



SWAMP Bioaccumulation Monitoring Review Panel Meeting

Tuesday, February 15, 2011
CalEPA
Room 720
1001 I Street
Sacramento, CA

Attendees:

Jennifer Doherty	State Board	Cassandra Lamerdin	MLML
Karen Taberski	Region 2	Autumn Bonnema	MLML
Gary Ichikawa	DFG/ MLML	Dylan Service	DFG/ MLML
Billy Jackl	DFG/ MLML	Bob Brodberg	OEHHA
Jay Davis	SFEI	Gail Cho	DFG
Terry Fleming	EPA	Dave Crane	WPCL
Aroon Melwani	SFEI	Rusty Fairey	MLML
Jim Wiener	UW-La Crosse	Shiri Teng	
Stacey Swenson	MLML	John Toll	
Michael Lyons	Region 4	Rachel Allen	SFEI
Mark Stephenson	DFG/ MLML	Ken Schiff	SCCWRP
Chris Schmitt	USGS		

Via telephone:

Scott Johnson		Kathleen Regalado	WPCL
Margy Gassel	OEHHA	Rich Fadness	State Board

1) Introduction

Jay Davis began the meeting by updating the group about progress since the last meeting. The lakes report was finished and released in June 2010, accompanied by a factsheet and a press release, along with a web portal for the data. Links to media coverage of the report are on the BOG website. Follow up sampling is currently underway in Regions 2 and 4.

The sampling for year 2 of the coast survey was completed by Gary Ichikawa, Billy Jackl, and Dylan Service during the summer. The samples are currently being analyzed at MLML, and the team is on track to have all data reported by March 1, 2011.

The Coast year 1 reporting was delayed partly due to the collaboration with NIST, and partly due to minor glitches in the data pathway. A draft report is scheduled for March 1, 2011. The timing for this meeting was driven by the timeline for the sampling plan for the rivers and streams work. When the plan is approved, Gary and his team can get started sampling.

The goals for day 1 of the meeting is to review the Coast year 1 report, breaking it down into the statewide, southern California, and SF Bay sections.

The status of SWAMP in general is up in the air – due to California’s budget problems it is uncertain if there will be continued funding for SWAMP in 2012. Therefore, continued BOG funding is partially contingent upon making a compelling case for the need for continued research.

Terry Fleming pointed out the two criteria for maintaining the BOG program: that it work towards self-sustainability and that it make a difference to management.

Jim Wiener mentioned the annual Mercury conference that will be held in Halifax. This year’s theme is “air, land, sea, and me”, and he encouraged this group to present some of the coastal work at the meeting. Aroon Melwani noted that he just submitted an abstract to it.

2) Design of Coast Sampling

Jay Davis presented the rationale for the Coast bioaccumulation study and its management questions. It was designed to address the lack of systematic bioaccumulation data throughout the state, and it will help evaluate the status and regional distribution of contaminants in sport fish. It will also help OEHHA decide if more sampling is needed in order to develop guidelines.

The report will be broken down into 3 sections, with one section on the statewide data, one on Bight data, and one on SF Bay data. This enables Ken Schiff and Jay Davis to respond to the specific needs of their local stakeholders in the Bight and SF Bay, respectively. Jay Davis noted that this collaboration brought in an additional \$600,000 of funding from the RMP and the Bight. The sampling design established “zones” throughout the coast, with 5 popular species targeted in each zone. The zones were plotted based on the center of where fish were caught within them.

Jay Davis discussed the details of a few design decisions, including skin on vs. skin off for white croaker analysis. Bob Brodberg noted that skin off is the primary form of analysis because advisories always suggest not eating the skin. He mentioned that he would like to promote information on Omega 3 in fish, but it is not a water quality endpoint, so the water board is less interested in it.

Jay Davis indicated that he is developing a report card for San Francisco Bay, and that the sport fish data will be central to the report card.

3) Statewide Data

Jay Davis presented the data from the Statewide monitoring. His goal was to provide a comprehensive statewide assessment.

