



CENTRAL VALLEY REGIONAL
WATER QUALITY CONTROL BOARD

AMENDMENTS TO THE WATER QUALITY CONTROL
PLAN FOR THE SACRAMENTO AND
SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF DIAZINON AND CHLORPYRIFOS
DISCHARGES

DRAFT FINAL STAFF REPORT
MARCH 2014

APPENDIX F

CATEGORY 4B DEMONSTRATION TO USEPA

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USEPA regulations recognize that alternative pollution control requirements may obviate the need for a TMDL. Specifically, segments are not required to be included on the Section 303(d) list if “[o]ther pollution control requirements (e.g., best management practices) required by local, State, or Federal authority” are stringent enough to implement applicable water quality standards (WQS) within a reasonable period of time. (40 C.F.R. § 130.7(b)(1).) These alternatives to TMDLs are commonly referred to as “Category 4b” determinations in reference to the one of the classifications used in 303(d)/305(b) Integrated Reports. This Appendix provides the rationale for the State’s Category 4b Demonstration to USEPA for the currently 303(d)-listed diazinon and chlorpyrifos impairments being addressed in the proposed Basin Plan Amendment.

An October 2006 USEPA memorandum (USEPA, 2006) provides the recommended structure for addressing USEPA’s expectations for Category 4b demonstrations. Category 4b demonstrations are expected to address the following six elements:

1. Identification of segment and statement of problem causing the impairment;
2. Description of pollution controls and how they will achieve water quality standards;
3. An estimate or projection of the time when WQS will be met;
4. Schedule for implementing pollution controls;
5. Monitoring plan to track effectiveness of pollution controls; and
6. Commitment to revise pollution controls, as necessary.

In addition, USEPA may request that the State provide further information supporting Category 4b Determinations in order to demonstrate good cause not to include those segments on the 303(d) list of water bodies for which TMDLs are required. (40 C.F.R. § 130.7(b)(6)(iv).) In the analysis provided below, relevant sections of the October 2006 USEPA memorandum are shown in indented text, followed by the demonstration of how these expectations will have been address by the Proposed Amendment.

States should submit their Category 4b demonstrations that address each of the six elements with their Section 303(d) list or Integrated Report submission. In general, the State’s 4b demonstration should be submitted as a stand-alone document. In situations where data and information for a Category 4b demonstration are contained in existing documents developed under separate programs (e.g., NPDES permit, Superfund Record of Decision), the State should summarize relevant information in the Category 4b demonstration and reference the appropriate supporting documentation that provides that information. The supporting documentation should be included as part of the State’s administrative record supporting the Category 4b determination.”

This Appendix summarizes the relevant information for the State’s 4b demonstration and can be read as a stand-alone document showing how each of the six recommended elements for 4b submittals are addressed with references to appropriate sections of the Basin Plan Amendment and Staff Report.

1. Identification of Segment and Statement of Problem Causing Impairment

Segment Description

The demonstration should identify the impaired segment, including name, general location in the State, and State-specific location identifier. Also, the segment should be identified/georeferenced using the National Hydrography Dataset (NHD). The assessment information should be transmitted electronically through the Assessment Database (ADB).

The impaired segments being considered for a “4b” classification are those listed in Table 1, below. These specific segments were identified to USEPA on the 2010 integrated report submittal to USEPA which included geo-referencing of the impaired segments, and compatibility with USEPA’s Assessment Database.

Impairment and pollutant causing impairment

The demonstration should identify the applicable water quality standard(s) not supported for each segment and associated pollutant causing the impairment.

The water quality standards not being attained are the narrative toxicity objective and narrative pesticide water quality objectives which are established in the Water Quality Control Plan for the Sacramento and San Joaquin River Basins. The specific water body segments and pollutants causing the impairments being addressed in this Category 4b demonstration are summarized in Table 1 below:

Table G1:

