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To: "Wanda Cross" <wcross@waterboards.ca.gov>, "Kathy Rose" <krose@waterboar...
Date: 1/3/2007 3:16 PM
Subject: Re: Fwd: Peer Review of Draft Organochlorine Compounds TMDLs for San Diego Creek and Newport Bay

K. Rose and W. Cross,

As I said I would, I did spend some time (about 8 hours) reading through your document, Total Maximum Daily Loads for Organochlorine Compounds, dated 17 November 2006. First off, and given the diverse and distinguished representation in the original preparation and analyses in this report, along with a diverse and competent group of advisors who met at least three times to discuss various sections of this report in 2006, such a document is highly-likely to be current, scientifically sound, and representative of the most recent risk-assessment approaches to judge, for example, "how much this system can or should be allowed to 'take' from compounds X." And that was my general impression of the report after reading through the document, as I expected. The approach combines physical/chemical characteristics with biological characteristics (ex. BCFs) of the various compounds, and then attempts to tie them together with currently-accepted, recently-developed models (in this case as most recently developed by EPA, the TMDL).

As an ecotoxicologist, I have always been a bit skeptical (from an ecological viewpoint) of the desire by regulatory agencies to assign (realistic) numbers to various physical plus biological phenomena for regulatory purposes, based heavily on sediment or water quality criteria, and general synthetic models. It might, however, be a personal "bias" based on my past experiences with a regulatory agency that emphasized direct and extensive laboratory and field studies with wildlife species (USFWS). But the TMDL approach at least attempts, in my view, to combine, as reasonably as possible, and with a built-in margin of safety (although this potentially introduces an unknown degree of uncertainty), a derivation of some sort of number that regulators and enforcers can work-with. And as ecotoxicologists often state, the unique position of ecotoxicology and its intent is that the "field" be relevant and contributory in our science of risk assessment and then regulation and control of toxic substances, and therefore of high relevance to policy and regulation. It is something we all chide and thus, as any businessman would say: "we had better be able to deliver the goods."

And after-all, we are talking here about pollutants, which do usually act quite as natural organic materials in the way they cycle through ecosystems and individuals, so they can be predicted by and predicated on basic scientific descriptions. But these compounds have been introduced by man's activities and therefore must be controlled and regulated. No, I think the models here, as far as they can go, are scientifically sound and representative of a state-of-the-art approach. And given the fairly large (actually huge) body of toxicological and physiological and physical data on which to develop these models for San Diego Creek and Newport Bay, a reasonable, scientifically-based regulatory value should be possible, given the fact that it can and will be updated with new insights from the rather large research and remediation programs associated with future and current applications and research in this specific watershed. And given that this is a fairly well-studied watershed (in comparison to many others in California, but not as well-studied perhaps, for example, as San Francisco Bay), I would still expect reasonable and useful TMDL values, especially given the many outstanding follow-up studies that are listed in the report. I wonder if some kind of comparative data (a paragraph or two) on TMDLs from other systems in California would be useful. On reading through the report and thinking about other systems in California, I was curious about this.

One of the most serious criticisms of the "regulatory value" approach is the many intermediate steps between say, sediment or water and then biota, and then between biota, that remain unknown, so that the values are inherently questionable and possibly incomplete. Thus some uncertainty is inevitable. But regulation is still necessary and the approach of "best available data" is thoroughly justified. But, a good monitoring program is necessary (1) to follow trends and changes as regulation and remediation

(or continuing downward trends occur (based on your regulatory values as well as the best analytical chemistry), and (2) to further understand the mechanisms and patterns (and further filling-in those boxes in the model of those unknown intermediate steps between sediment and biota), and regarding this specific watershed (my guess is that every watershed is different in some unique way and general models need to be "tweaked" to specific systems and their specific characteristics), to refine understanding through scientific hypothesis-testing and modeling.

That said, I think you are doing that here. It adds a lot of strength to the regulatory process (I am not a lawyer, but something mentioned in your report, a court-case challenge to express scientifically-derived TMDLs on a daily rather than longer-term basis struck me oddly--without more knowledge on this specific example--that well-intentioned and scientific regulatory standards like you have developed here will always be subject to seemingly and often frivolous challenges). Certainly the better the science, the less likely the regulatory values will be challenged.

Given that these TMDLs reviewed here are for "legacy" organochlorines, it is important that the sources be identified as best as possible, but this is difficult, not because of lack of scientific data but because of "legacy regulatory omissions" from the past. I hope that research associated with these TMDLs will be able to "zero-in" a bit better, now that we have more modern regulatory bases and better science to assign regulatory values to ecological phenomena. I assume that the regulatory program has in-it this better data-base on which to operate for currently-used and more easily source-identifiable compounds which are no-doubt being introduced into the current system. This is mentioned in your report and I assume the TMDLs for things like Se, etc. will be (are being) developed. I would expect TMDLs for these to be even more supportable through more complete data.

