



CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

Sacramento and San Joaquin Delta
Pesticides Monitoring Report
2002 and 2003



August 2004

State of California

California Environmental Protection Agency

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REPORT PREPARED BY:

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1 INTRODUCTION

1.1 Delta Overview

The Sacramento and San Joaquin Delta (Delta) covers 1,153 square miles with 78 square miles of water. Agricultural land use covers about 538,000 acres, which is about 73% of the total land in the Delta. The Delta receives over 40% of the State's runoff, mostly from the Sacramento and San Joaquin rivers. The tide affects the flow direction and water level in individual waterways. For example, the flows in the Sacramento River at Rio Vista can vary from 71,000 cubic feet per second (cfs) upstream to 80,000 cfs downstream (DWR, 1995).

Pesticides used within the Delta are important sources for the occurrence of pesticides found in the Delta waterways. From 1993 to 2002, the average annual reported diazinon and chlorpyrifos uses within the Delta were approximately 12,000 and 30,000 lbs, respectively. In 2002, about 8,000 lbs of diazinon and 19,000 lbs of chlorpyrifos were reportedly applied for agricultural, commercial structural, and landscape purposes (DPR PUR database, 2002).

The Delta was monitored between June 2002 and May 2003 for the identification of diazinon and chlorpyrifos sources. The monitoring includes surface water sample collection and field parameter measurements. Over 400 samples were collected during the one-year program.

1.2 Delta Monitoring 2002 – 2003 Overview

From June to December 2002, 14 primary sites were monitored on a monthly basis. In January and February 2003, nine primary sites were monitored during and following two storms events (5 or 6 days per storm event) on a daily basis and five primary sites were monitored on a monthly basis. From early March to April 2003, ten primary sites were monitored twice per week and four primary sites were monitored weekly. During this period, five additional sites were monitored weekly. In May 2003, only the primary sites were monitored: seven sites were sampled weekly and the other seven sites were sampled twice per month. The measured field parameters included pH, water temperature, electrical conductivity (EC), and flow rates for selected sites and sampling periods.

All water samples were sent to the California Department of Food and Agriculture (CDFA) laboratory in Sacramento, California for chemical analysis using gas chromatography (GC) and a flame photometric detector (FPD). From June to December 2002, water samples were collected by the Central Valley Regional Water Quality Control Board (CVRWQCB) staff and students. From January to May 2003, water samples were collected by a monitoring team at the University of California, Davis (UCD) under a contract with the CVRWQCB.

The CDFA laboratory analyzed 17 chemical compounds for each water sample. The chemical analysis results obtained from the laboratory and parameters measured in the field are presented in this report. The detection frequency and calculated instantaneous loads for diazinon and chlorpyrifos are also presented.

2 2002 – 2003 DELTA MONITORING METHODS

2.1 Sampling Sites

Figure 1 shows the study area and monitoring sites. Site descriptions for each site are listed in Table 1. The monitoring plan was designed to monitor the pesticide concentrations in the main rivers, back sloughs, agricultural drains, and urban areas of the Delta. Of the 14 primary sites (Delt01 to Delt14), the Mokelumne River (Delt01) and Sacramento River (Delt14) sites are in the main rivers; Mosher Slough (Delt02) and Five Mile Slough (Delt03) are in back sloughs of urban areas; Mid-Roberts Island Drain (Delt05) and Duck Slough (Delt11) are in main drains of agricultural fields; and the remaining sites are in back sloughs that drain primarily agricultural areas.

To determine the pesticide distributions in the Delta, the selected sites include the boundaries and interior of the Delta. The sampling sites at Mokelumne River (Delt01), Calaveras River (Delt04), French Camp Slough (Delt06), and Ulatis Creek (Delt10) are located near, or at the Delta boundary. The Mokelumne and Calaveras Rivers are two major rivers that carry most of the flow, including runoff from upstream agricultural lands, from east of the Delta. French Camp Slough is a back slough that contains runoff from agricultural lands southeast of Stockton. Ulatis Creek is a back slough that receives runoff from agricultural land in Solano and Yolo counties. The other sites are within the Delta. The sampling sites at Mid-Roberts Island Drain (Delt05), Paradise Cut (Delt07), and Old River at Tracy Road (Delt08) are located in the southern Delta and receive runoff from agricultural lands. In particular, Delt05 is located in alfalfa fields. The sites at Duck Slough (Delt11), Steamboat Slough (Delt12), and Cache Slough (Delt13) are located in the northwest part of the Delta, where the runoff is from agricultural areas including alfalfa fields and pear orchards. The Mosher Slough (Delt02) and Five Mile Slough (Delt03) sites are located in the northern part of the Stockton urban area and likely represent urban runoff from the city of Stockton. The Five Mile Slough site is downstream of a golf course. The Fabian and Bell Canal (Delt15) and Middle River (Delt16) sites are located in the southern Delta, where the main source is probably agricultural runoff. The San Joaquin River at Highway 4 (Delt17), San Joaquin River at Antioch (Delt18), and Sacramento River near Freeport (Delt19) sites are located on major rivers. Delt17 is located inside the Delta, where the upstream runoff is mainly from agricultural fields. Delt18 is located west of the Delta and represents the output of the Delta from San Joaquin River. Delt19 represents the input to the Delta from the Sacramento River.

2.2 Sampling Frequency

The monitoring frequencies varied for different sampling sites. From June to December 2002, all 14 primary sampling sites (Delt01 to Delt14) were monitored on a monthly basis (Table 1). The samples were collected during the third week of each month, typically over two days, with approximately seven sites visited each day.

In January and February 2003, five sampling sites (Delt04 to Delt08) were monitored on a monthly basis (Table 1). The other nine primary sites (Delt01 to Delt03, and Delt09 to Delt14) were sampled daily during two storms. The first storm was from January 21 to

25, 2003. The second storm was from February 13 to 17, 2003. Delt01 to Delt03 and Delt09 to Delt12 were sampled once per day over each five-day storm event. Delt13 and Delt14 were sampled over a six-day period (for one more day after each storm event). The six-day storm sampling was designed to capture the pesticides transported from the upstream portion of the Sacramento River watershed.

From March to May 2003, seven primary sites (Delt04 to Delt10) were monitored weekly and the other seven primary sites were sampled twice per month, except between March 12 and April 4, 2003. From March 12 to April 4, 2003, additional sampling sites Delt15 to Delt19 were monitored once per week, primary sites Delt01, Delt04, Delt08, and Delt09 were sampled once per week, and the other primary sampling sites were monitored twice per week.

2.3 Sample Collection

All water samples were collected using grab sampling methods. Two types of sample bottles were used for water collection: a 3-liter Teflon bottle (3-liter bottle) and a 1-liter amber glass bottle (1-liter bottle). The 3-liter bottle was placed into a metal holder to collect water samples from bridges. In some cases, the samples were collected from three points equally spaced across the bridge with approximately equal amounts of water collected at each point. The 1-liter bottle was fastened to a sampling pole to collect samples near the stream banks. All water samples submitted to the CDFA lab required a 1-liter bottle. Thus, approximately one-third of the sample collected using the 3-liter bottle was poured into a 1-liter bottle onsite at the time of sample collection.

Approximately 15% of all of the field samples were quality control (QC) samples. QC samples included field duplicates, field blanks, equipment blanks, and field spike samples. The duplicates were split samples. For samples collected using the 3-liter Teflon bottle, the water was poured into two 1-liter bottles. For samples collected using a 1-liter bottle, two bottles were tied to the sampling pole and the water samples were collected at the same time. The field blanks were organic-free water. If using the 3-liter bottle for sampling, the cleaned bottle was filled with organic-free water (deionized), which was then poured into a 1-liter bottle as a field blank. If using the 1-liter bottle, a cleaned bottle was filled with the organic-free water directly. The equipment blanks were collected only for new (never been used) sampling equipment (e.g. metal holder and sampling pole). The equipment was cleaned according to the standard cleaning procedure (Lu, 2002) and then rinsed with organic-free water. The rinse water was collected in a 1-liter bottle as an equipment blank. The field spike samples were collected in the same manner as the field duplicate samples, however a spike mixture was added to the field spike samples in the lab.

