STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF MAY 9, 2008
Prepared on March 31, 2008

ITEM NUMBER: **22**

SUBJECT: **Toxicity Problems on the Central Coast: Agricultural and Urban Solutions**

SUMMARY

Central Coast Water Board staff monitors and assesses toxicity conditions in the Central Coast region surface waters through our own Central Coast Ambient Monitoring Program (CCAMP), and through coordination with other monitoring programs and research activities. The Central Coast Water Board has taken several actions to reduce and control toxicity in Central Coast water bodies. As we learn more about our toxicity problems, and the activities and types of chemicals that cause them, we will improve and refocus our control actions.

In this staff report, we have summarized Central Coast findings on toxicity by several researchers. These include a number of studies over the past decade by the Granite Canyon Marine Pollution Studies Laboratory, a study in the Salinas area by U.C. Berkeley researchers, and a study on pesticides in the Salinas River by the Department of Pesticide Regulation. Much of the research points to water column toxicity from two organophosphate pesticides, chlorpyrifos and diazinon. Research also has found toxicity in sediment from pyrethroid pesticides, as well as from chlorpyrifos.

Water Board staff has summarized all available toxicity data from CCAMP and the Cooperative Monitoring Program for the Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Irrigated Ag Order) on our website, at www.ccamp.org (click on "Toxicity Findings"). In evaluating toxicity data, Water Board staff relies heavily on the California policy for listing waters as "impaired" under the Clean Water Act or the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Water Resources Control Board, 2004). This policy requires that if two or more acutely toxic samples are collected on a water body, that water body should be listed as "impaired" due to toxicity (and for the chemical causing the toxicity, if known). This approach drives the web-based maps of the data, but when Water Board staff considers where to prioritize work on toxicity issues, we consider frequency of toxicity as well as the species showing the toxic effect.

CCAMP and the Cooperative Monitoring Program have conducted toxicity monitoring in 98 streams and rivers in the Region. In 26% of these, we observed no toxic effects whatsoever. We found lethal effects in 74% of the water bodies we monitored. We found sublethal effects (related to growth or reproduction) at 67% of sites we monitored. Overall, lethal effects for fish were the least commonly encountered toxic effect. For *Pimephales* (fathead minnow), toxic effects were found at 17% of sites sampled. For *Selenastrum* (an alga), toxic effects were found at 31% of sites. Water column toxicity to *Ceriodaphnia* (a planktonic crustacean) was found at 33 % of sites. *Hyalella* (an amphipod) showed toxic effects in sediment at 51% of all sites sampled. Because only one sample is collected per year, many

sites are represented by a single sediment toxicity sample.

In general, we have toxicity problems in many water bodies in our region, with the worst problems occurring coincident with concentrations of agricultural and urban land uses. To address toxicity in water bodies in the region, we rely predominantly on our regulatory and grants program activities, collaborations with researchers, and interagency coordination. The main actions we are taking now include the following:

1. Continuing to implement the Water Board's Irrigated Ag Order, including enrollment in the program, water quality education, farm water quality planning and implementation of management practices to protect water quality, and reporting practice implementation to the Water Board.
2. 93% of the irrigated acreage is currently enrolled, and we are pursuing enforcement against the remainder. In addition, nearly 1,300 out of the approximately 1,800 enrolled operations have completed 15 hours of education and developed farm plans. Most operations have implemented at least some management practices to address water quality concerns. We recently completed a summary report on management practice implementation, based on information submitted by all growers, as required by the Irrigated Ag Order.
3. Providing Water Quality Information through the Cooperative Monitoring Program.
4. Supporting Management Practice Implementation through an Irrigation and Nutrient Management Grant.
5. Interacting with Department of Pesticide Regulation (DPR) and County Agricultural Commissioners.
6. Targeting Inspections and Enforcement Actions.
7. Incorporating urban pesticide reduction management practices into new Municipal Storm Water Management Plans and requiring implementation of such management practices in existing Storm Water Management Plans.
8. Funding and managing grant projects that reduce pesticide use and loading to surface and ground waters.

The actions we have planned include the following:

1. Presenting the Irrigated Ag Order to the Water Board for renewal in 2009. This will include actions to address pesticide and fertilizer loading to surface water and groundwater, and protection for aquatic habitat.
2. Increasing storm water management plan requirements to focus on and resolve water quality issues.
3. Broaden communication with DPR to include urban pesticides.

As we continue to learn more about the nature and extent of toxicity in our region, we will improve our ability to select and implement actions to control pesticides and other sources of toxicity. We will also be able to evaluate whether toxicity is improving as a result of our actions.

DISCUSSION

Background

The Central Coast Region includes a diverse landscape of agricultural crops, orchards, and vineyards, rapidly expanding urban areas, and many miles of paved roadways. All of these land uses may result in runoff of chemicals (including metals, pesticides, herbicides, petroleum products and others) into drainages, creeks and rivers, and ultimately the ocean.

These chemicals are transported during storm water runoff and through dry season discharges of various sorts, including urban drains and agricultural irrigation tail water and tile drain systems.

Toxicity tests are used to determine if waters and streambed sediments are toxic to or produce detrimental physiological responses in aquatic life, conditions specifically prohibited in the Central Coast Basin Plan. At some concentrations, pollutants can kill test organisms, but at lower concentrations can cause sub-lethal effects (such as changes in rates of reproduction, growth, or other anomalies). Test organisms are exposed to water and sediment samples in a controlled laboratory environment, and survival, growth, and other measures are compared to the same measures in concurrent exposures to clean water or sediment (control test). Statistical comparisons are made between the test and control populations to determine whether the test matrix has had a significant effect.

Typically, toxicity testing in fresh water systems of the Central Coast has included four species (with other species substituted in brackish or saline waters). Following the US Environmental Protection Agency (USEPA) methodology for Whole Effluent Toxicity testing, an invertebrate, a fish and an alga are used to test the water column and an invertebrate is used to test sediment samples. Multiple species are used because some are more sensitive to certain classes of pollutants than others. Either acute or chronic tests can be used. On the Central Coast, most tests in the ambient environment have been chronic tests. These tests are longer in duration and typically have several other test "endpoints" in addition to mortality, such as growth or reproduction. Both acute and chronic tests can be used with a dilution series of a field sample to provide information on the magnitude of toxicity.