Jay Davis noted that the highest mercury concentrations on the coast were detected in sharks, and that general trends in the literature suggest that sharks are often high in mercury. It is not known why this should be true, as they are benthivores and lower on the food chain than striped bass, but have higher mercury concentrations. Ken Schiff suggested that the coast data be presented

with sharks excluded, so as not to confound the overall results, but include a sidebar that highlights the issue of sharks, and cautions the public to limit their consumption of sharks.

Jay Davis noted that with the shark data excluded, the data for the north coast and the south coast look rather similar.

Because striped bass were analyzed on an individual basis for mercury, Jim Wiener suggested determining if individual length is a confounding factor in site variability.

Jay Davis noted that because there is too much data to present all of it, that it be made available on a web query tool so that the public can look up what they are interested in.

Terry Fleming asked if it is better to fish in lakes or on the coast. Jay Davis noted that the data are currently displayed on a contaminant by contaminant basis, and do not yet get at this question.

Karen Taberski suggested making a sidebar for trout as well, to compare it between the coast and lakes studies.

With regards to PCBs, Jay Davis concluded that in urban areas, PCBs may be a larger problem than mercury. They are also a larger issue on the coast than in lakes.

Jay Davis noted that no species had concentrations of DDTs that approached the ATL threshold. Jennifer Doherty suggested that red be calibrated to mean “above the no consumption ATL” for all contaminants. Karen Taberski approved of including the DDT maps, because they send the message that DDTs are low. Mike Lyons noted that while DDTs are not an issue from a human health standpoint, because a large portion of the coast is above the fish contaminant goal, it could be an issue for wildlife.

Ken Schiff suggested making stacked bar charts which would show the difference between the contaminants.

Action items:

- Add a sidebar on mercury in trout and sharks.
- Make the data available on the web query tool.
- Revise the maps such that the colors correspond to similar thresholds for all contaminants.
- Add stacked bar charts to show the difference between contaminants.

4) Southern California Bight Data

Ken Schiff presented the data from sport fish monitoring along the Southern California Bight. Chris Schmitt noted that Ken’s manner of interpreting the data differed from Jay’s. While each will be writing a chapter of the overall report to suit the needs of their stakeholders, the report

should have coherent and similar conclusions from both sections. Jay Davis suggested that a text box comparing the two approaches be added for transparency and clarity.

Terry Fleming asked that both reports use the same technique for treating non-detects. Jay Davis and Ken Schiff agreed that substituting 0 for non-detects provided a consistent way of treating the data without introducing arbitrary values from MDLs. Chris Schmitt noted that he prefers substituting half of the MDL for non-detects because it provides a placeholder for data too low to be measured.

Bob Brodberg noted that the reports have been treating the ATLS as bright lines that should not be crossed. In his mind, they are more flexible, and should be treated as such in the reports.

Jim Wiener suggested comparing concentrations and body size between the earlier NOAA superfund study and the Bight '08 project.

Action Items:

- Add a text box comparing the analytical approaches between Ken's chapter and Jay's chapter.
- Use a consistent method of substitution for non-detects.

5) San Francisco Bay Data

Jay Davis presented the data from sport fish in San Francisco Bay. He noted that shiner surfperch show a spatial correlation. Jim Wiener suggested that in part because of this site fidelity, shiner surfperch could be more useful for determining temporal trends than striped bass. Chris Schmitt pointed out that the strong spatial trends in shiner suggest that there is a lack of site fidelity in other species.

Bob Brodberg asked if the PCBs in croaker data was lipid normalized, and suggested that the document explain the importance of lipid normalization.

Jay Davis noted that the treatment of non-detects could affect the dioxin results. While the levels of congeners that drive TEQs are well quantified, other congeners that are less potent could change the overall TEQs depending on the substitution method used. Terry Fleming thought that EMAP substituted non-detects in dioxin data with half of the MDL. For comparability with previous studies, Chris Schmitt suggested performing the dioxin TEQ calculation substituting half the MDL for non-detects, rather than 0, and determining how much this impacts the overall result.

With regards to legacy pesticides, Karen Taberski suggested contacting Naomi Feger about how to refer to the "target" for DDTs and other analytes.