All field samples, including QC samples, were placed into an ice chest (ice chest was filled with ice to keep the temperature of samples at approximately 4°C). In general, samples were delivered under chain-of-custody (COC) protocol to the lab on the sampling day. If the samples could not be transported to the lab on the sampling day, the samples were stored in a refrigerator (approximately 4°C) and then transported to the lab within 3 days.

To minimize the dilution of pollutants caused by an influx of water during high tides, the samples should have been collected during low or outgoing tides. However, since several sampling sites were visited each sampling day, some samples might have been collected during rising tides.

2.4 Field Measurements

Flow rate, pH, water temperature, and EC were measured at the time of water sample collection at selected sites. The instantaneous flow was measured at four sites (Delt01, Delt04, Delt09, and Delt10). The flow rate for each site was calculated by multiplying the measured flow velocity by each cross-sectional area. Flow velocities were measured with a Sworrer Current Velocity meter (Model 2100). Flow velocity measurements were made either by wading across the stream or by suspending the flowmeter from a bridge. For flow rate measurements made from bridges that were not perpendicular to the stream channel, the flow rate was corrected using an appropriate coefficient (Nolan *et al.*, 2001).

2.5 Chemical Analysis

The CDFA lab conducted the organophosphate insecticides analysis using GC FPD. Seventeen compounds were analyzed for each sample. The limits of quantitation (LOQ) for diazinon and chlorpyrifos were 20 and 10 nanograms per liter (ng/L), respectively. The detection limits (LOD) were 7 and 4 ng/L for diazinon and chlorpyrifos, respectively. The lab reported estimated values when the values were below the LOQ but above the LOD. To ensure the accuracy and precision of the sample analysis, lab spikes, blanks, and a surrogate standard (chlorpyrifos methyl) were used. If the recovery of a spike sample was out of the control range, the water sample was re-analyzed.

3 2002-2003 DELTA MONITORING RESULTS

The results include pesticide concentrations, field parameter measurements, and quality control data. The diazinon and chlorpyrifos concentrations are listed in Table A1, and other chemical components are listed in Table A2. Tables A3 and A4 list the results of field spikes and duplicates, respectively. For each analytical set of environmental samples, the laboratory analyzed at least one spike and one blank. For each environmental sample, chlorpyrifos methyl was added as a surrogate and analyzed. Table A5 lists the results of the lab blanks and Table A6 lists the recoveries of lab spikes and surrogates.

3.1 Chemical Concentrations

The concentrations of diazinon and chlorpyrifos were compared to their respective California Department of Fish Game (CDFG) freshwater Criterion Continuous Concentration (CCC) and Criterion Maximum Concentration (CMC) values (Siepmann and Finlayson, 2000). Since all of the samples were collected as grab samples, the analytical results may not reflect the four-day and one-hour average values upon which the CCC and CMC, respectively, are based.

The diazinon concentrations were evaluated by month and by site using boxplots (Figures 2 and 3, respectively). The highest diazinon concentration (460 ng/L) was observed in January at the Five Mile Slough site (Table A1). Relatively high concentrations were observed between January and April at the Mosher Slough (Delt02), Five Mile Slough (Delt03), Calaveras River (Delt04), Marsh Creek (Delt09), and Ulatis Creek (Delt10) sites. In September, a high diazinon concentration (110 ng/L) was detected at the Calaveras River site. In May, June, August, and October, the maximum diazinon concentrations were above the LOQ (20 ng/L) but below the diazinon CMC (80 ng/L). In July, no diazinon was detected. In November and December, high diazinon concentrations were detected at the Mosher Slough site (Delt02).

The maximum diazinon concentrations detected at the Mokelumne River (Delt01), Mid-Roberts Island (Delt05), Old River (Delt08), Duck Slough (Delt11), and Sacramento River at Rio Vista (Delt14) sites were over the LOQ but below the diazinon CMC.

Diazinon concentrations were not detected above the LOQ at the Paradise Cut (Delt07), Steamboat Slough (Delt12), Cache Slough (Delt13), Fabian and Bell Canal (Delt15), Middle River (Delt16), San Joaquin River at Hwy 4 (Delt17), San Joaquin River at Antioch (Delt18), and Sacramento River at Freeport (Delt19) sites.

The chlorpyrifos concentrations were also analyzed by month and by site using boxplots (Figures 4 and 5, respectively). The highest chlorpyrifos concentration (360 ng/L) was observed in March at the Mid-Roberts Island Drain site. Relatively high chlorpyrifos concentrations were observed from January to May (Figure 4). In July and August, the concentrations were above the LOQ (10 ng/L) but below the chlorpyrifos CCC (14 ng/L).

In June, October, and November, no chlorpyrifos was detected above the LOQ. In September, the highest chlorpyrifos concentrations were equal to the CMC (20 ng/L).

On December 23, samples collected from all of the sites had chlorpyrifos concentrations between 20 ng/L and 40 ng/L, including sites at which chlorpyrifos was not detected in other months, (the Mokelumne River, Steamboat, Cache Slough, and Sacramento River at Rio Vista sites).

The highest chlorpyrifos concentrations were observed at Mid-Roberts Island Drain (360 ng/L) and Ulatis Creek (110 ng/L) (Table A1 and Figure 5). Samples from most of the sites had observed chlorpyrifos concentrations over 20 ng/L during the entire sampling period (Table A1). Samples collected from the Fabian and Bell Canal, Middle River, and San Joaquin River at Hwy 4 sites (samples were collected only between March 12 and April 4, 2003) contained chlorpyrifos concentrations greater than the LOQ (10 ng/L) but lower than the chlorpyrifos CMC value (20 ng/L). Samples collected during the same limited period from the San Joaquin River at Antioch and Sacramento River near Freeport sites did not contain chlorpyrifos concentrations above the LOQ.

Monthly sampling at the Calaveras River, Mid-Roberts Island, French Camp Slough, Paradise Cut, and Old River at Tracy Rd sites coincided with two storms. Diazinon

concentrations from samples collected at three of these five sites (Calaveras River, Mid-Robert Island, and French Camp Slough) were above the diazinon LOQ (Table A2). The maximum diazinon concentration was 220 ng/L at the Calaveras River site. Chlorpyrifos was not detected above the chlorpyrifos LOQ at any of the five sites. During the two storm sampling events, diazinon concentrations above the diazinon CCC value (50 ng/L) were also detected at the Mosher Slough, Five Mile Slough, Marsh Creek, and Ulatis Creek sites and chlorpyrifos concentrations above the chlorpyrifos CCC value (14 ng/L) were only detected at the Ulatis Creek site (Table 2).

The relationships between daily rainfall amounts and diazinon concentrations are shown in Figure 6. The relationships between rainfall amounts and chlorpyrifos concentrations are shown in Figure 7.

3.2 Quality Control Data

The precision and accuracy of the chemical analyses are determined by field and lab QC data. The field QC data includes the analytical results of spike, duplicate, and blank samples. The spike sample results are used to evaluate the accuracy of the analytical process and system performance. The field spike samples included the addition of 100 ng/L diazinon, 50 ng/L chlorpyrifos, and 200 ng/L bifenthrin at the laboratory. The lab spikes were prepared in the laboratory using organic-free water with the same amounts of pesticides added as the field spikes. The lab blanks were used to identify possible contamination during sample preparation and chemical analysis in the laboratory. The lab QC samples were prepared and analyzed for each analytical set of field samples. In addition, the surrogate compound (500 ng/L chlorpyrifos methyl) was added to all samples to evaluate sample recovery. The surrogate recovery provides an indicator of the accuracy of each sample analysis.

The field duplicate sample results are used to estimate the precision of laboratory analysis and the sampling process. Relative percentage differences (RPD) were calculated to determine the variability between primary and duplicate samples. The blank samples are used to determine the magnitude of any contamination during sample handling in the field and laboratory. The field and equipment blanks were analyzed to detect possible contamination that could occur during sampling, handling, transporting, and lab analysis.

The ranges and averages of recovery values for lab and field spike samples (Tables 4 and 5, respectively) were similar for each spiked compound. The low average recovery values for each compound suggest that the results “under-estimated” the actual (spiked) concentrations. The lowest recoveries for all three spiked compounds occurred in the samples collected at Marsh Creek on January 24, 2003 (Table A3). The sample was re-injected but the re-analyzed results were still quite low (48%, 62%, and 34% for diazinon, chlorpyrifos, and bifenthrin, respectively).