Ceriodaphnia dubia, a planktonic crustacean commonly called a water flea, is the most commonly used fresh water invertebrate test organism in the Central Coast. In addition to survival, 7-day chronic tests on *Ceriodaphnia* include number and size of broods. Invertebrates tend to be more sensitive to many pesticides, since pesticides are formulated to kill insects and other invertebrates. *Ceriodaphnia* has shown a particular sensitivity to organophosphate pesticides. *Pimephales promelas*, the fathead minnow, is a standard vertebrate test organism. *Pimephales* is less sensitive to organophosphates, but can be impacted by other pollutants, including ammonia and pyrethroid pesticides. In 7-day chronic tests, larval *Pimephales* are evaluated for increases in weight as well as for survival. *Selenastrum* is an alga commonly used to test for toxic effects in water. The 96-hour test examines the rate of algal cell growth relative to a control sample. Algae are used to test for toxicity associated with herbicides and metals such as copper that are toxic to plants. However, when nutrient levels are high in the test water, the test sample can show higher growth rates than the control sample. To some extent this growth effect can confound test interpretation, but a toxic sample definitely indicates a problem. Streambed sediments are usually tested for toxicity with *Hyalella azteca*, an "epi-benthic" amphipod (closely associated with the sediment – water interface). *Hyalella* is native to the Central Coast Region and other parts of California. The *Hyalella* chronic test measures both survival and growth in 10-day exposures.

To determine the chemical causes of observed toxicity, Toxicity Identification Evaluations (TIE) can be conducted. These are complicated weight-of-evidence procedures in which the field samples are manipulated to alter the ability of specific chemicals to affect organisms. For example, filtration can remove toxicants associated with particulates. Aeration can remove volatiles, solid-phase extraction can remove non-polar compounds, and piperonyl butoxide can block the toxic effects of organophosphate pesticides. Researchers progressively inactivate or enhance each chemical group, test for toxicity, and then where possible reintroduce the chemical group back into the sample, and retest for toxicity. In this way researchers generate multiple lines of evidence about the source of the toxicity. Some chemicals, such as diazinon, can be specifically identified; others, such as PCBs, can be identified to class.

A number of chemicals can cause toxicity to test organisms. Clearly, pesticides and herbicides are primary target groups, because they are formulated specifically to kill invertebrates or plant life. Over the past decade, toxicity testing in our Region has focused on organophosphate pesticides, particularly chlorpyrifos and diazinon, as these two chemicals have repeatedly shown toxicity to invertebrate test organisms. Because of the toxicity of these chemicals, the U.S. Environmental Protection Agency moved to ban both chemicals for sale for urban uses in 2000 and also restricted uses of these chemicals for some agricultural purposes. They are both still applied on row crops, such as broccoli, lettuce, cauliflower and spinach. Diazinon is a very soluble chemical, and therefore tends to have toxic effects in the water column only. Chlorpyrifos is less soluble and can be found at toxic concentrations in sediment as well.

Pyrethroids are a newer class of pesticides that are replacing diazinon and chlorpyrifos for both urban and agricultural uses. Different pyrethroid chemicals have different properties in water, including solubility, persistence and toxicity, but generally tend to attach to sediment particles as do the long banned organochlorine pesticides. Because of this, they are most likely to be detected using sediment chemistry and toxicity tests, rather than water tests. Some pyrethroids are very stable in water and can remain toxic for many months; others begin to break down in a matter of days. Permethrin is extremely stable, but is also the least toxic of the commonly used pyrethroids. The median concentration that is lethal to 50% of test organisms (the "LC50") for permethrin for *Hyalella* is 10.53 ug/g; for other common pyrethroids it ranges between 0.45 and 1.54 ug/g (Starner and Kelley, 2004). These LC50 values are very low because pyrethroids are highly toxic to amphipods and fish.

Because chemicals in groups like the organophosphate and pyrethroid pesticides can have additive effects, they are sometimes evaluated in total, using Toxic Units (TUs). A toxic unit is the pesticide concentration for a given sample, divided by its respective LC50. Toxic units for all measured chemicals can be summed to create a single value to represent the potential toxic effects of multiple chemicals with different toxicity thresholds. Typically, any value over 1 TU is likely to kill half of the exposed test organisms.

Many other pollutants can cause toxicity, including petroleum products and other organic pollutants and some metals, such as copper and mercury. Ammonia is toxic to fish and is routinely quantified in toxicity test procedures. Some chemicals cause sublethal effects as well as mortality. Tests that include embryo-larval development, like the *Pimephales test,* may be useful in situations where teratogenic (cancer-causing) chemicals are present, or where chemicals that cause endocrine disruption are present, and some standard tests have been adapted to better assess reproductive fitness and endocrine function (Anderson et al., 2003c).

Researchers and monitoring programs have documented toxicity in Central Coast waters and sediment, using multiple test organisms in both agricultural and urban settings. A compilation of references on toxicity in the Central Coast Region, both from peer reviewed journals and from technical reports, can be found in Attachment 1, and most of these articles and reports can be found posted on the Water Board's Central CCAMP website (http://www.ccamp.org/ccamp/Reports.html). Findings from several of these efforts are summarized below.

Findings from Research Studies

Granite Canyon Toxicity Findings - The Granite Canyon Marine Pollution Studies Laboratory has been studying issues associated with toxicity in marine and fresh waters of the Central Coast for the past decade. Granite Canyon researchers were originally affiliated with the University of California, Santa Cruz but became part of the U.C. Davis Department of Environmental Toxicology in 1998. CCAMP formed in 1998 and began collaborations with Granite Canyon in the Pajaro and Salinas watersheds, and when the State Board initiated the statewide Surface Water Ambient Monitoring Program (SWAMP) , Granite Canyon became one of the primary contractor laboratories for toxicity testing through SWAMP.

Granite Canyon researchers Brian Anderson, John Hunt, Bryn Phillips and others initiated work in the Pajaro watershed in the mid-1990's (Hunt et al., 1999). In that study, they used *Neomysis mercedis*, a resident crustacean, as the invertebrate test organism in water toxicity bioassays. They found significant toxicity at all seven sites they sampled in the lower watershed, but found that toxicity was most prevalent in agricultural drains (78% of all samples) and tributary ditches (25% of samples), compared to the main stem river and estuary (11% of samples). Toxicity in the estuary was correlated with higher river flow. Several chemicals, including toxaphene and DDT (both banned organochlorine pesticides) and diazinon (a currently applied pesticide) were found at potentially toxic levels. TIE results indicated that multiple compounds were responsible for toxicity, and implicated non-polar compounds (such as organochlorine pesticides), and possibly polar compounds as the cause of toxicity.