Water body Segment	Pollutant(s) Causing Impairment
Bear Creek (San Joaquin and Calaveras Counties; partly in Delta Waterways, eastern portion)	diazinon
Bear River, Lower (below Camp Far West Reservoir)	diazinon, chlorpyrifos
Berenda Creek (Madera County)	chlorpyrifos
Berenda Slough (Madera county)	chlorpyrifos
Colusa Basin Drain	diazinon
Coon Creek, Lower (from Pacific Avenue to Main Canal, Sutter County)	chlorpyrifos
Deadman Creek (Merced County)	chlorpyrifos
Del Puerto Creek	diazinon, chlorpyrifos
Dry Creek (tributary to Tuolumne River at Modesto, E Stanislaus County)	diazinon, chlorpyrifos
Duck Creek (San Joaquin County)	chlorpyrifos
French Camp Slough (confluence of Littlejohns and Lone Tree Creeks to San Joaquin River, San Joaquin Co.; partly in Delta Waterways, eastern portion)	diazinon, chlorpyrifos
Gilsizer Slough (from Yuba City to downstream of Township Road, Sutter County)	diazinon
Ingram Creek (from confluence with San Joaquin River to confluence with Hospital Creek)	diazinon, chlorpyrifos

Jack Slough	diazinon
Live Oak Slough	diazinon
Lone Tree Creek	chlorpyrifos
Main Drainage Canal	diazinon
Merced River, Lower (McSwain Reservoir to San Joaquin River)	diazinon, chlorpyrifos
Mormon Slough (from Stockton Diverting Canal to Bellota Weir--Calaveras River)	chlorpyrifos
Morrison Slough (Sutter county)	diazinon
Orestimba Creek (above Kilburn Road)	diazinon, chlorpyrifos
Orestimba Creek (below Kilburn Road)	diazinon, chlorpyrifos
Pixley Slough (San Joaquin County; partly in Delta Waterways, eastern portion)	diazinon, chlorpyrifos
Salt Slough	diazinon, chlorpyrifos
Spring Creek (Colusa County)	diazinon, chlorpyrifos
Stanislaus River, Lower	diazinon, chlorpyrifos
Tuolumne River, Lower (Don Pedro Reservoir to San Joaquin River)	diazinon, chlorpyrifos
Ulatis Creek (Solano County)	diazinon, chlorpyrifos
Wadsworth Canal	diazinon, chlorpyrifos
Westley Wasteway (Stanislaus County)	chlorpyrifos
Winters Canal (Yolo County)	diazinon
Yankee Slough (Placer and Sutter Counties)	chlorpyrifos

Sources of pollutant causing impairment

The demonstration should include a description of the known and likely point, nonpoint, and background (upstream inputs) sources of the pollutant causing the impairment, including the magnitude and locations of the sources. In cases where some portion of the impairment may result from naturally occurring sources (natural background), the demonstration should include a description of the naturally occurring sources of the pollutant to the impaired segment.

The main source of diazinon and chlorpyrifos to the impaired segments being considered are agricultural applications to fruit and nut trees, alfalfa, tomatoes and a variety of other crops. The other potential sources are municipal and domestic storm water and wastewater discharges, but these are far less significant than the agricultural sources, and are expected to continue to decline in significance due to the cancellation of almost all non-agricultural uses of diazinon and chlorpyrifos in the early 2000's. The other potential sources are the other remaining registered uses of chlorpyrifos which include rights of way and golf courses. These sources are characterized in detail in Section 2 of the Staff Report.

2. Description of Pollution Controls and How They Will Achieve Water Quality Standards

Water quality target

The demonstration should identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical contained in the water quality standard. The demonstration should express the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorous and the numeric water quality target is expressed as dissolved oxygen (DO) criteria). In such cases, the Category 4b demonstration should explain the linkage between the pollutant of concern and the chosen numeric water quality target. In other cases, multiple indicators and associated numeric target values may be needed to interpret an individual water quality standard (e.g., multiple fish habitat indicators to interpret acceptable sediment levels). In cases where the impairment is based on non-attainment of a narrative (non-numeric) water quality criterion, the Category 4b demonstration should identify one or more appropriate numeric water quality target levels that will be used to evaluate attainment of the narrative water quality criteria. The Category 4b demonstration should also describe the basis for selecting the numeric target levels.