Of a total of 22 duplicate samples, only five associated primary samples contained analytes that exceeded their respective LOQs (Table 6). The highest RPD (23% for chlorpyrifos) had a high bias because the concentrations of the duplicate samples were

very close to the LODs. The calculated RPD of lab and field duplicates are less than 10% except for samples near the LOQ, therefore, the precision of analyzed data are acceptable.

Analytes in all blank samples were below their respective LODs, except for one sample that contained simazine at an estimated concentration of 9 ng/L (LOD = 5 ng/L). Since the present study focused on diazinon and chlorpyrifos, the blank sample results are acceptable.

For individual samples, the surrogate recoveries met the lab acceptance range (50% to 150%). The averages and standard deviations for the recovery of surrogate samples were 75% ±10% for lab control samples, 79%±9% for field QC samples, and 80%±11% for primary field samples (Table 7).

3.3 Flow Measurements and Load Calculations

The measured instantaneous flow rates and their corresponding diazinon and chlorpyrifos concentrations were used to calculate loads (Table A7). There were only eight flow measurements at the Mokelumne River site. The measured flow rates ranged from 41 to 234 cfs with a median value of 164 cfs. For the Calaveras River site, only three flow measurements were taken because the flow rates were too low to be measured during other monitoring events. The measured flows ranged from 5 to 14 cfs with a median of 12 cfs. For the Marsh Creek site, 21 flow measurements were taken. The flows ranged from 1 to 27 cfs with a median flow of 9 cfs. The Ulatis Creek site had 31 flow measurements and the flow rates ranged from 8 to 1,115 cfs with a median of 62 cfs.

The instantaneous loads are calculated only when the concentration is over the LOD. The calculated maximum diazinon loads showed that the highest load was at the Ulatis Creek site and the lowest load was at the Calaveras River site (Table 3). The maximum load of chlorpyrifos was much lower than that of diazinon. At the Ulatis Creek site, the highest load was 160 g/d and 60 g/d for diazinon and chlorpyrifos, respectively.

3.4 Field Parameter Measurements

Water temperature, pH, and EC were only measured from January to May 2003 during sample collection because no equipment was available from June to December 2002. The ranges and medians of the three parameters for each month are shown in Figures 8 to 13. The temperatures ranged from 10.1 to 23.8 °C with an average of 16.4 °C and generally increased from January to May (Figure 8). The ranges of temperature for each site are shown in Figure 9. The pH values ranged from 6.56 to 9.47 with an average of 7.70. There is no major difference among the mean pH values by month (Figure 10). However, the pH ranges varied from site to site (Figure 11). The pH values measured at the Five Mile Slough and Calaveras River sites had relatively higher variability than the other sites. The EC values varied from 47 to 2,620 micro siemens (µs) with an average of 679 µs. The EC values were relatively lower between January and March than in April and May (Figure 12). The Mid-Roberts Drain, Paradise Cut, and Marsh Creek sites had higher EC values than the other sites (Figure 13). The Mokelumne River site had the lowest EC values.

3.5 Precipitation Measurements

Monthly rainfall at the Sacramento International Airport and Stockton from June 2002 to May 2003 are shown in Figure 14. There was no rainfall from June to October 2002. The highest monthly rainfall was in December during the sampling period. On December 19, 2002 (a sampling day), the daily precipitation was 0.65 inch in Sacramento and 0.59 inch in Stockton. In January and February, two storm events were monitored. The total precipitation for Storm 1 was 0.66 inch and the highest daily rainfall was 0.37 inch. The total precipitation for Storm 2 was 1.14 inches and the highest rainfall was 0.44 inch (Table 2). The amount of rainfall in December 2002 was about double the historical average (Figure 14). The amount of rainfall in January and February 2003 was less than 50% of normal and the rainfall in April and May was more than double the normal amount.

4 DISCUSSION AND CONCLUSIONS

The monitoring results indicate that the concentrations of diazinon and chlorpyrifos periodically exceeded the CDFG CCC and CMC. The amount of pesticides applied, timing of application, type of application, and amount of rainfall affect the diazinon and chlorpyrifos concentrations in the water. To identify the pesticide sources, the pesticide application data are needed. Since diazinon and chlorpyrifos application data are not currently available for the monitoring period (2003), the average monthly pesticide use data from 1992 to 2002 were used (Tables 8 and 9). The historical data showed relatively high diazinon uses in January to March, May, and October. The chlorpyrifos application patterns were different from diazinon. The highest amount of chlorpyrifos use was in March. In January and February, the amounts of chlorpyrifos applied were very low.

4.1 Diazinon

In January and February, the peak diazinon concentrations were due to high application amounts and subsequent storm runoff. In March, although diazinon application was not very high, diazinon was detected. The unusual heavy storm in March apparently transported residual diazinon from fields into receiving waters. In May 2003, the monthly rainfall was higher than normal years, but the amount of precipitation apparently did not cause significant diazinon runoff. Although the amount of diazinon applied was relative high, the detected concentrations were very low. In October, the diazinon application on agricultural land was the highest (mainly applied on pears trees), but no diazinon was detected at the sites receiving agricultural runoff. There was one low diazinon concentration detected at an urban site. In November and December, the storm season began but the runoff and the amount of pesticides applied were not at their highest levels, so the observed concentrations were relatively low.

High diazinon concentrations were detected at the Mosher Slough, Five Mile Slough, Calaveras River, French Camp Slough, Marsh Creek, and Ulatis Creek sites in January and February. The Mosher Slough site is located in the city of Stockton, and also had high concentrations detected in November and December. The sources were most likely due to urban applications. Five Mile Slough likely had similar sources. The Calaveras

River site had high concentrations in September and between February and April. The sources were most likely from the agricultural land. The French Camp Slough site had a relatively low concentration (maximum of 160 ng/L) compared to the other sites. The main contribution could be upstream agricultural uses. The Marsh Creek site appears to represent the mixing of urban and agricultural sources. The Ulatis Creek site had diazinon concentrations detected from January to May with the major sources most likely from agricultural runoff.

The diazinon concentrations at the Sacramento River at Rio Vista were very low compared to the results of a previous study by Kuivila and Foe (1995). The lower concentrations detected during the present study are likely due to the reduced amount of diazinon applied. Diazinon applications have been reduced 39% from 1993 to 2002 for the Delta (DPR PUR database, 2002). Similarly, for the Sacramento River and San Joaquin River watersheds, diazinon use has also been significantly reduced.

There were no clear correlations between flow rate and diazinon concentration for the monitoring period, but both flow and concentration were increased in January and February. As an example, Figure 15 shows the flows and calculated loads for the Ulatis Creek site during storms. The flow rates were influenced by tides, therefore, the calculated loads only represent the load at the sampling time.

4.2 Chlorpyrifos

The application timing of chlorpyrifos is different from that of diazinon. In January and February, the amount of chlorpyrifos applied was very low, but relatively high concentrations were detected at several sites, such as Ulatis Creek. Storm runoff appears to be an important mechanism for transporting the pesticides into surface water. The highest application occurred in March (Table 9), and as expected, the highest chlorpyrifos application combined with storm runoff resulted in high concentrations in the water. From July to September, relatively high amounts of chlorpyrifos were applied, but high concentrations were not detected.

The major application of chlorpyrifos is on alfalfa fields. The Mid-Roberts Island Drain site had the highest concentration detected in March. Ulatis Creek had high concentrations detected in January and February. During this period, chlorpyrifos uses were very low in the Delta. Therefore, the potential chlorpyrifos sources could be from upstream tributaries. In December, many sites had concentrations over the LOQ. Since the samples were collected after a storm, the concentrations indicated that a low amount of application combined with storm runoff could result in high concentrations. Compared to the study results from Kuivila and Foe (1995), the observed concentrations were relatively low. One of the reasons is the reduction of the amount of chlorpyrifos applied. The amount of chlorpyrifos applied was reduced about 46% from 1993 to 2002.

The calculated instantaneous chlorpyrifos loads were high in January for Ulatis Creek during storms (Figure 16). Storm runoff plays a major role in pesticide runoff. Although the chlorpyrifos applications were relatively low, the storm runoff resulted in high concentrations in the water.