Jay Davis mentioned that the selenium analyses in sturgeon were performed on both muscle plugs and on filets, to determine if plugs (non-lethal to the organism) can produce reliable results. The RMP would prefer to take muscle plugs than have to kill sturgeon, as the fish are

relatively rare and age slowly. The regression between muscle plugs and filets is significant, but is driven by two high selenium samples. Without those two data points, the regression is not significant.

Chris Schmitt suggested looking at mercury and selenium in sturgeon in the future, and getting more information in the use of muscle plugs. A paper by Bruce Waddell and Tom May evaluates the use of muscle plugs for selenium analysis.

Bob Brodberg noted that OEHHA will likely be developing thresholds for PBDEs in the future. Jay Davis and Margy Gassel noted that only PBDE data from 2009 (not 2006 or 2003) should be used in the development of the advisory.

Jay Davis noted that PFCs tend to accumulate in the liver, but were analyzed in muscle, which may partially explain why there were so few detects.

Action Items:

- Update the report as suggested by the review panel.
- Perform Dioxin TEQ calculations using both 0 and ½ MDL as substitution methods for non-detects to determine the effect of the substitution method.

6) Discussion of combined Report

Jim Wiener suggested that Jay Davis and Ken Schiff spend time developing the outline for the overall report, so that the presentation of all chapters is standardized. He suggested a few ideas to highlight: that sharks are high in contaminants, transparency about the comparability of the data, and how non-detects are treated. He suggested that the report illustrate the limitations of the use of striped bass for trend analysis, and put forth alternative candidates, such as shiner surfperch.

Chris Schmitt suggested that the report pull out “known knowns” for comparability between the studies, and focus on more detailed analyses within groups of sites. Terry Fleming suggested that this level of analysis is not necessary to “make a splash” in the newspaper, and that the real goal for this project is the report after year 2. Jay Davis and Ken Schiff both noted that their stakeholders are more interested in the year 1 report as it contains the region specific data.

Ken Schiff suggested that the Bay chapter and the Bight chapter need not be organized in parallel and integrated, because the chapter on the statewide effort will incorporate all of the information. This will enable the region specific chapters to be written to meet the needs of the respective stakeholders.

Jim Wiener noted that he would be available to review the report during the first half of March, and Chris Schmitt mentioned that he had set aside time to work on it in March. Jay Davis noted that the final report is scheduled to be released on Memorial Day weekend.

Bioaccumulation Peer Review Day 2

Attendees

Jennifer Doherty	State Board	Chris Schmitt	USGS
Karen Taberski	Region 2	Cassandra Lamerdin	MLML
Gary Ichikawa	DFG/MLML	Autumn Bonnema	MLML
Billy Jackl	DFG/MLML	Dylan Service	DFG/MLML
Jay Davis	SFEI	John Marchack	State Board
Terry Fleming	EPA	Michelle Wood	Region 5
Aroon Melwani	SFEI	Bob Brodberg	OEHHA
Jim Weiner	UW-La Crosse	Laurie Lynn	
Rich Fadness	State Board	Tom Suk	Region 6
Stacy Swenson	MLML	Gail Cho	DFG
Michael Lyons	Reg 4	Dave Crane	WPCL
Mark Stephenson	DFG/MLML	Chris Foe	Region 5

Jay Davis began the meeting by summarizing the goals of Day 2 --

1. Provide an overview of the rivers and streams sampling plan; Need to obtain agreement on plan
2. Discuss options for future directions for BOG; Brain storming today, follow up in BOG with further conversations

1.

Jay Davis gave an overview of the BOG Rivers and Streams sampling plan for 2012. It will be a one year study that will target 55 popular fishing locations across the state. The sites were selected based on review of popular fishing locations with rating of 6 in Stienstra book. The study will work under the same timeline as previous habitats. The field crew plan to go out as soon as the sampling plan has been agreed upon. Autumn Bonnema mentioned that the QAPP will not be ready by the end of February. However, this won't stop the field crew planning for and going out. The parts likely to change in QAPP are DQOs and validation steps, which is on the analytical end not the sample collection end.