The water quality targets for diazinon and chlorpyrifos are the proposed numeric diazinon and chlorpyrifos water quality objectives. These are maximum acute and chronic concentrations that can be directly compared to measured concentrations, or averages of measured concentrations which more than one sample is available during a 1-hour or 4-day averaging period. Compliance with these targets will be considered for each chemical. Additionally, as stated in the Proposed Amendment, the additive toxicity of these chemicals will also be addressed using the additive toxicity equation in the Basin Plan from Chapter 4 of the Basin Plan (Equation 1 in the Staff Report) to determine compliance with the narrative toxicity and chemistry water quality objectives when more than one pesticide is present during an averaging period.

Point and nonpoint source loadings that when implemented will achieve WQS

The demonstration should describe the cause-and-effect relationship between the water quality standard (and numeric water quality target as discussed above) and the identified pollutant sources and, based on this linkage, identify what loadings are acceptable to achieve the water quality standard. The cause-and-effect relationship may be used to determine the loading capacity of the water body for the pollutant of concern. However, a loading capacity may not be relevant in all circumstances. For example, a loading capacity would not be relevant in situations where the pollutant source will be completely removed. The demonstration should identify the loading capacity of the segment for the applicable pollutant or describe why determination of the loading capacity is not relevant to ensure that the controls are sufficient to meet applicable water quality standards. The demonstration should also contain or reference documentation supporting the analysis, including the basis for any assumptions; a discussion of strengths and

weaknesses in the analytical process; and results from any water quality modeling or data analysis.

The most sensitive endpoints to diazinon and chlorpyrifos are direct toxic effects to aquatic invertebrates, which are directly related to acute and chronic concentrations in water, as discussed in the water quality objectives section of the Staff Report. For this reason, the water quality objectives are defined in the Proposed Amendment as acute and chronic concentrations. These pesticides are not persistent, so their concentrations are directly a function of the concentrations being discharged upstream within the same time period that concentrations are measured. Attaining these objectives is directly a function of the acute and chronic concentrations in discharges to the impaired water bodies during in the time attainment is needed, and the time immediately subsequent (to allow for travel time, which is on the order of days to hours for the impaired segments under consideration). Since this is a concentration-based program, the loading capacity for each of the segments being considered can be defined using the concentration times the flow to determine an allowable mass per time. If multiple pesticides are present, the additivity formula from the Basin Plan can be used to normalize to toxic equivalents, which can multiplied times flow to determine an allowable loading in chlorpyrifos toxic equivalents per unit time. Assuming these chemicals are conservative, the sum of the discharges times the flow for each segment would need to be less than the assimilative capacity for each segment. While the assimilative capacity varies for each of these segments during different flow conditions, the attainment of the assimilative capacity can be directly assessed by concentration measurements in the impaired segments.

Controls that will achieve WQS

The demonstration should describe the controls already in place, or scheduled for implementation, that will result in reductions of pollutant loadings to a level that achieves the numeric water quality standard. The demonstration should also describe the basis upon which the State concludes that the controls will result in the necessary reductions.”

As discussed in Sections 5.1 and 9.1 of the Staff Report, there are many agricultural management practices effective in reducing offsite movement of diazinon and chlorpyrifos into surface water. Available information indicates that a significant portion of the growers in the Central Valley have already implemented runoff mitigation practices, either voluntarily or as required by the Board’s Irrigated Lands Regulatory Program (ICF, 2010). The major types of management practices available for reducing diazinon and chlorpyrifos agricultural discharges are:

- Pest management practices
- Pesticide application practices
- Vegetation management practices
- Water management practices.

As discussed in previous Basin Plan Amendment Staff reports, viable pest control alternatives to diazinon and chlorpyrifos are available (Beaulaurier et al., 2005; Reyes and Menconi, 2002). These reports assessed strategies that should be viable for both pest management and water quality protection (including mitigating potential effects of replacement products).

When pesticides that pose significant risks to water quality, such as diazinon or chlorpyrifos, are used, a broad range of pesticide application, vegetation management, and water management practices are available to growers which can significantly reduce or eliminate diazinon and chlorpyrifos discharges (Zhang et al., 2010).

Pesticide application practices include turning off outward facing airblast sprayer nozzles at the end of rows and on outside rows, improved sprayer technologies, more frequent calibration of sprayer equipment, use of aerial drift retardants, improved mixing and loading procedures, and other practices that would result in reduced application rates or mitigation of off-site pesticide movement.

