: Excellent point. The discussion will be revised to capture this.

I agree with the conclusion that dieldrin is a non-issue in this environment. Chlordanes appear to remain of some concern in specific areas. It is not clear (perhaps I missed it) what congeners are included in the term 'chlordanes'. I assume it includes the nonachlors, chlordanes, oxychlordane and heptachlor epoxide.

RESPONSE: Individual congeners used for summing are described in the methods (Section 2.2 Data Analysis).

DDT is likely a significant concern for wildlife in some areas. Although only a few sites in the Imperial Valley (Salton Sea) area are above the 830 ppb best choice guideline for human consumption, it is probable that more sites will be above a reasonable guideline for protection of fish-eating birds.

RESPONSE: This issue was addressed more fully in the report through the use of biomagnification factors to estimate bird egg concentrations from sport fish concentrations.

I am a proponent of targeting analytes in monitoring programs as broadly as possible. For the majority of POPs, the big expense is in collecting, preparing, extracting and cleaning up samples. Once this is done, it is really not very much additional effort to collect all the data that the instrument is capable of producing. Why throw data away? Additional effort is needed in QA to do this, but it should not add significant incremental cost. Other analytes which should be routinely considered for future monitoring programs that fall into this category are chlorobenzenes, HCHs, mirex and some toxaphene congeners. Also, I it is unconscionable nowadays to be measuring Aroclor equivalents derived from congener-specific data. Sum of congeners, with some indication of average congener composition, is the most appropriate way of handling PCB quantitation. Congener specific analysis of PCDDs, PCDFs, no-PCBs, PBDEs, complete toxaphene congeners, PFAs, etc., is another matter. These do entail significant extra costs. However selective, limited monitoring for these compounds can be incorporated in a meaningful way into monitoring programs without huge additional cost.

RESPONSE: These recommendations will be considered as SWAMP develops its long-term monitoring plans.

In my view a complete monitoring program should incorporate a multi-faceted approach. Thus, while a sampling design with spatial randomization, as proposed in the summary of net impacts has merits, it is important to have a some sites which are sampled coherently (species, size, time of year, etc.) and annually in order to establish time trends, as proposed on page 3.2-6. I am also very much in favor of archiving representative frozen samples for potential future analysis. Establishment of a specimen archive should be considered as part of the new SWAMP monitoring program.

RESPONSE: We agree with these recommendations. They will be considered as SWAMP develops its long-term monitoring plans.

REVIEWER 6: JIM WIENER (DISTINGUISHED PROFESSOR, UNIVERSITY OF WISCONSIN-LA CROSSE)

SWAMP Monitoring Plan or Research Proposal REVIEW Sheet

Report Title: The impact of pollutant bioaccumulation on the fishing and aquatic life support beneficial uses of California water bodies: a review of historic and recent data

Author & Affiliation: Jay A. Davis and five others, San Francisco Estuary Institute

Reviewer: James G. Wiener PhD, Wisconsin Distinguished Professor, University of Wisconsin-La Crosse, River Studies Center, 1725 State Street, La Crosse, Wisconsin 54601 (Office phone 608-785-6454; Email: wiener.jame@uwlax.edu)

Review Date: December 22, 2006

General guideline for evaluating proposals

- Does the background provide sufficient information to understand the problem?
- Are monitoring objectives clearly defined?
- Is the monitoring/research question(s) clearly formulated?
- Is the monitoring design appropriate to answer the question?
- Are the data appropriate to answer the question?
- Are the data collection methods appropriate?
- Are the data analysis methods appropriate to analyze the data and interpret results?

Reviewers' recommendation

Recommend to approve as is
Recommend to approve with minor changes
X Recommend to approve with major changes
Do not recommend to approve

Reviewer's' comments

This review focuses on sections of the subject report concerning mercury contamination of sport fish, which is the topical area of the reviewer's greatest expertise.

(1) Title - I recommend that the title of the report be revised to read "Bioaccumulation of pollutants in California waters: a review of historic data and assessment of impacts on aquatic life and beneficial uses of sport fishes."

RESPONSE: The title will be revised to: "Bioaccumulation of pollutants in California waters: a review of historic data and assessment of impacts on fishing and aquatic life

Executive Summary

Page 1, line 32
Is it appropriate to say that "8% [of the locations sampled] do not support fishing" per se? Couldn't these locations support catch-and-release fishing?

RESPONSE: The text will be revised.

Page 1, line 43
I recommend that "methylmercury," rather than "mercury" be used in the text in cases where exposure and health risks are being discussed (i.e., replace "mercury" with "methylmercury").