4.3 Future work

The monitoring program should be continued because more data will help in identifying diazinon and chlorpyrifos sources in Delta waterways. The measured chlorpyrifos in December showed relatively high concentration (greater than 20 but less than 40 ng/L) after storm events, therefore, pesticide runoff during storm events should be monitored in order to further determine the sources. Samples should be collected only during low and outgoing tides from the sites where tidal influence is strong. The analytical method needs to be refined or modified by the lab to address quality assurance issues.

5 REFERENCES

- DWR. 1995. *Sacramento-San Joaquin Delta Atlas*. California Department of Water Resources. pp.121.
- DPR PUR database. 2002. <http://www.cdpr.ca.gov/docs/pur/purmain.htm>
- Kuivila, K.M. and C.G. Foe. 1995. *Concentrations, transport and biological effects of dormant pesticides in the San Francisco estuary, California*. *Env. Toxic. and Chem.* Vol. 14. No. 7. pp. 1141 –1150.
- Lu, Z. 2002. *Diazinon and chlorpyrifos monitoring plan for Sacramento and San Joaquin Delta Waterways*. Appendix IV of Regional Board – UC Davis Contract number 00-197-150-0
- Nolan, M., C. Fred, and J. Jacobson. 2001. *Surface water field techniques training class (Version 1.0)*. Water Resources investigations Report 98-4252. USGS Training Class-SW 4230.
<http://wwwrcamnl.wr.usgs.gov/sws/fieldmethods/index.html>
- Siepmann, S. and B. Finlayson. 2000. *Water quality criteria for diazinon and chlorpyrifos*. California Department of Fish and Game. Office of Spill Prevention and Response. Administrative Report 00-3. 2000.

Figures

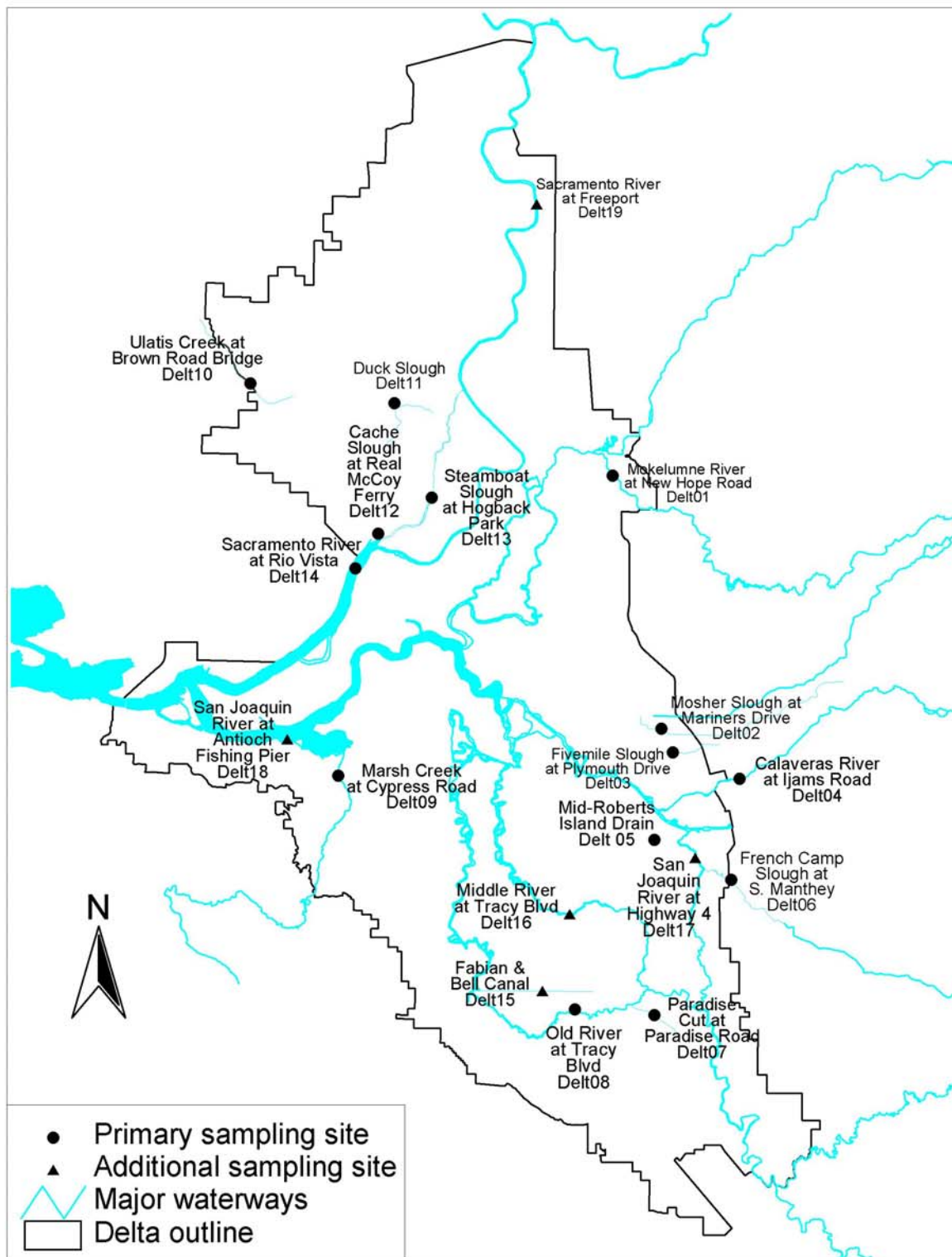


Figure 1. Study area and monitoring sites

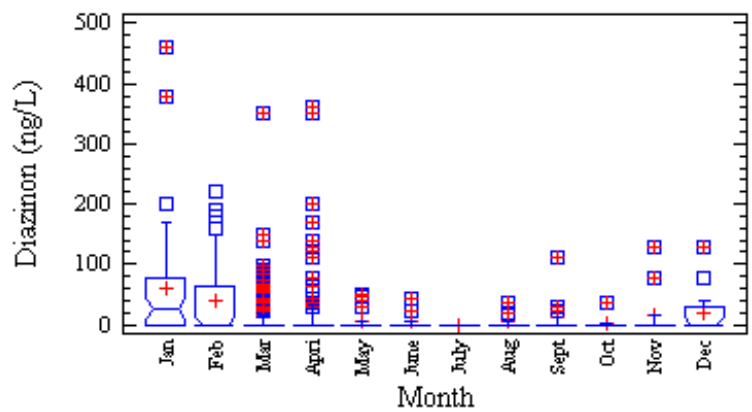


Figure 2. Diazinon concentrations for all sites by month (for each month, a central box covers the middle 50% of the data, the median is the horizontal line inside the box, the plus sign (+) indicates the mean value, the whiskers show the 1.5 times inter-quartile ranges from the lower and upper quartiles, the points between 1.5 times inter-quartile and 3 times inter-quartile are shown as small squares, and the points beyond 3 times inter-quartile are shown, with a plus sign (+) within a small square, as outliers).

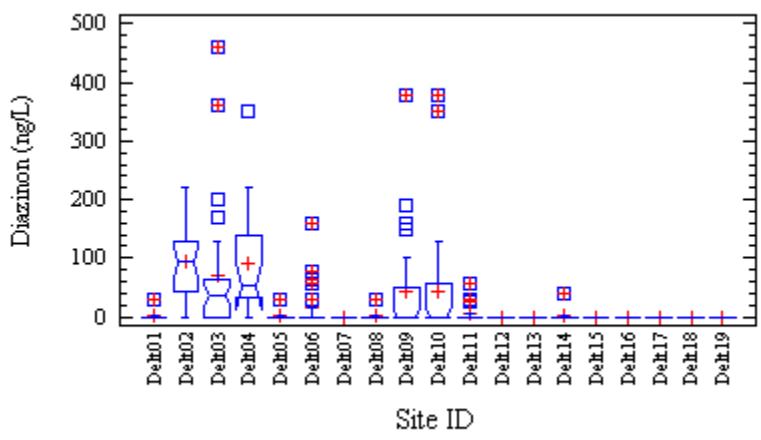


Figure 3. Diazinon concentrations by sampling site (for each site, the mean, median, outliers, and frequency distribution are indicated by a boxplot, see Figure 2 for description of boxplot).