Vegetation management practices increase infiltration and/or decrease runoff and drift. Examples of these types of practices include planting cover crops, buffer strips, or allowing native vegetation to grow where they would reduce runoff rates and drift.

Water management practices include improvements in water infiltration and runoff control include increased irrigation efficiency and distribution uniformity, increased use of soil moisture monitoring tools, increased use of tailwater return systems, and vegetated drainage ditches.

All of these practices can result in significant reductions of the discharges of diazinon and chlorpyrifos. (Ultimately, if necessary, the practices include ones that completely eliminate irrigation return flows and the use of alternatives to diazinon and chlorpyrifos in the rainy season.) Therefore, these practices can result in the necessary reductions to achieve the numeric water quality standards. The practices utilized may vary from field to field, but the regulatory requirements will ensure that the practices will continue to be improved until the impairments are fully addressed. The success of these practices has already resulted in attainment of standards for many formerly impaired segments in the Sacramento and San Joaquin River Basins, including: the Sacramento and San Joaquin Rivers, Butte Slough, Duck Slough (in Merced County), Harding Drain, Newman Wasteway, Sacramento Slough, and Stony Creek, as discussed in Section 2 of the Staff Report.

For point sources, as described in Section 2 of the Staff Report, current controls are adequately reducing concentrations the discharges and no additional practices are being required at this time.

Description of requirements under which pollution controls will be implemented

The demonstration should describe the basis for concluding that the pollution controls are requirements or why other types of controls already in place may be sufficient, as discussed below.

As discussed in the 2006 IR guidance, EPA will consider a number of factors in evaluating whether a particular set of pollution controls are in fact “requirements” as specified in EPA’s regulations, including: (1) authority (local, State, Federal) under which the controls are required and will be implemented with respect to sources contributing to the water quality impairment (examples may include: self-executing State or local regulations, permits, and contracts and grant/funding agreements that require implementation of necessary controls); (2) existing commitments made by the sources to implement the controls (including an analysis of the amount of actual implementation that has already occurred); (3) availability of dedicated funding for the implementation of the controls; and (4) other relevant factors as determined by EPA depending on case-specific circumstances.

Since the overriding objective of the 4b alternative is to promote implementation activities designed to achieve water quality standards in a reasonable period of time, for all of the factors listed above, EPA will evaluate each 4b alternative on a case-by-case basis, including in particular the existence of identifiable consequences for the failure to implement the proposed pollution controls. Depending on the specific situation, “other pollution control requirements” may be requirements other than those based on statutory

or regulatory provisions, as long as some combination of the factors listed above are present and will lead to achievement of WQS within a reasonable period of time. For example, established plans of government agencies that require attainment of WQS within a reasonable period of time may qualify even when their components include incentive-based actions by private parties. States may also choose to rely on controls that have already been implemented where there is sufficient certainty that implementation will continue until WQS are achieved and will not be reversed. Because the controls are already in place and achieving progress, EPA may consider such controls to be requirements even if their implementation did not occur pursuant to binding legal authority.

Under the Central Valley Water Board's Irrigated Lands Regulatory Program, the Board has developed and issued a series of watershed-based and commodity-based waste discharge requirements under the authority Porter-Cologne Water Quality Control Act (Ag WDRs) to regulate all agricultural dischargers in the Central Valley Region. This multi-year process will conclude in early 2014. Therefore, all agricultural sources of diazinon and chlorpyrifos to the water bodies for which numeric objectives are to be established in the Proposed Amendment, including all the segments shown in Table F-1, are now being regulated under existing state authority. The Ag WDRs now require that agricultural dischargers develop and implement management practices to ensure that all water quality standards are attained within ten years of the date when the Ag WDRs are issued. Under the Proposed Amendment, these agricultural dischargers will be required to specifically address diazinon and chlorpyrifos discharges as they develop comprehensive management plans pursuant to requirements imposed by the Ag WDRs. After USEPA approves the Proposed Amendment, dischargers will have one year to demonstrate that the management plans detail practices to specifically address diazinon and chlorpyrifos. The management plans must demonstrate that effective measures will be implemented to achieve water quality objectives as soon as practicable, but in no event later than 10 years.

