*Bryan Speegle, Director*

# *COUNTY OF ORANGE*

***RESOURCES & DEVELOPMENT MANAGEMENT DEPARTMENT***

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January 31, 2006

**303 (d)** Deadline:
1/31/06



Selica Potter, Acting Clerk to the Board
State Water Resources Control Board
Executive Office
1001 I Street, 24th Floor
Sacramento, CA 95814

**RE: COMMENTS ON PROPOSED CHANGES TO 2006 303(d) LIST FOR PORTIONS OF THE NEWPORT BAY WATERSHED**

Dear Ms. Potter:

The County of Orange Resources and Development Management Department is pleased to submit these comments on the State Water Resources Control Board's proposed changes to the 2006 303(d) list for portions of the Newport Bay Watershed. Our comments incorporate and expand on our oral testimony provided at the January 5, 2006 SWRCB Workshop held in Pasadena, California. These comments have been coordinated with the City of Irvine, the City of Tustin, the City of Newport Beach, the Great Park Corporation, and major landowners within the watershed. Specialized consultants have also contributed to the technical evaluations.

We have organized these comments into two sections. First, we are pleased to be active participants in ongoing efforts to address water quality issues and impairments within the watershed and within Newport Bay, and a brief overview is provided of ongoing and planned activities that are related to the water bodies and constituents proposed for listing by the State Board. Second, we provide technical comments on specific proposed listings, and a summary of trends over time, additional data, and additional information that is material to the State Board's listing recommendations.

**Overview of Ongoing and Planned Actions Taken By Stakeholders Addressing Toxicity in the Newport Bay Watershed.**

Multi-faceted dynamic programs and voluntary stakeholder initiatives currently exist that give the Santa Ana Regional Board and stakeholders throughout the Newport Bay Watershed the ability to comprehensively address toxicity within the watershed. The health of the watershed is improving, due in large part to these existing programs and initiatives, and regulators' and stakeholders' have a proven track record of working cooperatively together to address toxic constituents of concern as they are identified.

The proposed compound-specific 303(d) listings focus on five primary contaminants[1], which as discussed below are likely not the contaminants causing toxicity problems in the watershed. The proposed listings may divert resources away from the contaminants actually causing toxicity problems, and may unnecessarily hamstring the Regional Board's and stakeholders' ability to proactively address other toxic chemicals as they are currently doing.

The Newport Bay Watershed currently has a 303(d) listing for general pesticides and unknown toxicity. The so-called toxics TMDL was established and approved by U.S. EPA on June 14, 2002, to regulate concentrations and loads of fourteen constituents that were identified by EPA as having the potential to cause toxicity within the Bay. The general toxicity listing (rather than listings for specific individual constituents) has allowed EPA, the Regional Board, and stakeholders to address potentially toxic contaminants in a dynamic fashion, focusing resources on those issues as developing science dictates. That flexible program works, and is responsible for a number of initiatives that the Regional Board and stakeholders are tackling. For example:

- Chlorpyrifos and diazanon were identified as agents that caused toxicity within the watershed, yet were never specifically listed under section 303(d). Nonetheless, the Regional Board was able to address these compounds through the flexibility afforded by the toxics TMDL.
- Selenium, a naturally occurring contaminant due to prehistoric marshland, is another compound not specifically listed on the current 303(d) list, yet which was present at concentrations above water quality objectives (specifically, above levels defined in the California Toxics Rule, or CTR). Stakeholders, including the Irvine Ranch Water District and many of the parties that have coordinated on this letter, have committed over $2 million dollars in a major, multi-year effort to study new ways to remove this chemical from the watershed and to implement known treatment methods today. As part of that effort, the Irvine Ranch Water District is incorporating selenium treatment into its innovative Natural Treatment System, a series of constructed wetlands in the Newport Bay Watershed.
- A third effort involves a $90,000 stakeholder funded analysis of the role that the legacy pesticide DDT is currently playing in the watershed. The study will review available data on DDT concentrations within the watershed (including the data discussed in this letter), will review the basis of the relevant guideline values, and will evaluate the available data regarding the potential of DDT to be the source of toxicity in the watershed.
- A fourth effort is an $800,000 stakeholder funded field program and toxicity identification study, known as the Phase II Workplan, that is being planned to study the toxic agents that are believed to be the current causes of toxicity in the watershed. Previous studies have indicated that organophosphates and certain "replacement" pesticides are likely the cause of significant toxicity within the watershed, and that DDT, PCBs, and other organochlorines are unlikely to be the causes of current toxicity. Scientists believe that replacement pesticides such as pyrethroids and carbamates are likely the prime agents responsible for toxicity

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1 The proposed 303(d) listings include PCBs, DDT, toxaphene, copper, and zinc for different portions of the Newport Beach Watershed. See the State Board's staff report.

observed in the watershed today. The Phase II Workplan will develop sound science to test that hypothesis, and also to improve the tools necessary to identify the chemicals that cause toxicity.

These four initiatives are largely stakeholder funded and are examples of the aggressive and proactive work regulators and stakeholders are engaged in to address all potential causes of toxicity in the watershed through the existing regulatory framework. The general listings for unknown toxicity and pesticides give the Regional Board and stakeholders the flexibility to focus resources on those chemicals that are causing problems, as new information is obtained. This dynamic, iterative process allows resources to be quickly deployed to address compounds as needed.

We are concerned that the compound-specific 303(d) listings proposed by the State Board may unnecessarily take the focus off other potential toxicity causes, and instead require that efforts be focused on a handful of compounds to the exclusion of others (including those that cause significantly more impairment within the watershed). As discussed below, we believe that existing science and data do not support these proposed listings, namely, that these compounds are the cause of toxicity in the watershed. If the listings are approved, agency resources may be consumed in connection with the intensive process for developing TMDLs for and/or delisting these compounds that will almost certainly follow.

**Technical Comments:**
We would first like to note that we appreciate the clarity and objectivity brought by the State's New Listing Policy (September 2004). While we do not agree with all of the recommended listing decisions, the Board's recommendations – and the basis for those recommendations – is far clearer than in previous listing cycles. Nonetheless, we are concerned that several of the data references are inaccurate, cannot be located, and mischaracterize the data. Inaccuracies in descriptions of the data, difficulties identifying the data referred to in the State Board's staff report, and misuse of certain data sets have hampered our ability to understand and comment upon the proposed listings. Specific examples are detailed in Attachment A.

Our technical comments are presented in detail in three attachments to this letter. Attachment A presents a detailed analysis of several of the proposed listings, incorporating concerns about the data used, the conclusions reached by the State Board in support of listing, and our recommendations for alternative approaches. Attachment B provides a detailed analysis of trends in organochlorine concentrations over time, including a statistical evaluation of the observed trends in the data and the changes within the watershed that have resulted in those trends. Attachment C provides additional analysis of the potential toxicological effects of DDT on aquatic systems.

**The application of fish tissue data in the 303(d) listing process has several areas of concern.**

We question the appropriateness of the use of the OEHHA screening values from the 1999 paper "Prevalence of Selected Target Chemical Contaminants in Sport Fish from

Two California Lakes: Public Health Designed Screening Study" by Brodberg and Pollock. The paper states: "The SVs (Screening Values) are not intended as levels at which consumption advisories should be issued but are useful as a guide to identify fish species and chemicals from a limited data set, such as this one, for which more intensive sampling, analysis or health evaluation are to be recommended." (Brodberg and Pollock, 4) Additionally, the screening values were calculated specifically for the California Lakes Study and were not intended to be used to determine beneficial use impairment in the lakes or other water bodies throughout the state. (Comment applies to listings for Balboa Beach (Dieldrin, PCBs), and Upper Newport Bay (PCBs)).

We also question the application of the National Academy of Science (NAS) Guideline as an evaluation guideline for protection of aquatic life from bioaccumulation of toxic substances. The NAS guidelines were published in 1973 and are based on information and data collected in the 1960s. A comparison of the NAS guidelines to more recent evaluations of concentrations of chemicals in aquatic organism tissue and their apparent effects on aquatic life by the US Army Corps of Engineers and the US Environmental Protection Agency, shows wide discrepancies between the NAS values and more recent information. We do not feel that the NAS guidelines are reliable values for evaluating the potential impacts of chemicals on aquatic life. We recommend the SWRCB evaluate the USACOE Environmental Residue-Effects Database and the paper "Linkage of effects to Tissue Residue: Development of a Comprehensive Database for Aquatic Organisms Exposed to Inorganic and Organic Chemicals" by Jarvinen and Ankley, 1999. (Comment applies to Peters Canyon Channel (DDT and Toxaphene), Santa Ana-Delhi Channel (Toxaphene)).

Lastly, we feel that fish tissue data alone should not be used for listing without corresponding water column and/or sediment data confirming the presence of the contaminant. Due to the migratory nature of most fish, particularly sport fish, the presence of contaminants in fish tissue caught at a particular location does not necessarily indicate that the exposure to the contaminant occurred at that location. Based on this comment, the following proposed listings should be re-evaluated: Balboa Beach (DDT, Dieldrin, PCBs), Lower Newport Bay (DDT, PCBs), Upper Newport Bay (PCBs), Peters Canyon Channel (DDT, Toxaphene), and Santa Ana-Delhi Channel (Toxaphene),

**DDT should not be listed in Lower Newport Bay, Upper Newport Bay or Peters Canyon Channel.**

The use of DDT was banned by the United States EPA in 1972 and its presence in waters throughout the Region is declining. There is no evidence of changes in recent years that have resulted in increases of loading of the pollutant in the watershed, and in fact the opposite is the case as studies have shown a declining trend of DDT concentrations in the watershed in samples collected over a 20-year period. Soil samples from agricultural areas within the watershed also provide evidence that the presence of DDT is in decline. The trend away from agricultural uses to urban uses within the watershed also indicates that the transport of DDT to receiving waters will continue to decline. The data cited by the State Board in support of the DDT listing are useful in establishing the rate at which concentrations are declining, but these trends must be considered in conjunction with the available data. The State Board should not list these pollutant-waterbody combinations but should continue to evaluate any additional data to further confirm that the levels of DDT are in fact declining in the watershed.

**Toxaphene should not be listed in Peters Canyon Channel or Santa Ana-Delhi Channel.**

The same holds true for the recommended listings for toxaphene in the Newport Bay watershed. Toxaphene's use in the United States was banned in 1990, and concentrations in the watershed have been declining since the ban. Similar to DDT, soil concentrations of toxaphene are declining over time. The steady conversion of land from agricultural uses to urban uses additionally reduces the mass of toxaphene that can be transported in storm flows. As discussed above, EPA's 2006 Guidance provides that under these facts it would be appropriate to conclude that Peters Canyon Channel and Santa Ana-Delhi Channel are meeting the applicable standards for toxaphene and that listing is not warranted. The State Board should not list these pollutant-waterbody combinations but should continue to evaluate any additional data to further confirm that the levels of toxaphene are in fact declining in the watershed.

**PCBs should not be listed in Lower Newport Bay or Upper Newport Bay.**

Similar to DDT and toxaphene, the use of PCBs in the United States was banned in 1979, and concentrations in fish from the watershed have been declining since the ban. In fact, concentrations projected over the next 70 years would be below OEHHA's standard for human consumption. Thus, the State Board should not list these pollutant-waterbody combinations but should continue to evaluate any additional data to further confirm that the levels of PCBs are in fact declining in the watershed.

**Copper should not be listed in Lower Newport Bay or Upper Newport Bay.**

As noted in Attachment A, the evidential basis for these proposed listings is not substantial enough to warrant listing.

**Zinc should not be listed in San Diego Creek, Reach 1.**

As noted in Attachment A, the evidential basis for this proposed listing is not substantial enough to warrant listing.