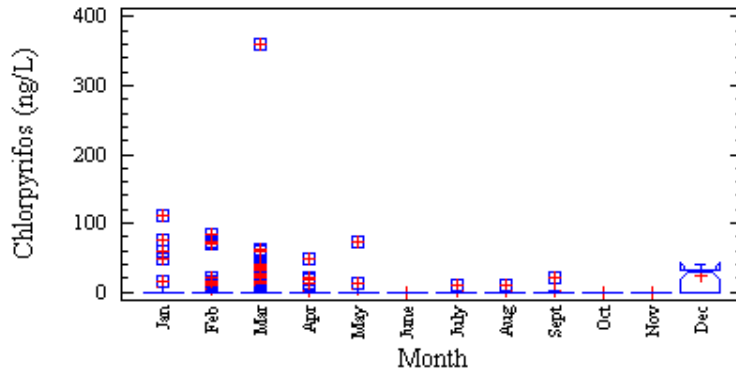


Figure 4. Chlorpyrifos concentrations for all sites by month (for each month, the mean, median, outliers, and frequency distribution are indicated by a boxplot, see Figure 2 for description of boxplot).

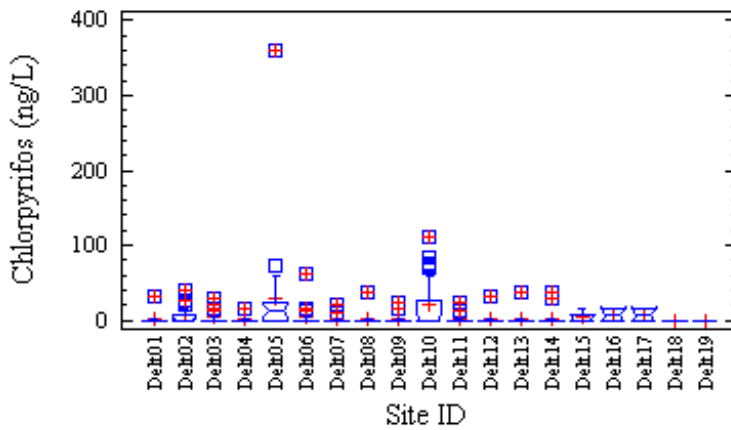


Figure 5. Chlorpyrifos concentrations by sampling site (for each site, a boxplot shows the mean, median, outliers, and frequency distribution, see Figure 2 for description of boxplot).

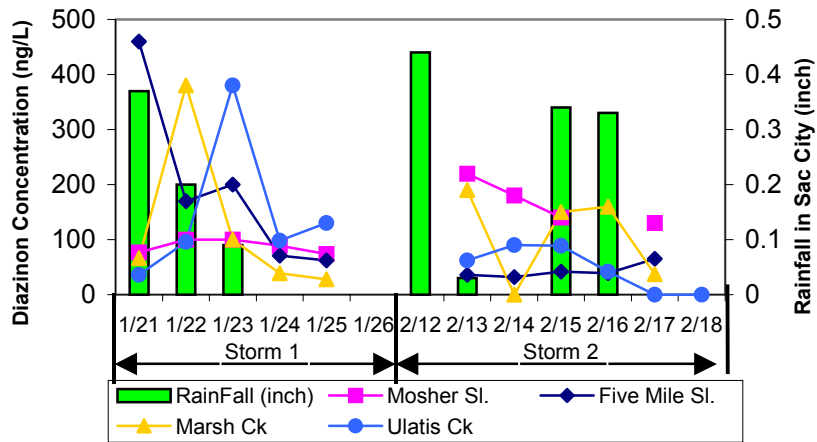


Figure 6. Observed diazinon concentrations during storms

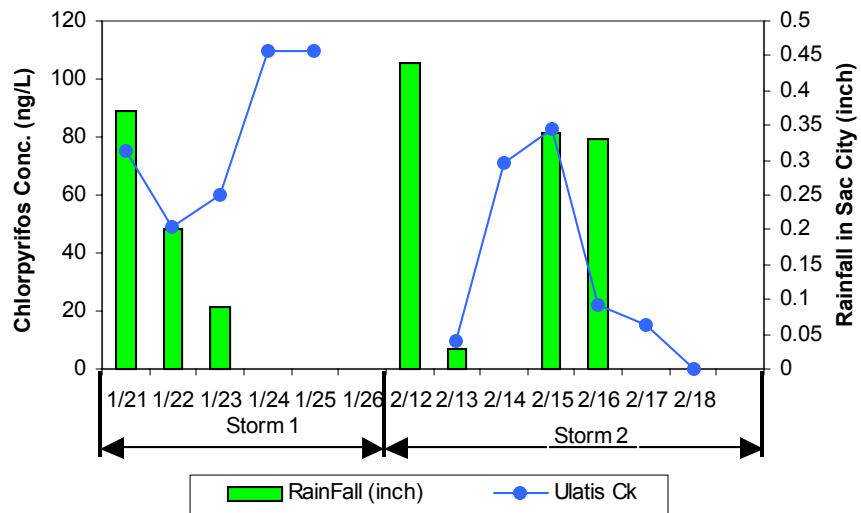


Figure 7. Observed chlorpyrifos concentrations during storms

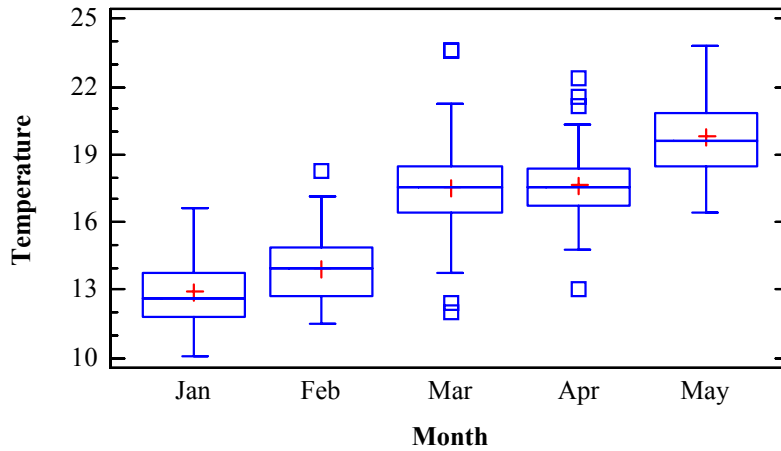


Figure 8. Measured temperature ($^{\circ}\text{C}$) by month (for each month, a boxplot shows the mean, median, outliers, and frequency distribution, see Figure 2 for description of boxplot).

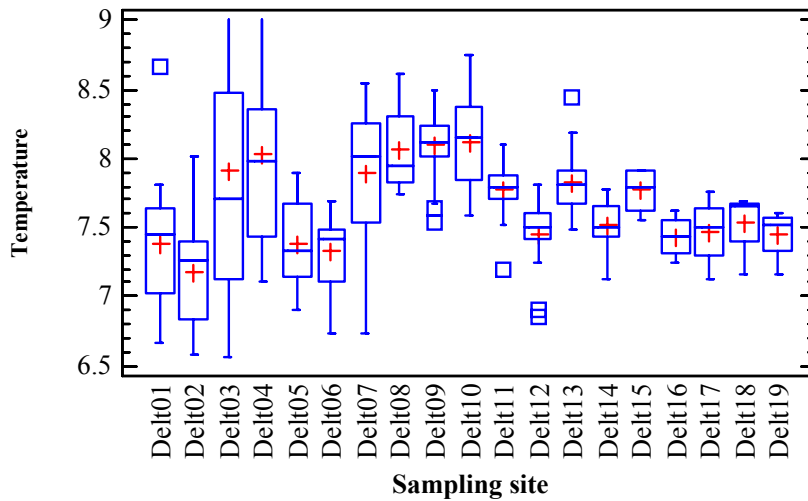


Figure 9. Measured temperature ($^{\circ}\text{C}$) by sampling site (for each site, a boxplot shows the mean, median, outliers, and frequency distribution, see Figure 2 for description of boxplot).