3. Estimate or Projection of Time When WQS Will Be Met

EPA expects that segments impaired by a pollutant but not listed under Section 303(d) based on the implementation of existing control requirements will attain WQS within a reasonable period of time.

The demonstration should provide a time estimate by which the controls will result in WQS attainment, including an explanation of the basis for the conclusion. The demonstration should also describe why the time estimate for the controls to achieve WQS is reasonable. EPA will evaluate on a case-specific basis whether the estimated time for WQS attainment is reasonable. What constitutes a "reasonable time" will vary depending on factors such as the initial severity of the impairment, the cause of the impairment (e.g., point source discharges, in place sediment fluxes, atmospheric deposition, nonpoint source runoff), riparian condition, channel condition, the nature and behavior of the specific pollutant (e.g., conservative, reactive), the size and complexity of the segment (e.g., a simple first-order stream, a large thermally stratified lake, a density-stratified estuary, and tidally influenced coastal segment), the nature of the control action, cost, public interest, etc.

As discussed above, the Proposed Amendment requires the development of management plans to ensure compliance with water quality objectives no later than 10 years following adoption of the Proposed Amendment. Since the Board and agricultural stakeholders have identified these pesticides as a high priority, the Board expects these impairments to be resolved within a few

years of adoption of the Proposed Amendment. As discussed above, a considerable number of the diazinon and chlorpyrifos impairments in the Central Valley Region have already been resolved by reductions in agricultural discharges that are now regulated under the Ag WDRs. Though the attainment of diazinon and chlorpyrifos objectives is required within 10 years for all the segments in Table F-1, implementation of management practices will begin shortly after the adoption of the Proposed Amendment (if those management practices are not already being implemented), and therefore full compliance with water quality objectives is likely to be achieved in many segments sooner than the 10-year final deadline.

4. Schedule for Implementing Pollution Controls

The demonstration should describe, as appropriate, the schedule by which the pollution controls will be implemented and/or which controls are already in place.

Upon adoption of the Proposed Amendment, management plans will be due from the agricultural discharges within one year. These management plans will describe the practices that will be implemented to attain standards. Implementation of management practices to reduce discharges would be expected to begin upon completion of those management plans. Some of these segments have management plans already in place, and growers are implementing practices to reduce discharges.

5. Monitoring Plan to Track Effectiveness of Pollution Controls

The demonstration should include a description of, and schedule for, monitoring milestones to track effectiveness of the pollution controls. The demonstration should describe water quality monitoring that will be performed to determine the combined effectiveness of the pollution controls on ambient water quality. If additional monitoring will be conducted to evaluate the effectiveness of individual pollution controls, EPA encourages States to include a description of these efforts as well. The demonstration should identify how and when assessment results from the monitoring will be reported to the public and EPA.

The proposed amendment requires that the monitoring and reporting programs for agricultural monitoring be designed to meet the following goals:

1. Determine compliance with established water quality objectives applicable to diazinon and/or chlorpyrifos;
2. Determine the extent of implementation of management practices to reduce off-site migration of diazinon and/or chlorpyrifos;
3. Determine the effectiveness of management practices and strategies to reduce off-site migration of diazinon and/or chlorpyrifos;
4. Determine whether alternatives to diazinon and/or chlorpyrifos are being discharged at concentrations which have the potential to cause or contribute to exceedances of applicable water quality objectives; and
5. Determine whether the discharge causes or contributes to a toxicity impairment due to additive or synergistic effects of multiple pollutants.

The Proposed Amendment also states that

Representative monitoring may be used to determine compliance with the water quality objectives. Monitoring shall be representative of all Table III-2A Applicable Water

Bodies [the waterbody segments shown in Table F-1], either directly or through a representative monitoring program. Changes in monitoring requirements may be required if pesticide use data, management practices, runoff potential, or other information indicates additional or less monitoring is needed to meet the monitoring requirements.

Expected monitoring is described in greater detail in the Monitoring and Costs sections of the Staff Report. Generally, the goals for diazinon and chlorpyrifos objectives will be met by the monitoring of these pesticides in the subject segments during and following the times of applications of these products in upstream watersheds.