We appreciate the opportunity to comment on the State Board's proposed 303(d) listings for the Newport Bay watershed, and we look forward to working with the Board to ensure that the listings are appropriate such that resources will be efficiently directed to solving the actual causes of toxicity in the watershed.

Very Truly Yours,

Chris Crompton, Manager
Environmental Resources

Attachments:

Attachment A Detailed review of individual proposed listings
Attachment B Analysis of trends in organochlorine concentrations over time
Attachment C Comments from James L. Byard, Ph.D, B.A.D.T, Toxicology Consultant

## Attachment A
## Detailed review of individual proposed listings

Specific comments on proposed listings related to Newport Bay and its tributaries are discussed below. These comments are arranged according to water body-constituent pairs.

### NEWPORT BAY, LOWER: COPPER

Board Recommendation: List.
Board Lines of Evidence: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation]

1. Zero of three sediment samples exceed the ERM sediment quality guideline of 270 ug/g (Bay and Greenstein, 2003) [data received]
2. **Two water samples exceeded the CTR aquatic life saltwater criterion of 3.1 ug/l** [data received];
3. Five of 15 sediment exhibit toxicity in various species (Bay and Greenstein, 2003) [incorrect data reference; data not received]

Comments:

1. Toxicity data referred to are not contained in Bay and Greenstein (2003) or Bay et al. (2004). The toxicity samples referred to by the State Board were taken in 1994, 1996, and 1997. Bay and Greenstein (2003) report no toxicity results from their 2001 and 2002 sampling, and Bay et al. (2004) report toxicity results from sampling conducted in 2000 and 2001. Thus, the toxicity data reference is incorrect.
2. The two water sample exceedances were collected on the same day, and were only slightly above the CTR CCC criterion of 3.1 ug/l (samples were 3.12 and 3.31 ug/l). Two samples collected on the same day are not temporally representative of conditions within the water body.
3. Of three sediment samples cited in Bay and Greenstein (2003), none exceeded the ERM sediment quality guideline for copper of 270 ug/g.
4. While sediment toxicity data referred to by the State Board could not be located, sediment toxicity found by Bay et al. (2004) is not clearly linked with copper, and thus does not constitute a confirming line of evidence. Although the study suggests some correlation between metals and toxicity, the correlation is not strong and additional work is required to confirm the source of toxicity. Given this uncertainty, it is inappropriate to use toxicity as a basis for listing.

Recommendation: Do not list, but continue to collect additional data.

### NEWPORT BAY, LOWER: DDT

Board Recommendation: List.
Board Lines of Evidence: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation]

1. **Two of five fish tissue samples exceeded the 100 ng/g OEHHA screening value** (Coastal Fish Contamination Project) [data received]
2. Three sediment samples, with no applicable sediment quality guideline (Bay and Greenstein, 2003) [data received];

3. **Sixteen of 51 fish tissue samples exceeded the 100 ng/g** OEHHA screening value (TSMP, 2002; in Allen et al., 2004 (SCCWRP TR #436)) [data received]
4. **Sediment toxicity is evident from a study by Bay and Greenstein (2003)** [incorrect data reference; data not received]
5. **Biological community degradation is evident in four of 16 samples** [incorrect data reference; data not received]

Comments: From our review, this listing is inadequately grounded.

1. Toxicity and biological community degradation data referred to (4. and 5. above) are not contained in Bay and Greenstein (2003) or Bay et al. (2004). The samples referred to by the State Board were taken in 1994, 1996, and 1997. Bay and Greenstein (2003) report no toxicity results from their 2001 and 2002 sampling, and Bay et al. (2004) report toxicity results from sampling conducted in 2000 and 2001. Neither report refers to biological community degradation. Thus, the toxicity and degradation data references are incorrect.
2. As detailed in Attachment A, clear trends of declining DDT concentrations are evident in all fish species. Older samples generally exhibit significantly higher concentrations than newer samples, and newer samples should be weighted more heavily than older data.
3. Fish tissue exceedances are listed as inhibiting the MA, RA, SP, and WI beneficial uses, all of which are related to marine habitat. However, the OEHHA screening value is a human health hazard standard, and should be used to evaluate concentrations of DDT in sport fish only (i.e., in fish that might be consumed by humans). This also highlights the need to distinguish between forage fish (whole body concentrations) and sport fish (fillet concentration).
4. As detailed in Attachment A, fish tissue concentrations of DDT have been declining significantly in the 30+ years since DDT use was banned in the US. Concentrations are expected to decline into the future, so that humans would not be able to consume fish at OEHHA concentrations for a 70-year lifetime. As detailed in Attachment A, the current concentration that would result in exposure to the OEHHA guideline of 100 ng/g over a 70-year lifetime is 1200 ng/g. Concentrations of recent samples of resident sport fish are well below this value (see Attachment A). Thus, there is no basis for the proposed listing.
5. Evidence of biological community degradation and toxicity is from samples taken in 1994, 1996, and 1997. These samples are too old to be relevant to the current listing decision. Further, there is no evidence that DDT is responsible for these observed effects—in fact Bay et al. (2004) explicitly note that toxicity was *uncorrelated* with DDT in their results. Most data indicate that compounds other than DDT are responsible for both sediment toxicity and community effects (Bay et al., 2004).
6. Need to include any additional data that they should consider in the listing process.

Recommendation: Do not list, but continue to collect additional data.

**NEWPORT BAY, LOWER: PCBs**

Board Recommendation: List.

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation]

1. **Three of five fish tissue samples exceeded the 20 ng/g OEHHA screening value** (Coastal Fish Contamination Program) [data received].
2. Zero of three sediment samples (reported in Bay and Greenstein, 2003) exceeded the sediment quality guideline of 400 ng/g published in McDonald et al. (2000) [data received].
3. **Ten of 50 fish tissue samples exceeded the 20 ng/g OEHHA screening value** (TSMP, 2002; in Allen et al., 2004 (SCCWRP TR #436)) [data received].
4. **Sediment toxicity is evident from a study by Bay and Greenstein (2003)** [incorrect data reference; data not received]
5. **Sixteen of 72 fish tissue samples exceeded the 20 ng/g OEHHA screening value.** [data not received]

Comments:

1. The third line of evidence (3. above) mistakenly cites ten of 50 fish tissue exceedances, when the correct numbers are nine of 51 fish tissue exceedances (Appendix 7, 8, and 12, Allen et al., 2004).
2. Toxicity data referred to (4. above) are not contained in Bay and Greenstein (2003) or Bay et al. (2004). The samples referred to by the State Board were taken in 1994, 1996, and 1997. Bay and Greenstein (2003) report no toxicity results from their 2001 and 2002 sampling, and Bay et al. (2004) report toxicity results from sampling conducted in 2000 and 2001. Thus, the toxicity reference is incorrect.
3. Exceedances in (1.) above were from 1999, and thus are too old to justify a current listing. Also, exceedances are assessed based on an OEHHA value, which assumes 70 years of consumption at these concentrations, when concentrations are shown to be declining (see PCB trends trends analysis performed in Appendix A of this report). Assuming that declining trends continue into the future, a current PCB concentration of approximately 145 ng/g would still allow the OEHHA value to be met, on average, over the next 70 years.
4. Although the sediment toxicity data reference (in 4. above) is incorrect, other evidence suggests that sediment toxicity is not related to PCBs. For example, sediment toxicity reported in Bay et al. (2004) is not clearly linked with PCBs—in fact the authors explicitly note that toxicity was *uncorrelated* with PCBs in their results. Thus, sediment toxicity does not constitute a confirming line of evidence; the State's Listing Policy (2004) allows listing of a constituent when sediment toxicity is observed and when sediment quality guidelines are exceeded. However, none of three sediment samples exceeded a sediment quality guideline for PCBs of 400 ng/g (apparently taken from MacDonald, D.D. L.M. Dipinto, J. Field, C.G. Ingersoll, E.R. Long, and R.C. Schwartz. 2000a. Development and evaluation of consensus-based sediment effect concentrations for polychlorinated biphenyls. Environmental Toxicology and Chemistry. 19(5): 1403-1413); thus, there is no evidence of sediment contamination. Again, sediment quality objectives for the State are under development, but the methods under development should be used in listing decisions.

Recommendation: Do not list, but continue to collect additional data.

**NEWPORT BAY, UPPER: COPPER**

Board Recommendation: List.

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Two of four water samples from 2001-2002 exceeded the CTR aquatic life saltwater criterion of 3.1 ug/l** (Bay and Greenstein, 2003) [incorrect data reference; data not received];
2. Zero of two sediment samples exceeded the ERM sediment quality guideline of 270 ppm (Bay and Greenstein, 2003) [data received].
3. **Zero of two water samples (Nov. 2001, Mar. 2002) exceeded CTR aquatic life saltwater criterion of 3.1 ug/l** (data source not cited, though it seems to be Bay and Greenstein, 2003) [data received].
4. Sediment toxicity is evident from a study by Bay and Greenstein (2003) [incorrect data reference; data not received].

Comments: This listing is based on very few data.

1. The first data set above is an incorrect reference to Bay and Greenstein (2003). Bay and Greenstein record only two water samples for the Upper Bay, and neither exceeded the CTR criterion (these samples appear to be referred to in 3. above, though no citation is given in the State Board fact sheet). The sampling dates cited in the fact sheet (between August 2001 and October 2002) do not correspond with sampling reported in Bay et al. (2004), so the actual reference for this first line of evidence—upon which the entire listing proposal rests—is unclear.
2. Toxicity data referred to (4. above) are not contained in Bay and Greenstein (2003) or Bay et al. (2004). The samples referred to by the State Board were taken in 1994, 1996, and 1997. Bay and Greenstein (2003) report no toxicity results from their 2001 and 2002 sampling, and Bay et al. (2004) report toxicity results from sampling conducted in 2000 and 2001. Thus, the toxicity reference is incorrect.
3. Only two (purported but not verified) exceedances of the CTR aquatic life saltwater criterion form the basis of this listing, which are very few data. Moreover, the sample size of four is very small
4. Of two sediment samples reported in Bay and Greenstein (2003), none exceeded the ERM sediment quality guideline for copper of 270 ug/g;
5. Sediment toxicity data (cited by the State Board but not verified) is from samples taken in 1994, 1996, and 1997, and are thus too old to be relevant to a current listing. Moreover, sediment toxicity found by Bay et al. (2004) is not clearly linked with copper, and thus toxicity does not constitute a confirming line of evidence. Although the study suggests some correlation between metals and toxicity, the correlation is not strong and additional work is required to confirm the source of toxicity. Other constituents were regarded by Bay et al. as much more likely causes of sediment toxicity.
6. The SWRCB sediment quality objectives should be the basis for listings based on sediment data.

Recommendation: Do not list, but continue to collect additional data.

**NEWPORT BAY, UPPER: DDT**

Board Recommendation: List.