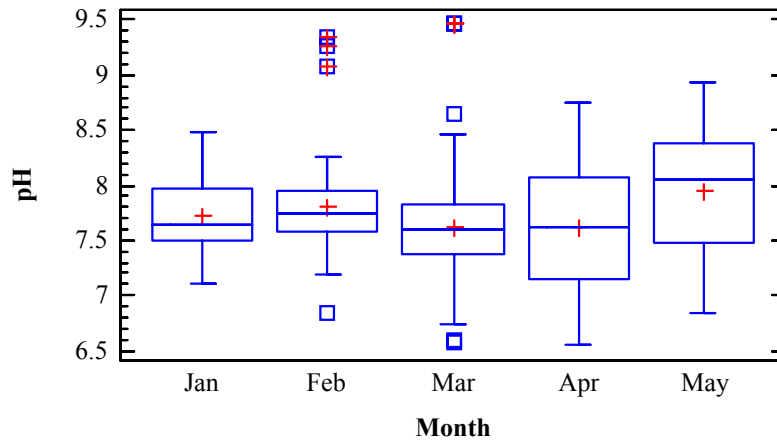


Figure 10. Measured pH by month (for each month, a boxplot shows the mean, median, outliers, and frequency distribution, see Figure 2 for description of boxplot).

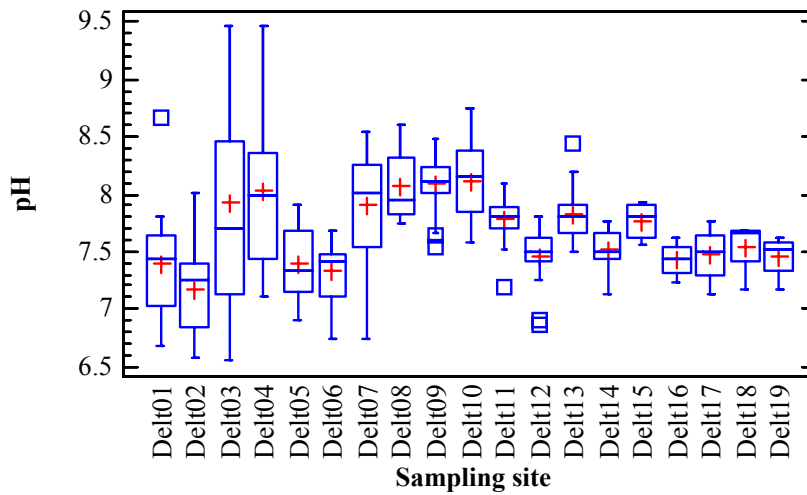


Figure 11. Measured pH by sampling site (for each site, a boxplot shows the mean, median, outliers, and frequency distribution, see Figure 2 for description of boxplot).

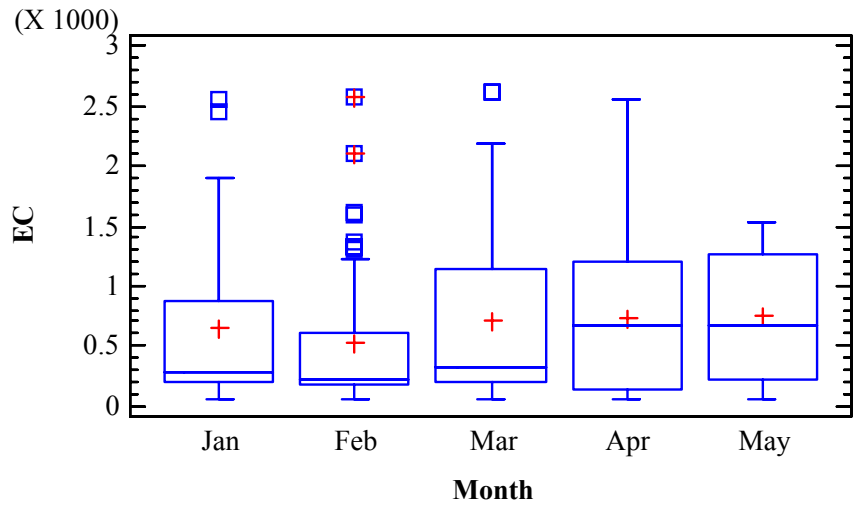


Figure 12. Measured EC (μS) by month (for each month, a boxplot shows the mean, median, outliers, and frequency distribution, see Figure 2 for description of boxplot).

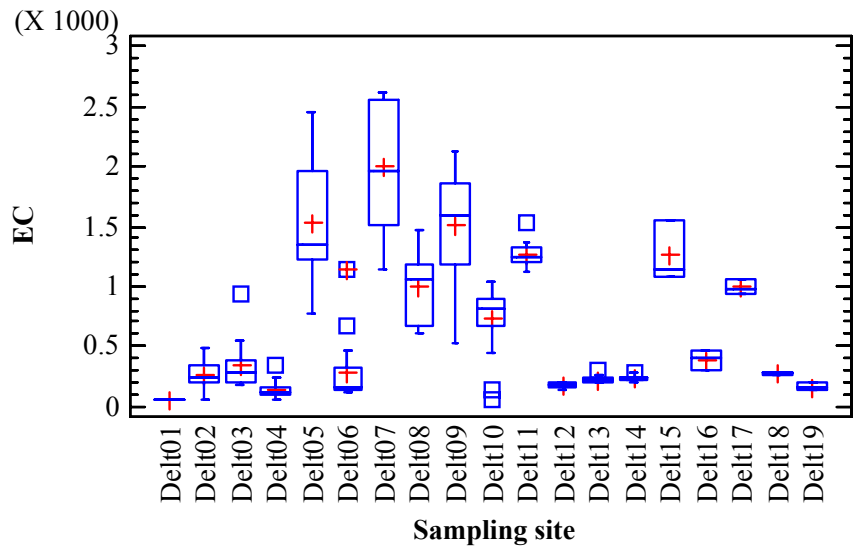


Figure 13. Measured EC (μS) by sampling site (for each site, a boxplot shows the mean, median, outliers, and frequency distribution, see Figure 2 for description of boxplot).