The Granite Canyon team also spent several years working intensively in the Salinas watershed and surrounding area. In 1997 they worked through the State Water Resource Control Board's Bay Protection and Toxic Cleanup Program to evaluate toxicity in Tembladero Slough between the City of Salinas and Moss Landing Harbor. They tested both sediment and sediment pore water. All sites on the drainage had sediment that was toxic to invertebrates. High levels of DDT, dieldrin, and chlordane (all banned organochlorine pesticides) were found in sediments, generally decreasing in concentration from upstream to downstream. This study did not analyze for other pesticide groups (like organophosphates or pyrethroids). The Harbor was subsequently listed as one of two "toxic hot spots" in the Region because of high concentrations of organochlorine pesticides (SWRCB 1998).

The Granite Canyon group began to move upstream into the Salinas watershed, where they found extensive water column toxicity to the invertebrate *Ceriodaphnia* in the lower watershed (Hunt et al., 2003). TIEs generally implicated chlorpyrifos and/or diazinon (i.e. every toxic sample had concentrations of one or both of these chemicals sufficient to cause toxicity). 100% of samples taken from an agricultural tail water drain were toxic, and 87% of samples from a channel draining a mixed agricultural and urban watershed were toxic. Only 13% of samples from a tile drain were toxic and 11% of samples on the main stem were toxic. Other studies have noted lower toxicity from areas drained by tiles; it is likely that pesticides are removed from water as it filters through soil to the tile drains.

In a related study conducted about the same time, the Granite Canyon group documented high levels of chlorpyrifos and diazinon leaving an agricultural drain (Quail Creek), and tracked those levels downstream in the Salinas River (Anderson et al., 2003). They documented high toxicity in water and sediment from the drain and River and a concurrent impact on benthic macroinvertebrate communities where toxicity and chemical concentrations were highest. In this study, they had direct evidence relating measures of organophosphate pesticides to water column and sediment toxicity, and showed associated benthic invertebrate community degradation. TIEs indicated toxicity due to chlorpyrifos, but also indicated that a pyrethroid pesticide might contribute to toxicity. A subsequent dose-response study (Anderson et al., 2006) showed that several native invertebrates were sensitive to the levels of chlorpyrifos and permethrin (a pyrethroid) measured in the river system.

Granite Canyon studies in the Santa Maria watershed began in the early 2000s. Anderson et al. (2005) collected water and sediment samples for toxicity testing, chemical analyses, TIEs, and assessed benthic invertebrate communities from several sites, including one in the lower Orcutt Creek, and one in the Santa Maria River just downstream of Orcutt Creek, near where it becomes an estuary. Water samples from both of these sites were toxic to *Ceriodaphnia*, with high levels of chlorpyrifos (implicated by the TIE). Sediment sampling and subsequent TIEs from the same sites suggested chlorpyrifos and most likely a pyrethroid pesticide were responsible for observed sediment toxicity to *Hyalella*. Benthic invertebrate samples from these two sites were impacted relative to an upstream reference site, implying that toxicity and ecological damage are related. The researchers had few toxic samples at other sites evaluated in the study.

Phillips et al. (2006) evaluated sediment toxicity in Orcutt Creek in more detail. Several pesticides were present, including chlorpyrifos, DDT, and three pyrethroid pesticides (permethrin, esfenvalerate, and fenvalerate). Though individual concentrations were below documented toxic thresholds, many of these chemicals are known to have synergistic or additive effects. Also, only four pyrethroids were tested in this study; several others are applied in the watershed. TIE analysis indicated that one or more organic chemicals were responsible for toxicity, likely including a pyrethroid pesticide.

Hunt et al. (2005) evaluated the utility of pesticide-use reporting data for identifying sites at risk for toxicity, and examined whether nitrate concentrations could be used as a surrogate to identify sites at risk for toxicity. The study showed that there were significant correlations between intensity of pesticide application rates and in-stream toxicity, but that nitrate was not useful as a predictor of where toxicity might be found.

The Granite Canyon group has also done work in the Region on effectiveness of agricultural management practices (MPs) in reducing toxicity (Hunt et al., 2007 and 2008). This study evaluated two types of vegetated treatment systems. Sediment and water toxicity testing and TIEs were used to evaluate the effectiveness of MPs in reducing concentrations of chemicals that caused toxicity. In one treatment system, inflows were toxic and contained toxic levels of chlorpyrifos (water and sediment) and permethrin (sediment). Significant reductions in chemical concentrations and toxicity were achieved at the outflow. The other system typically had water toxicity due to diazinon and sediment toxicity from lambda-cyhalothrin and cypermethrin (pyrethroids) at the inflow. Most pesticides were reduced in concentration at the outflow. Diazinon concentrations were less effectively reduced, because its high solubility limits absorption in the vegetated treatment system.

In 2006, SWAMP funded a statewide urban pyrethroid study that included a number of sites in the Central Coast. Granite Canyon researchers conducted the toxicity work for this study. Sites were selected to be representative of urban impacts only, to the extent possible. None of the ten sites initially screened in Region 3 showed toxicity, but more detailed follow-up testing found toxicity at three of five sites, though one may be influenced by greenhouses in the area. Pyrethroid chemistry analysis was conducted at two of these sites and found lambda-cyhalothrin and bifenthrin present. Pyrethroids are unusual in that they are more toxic at colder temperatures; this characteristic can be used as partial evidence that the chemical of interest is a pyrethroid. Many sites in the statewide study were more toxic at colder temperatures, implicating pyrethroids as a widespread cause of toxicity in urban streams.

U.C. Berkeley, Salinas Study Findings - Dr. Don Weston, a professor in the Integrative Biology Department of U.C. Berkeley, has worked on pyrethroid toxicity issues, primarily in the Central Valley of California. In previous studies in the Central Valley, he has showed that homeowner use of insecticides and structural pest control by professional applicators can be responsible for a significant amount of toxicity in adjacent drainages. Some of the concentrations he detected in urban areas were many times more toxic than those he found in agricultural areas. The U.C. Berkeley group expanded their research on pyrethroid toxicity into three creeks draining through the City of Salinas (Ng et al., in press). At all sites, including both urban and agricultural land uses, sediment toxicity was found with pyrethroid concentrations high enough to explain the toxicity (exceeding the LC50). Though there were not distinct differences between pesticide patterns in urban and agricultural areas, two pyrethroids, cyfluthrin and cypermethrin, tended to be typical of urban areas, while lambda-cyhalothrin tended to be found in agricultural areas. Other pyrethroids, bifenthrin and permethrin, were found in drainages associated with both land uses. In addition, chlorpyrifos contributed toxicity at one agricultural site.