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Biological community degradation is evident in four of 16 samples** (Bay and Greenstein, 2003) [incorrect data reference; data not received].
2. **Five of 15 sediment samples reflected toxicity to several species** (Bay and Greenstein, 2003) [incorrect data reference; data not received].
3. **Three of seven fish tissue samples exceeded the 100 ng/g OEHHA screening value**, including composite samples of diamond turbot (1997) and striped mullet (2002), and an individual sample of spotted sand bass (2002) (TSMP, 2002) [data received];
4. **Eight of 23 fish tissue samples (2000-2002) exceeded the 100 ng/g OEHHA screening value** (Bay and Greenstein, 2003) [data received].
5. Three sediment samples were collected but there is not applicable sediment quality guideline for total DDT (Bay and Greenstein, 2003) [data received]

<u>Comments</u>:

1. Sediment toxicity and biological community degradation data referred to (1. and 2. above) are not contained in Bay and Greenstein (2003) or Bay et al. (2004). The samples referred to by the State Board were taken in 1994, 1996, and 1997. Bay and Greenstein (2003) report no toxicity results from their 2001 and 2002 sampling, and Bay et al. (2004) report toxicity results from sampling conducted in 2000 and 2001. Neither report refers to biological community degradation. Thus, the toxicity and degradation data references are incorrect.
2. The reference to Bay and Greenstein (2003) in 4. above is incorrect. Bay and Greenstein (2003) has no fish tissue data. The data referenced actually seem to be to Allen et al. (2004).
3. Evidence of biological community degradation is from 1994, 1996, and 1997. These samples are too old to be relevant to the current listing decision. Further, biological community degradation is not linked with DDT and is more likely caused by other constituents.
4. Although the sediment toxicity data cited by the State Board was not verified, sediment toxicity reported by Bay et al. (2004) is not clearly linked with DDT—in fact the authors explicitly note that toxicity was *uncorrelated* with DDT in their results. Thus sediment toxicity does not constitute a confirming line of evidence.
5. The diamond turbot sample listed above in 3. is quite old (1997), and concentrations in this sample are likely not representative of current concentrations. Also, according to Allen et al. (2002), striped mullet are not year-round residents of Newport Bay, and so the exceedance for this species does not necessarily indicate DDT from the Newport Bay watershed. Thus, from this data set, only a single (not a composite) sample of spotted sand bass (which is a resident of Newport Bay, per Allen et al.) exceeded the OEHHA value, and was both a resident and a recent sample. A single sample is not sufficient basis for a listing decision (see Table 3.1 of State Listing Policy).
6. Moreover, the fact that there has been a significant decline in DDT fish-tissue concentrations over the past 30 years is not accounted for, either in the use of the OEHHA screening value or in analysis of general trends over time. For example, as noted in Attachment A, assuming a continuing declining trend in the future, fish tissue concentrations could meet the OEHHA screening value on average over the next 70 years (the consumption duration OEHHA assumes) if current concentrations were 1200 ng/g;

7. Of the 23 samples relied upon by the Board in Line of Evidence 4., 17 were resident fish, and 5 of those exceeded the OEHHA standard. Exceedances for non-resident fish do not necessarily indicate DDT originating in the Newport Bay watershed;

Recommendation: Do not list, but continue to collect additional data.

**NEWPORT BAY, UPPER: PCBs**

Board Recommendation: List.

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Three of seven fish tissue samples exceeded the OEHHA screening value of 20 ng/g** (TSMP, 2002) [data received];
2. **One of 23 samples exceeded the OEHHA value of 20 ng/g** (TSMP, 2002) [data received];
3. **Sediment toxicity for several species is evident in 5 of 15 samples** (Bay and Greenstein, 2003) [incorrect data reference; data not received]
4. Zero of four sediment samples exceeded the sediment quality guideline (in MacDonald et al., 2000) of 400 ng/g (Bay and Greenstein, 2003) [data received].

Comments:

1. In the second data set (2. above), one of 23 fish tissue samples from M.J. Allen et al. (2004) set exceeded the OEHHA screening value for PCBs of 20 ug/kg. This exceedance was noted by the SWRCB after publishing the summary fact sheet to justify the listing, and thus it did not show up in that document. Also, the OEHHA value is not explicitly cited as the value to which this data set were compared; however, from the SWRCB data source this seems to have been the value used.
2. Sediment toxicity data referred to (3. above) are not contained in Bay and Greenstein (2003) or Bay et al. (2004). The samples referred to by the State Board were taken in 1994, 1996, and 1997. Bay and Greenstein (2003) report no toxicity results from their 2001 and 2002 sampling, and Bay et al. (2004) report toxicity results from sampling conducted in 2000 and 2001. Thus, the toxicity reference is incorrect.
3. Although sediment toxicity data cited by the State Board was not verified, sediment toxicity found by Bay et al. (2004) is not clearly linked with PCBs—in fact the authors explicitly note that toxicity was *uncorrelated* with PCBs in their results. Therefore, sediment toxicity does not constitute a confirming line of evidence;
4. According to SWRCB data, one of the three exceedances in the first data set (1. above) occurred in 1999 and the other two occurred in 2002.
5. Only one of the three tissue exceedances (2002, single-fish sample of spotted sand bass) was for a fish that is believed to be a year-round resident of Newport Bay. The other two samples were of orangemouth corvina and striped sand bass, which are not believed to be year-round residents of the Bay. Thus (as noted in Attachment A) the exceedances in the two non-resident fish do not necessarily indicate the presence of problematic levels of PCBs in the Newport Bay Watershed; the PCBs found in their tissue could have derived from somewhere else.

6. Similarly, the exceeding sample for the second data set (2. above) was for a species of fish (jacksmelt) that is not believed to be a year-round resident of the Bay, and the level of exceedance of the OEHHA value was only 0.1 ng/g. For all other samples in this data set PCBs were not even detected.
7. Thus, on the whole, only one year-round resident single-fish sample out of 20 year-round resident samples constitutes evidence of PCBs in Upper Newport Bay. According to Table 3.1 of the SWQCB listing policy (p. 9), a single relevant sample does not form an adequate basis for listing Upper Newport Bay for PCBs. As Table 3.1 of the listing policy states, for a sample size of 20, at least two exceedances are required to place a water segment-toxicant pair on the 303(d) list.
8. Moreover, the fact that there has been a significant decline in PCB fish-tissue concentrations over the past 30 years is not accounted for, either in the use of the OEHHA screening value or in analysis of general trends over time. For example, as noted in Attachment A, assuming a continuing declining trend in the future, fish tissue concentrations could meet the OEHHA screening value for PCBs on average over the next 70 years (the consumption duration OEHHA assumes) if current concentrations were 145 ng/g;
9. None of four sediment samples exceeded the sediment quality guideline for PCBs of 400 ng/g; thus, there is no evidence of sediment contamination.

Recommendation: Do not list, but continue to collect additional data.

**PETERS CANYON CHANNEL: DDT**

Board Recommendation: List.

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Three of 14 fish tissue samples exceeded the 1000 ng/g NAS guideline** (TSMP, 2002) [data received].

Comments:

1. The Commercial and Sportfishing beneficial use listed in the fact sheet is not included in the Basin Plan for this waterbody. In previous listing cycles, water bodies that are not assigned beneficial uses in the Basin Plan were not placed on the 303(d) List. The listing of water bodies without assigned beneficial uses is contrary to previous actions by the State Board to such draft listings.
2. This listing is based on annual data from 1992 through 2002 during summer months, except for 1996. The morphology of this channel underwent significant change in 1997-98 due to development in the area and the building of Toll Roads. Subsequent to the channel morphology change, only one exceedance was observed in the data (1999-2002). Data collected prior to 1999 no longer reflect the current status of the channel and should be disregarded.
3. The fish tissue objective cited is designed to protect predators, but is woefully out of date (cite 1973 NAS report discussing use of these values). The NAS guidelines are based on information and data collected in the 1960s. A comparison of the NAS guidelines to more recent evaluations of concentrations of chemicals in aquatic organism tissue and their apparent effects on aquatic life by the US Army Corps of Engineers and the US Environmental Protection Agency, shows wide discrepancies between the NAS values and more recent information. We do not feel that the NAS guidelines are reliable values for

evaluating the potential impacts of chemicals on aquatic life. We recommend the SWRCB evaluate the USACOE Environmental Residue-Effects Database and the paper "Linkage of effects to Tissue Residue: Development of a Comprehensive Database for Aquatic Organisms Exposed to Inorganic and Organic Chemicals" by Jarvinen and Ankley, 1999.

4. The three exceedances are from 1992-93 and 1998, and thus are too old to justify a current listing for DDT, as concentrations are declining over time (see Attachment A).
5. No exceedances were observed in the most recent four years of data (1999-2002), and only one exceedance was observed for data from the past 10 years; thus, per the State Listing Policy, listing should not be indicated (two exceedances are required for listing on a sample size of 14).

Recommendation: Do not list based on the Commercial and Sportfishing beneficial use; do not include data prior to 1999 in the evaluation of the waterbody. Due to significant changes in channel morphology, data collected prior to 1999 do not reflect the current status of the channel. Continue to evaluate any additional data that are collected in the future.

**PETERS CANYON CHANNEL: TOXAPHENE**

Board Recommendation: List.

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Nine of 14 fish tissue samples exceeded the 100 ng/g NAS guideline** (TSMP, 2002) [data received].

Comments:

1. The Commercial and Sportfishing beneficial use listed in the fact sheet is not included in the Basin Plan for this waterbody. In previous listing cycles, water bodies that are not assigned beneficial uses in the Basin Plan were not placed on the 303(d) List. The listing of water bodies without assigned beneficial uses is contrary to previous actions by the State Board to such draft listings.
2. This listing is based on annual data from 1992 through 2002 during summer months, except for 1996. The morphology of this channel underwent significant change in 1997-98 due to development in the area and the building of Toll Roads. Subsequent to the channel morphology change, no exceedances were observed in the data (1999-2002). Data collected prior to 1999 no longer reflect the current status of the channel and should be disregarded.
3. The fish tissue guideline cited is from an NAS study conducted in 1973, and is outdated and an inappropriate basis for listing decisions. The NAS guidelines are based on information and data collected in the 1960s. A comparison of the NAS guidelines to more recent evaluations of concentrations of chemicals in aquatic organism tissue and their apparent effects on aquatic life by the US Army Corps of Engineers and the US Environmental Protection Agency, shows wide discrepancies between the NAS values and more recent information. We do not feel that the NAS guidelines are reliable values for evaluating the potential impacts of chemicals on aquatic life. We recommend the SWRCB evaluate the USACOE Environmental Residue-Effects Database and the paper "Linkage of effects to Tissue Residue: Development of a Comprehensive Database for

Aquatic Organisms Exposed to Inorganic and Organic Chemicals" by Jarvinen and Ankley, 1999.

4. The nine exceedances are from 1992-1998, and thus are too old to justify a current listing for toxaphene, particularly since concentrations are declining over time (see Attachment A).
5. No exceedances were observed in the most recent four years of data (1999-2002), indicating that the toxaphene mass in the watershed is declining, and that current exposures are below levels of concern.

Recommendation: Do not list based on the Commercial and Sportfishing beneficial use; do not include data prior to 1999 in the evaluation of the waterbody. Due to significant changes in channel morphology, data collected prior to 1999 does not reflect the current status of the channel. Continue to evaluate any additional data that are collected in the future.

**SANTA ANA-DELHI CHANNEL: TOXAPHENE**

Board Recommendation: List.

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Two of 7 fish tissue samples exceeded the 100 ng/g NAS guideline** (TSMP, 2002) [data received].

Comments: This listing is unjustified.

1. The fish tissue guideline cited is from an NAS study conducted in 1973, and is outdated and an inappropriate basis for listing decisions. The NAS guidelines are based on information and data collected in the 1960s. A comparison of the NAS guidelines to more recent evaluations of concentrations of chemicals in aquatic organism tissue and their apparent effects on aquatic life by the US Army Corps of Engineers and the US Environmental Protection Agency, shows wide discrepancies between the NAS values and more recent information. We do not feel that the NAS guidelines are reliable values for evaluating the potential impacts of chemicals on aquatic life. We recommend the SWRCB evaluate the USACOE Environmental Residue-Effects Database and the paper "Linkage of effects to Tissue Residue: Development of a Comprehensive Database for Aquatic Organisms Exposed to Inorganic and Organic Chemicals" by Jarvinen and Ankley, 1999.
2. The two exceedances (Red Shiner and Striped Mullet) were sampled in 1997 and 1998, and thus are too old to justify a current listing for toxaphene. No exceedances have been observed in the most recent three years of data (5 samples collected from 1999-2001).
3. Striped Mullet is believed *not* to be a year-round resident of the Bay. Thus, the only relevant exceedance is the Red Shiner sample (one exceedance in three year-round resident samples). According to Table 3.1 of the State Board Listing Policy, one exceedance is not an adequate basis for listing on a sample size of 3 (or 7 for that matter).
4. The Commercial and Sportfishing and REC-1 beneficial uses listed in the fact sheet are erroneously applied to this waterbody. No beneficial uses are listed in the Basin Plan for Santa Ana-Delhi Channel. In previous listing cycles, water bodies that are not assigned beneficial uses in the Basin Plan were not placed on

the 303(d) List. The listing of water bodies without assigned beneficial uses is contrary to previous actions by the State Board to such draft listings.