Jay Davis provided an overview of the past studies in California's rivers and streams. Jay mentioned that prior work has mostly been focused on Hg. Therefore, the statewide BOG study will provide data on a broader array of analytes than currently exists. Bob Brodberg provided information on the current status of advisories in the rivers and streams. Advisories exist for Hg in the Delta; Sacramento below Shasta; San Joaquin from Millerton to Delta; portions of the American River; Cosumnes R; and Feather R (areas below Dams); however, organic contaminants not always tested.

Jay Davis mentioned that the coordination of rivers and streams monitoring include Charlie Alpers work (coordination with State Board); Sierra Fund; and Region 5 (Michelle Wood). Charlie and Michelle's work will be discussed in more detail later in the morning (see below).

Gary Ichikawa stated that he has spoken with fly fishing groups and they will post locations of where we want to sample and help us to collect fish; and they will discuss at monthly meetings. Bob Brodberg suggested we talk to Northern California Federation of Fly Fishers. Bob expressed reservations about coordination with Stienstra due to legal problems that the author is involved in.

Gary selected sites based on Stienstra and input from Reg. 5 and other stakeholders (55 sites and 6 hatcheries). Aims to sample away from hatcheries; will avoid times when hatcheries release fish. Michelle Wood expressed concern that we are confounding potential exposure by sampling away from hatcheries, when people are catching hatchery fish.

Jay Davis stated that the RMP will pay for majority of cost to archive some samples at NIST for testing of emerging contaminants at a later date. This will give greater confidence in longer term storage (super cold freezers), but can only store small aliquots. Autumn Bonnema stated that as an example, it cost ~ \$3K in coast year 2 to archive 24 samples.

Terry Fleming and Jon Marshack mentioned that there is a State Board Hg Objective that is in the works; not sure timeline.

Jay Davis summarized ways to potential add to the design. Four options were mentioned: 1) to perform RBT Hg individuals; 2) long term archiving in trends sites; 3) add more locations; 4) evaluate more hatchery trout.

Chris Schmitt commented that the survey does not appear comprehensive enough and that there seems to be a lot of information already; need to make the case more clearly of how this study would improve on the previous work; Chris concluded by stating that all in all study seemed technically sound.

Jim Wiener commented that we need to make it clear that this is a screening study; not full coverage of the state. Jim voiced concerns about site selection; conflicting objectives. Jim suggested the goal should be modified to call out "popular fishing sites" not "all" rivers and streams. Jim is concerned that BOG will underestimate extent of contamination problem, by focusing on popular sites from Stienstra. Jim suggested that BOG get age estimates for all fish, as there is value for correlating period of exposure for particular species.

Gary Ichikawa mentioned that they have been using scales to age fish for a few years in LMB, but that it would be difficult to use scales to age trout. It might be possible to use

otoliths. Chris Schmitt responded that some trout lay down a mark in scales after release, due to differing growth patterns, and that it is possible to age trout from scales (annuli). Chris suggested taking scales from above lateral line; below dorsal fin.

Jim Wiener urged BOG to look for information to increase understanding; look at value of historic data, particular for individuals (better than composites); more intensive spatial sampling frame. Jim said that Ross Nostrom emailed to question value of legacy pesticides and selenium as he expects them to be very low.

The group discussed whether selenium information could be used to increase understanding of mechanisms of demethylation of Hg. Jim Wiener said that there is still limited understanding of the role of selenium in MeHg toxicity. Jim also stated that in Swedish lakes they tried applications of selenium. They showed less Hg uptake by fish but it affected reproduction. There is evidence that Se and MeHg are synergistic or additive at embryo stage, but may reduce effects of MeHg on adults. Jury still out.

Michelle Wood would like to see Se done to support Hg TMDL work. Chris Foe supported inclusion of Se. Chris stated that 350mm LMB have same amount of Se in different systems (based on FMP). Terry Fleming stated that an ecologically-based Se criteria is coming.

The group agreed that there was sufficient interest in selenium, so it will be kept in the sampling plan.

Jay Davis responded to concerns by stating that previous work has not been comprehensive, spatially or across contaminants. Also, the data are approaching being 10 years old or more. There is a push to do rivers and streams based on stakeholder interest, and it is the last piece of the statewide survey; and sets up a recurring cycle.