California Department of Pesticide Regulation Findings

In 2003, the Department of Pesticide Regulation (DPR) sampled agricultural dominated streams in the Salinas area for pyrethroid pesticides in sediment and water (Starner and Kelley, 2004 and Starner et al., 2006). Monitoring targeted fourteen sites and resulted in seventy-six total samples from the lower Salinas area. Starner et al. (2006) found 85% of sediment samples contained at least one pyrethroid pesticide and that 42% of samples exceeded one Toxic Unit (again, the sum of individual pesticide concentrations divided by their associated LC50s for *Hyalella*).

Findings From Ambient Monitoring

Central Coast Ambient Monitoring Program and Cooperative Monitoring Program for Agriculture Findings

CCAMP began routinely sampling toxicity in 2001, as part of its watershed rotation monitoring program. This program is conducted once every five years in each of our Hydrologic Units. Because of budget constraints, CCAMP did not include the full four species approach (three species in water, one in sediment) until 2005. CCAMP toxicity sampling is conducted once in the wet season and once in the dry season. We have summarized all available toxicity data on our website, at www.ccamp.org (click on "Toxicity Findings").

In 2005, a new program to address water quality issues associated with irrigated agriculture was put in place by the Central Coast Water Board. The Central Coast Order for discharges from Irrigated Lands (Irrigated Ag Order) includes a requirement for participation in water quality monitoring. In order to fulfill this requirement, growers formed a new non-profit, Central Coast Water Quality Preservation, Inc. (Preservation, Inc.) that has been managing the Cooperative Monitoring Program since the program began. The Cooperative Monitoring Program has collected toxicity using three water species (generally *Ceriodaphnia, Pimephales*, and *Selenastrum*) four times per year (twice during the wet season and twice during the dry season), and using *Hyalella* in sediment once per year.

The Cooperative Monitoring Program monitors 50 sites across the Region in water bodies associated with irrigated agriculture. All water bodies in the program were selected because they were known to have problems from chemicals associated with agricultural activity and are on the Clean Water Act Section 303(d) list of impaired waters. It should be noted that site placement intentionally targets areas with high agriculture use. Site selection was not intended to be spatially representative (e.g., through a randomized design). The intent of site placement was to show long-term positive trends in water quality at the lower ends of water bodies. The Cooperative Monitoring Program conducts toxicity monitoring five times a year at each site (water sampled twice in wet season, twice in dry season and annually for sediment). The Cooperative Monitoring Program has conducted follow-up work on invertebrate toxicity and organophosphate pesticides (Preservation, Inc., 2008). Follow-up monitoring findings are summarized later in this report.

Water Board staff has summarized all available toxicity data from CCAMP and the Cooperative Monitoring Program on our website, at www.ccamp.org (click on "Toxicity Findings"). In evaluating toxicity data, Water Board staff relies heavily on the California policy for listing waters as "impaired" under the Clean Water Act or the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (SWRCB,2004). This policy requires that if more that two acutely toxic samples are collected on a water body, that water body should be listed as "impaired" due to toxicity (and for the chemical causing the toxicity, if known). This approach drives the web-based maps of the data ("red" sites have two or more hits), but when Water Board staff considers where to prioritize work on toxicity issues, frequency of toxicity as well as the species showing the toxic effect must be considered.

Region wide, CCAMP and the Cooperative Monitoring Program have conducted toxicity monitoring in 98 streams and rivers in the Region. In 26% of these, no toxic effects were observed whatsoever. Lethal effects have been observed at 74% of the water bodies monitored. Sublethal effects (related to growth or reproduction) have been observed at 67% of sites monitored. Overall, lethal effects for fish were the least commonly encountered toxic effect. For *Pimephales*, toxic effects were found at 17% of sites sampled. For *Selenastrum*, toxic effects were found at 31% of sites. Water column toxicity to *Ceriodaphnia* was found at 33 % of sites. *Hyalella* showed toxic effects in sediment at 51% of all sites sampled. Because only one sediment sample is collected per year, many sites are represented by a single sediment toxicity sample.

Because of the large amount of toxicity data from CCAMP and the Cooperative Monitoring Program for the Region, Water Board staff has summarized data in more detail, and organized it by Hydrologic Units.

North Coast Hydrologic Unit

CCAMP monitoring in Santa Cruz and San Mateo County coastal watersheds is conducted on five-year rotation with most recent monitoring conducted in 2005. Toxicity monitoring was conducted in seven water bodies and resulted in two toxic results. Sediment from Gazos Creek, was toxic to *Hyalella* near the creek mouth and one water sample was toxic to *Selenastrum* at Arana Gulch. No toxic samples of any kind were collected on San Lorenzo, Zayante, Branciforte, Scott or Waddell Creeks.

Pajaro River Hydrologic Unit

CCAMP most recently conducted monitoring in the Pajaro watershed at twenty sites in 2005. CCAMP conducted toxicity monitoring in thirteen water bodies in the Pajaro watershed. Cooperative Monitoring Program toxicity monitoring is ongoing since January 2006 at ten monitoring sites. In the Pajaro Hydrologic Unit more sites were toxic to *Selenastrum* (the alga) than to other testing species, implying impacts from herbicide use. Thirty-three percent of sites showed algal toxicity (usually for only one sample). These included San Juan, Furlong, and Salsipuedes creeks, Pajaro River at Chitendon and Miller's Canal, lower San Benito River, Harkins and Watsonville Sloughs. Invertebrate toxicity was also reported. Sediment from San Juan Creek was toxic to *Hyalella*. Water toxicity to *Ceriodaphnia* was found at four of twenty-seven sites including San Juan and Salsipuedes creeks, Pajaro River at Chitendon Gap, and Miller's Canal. No toxicity was found to *Pimephales* in the Pajaro Hydrologic Unit.

Salinas River Hydrologic Unit

CCAMP most recently conducted monitoring in the Salinas watershed at 32 sites in 2006. CCAMP toxicity monitoring was conducted in ten water bodies and at two storm drains. Cooperative Monitoring Program toxicity monitoring is ongoing since January 2006, at 15 monitoring sites. Virtually all sediment samples taken in the Old Salinas/Tembladero/Reclamation Canal drainage and in its tributaries were toxic to *Hyalella*. This includes Gabilan and Natividad creeks, Espinosa and Alisal sloughs, Blanco Drain and Merrit Ditch. All of these locations were also toxic to invertebrates in water samples but at lower frequencies than for sediment toxicity. Blanco Drain was the exception, with toxicity to invertebrates in one sediment sample and one water sample (out of ten samples). Less toxicity was observed in fish and algae tests from Old Salinas, Tembladero Slough and Reclamation Canal sites. However, most sites had at least one toxic sample. A single sample was toxic to fish from Old Salinas River, Reclamation Canal, Espinosa Slough, Merrit Ditch and Blanco Drain.