Recommendation: Do not list, but continue to collect additional data.

**BALBOA BEACH: DDT**

Board Recommendation: List

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Four of 21 samples exceeded the 100 ng/g OEHHA Screening Value**

Comments:

1. The number of exceedances presented in the fact sheet was different than that calculated using the data provided. Specifically, the fact sheet indicated 4 exceedances out of 21 samples (19.0%). Review of the data provided from the Administrative Record resulted in 3 exceedances out of 21 samples (14.3%). This discrepancy may be due to the isomers included in the calculation of total DDT. Total DDT in the evaluation guideline and review of the raw data were both based on the sum of ortho- and para- DDTs, DDDs and DDEs. Total DDT in the fact sheet included these six isomers and may have also included para-DDMU, which would have resulted in an additional exceedance.

Recommendation: Make correction to the Fact Sheet text as noted.

**SAN DIEGO CREEK, REACH 1: SELENIUM**

Board Recommendation: List

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Four of four water samples exceeded the chronic CTR freshwater criterion of 5 ug/L.**

Comments:

1. There was a typographical error in the fact sheet in #3 of the "Weight of Evidence" section. The first sentence should read: "Four of 4 samples exceeded the CTR chronic freshwater criteria ..."

Recommendation: Make correction to the Fact Sheet text as noted.

**SAN DIEGO CREEK, REACH 1: ZINC**

Board Recommendation: List

Board Rationale: [**Bold** indicates that the Board relied upon this line of evidence as the basis for the listing recommendation].

1. **Four of four water samples exceeded the hardness-adjusted chronic CTR freshwater criterion of 528.5 ug/L.**

Comments:

1. The number of exceedances presented in the fact sheet was different than that calculated using the data provided. Specifically, the fact sheet indicated four exceedances out of four samples (100%). Review of the data provided from the Administrative Record (see table below) resulted in zero exceedances out of four samples (0%). Adjusted for the hardness of the samples, the CTR standard for Zinc is 382 ug/L (acute) and 379 ug/L (chronic).

Recommendation: Do not list. The data listed in the fact sheet does not indicate exceedences of the zinc CTR standard.

| *Station and Sample Information* | | | | *Raw Data (no averages)* | | | *Data used for assessment (daily average of dissolved zinc)* |
|---|---|---|---|---|---|---|---|
| Station Location | Station | Date | Time | Total (ug/L) | Dissolved (ug/L) | hardness (mg/L) | *Average Daily Dissolved Zinc (ug/L)* |
| San Diego Creek | Campus Dr. | 3/7/2002 | 1100 | 55 | 30.2 | 393 | *28.7* |
| San Diego Creek | Campus Dr. | 3/7/2002 | 1425 | 51.6 | 27.2 | 183 | |
| San Diego Creek | Campus Dr. | 5/2/2002 | 900 | 10.8 | 4.54 | 681 | *4.48* |
| San Diego Creek | Campus Dr. | 5/2/2002 | 1405 | 12.6 | 4.42 | 666 | |
| San Diego Creek | Campus Dr. | 8/12/2002 | 900 | 7.91 | 2.02 | 524 | *2.09* |
| San Diego Creek | Campus Dr. | 8/12/2002 | 1350 | 7.16 | 2.16 | 692 | |
| San Diego Creek | Campus Dr. | 11/8/2002 | 100 | 9.26 | 3.14 | 768 | *3.09* |
| San Diego Creek | Campus Dr. | 11/8/2002 | 430 | 10.4 | 3.04 | 783 | |

| | | | | | |
|---|---|---|---|---|---|
| | | *Average Hardness* | *586.25* | | |
| *CTR Acute ug/L* | *524* | | | *# Samples* | *4* |
| *CTR Chronic ug/L* | *528* | | | *# Exceedances* | *0* |

**Attachment B**
**Analysis of trends in organochlorine concentrations over time**

## INTRODUCTION

Section 3.10 of the California State Water Quality Control Board listing policy document outlines criteria for utilizing information on trends in water quality over time in making listing decisions. This section provides guidance on the type of information and type of analysis that is required to consider trends in water quality in listing decisions. As detailed below, we have used the criteria provided in Section 3.10 of the State's Listing Policy to establish that there are steady, well-defined trends of declining DDT and toxaphene concentrations. In addition, the causes of these decreasing trends – changes within the watershed itself and decreased mass and availability of these compounds – will continue into the future. Taken together, this information indicates that these water bodies should not be listed for these constituents.

Section 3.10 of the Listing Policy requires consideration of six factors as the basis for evaluating trends in time:

1. Use data collected for at least three years.
2. Establish specific baseline conditions.
3. Specify statistical approaches used to evaluate the declining trend in water quality measurements.
4. Specify the influence of seasonal effects, interannual effects, changes in monitoring methods, changes in analysis of samples, and other factors deemed appropriate.
5. Determine the occurrence of adverse biological response, degradation of biological populations and communities, or toxicity.
6. Assess whether the declining trend in water quality is expected to not meet water quality standards by the next listing cycle.

According to these criteria, waters shall be removed from the 303(d) list if the trend of water quality improvement is substantiated (by criteria 1 through 4) and impacts are not observed (criteria 5). These criteria are evaluated below for DDT, toxaphene, and PCBs.

## DDT

*Criterion 1:*

Trends in DDT concentrations—particularly fish and mussel tissue concentrations—are evident in data collected for approximately 20 years in the Newport Bay watershed. In the case of the fish species Red Shiner, data showing substantial decline in tissue DDT concentrations are available from 1983 (see Figure 1). Mussel tissue data from Upper Newport Bay show decreasing DDT concentrations dating to 1982 (see Figure 2). Similar declines are evident in tissue concentrations for other species, and for sediment concentrations in Newport Bay, though fewer data are available for these other media. Therefore, the declining trend of DDT concentrations in the watershed is evident in samples collected over more than a **20-year period**.

*Criterion 2:*

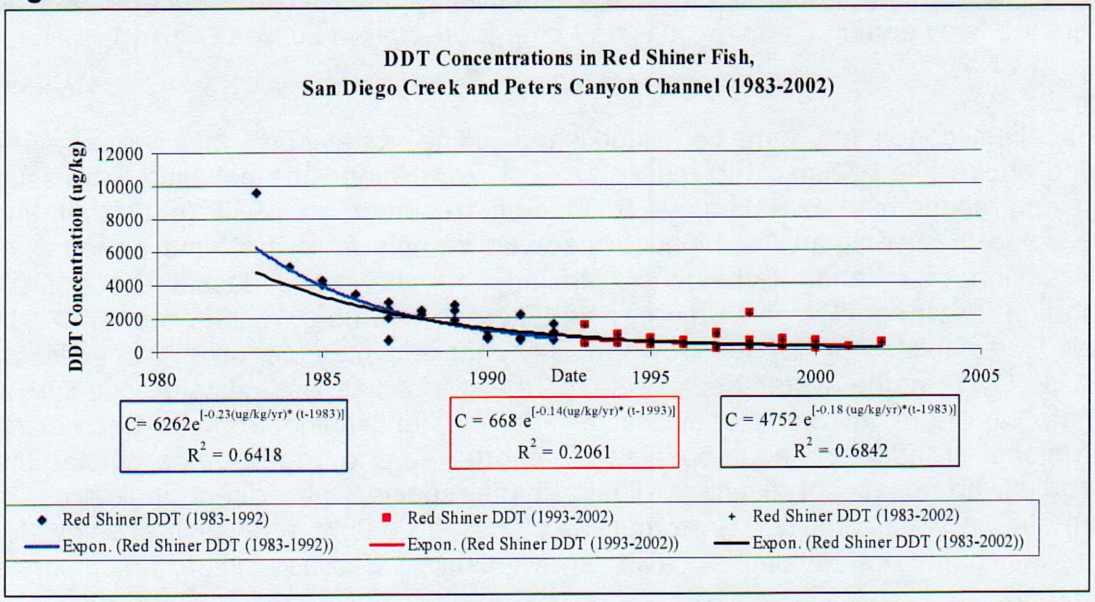
Baseline conditions can be established using data from the two species mentioned above (Red Shiner and mussels). For Red Shiner, the baseline fish tissue DDT concentration may be taken as 5100 ng/g, recorded in 1984 (note that this baseline value is lower than the highest observed sample from that time period; see also discussion of criterion 3 below). Similarly, the baseline mussel tissue DDT concentration for Upper Newport Bay may be taken as 386 ng/g, recorded in 1982. In this way, Red Shiner and Upper Newport Bay mussels may be taken as indicator species for DDT in the watershed. Use of these species as indicator species is appropriate, as there are sufficient data to clearly establish the trend in decreasing concentrations. In addition, these species are short-lived and do not range outside the water bodies proposed for listing. Thus, these species are direct indicators of improvements in water quality. Note that, as discussed below, other fish species (for which fewer data are available) also show similar declines in organochlorine concentration.

*Criterion 3:*

The primary statistical approach to establishing the declining trend in DDT concentrations in the watershed (as shown in Figures 1 and 2) has been to derive exponential decay curves, and corresponding first-order decay coefficients, using historical tissue DDT data for two indicator species, Red Shiner and mussels. The equations of these curves are indicated in Figures 1 and 2. The Red Shiner correlation exhibits a $R^2$ value of 0.68, while the mussel correlation exhibits a $R^2$ value of 0.54. Thus, data for both indicator species exhibit a strong downward statistical trend in DDT concentrations.

The robustness of these computed decay rates has been tested in several ways. First, general observation of all data indicates that this downward trend is consistent over time and space within the Newport Bay Watershed. Second, the statistical analysis that characterizes these trends has been confirmed by splitting the data set for Red Shiners into two separate sets consisting of the first ten years of data (1983-1992) and the second ten years of data (1993-2002). The data set for mussels has similarly been divided into three geographically distinct sets representing Lower Newport Bay, Upper Newport Bay, and San Diego Creek. Linear regression analyses on the natural logarithmically transformed data sets using a 95% confidence range confirm that the calculated first-order decay rates for the Red Shiner DDT data are statistically similar for the full data set and for the subsampled datasets. Similarly, the calculated decay rates for the mussel data regressions for the three locations are also similar within a 95% confidence range.