RESPONSE: This is a good point, but would have required very labor-intensive changes to figures and tables. To avoid creation of inconsistencies between the text and the figures, we stayed with use of "mercury".

Page 2, line 3
Revise sentence to read "The impairment is most severe worst in the San Francisco …"

RESPONSE: The text will be revised.

Page 3, line 45
Do the locations that "have not been sampled adequately" include sites where there is substantial fishing and (presumably) human consumption of fish? If so, this should be indicated for emphasis.

RESPONSE: Yes. The text will be revised.

Introduction

Page 1-1, lines 29-31
Some freshwater bivalves are quite mobile. I would, therefore, revise line 30 to read "they are stationary less mobile than fish and therefore good indicators…"

RESPONSE: The text will be revised.

Pages 1-1, 1-2, and elsewhere
Avoid the use of acronyms to the greatest extent possible in the report. They are not reader friendly.

RESPONSE: The text will be revised.

General comment
It may be prudent to include a limited glossary, to define important terms whose meanings may not be clear to some readers of the report. Following are examples of terms that could be defined in the glossary: bioaccumulation, impairment, legacy pesticides, metadata, guidance tissue levels, TMDL, etc.

RESPONSE: We'll consider this if/when we do a nontechnical summary of this report. We won't do this for this technical report.

Methods

Page 2-1, lines 26-29
It would be helpful if you provided some indication of the percentage of "non-detect" concentrations for each contaminant that had to be assigned a value of zero.

RESPONSE: These numbers will be added to text.

Page 2-2, lines 3-13
Add a sentence to this paragraph stating that nearly all of the mercury present in edible fish muscle is methylmercury, and that analysis of fish tissue for total mercury provides a valid, cost-effective estimate of methylmercury concentration in the tissue.

RESPONSE: Text will be modified as suggested.

Page 2-2, lines 39-43 and Table 2.3
Are the size limits for fish based on total length, standard length, or fork length? Please clarify this in the text and table. In addition, I recommend that scientific names of fishes also be given in Table 2.3.

RESPONSE: As stated in methods, both fork and total length measurements were included. The size limits applied were for total length. Clarify in table that lengths refer to total length. Scientific names will be added to Table 2.3.

Results and Discussion

Page 3.2-1, lines 5-7
Is it known that pollutants in fish are significantly affecting fishing beneficial use, or is this being assumed because of the existence of fish-consumption advisories?

RESPONSE: It is assumed based on the existing advisories, and also indicated by the data in this report. The text was revised.

Page 3.2-1, lines 15-17
There are a limited number of cases for which thresholds for certain wildlife species and contaminants can be reasonably estimated. For example, it is evident that consumption of prey fish with methylmercury concentrations of 0.2-0.3 µg/g wet weight will impair reproduction of common loons (Gavia immer).

RESPONSE: Good point. The text will be modified to indicate that a very few such thresholds have been established. Common Loons winter along the coast of California but do not breed here. They are absent from the vast majority of the areas sampled, and relatively dispersed in the remaining areas. Thus, this species was not appropriate for a statewide analysis.

Page 3.2-1, line 9
Replace "passed on" with "ingested."

RESPONSE: The text will be revised.

Page 3.2-2, line 26
Replace "was" with "were" (plural subject).

RESPONSE: The text will be revised.

Page 3.2-2, line 34
Replace "imperfect" with "inappropriate."

RESPONSE: Imperfect seems better. If listing criteria were applied consistently and uniformly across the state, they would be an appropriate and excellent indicator of the impact of bioaccumulation on the fishing beneficial use.

Figure 2 and elsewhere
The Guidance Tissue Range of 0.12-0.93 ppm for mercury is extremely broad, and the use of this broad range to classify mercury in fish diminishes the information that is conveyed in this and other figures. I recommend that this broad range be divided into 2 or 3 narrower categories.

RESPONSE: The categories have been revised, and this general range of values has been split into two categories.

Results and Discussion (section 3.3: Mercury)

Page 3.3-1
I recommend that 2 or 3 concise paragraphs be added in the form of a "primer on mercury," to provide the reader with a very general overview on mercury pollution, its conversion to methylmercury, entry into food webs, bioaccumulation in fish, and adverse effects of dietary exposure. This could be included in a text box near the beginning of section 3.3. This would be very helpful to readers who are unfamiliar with mercury pollution and its effects.

RESPONSE: We'll consider this if/when we do a non-technical summary of this report.

Page 3.3-2, line 3
Insert "contamination" after "Mercury."

RESPONSE: The text will be revised as suggested.