The Salinas River itself was typically not toxic. However, single samples were toxic to fish at Chualar Bridge and at Spreckles. Water toxicity to invertebrates showed a similar pattern; each of the five main stem sites between Greenfield and Spreckles had single toxic hits. No algal toxicity has been observed in Salinas River sites. Monitoring sites on Salinas River above Greenfield have not shown any toxicity.

Additional data from Salinas River tributaries above the City of Salinas includes Quail Creek, Chualar Creek, Arroyo Seco River and Atascadero Creek. Invertebrate toxicity in Quail and Chualar Creeks is common in both sediment and water samples. In addition, a single sample from Quail Creek was toxic to fish as was a single sample from Chualar to algae. No toxicity was observed in Atascadero Creek or Arroyo Seco.

Estero Bay Hydrologic Unit
CCAMP monitoring in San Luis County coastal watersheds is conducted at thirty sites. Monitoring for toxicity was conducted in 2002 at seven sites. Cooperative Monitoring Program toxicity monitoring is ongoing since January 2006 at five monitoring sites in agriculturally influenced areas. No toxicity has been reported at sites in this Hydrologic Unit.

Santa Maria Hydrologic Unit
CCAMP monitoring in the Santa Maria watershed was conducted at twenty-six sites in 2007. CCAMP sites are located throughout the watershed including areas dominated by rangeland, urban and agricultural influences. CCAMP has conducted toxicity monitoring in twelve water bodies in this watershed. Cooperative Monitoring Program toxicity monitoring is ongoing since January 2005 at ten monitoring sites in areas dominated by agriculture. Data from both programs show invertebrate toxicity is persistent throughout the lower watershed. All sites monitored by the Cooperative Monitoring Program were toxic to *Hyalella* in sediment samples and to *Ceriodaphnia* in water samples at least once. This toxicity includes sites downstream from the City of Santa Maria on Santa Maria River, Orcutt Creek, Green Valley Creek and Main Street Canal as well as Oso Flaco and Little Oso Flaco creeks. Additional sites where invertebrate toxicity was observed are located above the City and include Bradley Channel and Bradley Canyon Creek. All of these sites are heavily influenced by agriculture. Samples from Oso Flaco Lake, Nipomo Creek, Alamo Creek and Cuyama River were not toxic to invertebrates in CCAMP or Cooperative Monitoring Program sampling.

Toxicity to larval fish (generally using *Pimephales*) in the Santa Maria watershed has been documented in several water bodies including Bradley Channel, Main Street Canal, Orcutt Creek, Green Valley Creek and Little Oso Flaco Creek. At Main Street Canal, the ammonia concentrations in the toxic sample exceeded 90.0 mg/L. A partial TIE (adjusting pH to 6.0 to reduce the unionized, and toxic, form of ammonia in the sample) indicates that ammonia at this site was the cause of toxicity.

Most sites in the Santa Maria Watershed have at least one sample toxic to algae (typically *Selenastrum*) over the past two years. Sites are located in areas influenced by urban, agricultural and rangeland dominated landscapes. However, only Main Street Canal had multiple samples toxic to algae.

Santa Ynez Hydrologic Unit
CCAMP monitoring in the Santa Ynez Watershed is conducted on five-year rotation at eight sites, with the most recent monitoring conducted in 2007. CCAMP conducted toxicity monitoring in 2001 in this watershed at sites located throughout the watershed including areas dominated by rangeland, urban and agricultural influences. Cooperative Monitoring Program monitoring is ongoing since January 2006 at three sites in agricultural dominated areas of the lower watershed. Very few toxicity results were available for this summary, as 2006 was a very dry year for this watershed. Available data shows a single sediment sample was toxic to *Hyalella* in sediment collected from lowest site in the watershed. In addition, a single water sample was toxic to *Pimephales* at the upper-most site (located above Lake Cachuma). No toxicity has been observed at other sites in this watershed.

South Coast Hydrologic Unit
CCAMP monitoring in the South Coast Hydrologic Unit is conducted at thirty sites, with the most recent monitoring conducted in 2007. CCAMP conducted toxicity monitoring in 2001 in

this watershed at all sites. Multiple land uses influence these waters and include urban, rangeland, industrial and agriculture. Cooperative Monitoring Program monitoring is ongoing since January 2006 at four sites in agricultural dominated areas. Multiple waters are already identified as impaired by toxicity on the Clean Water Act Section 303(d) list. These include Arroyo Paredon, Mission Creek and Rincon Creek. Toxicity data from CCAMP are the basis for these listings.

Data from both CCAMP and the Cooperative Monitoring Program show sediment samples were toxic to *Hyalella* at lower Carpinteria, Atascadero and Franklin Creeks.Water samples were toxic to *Ceriodaphnia* at Carpinteria, Franklin Creek and Canada del Capitan in one sample. Multiple samples were toxic to *Ceriodaphnia* in Arroyo Paredon Creek. Toxicity to *Pimephales* was the most common type of toxicity observed in CCAMP monitoring conducted in 2001 and 2002 and occurred in the following creeks: Rincon, Carpinteria, Santa Monica, Arroyo Burro, Los Carneros, Glenn Annie, Bell, Refugio, Gaviota and Jalama.

There were multiple sites in this Hydrologic Unit that have not had any toxic samples.

All data, including samples counts and number of toxic samples, can be viewed on the CCAMP website. See www.ccamp.org and click on "Toxicity Findings".

Cooperative Monitoring Program Follow-up study

Toxicity monitoring by Cooperative Monitoring Program has shown significant toxicity in both water and sediment tests at many of the sites in the program. The Irrigated Ag Order requires follow-up monitoring to determine causes of toxicity. The Cooperative Monitoring Program initiated a follow-up study in which organophosphate (OP) pesticides and invertebrate toxicity sampling was conducted for one year at twenty-three sites (thirteen in the lower Salinas and ten in Santa Maria), to confirm the source of the toxicity.

Patterns of OP pesticide concentrations in the two watersheds differed. Diazinon was detected widely in the Salinas watershed area. Chlorpyrifos and malathion were detected in the Santa Maria area in much higher frequency. Table 1 shows the OP pesticides that were detected in the two study areas.

Table 1: Number of samples and sites with detections of various organophosphate (OP) pesticides. Total site count in the Salinas Area is 13 and total site count in the Santa Maria Area is 10, with 4 sampling events per site.