## Figure 1a: Red Shiner DDT Concentration Data, Newport Bay Watershed




## Figure 1b: Red Shiner DDT Concentration Data, Newport Bay Watershed

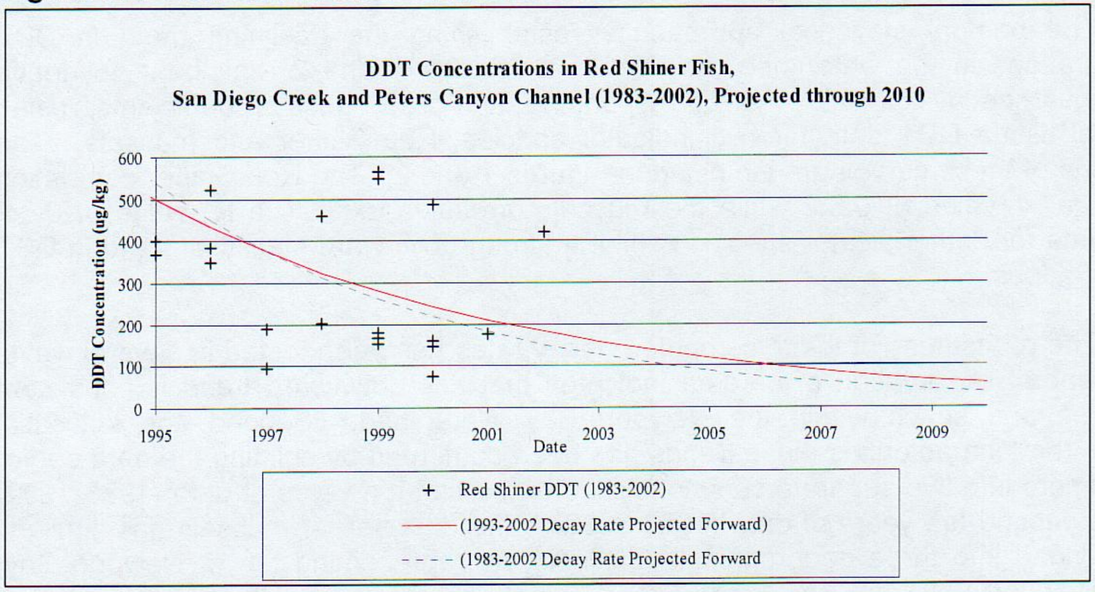


**Figure 2a: Mussel DDT Concentration Data, Newport Bay Watershed**

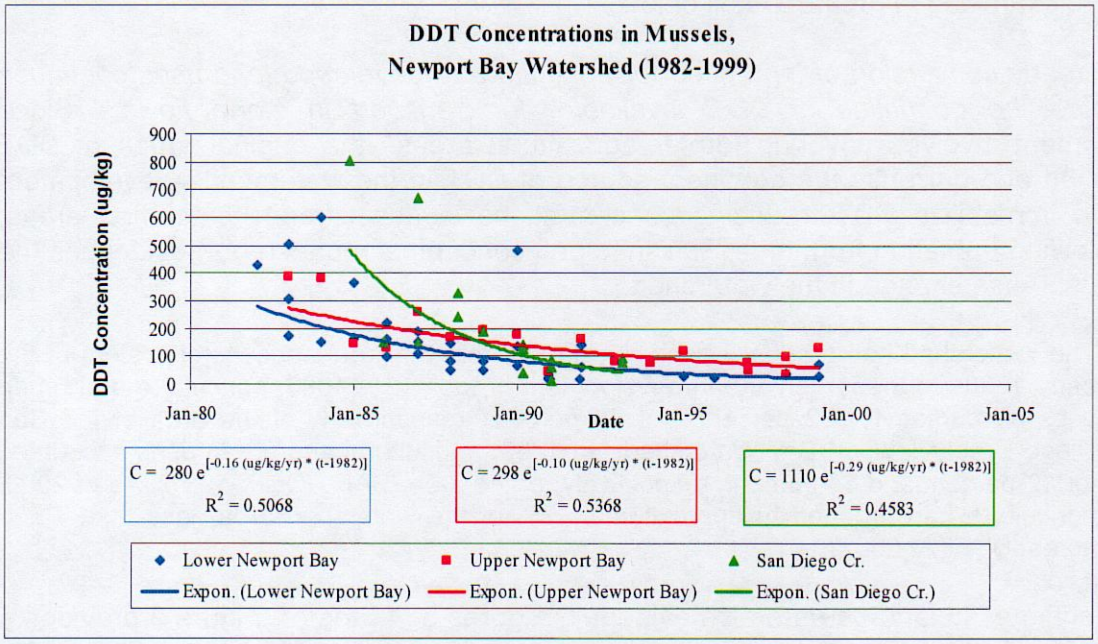
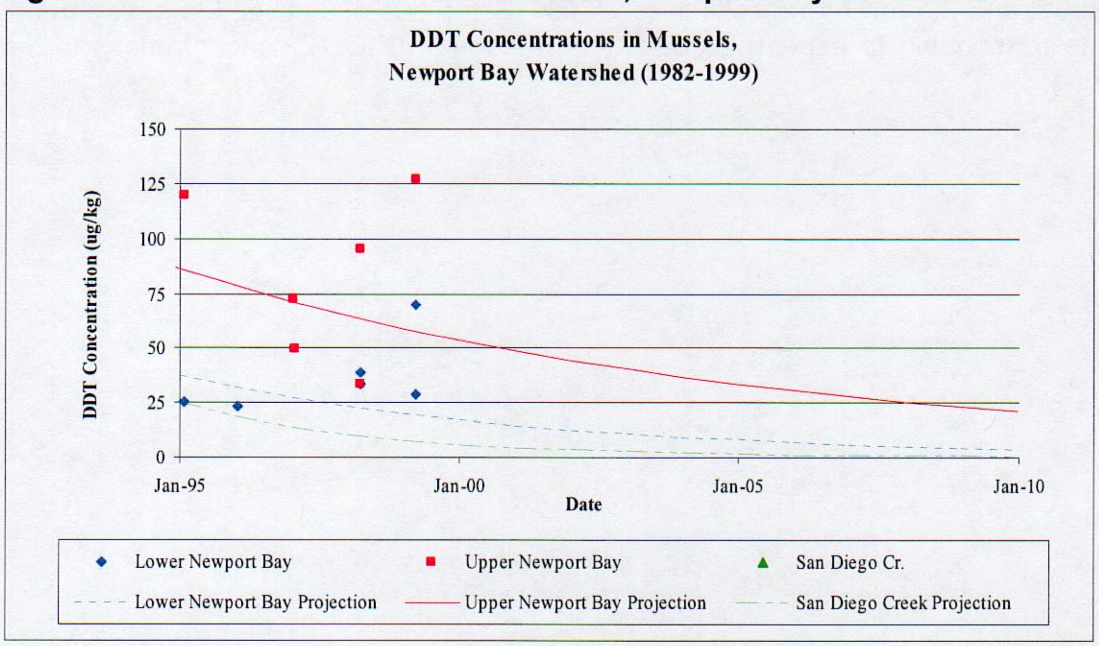



**Figure 2b: Mussel DDT Concentration Data, Newport Bay Watershed**




*Criterion 4:*

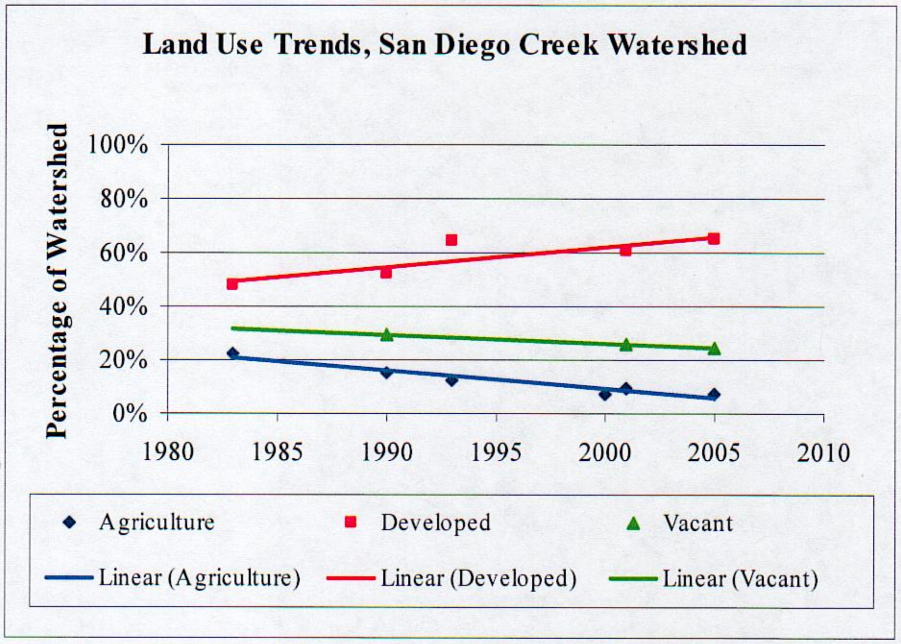
Several factors are relevant to the trend analysis of DDT in the Newport Bay Watershed. First, there is a strong trend away from agricultural use in the Newport Bay watershed, and toward urban development. Second, concentrations of DDT in soils within the watershed are declining, reflecting degradation of DDT that remains from historic agricultural use, and clearly indicating that the total available mass of DDT within the watershed is declining. In addition, the use of screening values and appropriate fish tissue data is essential in evaluating listing decisions. Each of these factors is examined in greater detail below.

(1) *A steady conversion of land used for agriculture to developed land uses continues to reduce the quantities of DDT "available" for transport in storm flows.* Since development involves covering former agricultural areas—the original areas of DDT application and currently the dominant source of DDT in the watershed—development tends to immobilize DDT, reducing concentrations in downstream watershed areas. The following quotation from the NSMP nitrogen conceptual model report evidences the idea of land-use change in the watershed.

> The Watershed has gradually been developed from the rural agricultural system of the early 1900s to the largely urban development of today. In 1983, agriculture and urban uses accounted for 22 percent and 48 percent, respectively, of the area of the San Diego Creek/Newport Bay Watershed. In 1993, agricultural and urban uses accounted for 12 percent and 64 percent, respectively, of the area (SARWQCB, 1997). As of 2000, agriculture had dropped to approximately 7% of the watershed area, less than 7,500 acres (USEPA, 2002).

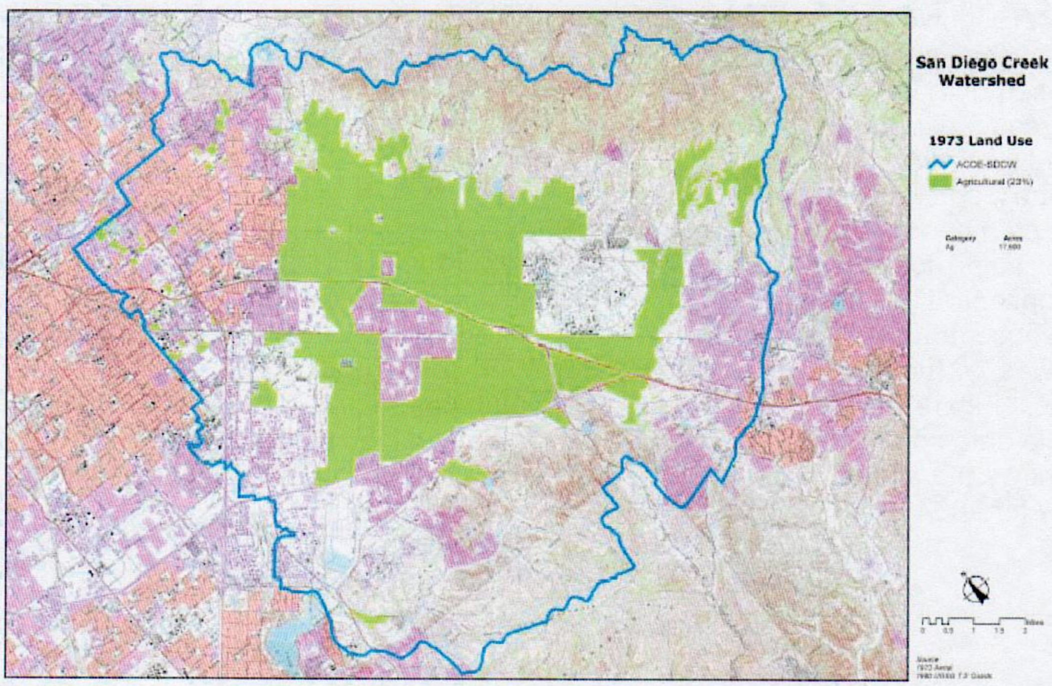
These changes in land-use are also evident in Figures 3, 4, and 5. Figure 3 provides a graphical representation of land in agricultural use in years 1973, 1983, 1990, 1993, 2000, 2001, and 2005 with projections for 2006. Given this established land-use trend, it is quite reasonable to expect the continued reduction of DDT concentrations in the watershed.