It wasn't immediately apparent to me as a reader of the report (but I didn't study it real carefully), but I assume that some of the current studies will be doing PCB-isomer specific, dioxin, co-planar PCBs, etc. analyses in a representative high trophic-level indicator species in the system (preferably in the lower reaches of the system, where maximum bioaccumulation would be expected to occur). The same idea would apply to sophisticated analytical studies that attempt to identify new compounds expected in the system, such as jet fuel components (from the military bases in the watershed) and PDBE-like compounds which are increasingly being show important in other systems, and expected from this watershed. Some of the more sensitive and sophisticated chemical analyses and determinations should be possible from tissue analyses through the (probably already completed) SCCWRP studies which should be reporting to you at the end of this coming March. I don't know which bird species SCCWRP is studying, but (perhaps too late here but still possible for a future study) a common species in the system rather than, say, endangered or listed species should be used as a continually monitored indicator or sentinal species. In these cases, dynamics, etc. of various compounds are essentially the same in species less likely to be affected and therefore more amenable to detailed study, with more data and samples possible, than the species experiencing potential problems, listed, etc. In that regard, I found the limited data on clapper rails to be minimally (or not even) useful for determinations related to the TMDLs in this report. Use of more common bird species, for example, a bit "lower on the food-web" would seem to be instructive. Pharmacodynamics and effects in these species still operate pretty much on a dose/response basis and are highly predictable (for example, the "gull models" developed by the CWS). Isotope studies can also better place your upper-trophic species (fish or fowl) into a more quantifiable trophic position. Basing regulatory values on only listed-species, again moves you from an ecological, scientific basis to a more policy basis. Don't just consider the listed species in the system. They will yield you the lesser amount of useful regulatory data. Of course, don't ignore them completely either.

I did have a few specific questions that might deserve some further explanation:

1. Could you include a short discussion on why the EPA TMDLs of 2002 were basically redone by the Santa Ana WQCB? What were the differences,

briefly, in approach and methodology? Is this a routine or sensitive subject? Just knowing the current situation, I would guess that the state's approach is more conservative and perhaps more complete and scientific. I just wondered about this as I read through the report.

2. On Table 2-2, I wondered why PCBs and PCB-like compounds were not interpreted through the TEQ approach. Would at least this not warrant some further study with very sophisticated analytical chemistry (say, in a representative series of samples or some representative pools?). I know it is expensive. I see that in Table 2-5, the TEQs for birds and mammals are mentioned. Realizing that the clapper rail samples were the only wildlife values represented, there would be no other data to evaluate for TEQs unless a high trophic, resident fish (page 20) could be evaluated on this basis. What am I missing here? I just have to accept the other values in the same table.

3. On page 24, when "adverse effects were caused by DDT or its metabolites", does this mean the different forms are analyzed and interpreted separately. With DDE, some agencies (I think EPA and some state agencies I have talked-to) have developed eggshell thinning indices as an easily-measurable endpoint for DDE effects, because shell thinning has been so well and extensively studied. This would be quite easy to do with some kind of indicator species (page 26), such as one of the ardeids in the Newport Bay (upper?) system. I just do not know which species nest there, but would guess there is a colony of DCCO or ardeids (such as BCNH or GBHE, that could be sampled, perhaps a tern other than LETE) that could be studied (and sampled).

4. The current field data demonstrate very convincingly that OC residues have and are declining in the system and that levels have become very low, and expectations are that TMDLs will continue to show this (perhaps accelerated by remediation). I wouldn't expect direct toxic effects any more (even eggshell thinning) but perhaps some endocrine disruptions and perhaps biomarker effects that would be physiologically demonstrable but perhaps might not be ecologically relevant, i.e., such minor effects might logically be compensated-for in the biota. Don't know if this is worthy of discussion, however, as it just brings up more unknowns.

5. Regarding the use of sediment residues, sampling them is good because of the known relationships between sediment samples and organisms that seem in most cases better than water samples, but I also wonder if the sediments aren't "sequestering" some of the contaminants in some instances. It would seem that this is an interesting question to pursue and it might relate to declining residues in the biota so adequately demonstrated in this report. I think that "story" is worth a publication, by the way.

6. In the bay, exceedences seem clear enough, as speculated, through bioaccumulation, but it is not clear if they are local in some cases. San Diego Creek and the drainages of the Tustin Plain seem clearly impeded, and the most conservative ("safest") approach seems to develop TMDLs for anything that exceeds or might be expected to exceed safe levels. The development of informational TMDLs is also a good idea. The more information, the better.

7. I wonder about looking at PDBEs. Perhaps it is already being done.

8. I would say the most important work regarding sensitive wildlife work (birds, amphibians?, reptiles?) is not done. Will the SCCWRP study help out on this question?

9. A minor typo? Page 44, first sentence after "DDT." If you have information that DDT use began in the 1930s, I would be astonished; as it's insecticidal properties were only discovered in 1939 and it was a military secret throughout World War II. I'll bet you mean the 1940s (after the war was over).

10. On page 46, end of second paragraph, several statements seem a bit unclear. First "brown pelican seems to be the most susceptible to adverse biological effects." I don't think this is true. For example, DCCO may be more susceptible or at least equally susceptible. The brown pelican is the

most-studied, and therefore the most well-known to have been affected by these legacy pollutants. BRPE is now being reviewed by CA and USFWS for de-listing because of its recovery from DDE. Brown pelicans barely use the study area (the coastal parts) and do not breed there (but fairly close). And the statement of a threshold of 3 ppm ww for eggshell thinning in the BRPE, I am sure comes from studies in the east by Blus and colleagues. The reference given is EPA 2000, but there are two (unlikely) references given, 2000a and 2000b. Given this is not even a major part of the TMDL evaluation, one wonders why it is even (a bit carelessly) mentioned. I do know this literature very well, and it gives me a little "pause" regarding citations I am much less familiar-with. Just a word of caution here not to appear careless! I am on your side.

11. However and overall, this is an impressive document, I think well supported by the science of ecotoxicology, the data, and the data analysis; and then, to even be further documented with the impressive follow-up studies now underway and soon to be in your hands. I have no serious problems with the report, and it promises to get even better with more science coming-in.

Let me know if you have any questions.

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