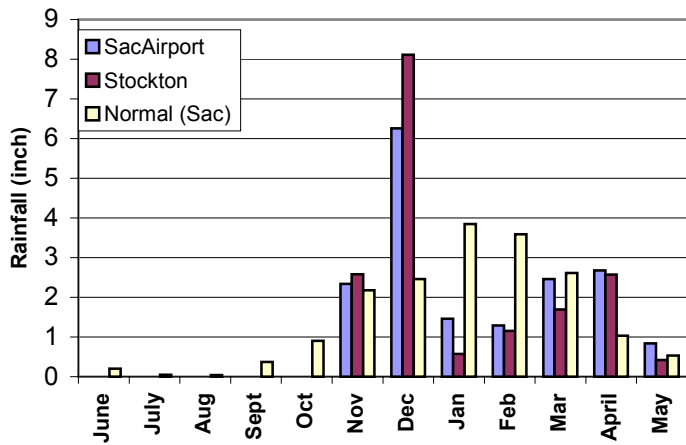


Figure 14. Monthly rainfall during sampling period

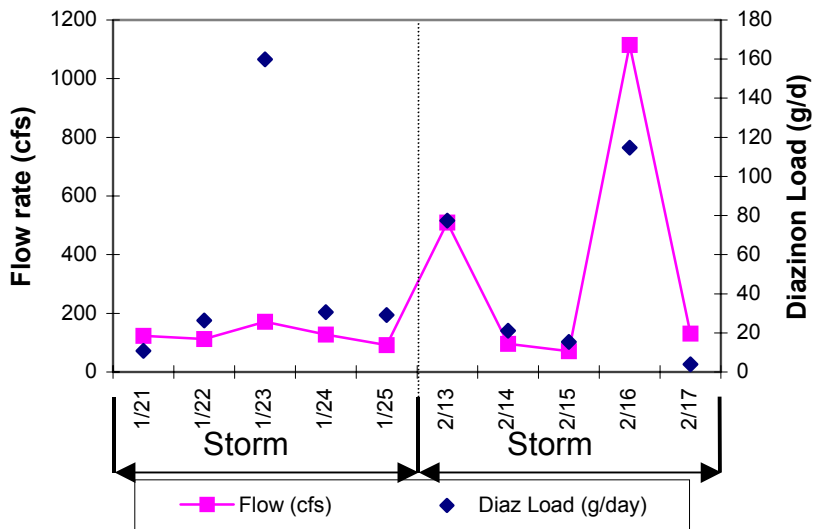


Figure 15. Flow rates and diazinon loads at Ulatis Creek site during storms

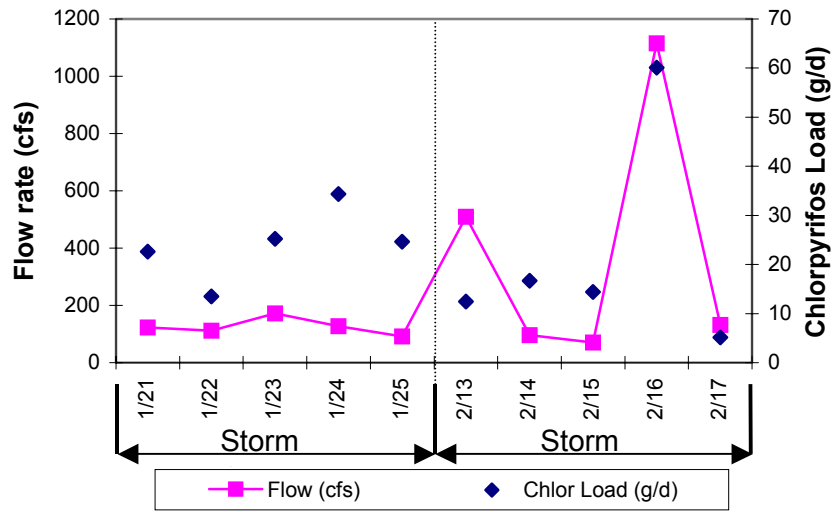


Figure 16. Flow rates and chlorpyrifos loads at Ulatis Creek site during storms

Tables

Table 1. Primary sampling sites and descriptions

Site ID	Site Location	Flow Measure (Y/N)	Type of Waterway	Latitude/ Longitude	Sampling Location
Delt01	Mokelumne River at New Hope Rd Bridge	N	Main River to the Delta	38° 14' 13.30"/ - 121° 25' 4.49"	Collected from the bridge
Delt02	Mosher Slough at Mariners Drive	N	Back Slough in the Delta	38° 1' 58.42"/ - 121° 21' 1.57"	Collected from the bank near bridge
Delt03	Five Mile Slough at Plymouth Rd	N	Back Slough in the Delta	38° 0' 49.66"/ - 121° 21' 6.76"	Collected from the five culverts
Delt04	Calaveras River at Ijams Rd	Y	Tributaries to the Delta	37° 59' 36.41"/ - 121° 16' 9.17"	Collected from the bank of the west bridge
Delt05	Mid-Roberts Island Drain	N	Ag. Drain in the Delta	37° 56' 35.15"/ - 121° 22' 9.50"	Collected from the platform of the pump station
Delt06	French Camp Slough at S Manthey Rd	N	Back Slough in the Delta	37° 54' 41.86"/ - 121° 17' 24.13"	Collected under the bridge
Delt07	Paradise Cut at Paradise Rd	N	Back Slough in the Delta	37° 48' 3.62"/ - 121° 22' 1.24"	Collected from the south bridge.
Delt08	Old River at Tracy Road	N	Back Slough in the Delta	37° 48' 16.50"/ - 121° 26' 54.57"	Collected under the bridge
Delt09	Marsh Creek at Cypress Rd bridge	Y	Tributary to the Delta	37° 59' 26.55"/ - 121° 41' 41.45"	Collected under the bridge
Delt10	Ulatis Creek at Brown Rd	Y	Tributary to the Delta	38° 18' 25.43"/ - 121° 47' 33.36"	Collected from the bridge or under the bridge
Delt11	Duck Slough at Five Point	N	Back Slough in the Delta	38° 17' 35.12"/ - 121° 38' 35.19"	Collected from the bank near the platform of pump station
Delt12	Steamboat Slough at Hogback Park	N	Back Slough in the Delta	38° 12' 50.85"/ - 121° 36' 20.34"	Collected from the west bank of land in the Park
Delt13	Cache Slough at Real McCoy Ferry	N	Back Slough in the Delta	38° 14' 16.26"/ - 121° 39' 29.69"	Collected from the bank of Cache Slough, north of the Real McCoy Ferry on Hwy 84, Ryer Island.
Delt14	Sac River at Rio Vista	N	Main River in the Delta	38° 9' 34.64"/ - 121° 41' 0.92"	Collected from DWR's dock

Table 1 (continued) Additional sampling sites

Site ID	Site Location	Flow Measure (Y/N)	Type of Waterway	Latitude/ Longitude	Sampling Location
Delt15	Fabian and Bell Canal	N	Canal	37° 49' 8.43"/ -121° 29' 7.63"	Collected from bank on Grimes Rd.
Delt16	Middle River at Tracy Blvd	N	Stream	37° 52' 54.51"/ -121° 27' 18.47"	Collected from downstream (west) side of bridge
Delt17	San Joaquin River at Hwy 4	N	Main River	37° 55' 43.31"/ -121° 19' 37.24"	Collected from bridge walkway
Delt18	San Joaquin River at Antioch Fishing Pier	N	Main River	38° 1' 9.99"/ -121° 44' 57.19"	Collected from the Antioch Fishing Pier
Delt19	Sacramento River near Freeport	N	Main River	38° 27' 23.18"/ -121° 30' 0.58"	Collected from east bank

Table 2. Diazinon and chlorpyrifos concentrations during storms

Storm	Date	Rainfall (inch)	Diazinon (ng/L)				Chlorpyrifos (ng/L)
			Mosher Slough	Five Mile Slough	Marsh Creek	Ulati Creek	Ulati Creek
Storm1	1/21/03	0.37	77	460	66	36	75
Storm1	1/22/03	0.20	100	170	380	96	49
Storm1	1/23/03	0.09	100	200	100	380	60
Storm1	1/24/03	0.00	89	71	39	98	110
Storm1	1/25/03	0.00	74	62	28	130	110
Storm2	2/13/03	0.03	220	36	190	62	10
Storm2	2/14/03	0.00	180	32	ND	90	71
Storm2	2/15/03	0.34	140	42	150	89	83
Storm2	2/16/03	0.33	L	39	160	42	22
Storm2	2/17/03	0.00	130	65	37	ND	15

ND = not detectable (below LOQ or LOD)

L = sample lost

Table 3. Calculated maximum instantaneous loads (g/day)

	Mokelumne River		Calaveras River		Marsh Creek		Ulati Creek	
	Diazinon	Chlorpy.	Diazinon	Chlorpy.	Diazinon	Chlorpy.	Diazinon	Chlorpy.
Maximum Load (g/day)	5.45	ND	1.82	0.20	8.39	0.22	159.90	60.10

Table 4. Summary of field spike sample recovery

Parameter	Diazinon	Chlorpyrifos	Bifenthrin	Chlorpyrifos Methyl (Surrogate)
Number of Analyses	23	21	27	27
Maximum	157%	121%	96%	100%
Minimum	43%	26%	29%	52%
Average	76%	73%	56%	76%
Median	71%	74%	57%	76%
Standard deviation	29%	18%	17%	12%

Table 5. Summary of lab spike sample recovery

Parameter	Diazinon	Chlorpyrifos	Bifenthrin	Chlorpyrifos Methyl (Surrogate)
Number of analyses	73	78	71	79
Maximum	164%	105%	119%	94%
Minimum	47%	46%	59%	48%
Average	83%	72%	84%	76%
Median	75%	72%	83%	76%
Standard deviation	25%	12%	13%	10%

Table 6. Relative percent difference (RPD) of duplicates

Date	Diazinon	Chlorpyrifos
8/20/02	ND	23%
12/23/02	ND	3%
1/22/03	6%	ND
1/22/03	2%	ND
3/11/03	ND	1%

Table 7. Summary of surrogate analysis percent recovery for all samples

Parameter	Lab QC	Field QC	Primary Samples
Maximum	101%	100%	110%
Minimum	45%	52%	18%
Average	75%	79%	80%
Median	76%	80%	81%
Standard Deviation	10%	9%	11%
Number of samples <50%	1	0	7

Table 8. Average monthly diazinon use from 1993 to 2002

Month	Diazinon Use	Major Crops
January	11.9%	Apricot, almond, apple, peach
February	10.0%	Apple, apricot, cherry, peach
March	10.5%	Apple, pear, tomato
April	5.6%	Tomato, apple, pear, cherry
May	14.6%	Apricot, tomato, carrots
June	6.6%	Corn, walnut, carrots
July	4.6%	Corn, tomato, walnut
August	7.1%	Tomato, corn,
September	3.5%	Pear, tomato
October	20.3%	Pear
November	4.7%	Pear
December	0.6%	Peach, cherry, apricot