**Figure 3: Land Use Trends in the San Diego Creek Watershed**



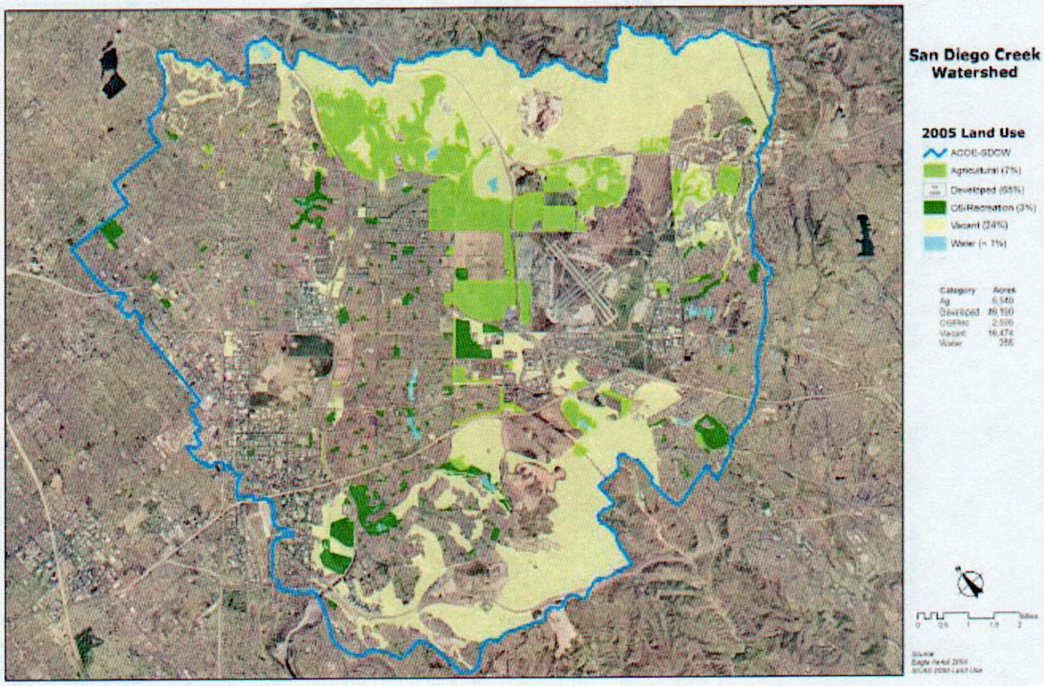

Land use data for years 1973, 1990, 1993, 2001, and 2005 was determined by GIS analysis of San Diego Creek Watershed land use maps.
Land use data for years 1983, 1993, and 2000 are from SARWQCB (1997) and USEPA (2002).

**Figure 4: Agricultural and Vacant Space Land Use in San Diego Creek Watershed, 1973**




Source: The Irvine Company, 2006.

**Figure 5: Agricultural and Vacant Space Land Use in San Diego Creek Watershed, 2005**




Source: The Irvine Company, 2006.

(2) *Concentrations and masses of DDT in watershed soils have declined, and will continue to decline in the future.* Soils concentrations in the watershed also demonstrate a downward trend in DDT concentrations over time. Data from 1985 demonstrate that average soil DDT concentrations at a six inch depth were 1,675 (ug/kg), based on composite samples from three sites; the maximum composite sample yielded a concentration of 2,958 (ug/kg). (Mischke T., Brunetti, K., Acosta, V., Wewaver, D., Brown, M., "Agricultural sources of DDT Residues in California's Environment, September: A report Prepared in Response to house Resolution No. 53 (1984). September, 1985.) Soil concentrations of DDT measured in 2004 at six inches depth were taken for 230 samples across agricultural lands in Orange County. The average concentration at a soil depth of six inches was 65 (ug/kg), with a maximum observed concentration of 2,000 (ug/kg). The average concentration at a soil depth of three feet was 24 (ug/kg), with a maximum observed concentration of 304 (ug/kg), over 45 samples. Figure 6 presents the average agricultural soil DDT concentrations from the available data sources with maximum and minimum values plotted by the error bars. Figure 7 shows the approximate location and values of all soil samples identified in this data review for 2004.

**Figure 6: Agricultural Soils DDT Concentrations**

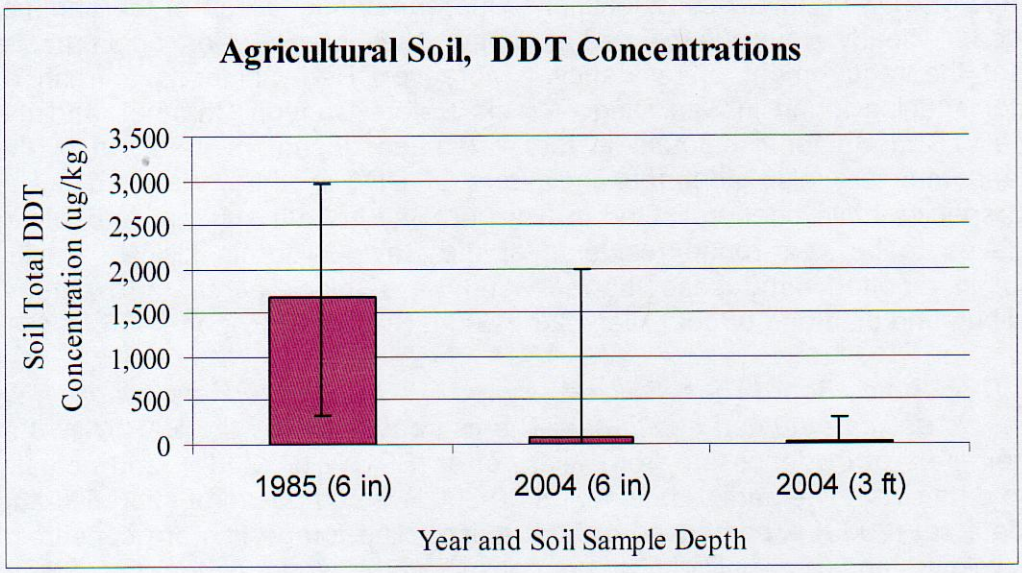
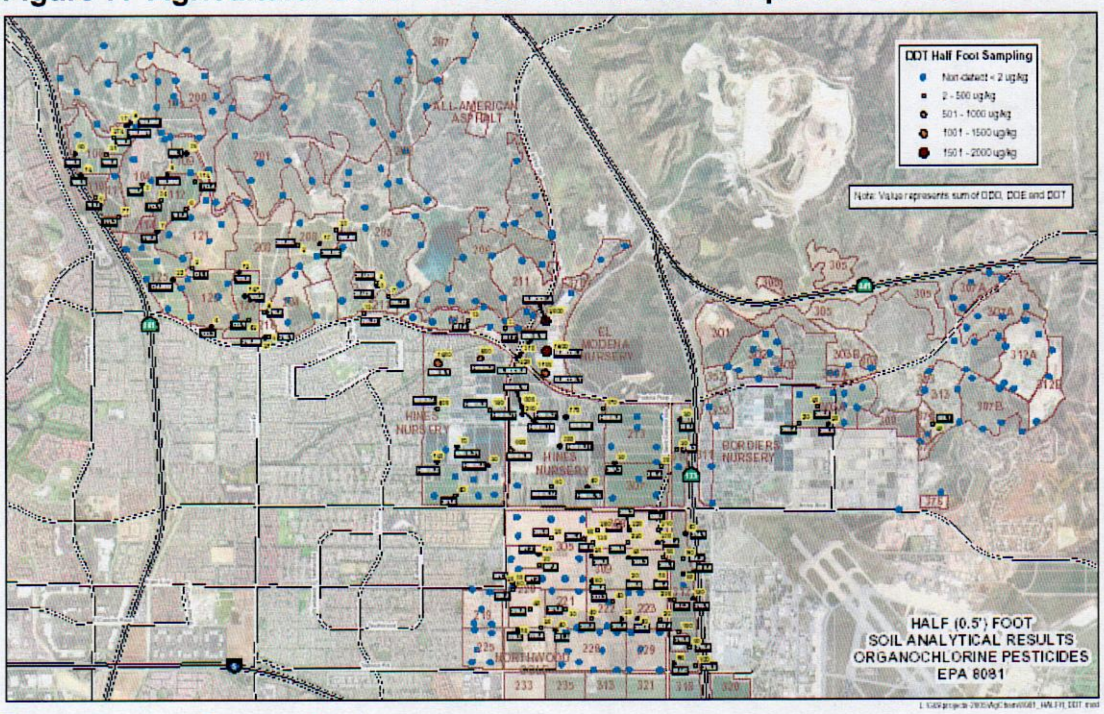



**Figure 7: Agricultural Soils DDT Concentration Sample Locations**




Source: The Irvine Company, 2006.

*(3) The highest DDT concentrations may be found in non-resident fish, indicating an important source of DDT* <u>*outside*</u> *the Bay and watershed.* The specification of correct indicator species is crucial to identifying concentration trends and exceedances. In particular, species that are not year-round residents of the Bay are not adequate indicators of watershed concentrations since DDT concentrations in these species may

have been accumulated elsewhere. Such species could accumulate DDT in tissue due to the presence of DDT in other ocean locations where they spend part of their annual cycle and feed. Clearly, mussels planted in Upper Newport Bay—as an immobile species—meet the requirement of residency. Moreover, Red Shiner is a fresh or brackish water species found in San Diego Creek, Peters Canyon Channel, and the Delhi Channel. Red Shiner fish found in the watershed do not migrate out of the watershed, and thus are also adequate indicators of DDT in the watershed. The following fish species have been collected in Newport Bay in both summer and winter and are believed to be year-round residents of the Bay: California killifish, Pacific staghorn sculpin, spotted sand bass, barred sand bass, black perch, arrow goby, California halibut, and diamond turbot (Allen et. al. 2004, SCCWRP Report #436, p. 14).

*(4) The State Board has utilized forage fish, analyzed as whole fish concentrations, to estimate human health risk.* The fish data cited by the SARWQCB in several of their lines of evidence are from Allen, et al (SCCWRP, 2004), and actually represent two data sets. The earlier data set (2000-2001) is composed of sport fish and the second data set (2002) is composed of forage fish. The forage fish are consumed primarily by wildlife and are unlikely to be consumed by sport fisherman. More importantly, the DDT residues in forage fish are for the entire fish and not the muscle (fillet). Since most of the DDT is in fatty tissues, other than muscle, the residues are higher on a wet weight basis than in the sport fish fillets. The OEHHA guidance assumes only the fillet is ingested, so using the entire fish is inappropriate, and further overestimates the risk.

*(5) OEHHA screening values are an inappropriate basis for listing.* Although the State Board has used the OEHHA (human health) fish tissue DDT screening value of 100 ng/g as a standard by which to assess whether portions of the watershed should or should not be added to the 303(d) list for DDT, it is not appropriate to use the screening value in this manner. The OEHHA value was never intended to function as a standard, or to provide a basis for 303(d) listing (Brodberg and Pollock, 1999). Such use of the OEHHA value is not appropriate since the value was established based on the assumption that six ounces of sport fish fillet at that concentration would be consumed weekly for 70 years. Given that DDT is no longer in use, and that concentrations are steadily declining in the watershed, not only is 70 years of consumption at that concentration unlikely, but it is unlikely. Even though red shiner are not consumed by humans, the red shiner data are indicative of trends in DDT concentration over time. Sport fish, which are consumed by humans, tend to follow the same overall trend of declining DDT concentration. For example, assuming that the declining trend in Red Shiner DDT concentrations of Figure 1 continues over the next 70 years, average tissue DDT concentrations over that 70-year period would be approximately 36 ng/g, which is well below the OEHHA screening value of 100 ng/g. Again assuming the declining trend of Figure 1, if average Red Shiner tissue concentrations were to be 100 ng/g over the next 70 years, a concentration of approximately 1200 ng/g would currently be acceptable. All but one data point from the past 11 years (a concentration of 2168 ng/g for a 1998 sample from Peters Canyon Channel, one of 28 composite samples since 1994) meets this criterion. Moreover, if average Red Shiner tissue concentrations were to be 50 ng/g over the next 70 years (a safety factor of 2), a concentration of approximately 580 ng/g would currently be acceptable, a criterion met by all but one

data point (one of 14 composite samples) from the past 8 years of Red Shiner DDT data.