	Salinas Area	Salinas Area	Santa Maria Area	Santa Maria Area
OP Pesticide	Number of samples with chemicals detected (N = 55)	Number of sites with chemicals detected (N = 13)	Number of samples with chemicals detected (N = 39)	Number of sites with chemicals detected (N = 10)
Chlorpyrifos	14	8	31	8
Malathion	7	5	26	10
Diazinon	48	13	18	7
Dimethoate	22	8	15	9
Ethoprop	7	4	0	0
Fenchlorphos	1	1	0	0
Dichlorvos	0	0	1	1

Although multiple organophosphate pesticides were detected in samples collected for this study, only chlorpyrifos and diazinon concentrations exceeded the suggested LC50 for *Ceriodaphnia* (0.053 ug/L and 0.32 ug/L respectively). Highest concentrations for both pesticides were from Quail Creek, where chlorpyrifos measured as high as 1.49 ug/L and diazinon as high as 24.5 ug/L – an outlier in this study (Preservation, Inc., 2008).

Chlorpyrifos concentrations exceeded the LC50 for *Ceriodaphnia* in at least one sample from Salinas area sites on Alisal, Espinosa and Tembladero sloughs, Natividad Creek and the Salinas River at Spreckles. All four samples from Quail Creek exceeded the LC50. Diazinon levels exceeded the LC50 at Salinas sites including Alisal, Espinosa and Tembladero sloughs and Natividad Creek. Only one sample from Quail Creek exceeds this concentration, as mentioned previously.

At Santa Maria area sites, diazinon exceeded the LC50 in Santa Maria River, Orcutt Creek, Bradley and Blosser channels. The highest concentration was in the Santa Maria River and measured 0.41 ug/L. Chlorpyrifos exceedances were more prevalent and consistently higher overall (the highest concentration was 0.98 ug/L from Orcutt Creek). No samples from Little Oso Flaco Creek exceeded the LC50 for either pesticide.

In follow-up monitoring, most samples were either not toxic or showed 100% toxicity. A large subset of samples (thirty-five) was 100% toxic and had greater than 1 OP-related TU present. A relatively large number of samples (fourteen) showed toxicity in spite of OP concentrations less than 1 TU. This implies another chemical may have been causing the toxicity, or that some unaccounted for synergistic effect was present. Three samples had high survival with greater than 1 TU present and forty-two samples had 100% survival (with less than 1 TU of OPs present. The following sites were toxic to 100% of test organisms in all samples: Bradley Channel at Jones Street, Salinas Reclamation Canal at Jon Road and above the City of Salinas at La Gaurdia Road (Preservation, Inc., 2008).

The follow-up report pointed out that during the 2006-07 sampling year the Phase 1 sites (Lower Salinas and Santa Maria watershed) showed significantly more toxicity than the Phase 2 sites (Pajaro, Santa Ynez and Santa Barbara). During this study, acute toxicity was observed at least once in nineteen of twenty-three Phase 1 sites (two were dry) and in 53% of all samples collected. Overall, most toxic results were obtained during August, at the height of the dry season, when irrigation runoff can represent a large percent of the flow in some areas (Preservation, Inc., 2008).

Actions to Address Toxicity from Irrigated Agriculture

The Central Coast Water Board adopted Order No. R3-2004-0117, Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Irrigated Ag Order) because of concerns about known toxicity and other water quality problems in our agricultural areas. The Irrigated Ag Order, developed with broad participation from Central Coast agricultural and environmental representatives, established many new requirements for growers, including enrollment, water quality education, farm water quality planning and implementation of management practices to protect water quality, and reporting practice implementation to the Water Board.

The Irrigated Ag Order and its associated Monitoring and Reporting Program have been purposely designed to implement a problem-solving approach to water quality problems originating with irrigated agriculture. Many of the water quality problems in the Central Coast's watersheds are long-standing, including high levels of nutrients in groundwater and surface water, and toxicity from pesticides, the result of years of intensive farming and inefficient management of irrigation and chemical applications. While we believe there has been a general improvement in practices, toxicity is still present at many sites, indicating that more management measures are needed. Vegetative practices are one of the important tools to address toxicity in water. Since the September, 2006 E.coli 0157:H7 outbreak, many growers have been forced to remove vegetation in response to buyers' demands and fears of vegetation harboring wildlife that may be carriers. Many of these responses have not been backed up with scientific evidence. This issue will be addressed when we renew the Irrigated Ag Order in early 2009.

Our initial effort in developing the new Irrigated Agriculture Program has been to get all commercial irrigated operations enrolled, meeting education and farm plan development requirements and reporting management practice implementation. As a result, 93% of the irrigated acreage is currently enrolled, and we are pursuing enforcement against the remainder. In addition, nearly 1,300 out of the approximately 1,800 enrolled operations have completed 15 hours of education and developed farm plans. Most operations have implemented at least some management practices to address water quality concerns. We recently completed a summary report on management practice implementation, based on information submitted by all growers, as required by the Irrigated Ag Order. This analysis can help us understand which practices are being used and which may require additional technical assistance and education for growers to use effectively. Most growers say they implement integrated pest management, use lower toxicity pesticides, and consider pesticide leaching and runoff potential in choosing pesticides. Most have taken steps to improve the distribution uniformity of irrigation systems. However, overall we see low implementation of vegetated practices to filter pollutants. We also see low implementation of key elements in irrigation management, such as using evapotranspiration information to schedule irrigations, using irrigation mobile labs to test irrigation systems, and keeping records of irrigations. All of these practices are important water quality protection tools. We consider irrigation management to be one of the most important management measures to address toxicity, along with integrated pest management techniques to reduce pesticide applications. The use of vegetation to filter pollutants that move off fields is another important tool in addressing multiple water quality problems.

Because toxicity is widespread, rather than attributable to a few identifiable "bad actors," we believe the most effective approach is multi-faceted:

- ensuring that growers have up to date information about problems in their watersheds;
- identifying priority management practices and ensuring that outreach and technical assistance are available to foster implementation;
- working with the Department of Pesticide Regulation and county Agricultural Commissioners to review labeling and usage of problematic pesticides;
- concentrating inspections in watersheds with repeated toxicity; and,
- initiating enforcement actions when we identify individual operations that are not taking adequate steps to address their discharges.

Each of these components is described in more detail below.