Specific monitoring and reporting programs for agricultural dischargers have been adopted by the Board pursuant to the Ag WDRs. These monitoring and reporting programs can be modified by the Executive Officer, if necessary, to ensure that the goals adopted by the Board are met. All the agricultural dischargers provide annual monitoring reports and management plan update reports to the Board which will contain the data needed to meet the goals in the Basin Plan. These monitoring reports are publicly available documents which are posted on the Boards website. Additionally the monitoring data from the ILRP is routinely uploaded to the States California Data Exchange Network (CDEN) database. The most recent monitoring data will also be included as lines of evidence for the diazinon and chlorpyrifos in these segments in subsequent Integrated Report cycles so that USEPA will be able to assess

As described in Chapter 2 of the Staff Report, generally non-agricultural sources of these pollutants are not discharging diazinon or chlorpyrifos at levels that have potential to cause exceedances in the receiving water, and following the phase-out of almost all nonagricultural uses, the concentrations being discharged by these sources is expected to continue to decline.

The Proposed Amendment also contains also states the following monitoring requirements for non-agricultural dischargers:

“The monitoring and reporting program for any waste discharge requirements that addresses discharges to Table III-2A Applicable Water Bodies from

- municipal storm water
- municipal or domestic wastewater, or
- other non-agricultural sites where diazinon or chlorpyrifos are applied,

must be designed to collect the information necessary to:

1. Determine whether the discharge causes or contributes to an exceedance of water quality objectives for diazinon and/or chlorpyrifos;

2. Determine whether the discharge causes or contributes to a toxicity impairment due to additive or synergistic effects of multiple pollutants; and

3. Determine whether alternatives to diazinon and/or chlorpyrifos are being discharged at concentrations with the potential to cause or contribute to exceedances of water quality objectives. .

With Executive Officer approval, representative monitoring programs, including coordinated regional monitoring programs, may be used to meet the monitoring goals listed above. Regular monitoring for diazinon and chlorpyrifos can be discontinued upon a showing by a discharger that such pesticides are not found in the effluent at concentrations with the potential to cause or contribute to exceedances of water quality objectives. In developing the monitoring and reporting programs for specific dischargers, the Board will, in coordination with DPR assist the discharger in identifying diazinon and chlorpyrifos alternatives for which monitoring may be necessary.”

Expected monitoring for non-agricultural dischargers is described in greater detail in the Monitoring and Costs sections of the Staff Report. In addition to these monitoring requirements, the establishment of water quality objectives in all of the impaired segments will trigger monitoring of these parameters in the reports of waste discharge provided to the Board during permit renewal cycles. Diazinon and chlorpyrifos Monitoring data collected by non-agricultural dischargers from receiving waters will also be assessed in subsequent Integrated Report development cycles.

6. Commitment to Revise Pollution Controls, as Necessary

The demonstration should provide a statement that the State commits to revising the pollution controls, as necessary, if progress towards meeting water quality standards is not being shown. Also, the demonstration should identify how any changes to the pollution controls, and any other element of the original demonstration, will be reported to the public and EPA.

The proposed amendment requires that if the management plans are not resulting in attainment of standards, the Executive officer will require the development of revised management plans. If standards are not attained through implantation of a single management plan for multiple dischargers, under the Ag WDRs individual management plans can be required from each discharger to an impaired segment if necessary.

All the management plans submitted to the Board are publicly available documents which are posted on the Board's website. The most recent management plans can also be included as lines of evidence to support continued 4b designation for the diazinon and chlorpyrifos listings in these segments in subsequent Integrated Report cycles, until such time as diazinon and chlorpyrifos concentrations are no longer exceeding water quality standards in all of these segments.

References:

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- Reyes, E., and M. Menconi. 2002. Agricultural Practices and Technologies Report. Staff report of the California Regional Water Quality Control Board, Central Valley Region (May 2002 Draft Report). Sacramento, CA.
- United States Environmental Protection Agency (USEPA), 2006. Memorandum from Diane Regas to USEPA Regional Water Division Directors entitled "Information Concerning 2008

Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions.” USEPA Office of Wetlands, Oceans and Watersheds. Washington, D.C.

Zhang, M., Goodhue, R., Eitzel, M., Grogan, K., Steinmann, K, Watson, T., Zang, X. 2010. Agricultural Pesticide Best Management Practices Report. University of California, Davis Agricultural GIS Laboratory. Davis, CA.