It is also worth noting that OEHHA provides DDT fish advisories for various water bodies where there is potential to exceed the guidance. There is no advisory to limit sport fish consumption for Newport Bay. There is an advisory for the Newport Pier (in the Ocean, not the Bay) limiting consumption to one six-ounce fillet of corbina every two weeks, or white croaker every four weeks. It should also be noted that the OEHHA screening value is highly conservative

*Criterion 5:*

In some parts of the Newport Bay watershed there is evidence of degradation of biological populations and communities, and evidence of sediment toxicity, but these phenomena have not been linked to DDT. In fact, Bay et al. (2004) explicitly note that sediment toxicity was *uncorrelated* with DDT in their results—and thus does not constitute a confirming line of evidence. Bay et al. (2004) and Lee and Taylor (2001) and RBF (20001) both indicate that observed sediment and water column toxicity is far more likely to be caused by other constituents, including organophosphates, pyrethroids, and carbamates. Thus, there is no evidence that DDT is responsible for impacts such as biological degradation and toxicity in the Bay or watershed.

*Criterion 6:*

As noted above in the discussion of the OEHHA value, if an appropriate measure of fish tissue DDT concentrations that are genuinely protective of human health over the next 70 years is used as a fish tissue standard—i.e., a measure that assumes the OEHHA value of 100 ng/g or less would be met on average over the next 70 years—the most recent Red Shiner tissue data would already meet such a standard.

## TOXAPHENE

*Criterion 1:*

(1) Trends in toxaphene concentrations—particularly fish tissue and sediment concentrations—are evident in data collected for over 20 years in the Newport Bay watershed. In the case of the fish species Red Shiner, data collected starting in 1983 show a substantial decline in tissue toxaphene concentrations are available from 1983 (see Figure 8). Watershed sediment data are available beginning in 1990 and also demonstrate a clear decline in toxaphene concentrations (see Figure 9). Therefore, the declining trend of toxaphene concentrations in the watershed is clearly based on data that dates much further back than simply three years from the present, and thus the trend meets the first Section 3.10 criterion for removing a water body-constituent pair from the 303(d) list.

*Criterion 2:*

Using the two media mentioned above (Red Shiner and sediment), baseline conditions may be established as the earliest non-outlier data points for each case. So, for Red Shiner, the baseline fish tissue toxaphene concentration may be taken as 3700 ng/g, recorded in 1984. Similarly, the baseline sediment toxaphene concentration for

Lower Newport Bay may be taken as 2000 ng/g, recorded in 1991. In this way, Red Shiner and Lower Newport Bay sediment may be taken as indicators of toxaphene concentrations in the watershed.

*Criterion 3:*

The primary statistical approach to establishing the declining trend in toxaphene concentrations in the watershed (as shown in Figures 8 and 9) has been to derive first-order decay constants using historical toxaphene data for Red Shiner fish tissue and Lower Newport Bay sediment samples. The equations of these curves are indicated in Figures 8 and 9. The Red Shiner correlation exhibits a $R^2$ value of 0.671, while the Lower Newport Bay sediment correlation exhibits a $R^2$ value of 0559. Thus, data for both media exhibit a strong downward statistical trend in toxaphene concentrations.

Sediment samples collected from Upper and Lower Newport Bay, the Rhine Channel, San Diego Creek, and Peters Canyon Channel, also demonstrate a downward trend in toxaphene concentrations over time, though this trend is less statistically established than that for Red Shiner and Lower Newport Bay sediment.

**Figure 8a: Red Shiner Toxaphene Concentrations in Newport Bay Watershed**

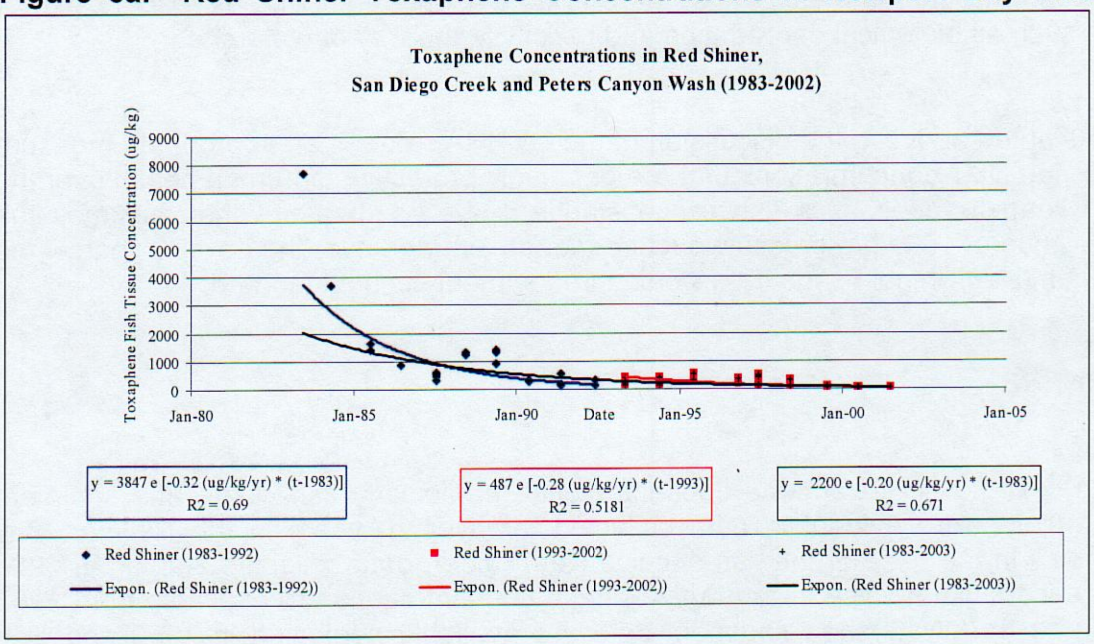


**Figure 8b: Red Shiner Toxaphene Concentrations in Newport Bay Watershed**

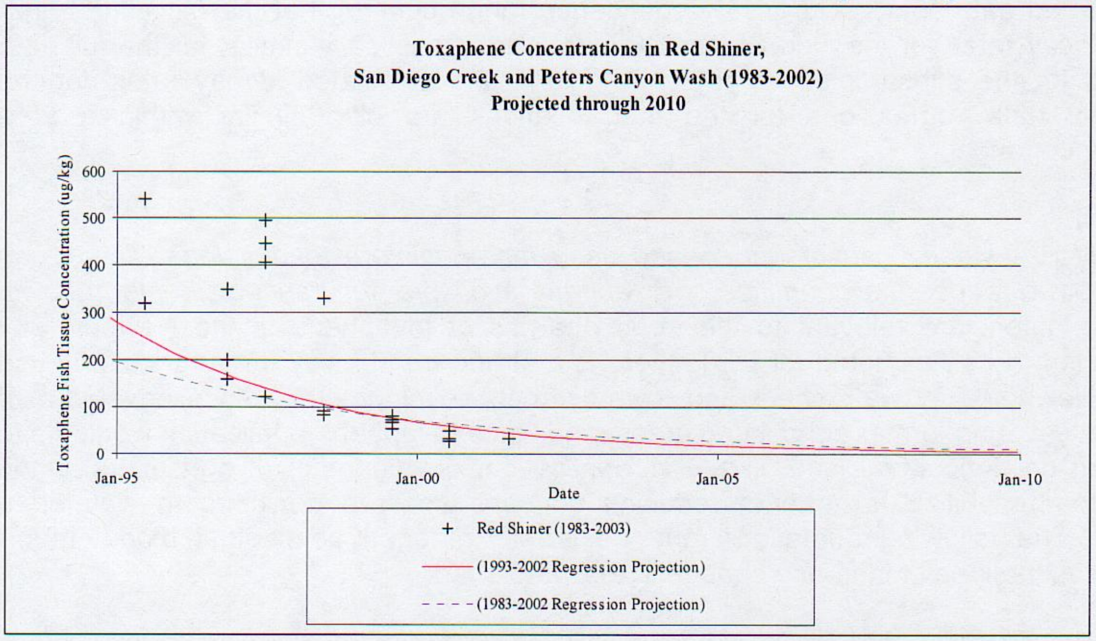
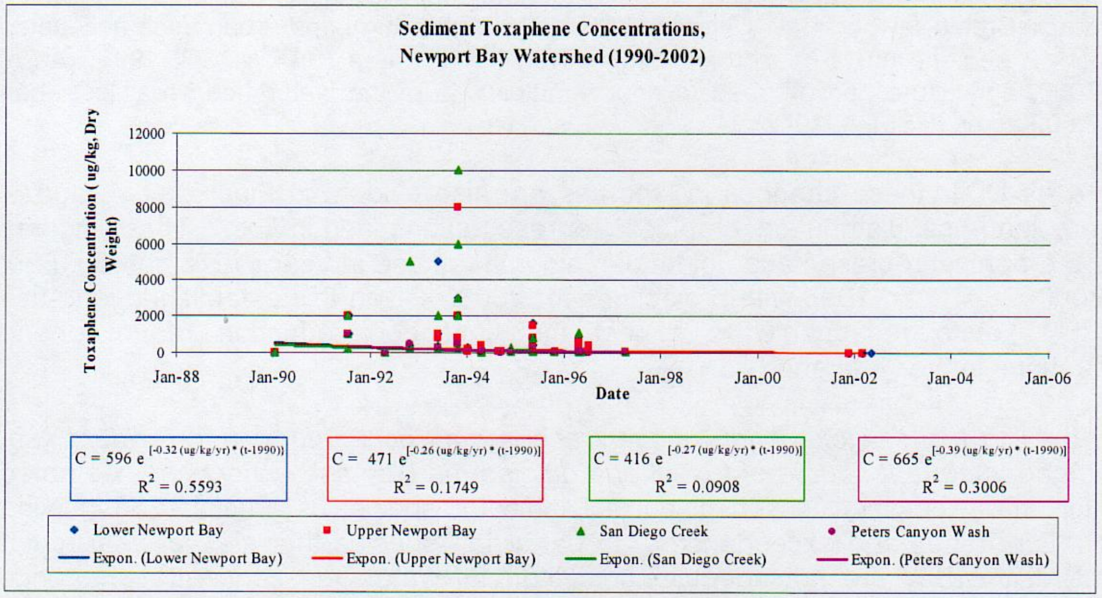



**Figure 9: Sediment Toxaphene Concentrations in Newport Bay Watershed**




Sources: SCCWRP database, 1990-2002; Bay and Greenstein, 2003.

The robustness of these computed decay rates have been tested in the same ways as the DDT data sets above. First, general observation of all data indicates that this downward trend is consistent over time and space within the Newport Bay Watershed. Second, the statistical analysis that characterizes these trends has been confirmed by splitting the data set for Red Shiners into two separate sets consisting of the first ten years of data (1983-1992) and the second ten years of data (1993-2002). The data sets for sediment have similarly been divided into four geographically distinct sets representing Lower Newport Bay, Upper Newport Bay, San Diego Creek, and

Peters Canyon Wash. Linear regression analyses on the natural logarithmically transformed data sets using a 95% confidence range confirm that the calculated first-order decay rates for the Red Shiner DDT data are statistically similar for the full data set and for the subsampled datasets. Similarly, the calculated 'decay rates' for the sediment data regressions for the four locations are also similar within a 95% confidence range.