Jim Wiener asked which of three habitats surveyed has the highest fishing pressure. Bob Brodberg responded that based on harvest and use, the coast has the most pressure. However, being that the San Joaquin and Sacramento are big rivers with many access points, it is also heavily fished. But not as much people tend to keep fish at higher elevation, though some tribes do (Pit Rver, Oroville, Trinity). Bob ranked them as coast; lakes; rivers/streams in order of decreasing fishing pressure. Jon Marshack added that in his personal experience, Sierra streams above Dams have high pressure, at certain times of the year. Bob Brodberg agreed that fishing above dams has high pressure several times of year; but coast/piers are very accessible to most people, even without a license, and thus overall has more fishing than rivers. Chris Foe commented that rivers/streams only have sport fishing; whereas coast has commercial and party boats as well as recreational fishing. Terry concluded that there maybe money for fishing pressure study in Region 9, which he will look into it. Bob Brodberg says some quantitative information already exists (e.g. FMP, Delta, Fraser Shilling).

Chris Schmitt suggested that the sampling consider less popular sites that are used by subsistence fishers, as they may actually be more contaminated. Chris suspects that sites

suggested by Stienstra would direct us towards more pristine sites. Gary added that in his evaluation of Stienstra's sites, Gary excluded sites that were catch and release only. Mark Stephenson suggested talking to fish and game to find out where the most fishing pressure is in their regions. Michelle Wood commented that she evaluated the amount of fishable area in the Central Valley for her special study, and found that there are large expaces of area, particularly on the Cosumnes River that is not accessible to the public.

Jay Davis concluded the discussion of site selection by stating that this study is a screening study of target locations, similar to the lakes study. Jim Wiener agreed, but reiterated that the study needs to focus the objectives written in the sampling plan, as the study will not answer some questions as currently written.

To conclude the discussion of dropping some analytes to save money, Terry Fleming intimated that he thinks it is worth doing the legacy pesticides if it lays to rest for good the question of whether they are a risk to human health anymore. Jay Davis indicated that we could only do 5 or 6 sites if we dropped the legacy pesticides. Bob Brodberg suggested that we look at the lakes data to see if they are associated with any rivers or streams that we would want target.

During discussion of the sampling of hatchery fish, Terry Fleming asked whether we can get agreement from hatcheries to fund sampling of their fish, which would reduce costs. Gary Ichikiwa said he plans to go to hatchery first to sample, as he wants to get returning fish that have been in the system for awhile. In general, hatcheries are very sensitive to sampling of their fish, so may not want to provide the fish.

Charlie Alpers described the study that he will do that hopes to coordinate with the BOG sampling. Charlie described a study where his group will be sampling of 15-20 sites for Hg in water and fish that is need data for listing. Also will be collecting total Hg in sediment and reactive Hg concentrations as sediment data could be used for additional listing criteria. Charlie plans to evaluate correlations and anticipated potential thresholds for fish tissues around 0.2-0.3 ppm.

In addition, Charlie's study will use data from the NAWQA program. That study sampled 200 sites across the state. Their data (found in a 2009 publication) were able to differentiate concentrations in fish from mine-impacted vs. non-mining impacted watersheds. They developed relationships of MeHg in water – Hg in fish (which were solid), and also found normalizing for DOC to improve relationships. They also found MeHg in sediment was related to LOI and sulfur (measured as AVS).

Charlie also plans to include information documented in Ron Churchill's paper in 2000 that described Hg loss as a function of time and gold production. Data from 1849 – 1948 was broken up into different decadal time slices. Other mining data suggested that less than 200 mines account for > 99% production of gold, so plans to subset out the mines by production size.

Michelle Wood gave an overview of the coordinated monitoring that is planned through Region 5. In comparison to Charlie's work it is bare bones sampling. Of the 30 sites pre-selected for rivers and streams in Region 5, Michelle picked 13 of them for further study. Sampling will consist of MeHg in water and sediments and two species of fish (but not at all sites). Charlie Alpers suggested that he and Michelle coordinate and take splits of samples so that he can do ancillary parameters that Michelle does not have budget for.