Providing Water Quality Information through the Cooperative Monitoring Program

The Cooperative Monitoring Program implemented by Preservation, Inc., conducts monthly monitoring at a network of 50 sites throughout the agricultural areas of the region. In addition, the program conducts follow-up monitoring in prioritized problem areas, funded by an amount set aside which is equivalent to 25% of annual routine monitoring costs. The first follow-up project, described above, conducted organophosphate scans at 25 sites in Salinas and Santa Maria in 2006 and 2007. The results confirmed that chloripyrifos and diazinon were present at many sites at sufficient levels to account for much of the observed toxicity. Preservation, Inc. presented these results to growers during workshops held across the region in 2007. Additional follow-up projects for 2008 add upstream sites in some mixed use watersheds to better characterize inputs, install continuous summer flow monitoring at six sites to better understand irrigation tailwater inputs, and provide watershed-level outreach, on-farm testing and site-specific technical assistance to address toxicity and other pollutants in six priority sub-watersheds.

Supporting Management Practice Implementation through an Irrigation and Nutrient Management Grant

The fact that we see the most toxic results in August (during irrigation season) confirms the need to more aggressively address tailwater runoff. Using the analysis of management practice implementation and results of past irrigation improvement projects as a guide, Water Board staff developed a conceptual proposal for a regionwide irrigation and nutrient management program, which would incorporate all the elements needed to make long-term, substantive changes in irrigation practices. Improving irrigation practices in order to reduce or eliminate tailwater has the potential to reduce toxicity in a relatively short time. Improved irrigation, used in combination with other practices, such as vegetated buffers and ditches, and integrated pest management techniques, could result in widespread reductions in toxicity in agricultural areas. We are working with potential partners to develop and fund an effective program.

Interacting with Department of Pesticide Regulation (DPR) and County Agricultural Commissioners

Water Board staff is coordinating with DPR about their current review of chlorpyrifos, diazinon and pyrethroids; Water Board staff provides data and relays our concerns about these chemicals. Water Board staff will be attending meetings in April with DPR and other parties to discuss the review of these pesticides. We met with several county agricultural commissioners in 2006 to share early toxicity data from the Cooperative Monitoring Program and are scheduling meetings with them in the near future to discuss the most recent data and discuss ways to coordinate our mutual efforts most effectively.

Targeting Inspections and Enforcement Actions

Water Board staff began conducting inspections in September 2007, to assess compliance with the Irrigated Ag Order, including review of on-site farm plans and management practice implementation. Our inspection program has a goal of completing 120 inspections by January 2009. We conduct some inspections randomly, to assess overall compliance with program requirements, but are currently focusing most of our inspections in watersheds with identified water quality problems and in response to complaints.

Water Board staff is currently conducting focused inspections in two areas of known organophosphate toxicity. We have conducted concentrated inspections in Quail Creek watershed, and are planning a similar approach in Santa Maria watershed. Part of our analysis includes reviewing cropping systems and pesticide use in each watershed. Our preliminary analysis suggests that some cropping systems (primarily broccoli and other cole crops, and lettuce) are problematic, because of heavy inputs of chemicals and constraints in irrigation system management (timing and mode of irrigation water applications). Crops may also be problematic because of high water demand, lack of good crop-specific information on the most efficient water or fertilizer management, or other crop management issues.

Water Board staff has been working closely with all growers in one subwatershed to address multiple issues, including irrigation management, sediment control and toxicity. As a result, one grower who typically irrigates his broccoli crop with sprinklers is experimenting with drip irrigation this season. He anticipates a reduction in tailwater and storm water run-off from his fields due to the use of drip irrigation. Since many growers currently use only sprinkler irrigation on broccoli, this grower's trial could have an impact on other growers' practices. It may also lead to development of formal guidance by University of California Cooperative Extension, thus extending the benefits to water quality beyond this subwatershed.

As we conduct inspections, if we identify growers who are not implementing adequate management practices to protect water quality or do not act promptly to address identified problems, we will pursue enforcement actions as appropriate.

We will continue to evaluate management practice and water quality changes that result from our activities, and adjust the Irrigated Ag Program to most effectively address toxicity and other agricultural water quality impacts.

Actions to Address Toxicity from Urban Runoff

In general, actions to address toxicity from urban runoff fall into two categories - regulatory programs and education and outreach. Additionally, we engage in research and monitoring and interagency coordination to further develop and prioritize actions. Regulatory programs prevent pollution by using existing regulatory tools to ensure that pesticides are not applied in a manner that results in discharges that threaten beneficial uses in water bodies. Education and outreach programs focus on decreasing demand for pesticides that threaten water quality, while increasing awareness of alternatives that pose less risk to water quality. Research fills existing information gaps. Monitoring informs implementation progress and success. Interagency coordination facilitates all of these actions. The actions described in more detail below fall into one or more of these categories and work together to reduce toxicity throughout the Central Coast.

Water Board staff has not yet developed action plans or controls for urban runoff toxicity in specific geographic areas, waterbodies, or pesticide types. The current research and monitoring program results on toxicity in urban areas in our region, and the types of pesticides used in urban areas, is not developed enough yet to do so. However, we have and will continue to respond directly to frequent and high levels of toxicity found through monitoring in urban areas. For example, when Water Board staff discovered high toxicity downstream of urban land uses in a tributary to the Santa Maria River and downstream of the City of Salinas, Water Board staff required the cities to find the cause of the toxicity, to reduce or eliminate the cause of the toxicity, and to create and implement monitoring, investigation and control programs as part of their Municipal Storm Water Management Program to prevent and address future toxicity problems. We continue to learn and improve our ability to select and implement actions from our CCAMP data, study results, local monitoring efforts in urban areas and watershed assessments for Total Maximum Daily Loads for pesticides (in development for the Salinas River Watershed and Santa Maria River Watershed).

The agencies with the broadest authorities to oversee pesticide use and pesticide discharges include the USEPA, the California Department of Pesticide Regulation, and the Water Board. Water Board staff is implementing and continue to consider both regulatory and non-regulatory actions to ensure that pesticide use does not result in discharges that cause or contribute to toxicity in urban area water bodies.

Storm Water Management and Regulation
The Central Coast Water Board is currently using authorities (e.g., through permits or waste discharge requirements) to require implementation of best management practices and control measures to minimize pesticide discharges from facilities and to receiving water bodies.

Most significantly, we rely on the State Water Resources Control Board General National Pollutant Discharge Elimination System (NPDES) Permit for the Discharge of Storm Water from Small Municipally Owned and Operated Separate Storm Sewer Systems (MS4s). The MS4 permit requires the discharger to develop and implement a Storm Water Management Plan/Program (SWMP). The management programs specify what best management practices (BMPs) will be used to address certain program areas. The program areas that control pesticide discharges and most reduce toxicity include public education and outreach; illicit discharge detection and elimination; and good housekeeping for municipal operations.