*Criterion 4:*

*(1) A steady conversion of land used for agriculture to developed land uses continues to reduce the quantities of toxaphene"available" for transport in storm flows.* Several factors are relevant to the trend analysis of toxaphene in the Newport Bay Watershed. First, as noted for DDT, there is a strong trend away from agricultural use in the Newport Bay watershed, and toward urban development. Since development involves covering former agricultural areas, and since toxaphene application would have occurred on agricultural land, like DDT application, development of agricultural lands tends to immobilize toxaphene, reducing concentrations in downstream watershed areas. The following quotation from the NSMP nitrogen conceptual model report evidences the idea of land-use change in the watershed:

> The Watershed has gradually been developed from the rural agricultural system of the early 1900s to the largely urban development of today. In 1983, agriculture and urban uses accounted for 22 percent and 48 percent, respectively, of the area of the San Diego Creek/Newport Bay Watershed. In 1993, agricultural and urban uses accounted for 12 percent and s 64 percent, respectively, of the area (SARWQCB, 1997). As of 2000, agriculture had dropped to approximately 7% of the watershed area, less than 7,500 acres (USEPA, 2002).

As noted for DDT, these changes in land-use are also evident in Figures 3, 4, and 5, which are land-use distribution graphical representations and maps. These figures provide a graphical representation of land in agricultural use in years 1973, 1983, 1990, 1993, 2000, 2001, and 2005 with projections for 2006. Given this established land-use trend, it is quite reasonable to expect the continued reduction of toxaphene concentrations in the watershed.

*(2) The highest toxaphene concentrations may be found in non-resident fish, indicating an important source of toxaphene outside the Bay and watershed.* As noted above for DDT, the specification of correct indicator species is crucial to identifying concentration trends and exceedances. In particular, species that are not year-round residents of the Bay are not adequate indicators of watershed concentrations since toxaphene concentrations in such species do not necessarily reflect toxaphene from the watershed. Such species could accumulate toxaphene in tissue due to the presence of toxaphene in other ocean locations where they spend part of their annual cycle. As noted for DDT, Red Shiner is also an appropriate indicator of watershed toxaphene concentrations given that its habitat is San Diego Creek, Peters Canyon Channel, and the Delhi Channel, and that it does not migrate out of the Bay. Based on the fact that the following fish have been collected in Newport Bay in both summer and winter, they are believed to be year-round residents of the Bay: California killifish, Pacific staghorn

sculpin, spotted sand bass, barred sand bass, black perch, arrow goby, California halibut, and diamond turbot (Allen et. al. 2004, SCCWRP Report #436, p. 14).

*Criterion 5:*

We are unaware of any data suggesting that sediment toxicity or degradation of biological populations or communities have occurred in Peters Canyon Channel or in Santa Ana-Delhi Channel. Although there is some evidence of these effects downstream in Newport Bay, there is no evidence that organochlorines, including toxaphene, are responsible for impacts such as biological degradation and toxicity in the watershed, and strong evidence that other compounds are likely responsible.

*Criterion 6:*

Given the declining trend in toxaphene concentrations in the watershed, evidence suggests that an appropriate water quality standard would be met by the next listing cycle.

**POLYCHLORINATED BIPHYNELS**

*Criterion 1:*

Trends in PCB concentrations—particularly in fish tissue—are evident in data collected for over 20 years in the Newport Bay watershed. In the case of the fish species Red Shiner, data collected starting in 1983 show a substantial decline in tissue total PCB concentrations are available from 1983 (see Figure 10).

*Criterion 2:*

Baseline conditions for fish tissue data may be established as the earliest non-outlier data points for each case. So, for Red Shiner, the baseline fish tissue total PCB concentration may be taken as 130 ng/g, recorded in 1984. In this way, Red Shiner may be taken as indicators of PCB concentrations in the watershed.

*Criterion 3:*

*(1) Statistical analysis shows a decline in PCB concentrations over time.* The primary statistical approach to establishing the declining trend in total PCB concentrations in the watershed (as shown in Figures 10a and 10b) has been to derive first-order decay constants using historical Total PCBs data for Red Shiner fish tissue. The equations of these curves are indicated in Figure 10a. These data exhibit a clear downward trend in total PCB concentrations.

**Figure 10a: Red Shiner PCB Concentrations in Newport Bay Watershed, 1980-2005**

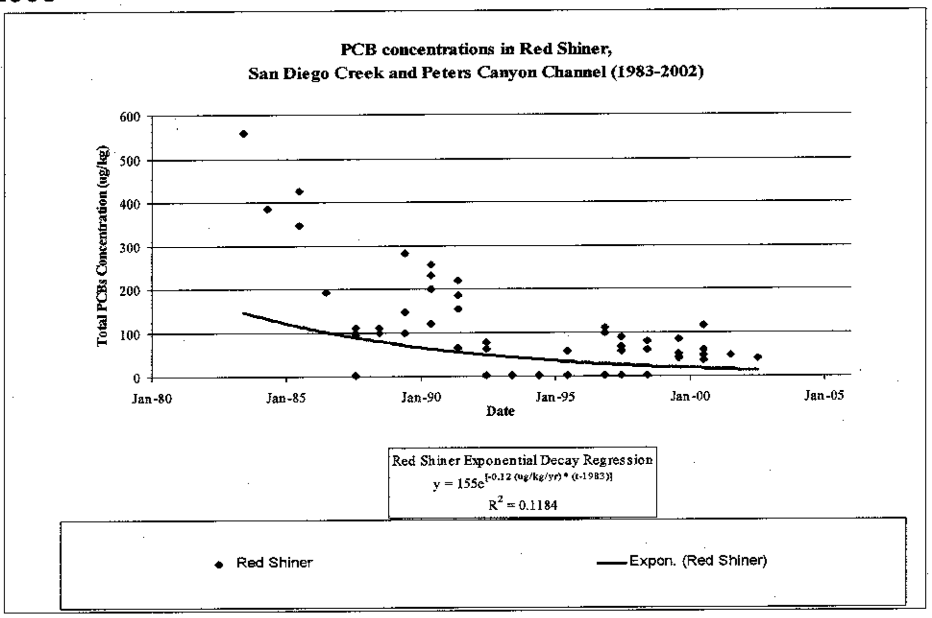
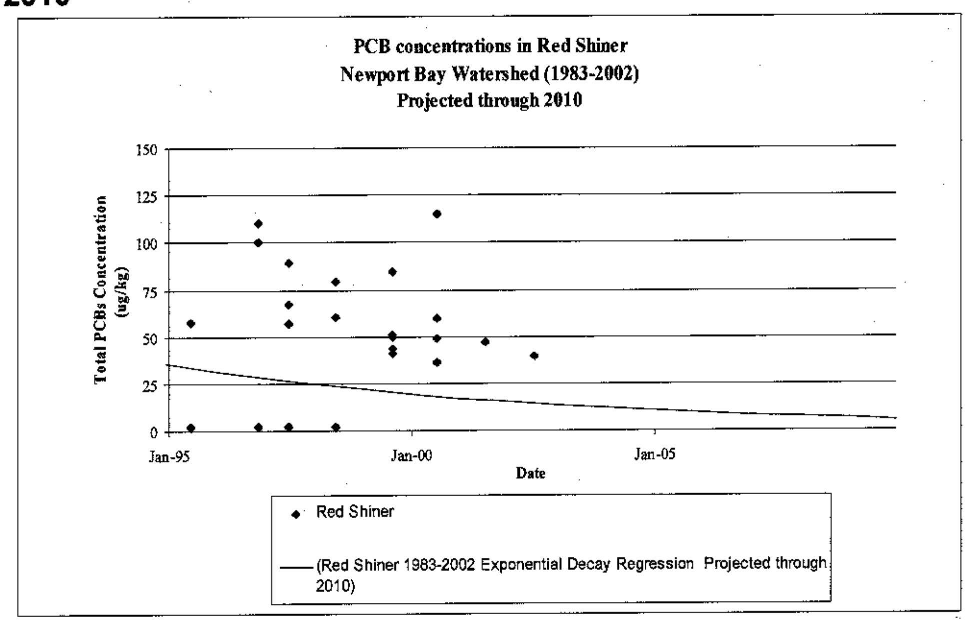



**Figure 10b: Red Shiner PCB Concentrations in Newport Bay Watershed, 1995-2010**




*(2) OEHHA screening values are an inappropriate basis for listing.* Although the State Board has used the OEHHA (human health) fish tissue PCB screening value of 20 ng/g as a standard by which to assess whether portions of the watershed should or should not be added to the 303(d) list for PCBs, it is not appropriate to use the screening value in this manner. The OEHHA value was never intended to function as a standard, or to provide a basis for 303(d) listing (Brodberg and Pollock, 1999). Such

use of the OEHHA value is not appropriate since the value was established based on the assumption that six ounces of sport fish fillet at that concentration would be consumed weekly for 70 years. Given that PCBs are no longer in use (they were banned in 1979), and that concentrations are steadily declining in the watershed, not only is 70 years of consumption at that concentration unlikely, but it is impossible. For example, assuming that the declining trend in Red Shiner PCB concentrations of Figures 10a and 10b continues over the next 70 years, average tissue PCB concentrations over that 70-year period would be approximately 5.5 ng/g, which is well below the OEHHA screening value of 20 ng/g. Again assuming the declining trend of Figures 10a and 10b, if average Red Shiner tissue concentrations were to be 20 ng/g over the next 70 years, a concentration of approximately 145 ng/g would currently be acceptable. All Red Shiner data collected since 1992 would meet this value.

*Criterion 4:*

*(1) The highest PCB concentrations may be found in non-resident fish, indicating an important source of PCB outside the Bay and watershed.* As noted above for DDT, the specification of correct indicator species is crucial to identifying concentration trends and exceedances. In particular, species that are not year-round residents of the Bay are not adequate indicators of watershed concentrations since total PCB concentrations in such species do not necessarily reflect total PCBs from the watershed. Such species could accumulate PCBs in tissue due to the presence of PCBs in other ocean locations where they spend part of their annual cycle. As noted for DDT and toxaphene, Red Shiner is also an appropriate indicator of watershed PCB concentrations given that its habitat is San Diego Creek, Peters Canyon Channel, and the Delhi Channel, and that it does not migrate out of the Bay. Based on the fact that the following fish have been collected in Newport Bay in both summer and winter, they are believed to be year-round residents of the Bay: California killifish, Pacific staghorn sculpin, spotted sand bass, barred sand bass, black perch, arrow goby, California halibut, and diamond turbot (Allen et. al. 2004, SCCWRP Report #436, p. 14).

*Criterion 5:*

While in some parts of the Newport Bay watershed there is evidence of degradation of biological populations and communities, and evidence of sediment toxicity, these phenomena have not been linked to PCBs. There is no evidence that PCBs are responsible for impacts such as biological degradation and toxicity in the watershed, and strong evidence that other compounds are likely responsible (see Bay et al., 2004; and Lee and Taylor, 2001).

*Criterion 6:*

As noted above in the discussion of the OEHHA value, if an appropriate measure of fish tissue PCB concentrations that are genuinely protective of human health over the next 70 years is used as a fish tissue standard—i.e., a measure that assumes the OEHHA value of 20 ng/g would be met on average over the next 70 years—the most recent Red Shiner tissue data would already meet such a standard.

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***Fish***

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## Attachment C
## Comments from James L. Byard, Ph.D, B.A.D.T, Toxicology Consultant