2.

Jim Wiener began the discussion of next steps by listing a number of potential research areas:

1) wetlands (sensitive habitat, being restored) and aquatic life (likely under-estimated Hg risk due to working on organisms that are more tolerant); endpoint of concern are reproduction effects.

Jim Wiener used the example of song birds as information we have gained through consistent monitoring of a wildlife indicator. Traditionally thought of as a terrestrial indicator, song birds were found to have higher concentrations than piscivorous birds. Showed the importance of songbirds as a biosentinel, they forage on spiders and on margins of wetlands and enclosed bays.

2) need better trend indicators, such as shiner surfperch; especially for Hg and PCBs. Jim suggested using age-1 fish or forage fish; as they are relevant to fluctuating water levels. Also, could seek to revisit new sport fish sites and subset of previous monitoring. Consider sampling designs that allow for monitoring biosentinels for trends.

3) Jim Wiener indicated that the BOG needs to get more involved with management (adaptive management) and academics. Also, Jim suggested that the BOG consider updating the historical bioaccumulation document.

Jon Marshack suggested that seek coordination with the state wetland monitoring workgroup.

4) Recommended studies looking at embryonic development (bird egg work), as we need site-specific and trend data.

Chris Schmitt followed with rebuttal and further suggestions.

1) Chris suggested that the BOG revisit schedule for revisiting sites and decide how many sites you need to do for trends.

2) use archiving to re-examine samples for new analytes later in time, even those that we don't have concern about now (e.g. LPs). Important new analytes include synthetic musk fragments; anti-depressants; analgesics; pharmaceuticals (those that accumulate in fish). This is a way to show managers/public that we are aware of the risks; use subset of archive samples to evaluate these from near urban areas.

3) If choose to focus on birds, be careful that where you catch them is not necessarily where they may forage; need telemetry studies for birds just like fish

4) look at histopathological effects (biomarker) studies for bass. Since there is already a lot of monitoring of bass this should be easier to build into current monitoring design. Recall that there are already lots of bass collected in National rivers and streams study. Chris suggested BOG think about new or novel endpoints that we can collaborate with other agencies on.

5) differences in food-web amongst locations needs to be studied, particularly relevant to spatial differences in diet; lipid may tell us about nutritional status/reproduction.

Jim Wiener suggested that ultimately should focus on questions and objectives, and let that lead you to what organism you study. Terry Fleming agreed and stated that the management context is huge; it makes us become indispensable; maybe don't need statewide efforts; just focus on trends; don't want to be slave to SWAMP objectives; BOG is here to support MQs.

Patrick Morris added that a statewide listing policy will be here in the next two years. A State Board fish tissue target needs to be developed; will use conceptual models for TMDL development.

Mark Stephenson suggested that BOG get together with managers in workshop setting to say ask what they need. Jay Davis added that USFWS are possible partners if we do aquatic life; as they have had interest in collaborating with SWAMP in the past.

Chris Foe added that we need to get dischargers to pay for program. Possibly there is an approach that we learn from SCCWRP where we get NPDES to pay for analysis. However, it is will likely only be sellable if focus on CECs, as dischargers are major sources of those, not the legacy contaminants.

Jon Marshack suggested that BOG coordinate with estuaries monitoring workgroup and wetland monitoring group as that would be good way to spread the cost and awareness of BOG. Also, it might be possible to leverage our efforts with previous datasets that are not yet integrated with the program.

Chris Schmitt ended the discussion on involving management in the decision of BOG future directions by stating that he anticipated that managers will not want new problems to be identified. Therefore, Chris predicted that managers would rather stay the course than fund new lines of evidence.

The remainder of the discussion focused on other ideas that could be brought up at future BOG meetings. Terry Fleming asked that we consider the statewide value of the future directions of the BOG, and think about what it would cost to do a probabilistic trend program. Jon Marshack suggested we discuss if there are there agencies we could engage

with that will tell us how the data we collect can be used for landuse decision making. Bob Brodberg commented that the State Board Hg objective will include an effects target for wildlife, so future monitoring may be an opportunity to test it by going to collect wildlife data statewide.