For example, the SWMP for the County of Santa Barbara includes:

- Green Gardener Certification Program: The program trains landscape maintenance professionals in techniques that reduce resource use and pollution from landscaped sites.
- Landscape Education Program: The County has a sustainable landscaping education program that includes information on reducing polluted runoff from landscaped areas through efficient irrigation and reduction of fertilizers and pesticides. The program includes annual landscape fairs in North County and South Coast locations, Earth Day exhibits, and brochures and other outreach materials. The County revised the brochure "Sustainable Landscapes for the Central Coast" to include specific recommendations on protecting water quality in June 2003.
- Hazardous materials collection: The Santa Barbara County Resource Recovery and Waste Management Division has established a household hazardous waste collection program for motor oil, antifreeze, pesticides and other common waste materials
- Identification and Elimination of Illicit Discharge Sources: In order to maximize the limited resources available, potential sources of illegal dumping and illicit connections are identified and prioritized based in part on public access and contact to the area (or storm drain), and characterization of nearby land uses as industrial, commercial and older residential areas. In addition, sources [including pesticides from residential areas] will be evaluated on an ongoing basis for their potential impacts to storm water quality within county watersheds. The County's existing program for identification and elimination of illicit discharge sources is comprised of two parts- Spill and Complaint Response and Field Investigation and Abatement.

The City of Salinas has an Individual NPDES Permit for Discharge of Storm Water that requires implementation of BMPs that control pesticide discharges. Examples of BMPs to reduce pesticide discharges in the City's SWMP include:

- All (100%) staff members that apply chemicals will be trained annually. All application staff will receive training on the topic of storm water protection at this annual event. The Annual Pesticide Applicator's training event will include a post-training test to determine the effectiveness of the training provided. Scores of 75% correct will be viewed as successful completion.
- Chemicals will not be sprayed with rain forecast within 24-hours, or winds are projected to be greater than 7-miles per hour.
- To ensure that only highly-trained staff purchase, schedule use and apply pesticides, all (100%) supervisory staff responsible for pesticide application oversight will be certified as Qualified Pest Control Applicators or Pest Control Advisors. Supervisory staff will participate in, at minimum, three meetings per year to review the application program, monitor results, and make recommendations for improvement. Integration of IPM approaches will be part of each agenda.
- Produce in-store displays, "shelftalkers" and other educational information regarding residential household use of pesticides. The award winning Our Water Our World materials will be provided to local retail stores and nurseries for residential community benefit.

Water Board staff is working to enroll remaining MS4s under the General Permit and will require those MS4s to include and implement appropriate BMPs in their SWMPs to control pesticides, particularly in the watershed areas described above that have the greatest toxicity problems and where waterbodies are identified as impaired by pesticides on the Clean Water Act 303(d) List.

The Water Board also relies on the following other NPDES permits and Waste Discharge Requirements:

- NPDES General Permit for Aquatic Pesticides (for vector and weed control)- The application of pesticides into waters of the United States, or onto aquatic plants growing in waters of the United States, results in discharges of pollutants and requires coverage under an NPDES permit.
- General Waste Discharge Requirements for Fertilizer and Pesticide Handling Facilities - The purpose of these General Waste Discharge Requirements is to provide consistent and uniform methods of containment, transfer and disposal of dry and liquid fertilizer and pesticide wastes, and to facilitate implementation of management practices for dry and liquid fertilizer and pesticide handling facilities.

<u>Education and Outreach</u>
Water Board staff generally encourages integrated pest management and less toxic pest management practices by municipalities and by commercial, industrial and residential property owners. Water Board staff also solicits and manages grant-funded projects that reduce pesticide discharges and/or promote less toxic pest management practices.

For example, we are currently managing the following grants:

- Reducing Nonpoint Sources of Sediment and Pesticide Pollution in County Road Maintenance Operations- The County of Santa Cruz is the grantee. The goal of this program is to reduce sediment, nutrient and pesticide NPS pollution to impaired waters in Santa Cruz County by changing County roadside vegetation management practices to reduce pesticides (e.g., by mechanically removing vegetation, by removing or mowing vegetation at times that minimizes growth and need for pesticides and by replacing vegetation with lower growing plant species that require less or no control with pesticides).

- Urban Pollution Prevention Program- Ecology Action of Santa Cruz is the grantee. The goal of this program is to decrease the negative effects of urban non point source pesticide, nutrient and sediment pollution into impaired water bodies and the Monterey Bay. It focuses on commercial and residential landscape and school site operations by implementing water quality site plans, BMPs and Low Impact Development at model sites. The project also provides training and technical assistance to school staff, administration, students, landscapers and the general public. The Pollution Prevention in the Schools program will meet this objective by facilitating a water quality site assessment / pollution prevention planning process for 6 model schools; and providing technical assistance to all schools in the region for water quality site planning and implementing pollution prevention programs. The Green Gardener program will meet this objective by training and certifying 80 Green Gardeners, implementing three projects on residential and commercial sites, and technically assisting hundreds of residents.

Research, Monitoring and Interagency Coordination

Water Board staff will broaden communication with DPR about their current review of chlorpyrifos, diazinon and pyrethroids to include urban pesticides, by providing data and relaying our data and known problems with these chemicals.

Water Board staff will consider expanding or implementing coordination with the USEPA. Water Board staff may track USEPA pesticide evaluation and registration activities as they relate to surface water quality and share monitoring and research data with USEPA. Water Board staff may request that USEPA coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act. The objective of this act is to provide federal control of pesticide distribution, sale, and use. All pesticides used in the United States must be registered (licensed) by USEPA. Registration assures that pesticides will be properly labeled and that, if used in accordance with specifications, they will not cause unreasonable harm to the environment. Use of each registered pesticide must be consistent with use directions contained on the label or labeling. Water Board staff will ask USEPA to fully address urban water quality problems within its pesticide registration process.

CONCLUSION

In general, we have toxicity problems in many water bodies in our region, with the worst problems occurring coincident with concentrations of agricultural and urban land uses. To address toxicity in the region, we are relying predominantly on our regulatory and grants program activities, collaborations with researchers, and interagency coordination. As we learn more about the nature and extent of toxicity in our region, we will improve our ability to select and implement actions to control pesticides and other sources of toxicity.

RECOMMENDATION

This item is presented for Board discussion and input.

ATTACHMENTS

Attachment 1 – References

S:\Seniors\Shared\Regional Monitoring & Assessment\Toxicity Workshop\Toxicity staff report 050908 Final.doc