Page 3.3-4, lines 15-26
Wetlands can indeed be important sites of methylmercury production and export. The presence of dissolved organic matter exported from wetlands can affect the biogeochemical cycling of mercury in a variety of other ways as well. The expected, additive effect of DOM would be an increase in the mass of methylmercury available for uptake. See page 6266 of Wiener et al. 2006 for a brief discussion of wetland influences on mercury cycling. (Reference: Wiener JG, BC Knights, MB Sandheinrich, JD Jeremiason, ME Brigham, DR Engstrom, LG Woodruff, WF Cannon, SJ Balogh. 2006. Mercury in soils, lakes, and fish in Voyageurs National Park: importance of atmospheric deposition and ecosystem factors. Environmental Science and Technology 40(20):6261-6268)

RESPONSE: The text will be revised and the reference added.

Page 3.3-6, lines 10-11
Revise text in this sentence to "exceeded the US Environmental Protection Agency's guideline of 0.30 ppm wet weight, which was established for the protection of persons who eat noncommercial fish; species with measured concentrations exceeding the guideline included largemouth bass…"

RESPONSE: In this case, the 0.3 ppm was meant to refer to an OEHHA screening value. The text has been clarified and a citation for the screening value provided.

Page 3.3-7, line 6
Insert "comparatively" before "little variation."

RESPONSE: The text will be revised as suggested.

Page 3.3-7, lines 11-12
To improve clarity, I suggest the last sentence in the paragraph be revised to "This study identified historic mercury mines as a primary source of mercury in highly contaminated fish in the Guadalupe River basin."

RESPONSE: The text will be revised as suggested.

Page 3.3-8, lines 25-28
I recommend that you cite the following papers as further support of the potential significance of mercury in atmospheric deposition:

Orihel, D. M., M. J. Paterson, C. C. Gilmour, R. A. Bodaly, P. J. Blanchfield, H. Hintelmann, R. C. Harris, and J. W. M. Rudd. 2006. Effect of loading rate on the fate of mercury in littoral mesocosms. Environmental Science and Technology 40:5992-6000.

Wiener, J. G., B. C. Knights, M. B. Sandheinrich, J. D. Jeremiason, M. E. Brigham, D. R. Engstrom, L. G. Woodruff, W. F. Cannon, and S. J. Balogh. 2006. Mercury in soils, lakes, and fish in Voyageurs National Park: importance of atmospheric deposition and ecosystem factors. Environmental Science and Technology 40:6261-6268.

RESPONSE: The text will be revised as suggested.

Page 3.3-8, lines 34-42
You may also wish to cite the synthesis paper by Tony Scheuhammer et al. (2007), which will appear in the January 2007 issue of Ambio. Dr. Jay Davis will be receiving a copy of this issue of Ambio by mail, probably in mid February 2007. The reference for Tony's paper is as follows:

Scheuhammer, A. M., M. W. Meyer, M. B. Sandheinrich, and M. W. Murray. 2007. Effects of environmental methylmercury on the health of wild birds, mammals, and fish. Ambio 36(1): in press.

RESPONSE: The reference will be added.

Page 3.3-10, line 17
The paper by Schwarzbach et al. (cited as "in press") has been published, and should be cited as "Schwarzbach et al. (2006)."

The full reference, for page 3.3-26, is as follows: Schwarzbach, S. E., J. D. Albertson, and C. M. Thomas. 2006. Effects of predation, flooding, and contamination on reproductive success of California Clapper Rails (Rallus longirostris obsoletus) in San Francisco Bay. The Auk 123:45-60.

RESPONSE: The citation will be revised as suggested.

Page 3.3-11, lines 21-22
I suggest that this sentence be revised as follows: "The impairment is worst generally greatest in the San Francisco Bay-Delta, Central Valley, and surrounding areas [please be more specific here], with sites near abandoned mercury mines containing the most mercury-contaminated fish."

RESPONSE: The text will be revised.

Tables and Appendices

The authors are advised to convert several of the longer, data intensive tables to appendices, which should be relocated to the end of the report.

RESPONSE: Longer tables will be placed in appendices.

General comment
I agree with the authors' conclusion that the available historic data on mercury in fish are of limited utility for assessing trends and patterns in mercury contamination at the state-wide scale. However, it should be mentioned in the concluding text and in the executive summary that the prior studies from which most of these data originated have greatly advanced our scientific understanding of the mercury pollution problem in California during the past 10-15 years. In short, you should indicate that the analysis of trends was not a central objective of those studies. If the scientific value of these independent investigations is not communicated, the uninformed reader may conclude that nothing substantial was learned from this large body of prior work.

RESPONSE: The text that refers to this topic will be revised