Table 9. Average monthly chlorpyrifos use from 1993 to 2002

Month	Chlorpyrifos Use	Major Crops
January	0.5%	Apple, peach, alfalfa
February	1.5%	Alfalfa, apple
March	31.2%	Alfalfa
April	4.5%	Alfalfa, walnut, apple, sugarbeet
May	6.6%	Walnut, almond, sugarbeet, apple
June	8.2%	Walnut, corn, sugarbeet, alfalfa
July	15.6%	Sugarbeet, walnut, nursery, alfalfa
August	17.2%	Alfalfa, sugarbeet, asparagus, walnut
September	10.9%	Alfalfa, sugarbeet, asparagus
October	3.3%	Asparagus, sugarbeet, alfalfa
November	0.3%	Asparagus, alfalfa
December	0.3%	Nursery, asparagus, sugarbeet

Appendix

Table A1. Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
Mokelumne River	6/18/02	7:25	ND	ND	96%
Mokelumne River	7/23/02	7:50	ND	ND	89%
Mokelumne River	8/20/02	11:20	ND	ND	95%
Mokelumne River	9/18/02	11:20	ND	ND	92%
Mokelumne River	10/24/02	14:30	ND	ND	85%
Mokelumne River	11/21/02	12:15	ND	ND	81%
Mokelumne River	12/23/02	11:50	28	31	83%
Mokelumne River	1/21/03	18:20	ND	ND	76%
Mokelumne River	1/22/03	16:10	ND	ND	78%
Mokelumne River	1/23/03	8:10	ND	ND	87%
Mokelumne River	1/24/03	17:30	ND	ND	83%
Mokelumne River	1/25/03	15:00	ND	ND	81%
Mokelumne River	2/13/03	15:20	ND	ND	92%
Mokelumne River	2/14/03	14:10	ND	ND	82%
Mokelumne River	2/15/03	14:50	ND	ND	82%
Mokelumne River	2/16/03	15:50	ND	ND	91%
Mokelumne River	2/17/03	14:40	ND	ND	91%
Mokelumne River	3/4/03	9:10	ND	ND	73%
Mokelumne River	3/12/03	15:50	ND	ND	78%
Mokelumne River	3/19/03	13:30	ND	ND	77%
Mokelumne River	3/26/03	11:20	ND	ND	78%
Mokelumne River	4/2/03	10:50	ND	ND	71%
Mokelumne River	4/15/03	11:30	ND	ND	77%
Mokelumne River	4/29/03	7:50	ND	ND	72%
Mokelumne River	5/13/03	12:50	ND	ND	85%
Mosher Slough	6/18/02	8:10	22	ND	94%
Mosher Slough	7/23/02	8:40	ND	ND	87%
Mosher Slough	8/20/02	10:35	20	ND	86%
Mosher Slough	9/18/02	10:35	24	ND	98%
Mosher Slough	10/24/02	12:55	35	ND	80%
Mosher Slough	11/21/02	11:35	130	ND	86%
Mosher Slough	12/23/02	11:15	130	40	84%
Mosher Slough	1/21/03	17:50	77	ND	64%
Mosher Slough	1/22/03	11:00	100	ND	80%
Mosher Slough	1/23/03	9:20	100	ND	83%
Mosher Slough	1/24/03	17:00	89	ND	56%
Mosher Slough	1/25/03	14:40	74	ND	62%
Mosher Slough	2/13/03	14:50	220	ND	94%
Mosher Slough	2/14/03	13:40	180	ND	83%
Mosher Slough	2/15/03	14:20	140	ND	85%
Mosher Slough	2/17/03	14:10	130	ND	88%
Mosher Slough	3/3/03	14:50	75	ND	83%
Mosher Slough	3/11/03	10:10	44	ND	84%
Mosher Slough	3/14/03	8:20	40	39	74%
Mosher Slough	3/18/03	14:00	140	27	88%
Mosher Slough	3/21/03	11:10	98	21	72%

Table A1 (continued). Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
Mosher Slough	3/25/03	9:30	85	25	73%
Mosher Slough	3/28/03	10:50	66	15	72%
Mosher Slough	4/1/03	11:50	200	12	90%
Mosher Slough	4/4/03	10:40	140	ND	73%
Mosher Slough	4/14/03	11:30	120	ND	76%
Mosher Slough	4/28/03	10:00	110	ND	76%
Mosher Slough	5/12/03	8:20	40	ND	86%
Five Mile Slough	6/18/02	8:30	ND	ND	102%
Five Mile Slough	7/23/02	8:50	ND	ND	97%
Five Mile Slough	8/20/02	10:50	ND	ND	99%
Five Mile Slough	9/18/02	10:45	ND	ND	94%
Five Mile Slough	10/24/02	13:10	ND	ND	83%
Five Mile Slough	11/21/02	11:50	ND	ND	90%
Five Mile Slough	12/23/02	11:20	76	30	85%
Five Mile Slough	1/21/03	17:00	460	14	62%
Five Mile Slough	1/22/03	10:10	170	ND	79%
Five Mile Slough	1/23/03	9:30	200	ND	76%
Five Mile Slough	1/24/03	16:40	71	ND	69%
Five Mile Slough	1/25/03	14:30	62	ND	55%
Five Mile Slough	2/13/03	14:30	36	ND	61%
Five Mile Slough	2/14/03	13:20	32	ND	53%
Five Mile Slough	2/15/03	14:00	42	ND	68%
Five Mile Slough	2/16/03	15:10	39	ND	50%
Five Mile Slough	2/17/03	14:00	65	ND	86%
Five Mile Slough	3/3/03	14:40	21	ND	81%
Five Mile Slough	3/11/03	10:00	ND	ND	75%
Five Mile Slough	3/14/03	8:30	ND	ND	52%
Five Mile Slough	3/18/03	14:20	64	20	88%
Five Mile Slough	3/21/03	11:30	60	14	88%
Five Mile Slough	3/25/03	10:00	35	12	74%
Five Mile Slough	3/28/03	11:10	27	ND	68%
Five Mile Slough	4/1/03	12:10	360	ND	75%
Five Mile Slough	4/4/03	11:00	130	ND	72%
Five Mile Slough	4/14/03	11:40	65	ND	78%
Five Mile Slough	4/28/03	10:20	29	ND	78%
Five Mile Slough	5/12/03	8:50	ND	ND	81%
Calaveras River	6/18/02	8:50	ND	ND	110%
Calaveras River	7/23/02	9:20	ND	ND	76%
Calaveras River	8/20/02	8:40	35	ND	97%
Calaveras River	9/17/02	8:40	110	ND	93%
Calaveras River	12/19/02	8:50	ND	ND	79%
Calaveras River	1/22/03	14:50	54	ND	78%
Calaveras River	2/18/03	14:10	220	ND	78%
Calaveras River	3/3/03	14:10	150	ND	83%
Calaveras River	3/18/03	14:50	52	16	92%
Calaveras River	3/25/03	10:30	350	ND	69%

Table A1 (continued). Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
Calaveras River	4/8/03	10:30	170	ND	72%
Calaveras River	4/14/03	12:10	130	ND	80%
Calaveras River	4/22/03	11:20	42	ND	69%
Calaveras River	4/28/03	11:00	76	ND	76%
Calaveras River	5/6/03	9:30	29	ND	88%
Calaveras River	5/12/03	9:10	NW	NW	NW
Calaveras River	5/19/03	11:20	49	ND	80%
Mid-Roberts Is. Drain	6/18/02	9:40	ND	ND	102%
Mid-Roberts Is. Drain	7/23/02	10:10	ND	10	89%
Mid-Roberts Is. Drain	8/20/02	9:40	ND	ND	86%
Mid-Roberts Is. Drain	9/17/02	9:00	ND	ND	88%
Mid-Roberts Is. Drain	10/24/02	13:30	ND	ND	84%
Mid-Roberts Is. Drain	11/19/02	8:10	ND	ND	80%
Mid-Roberts Is. Drain	12/19/02	9:20	ND	23	80%
Mid-Roberts Is. Drain	1/22/03	11:30	28	ND	83%
Mid-Roberts Is. Drain	2/18/03	15:00	ND	ND	70%
Mid-Roberts Is. Drain	3/3/03	12:40	ND	ND	82%
Mid-Roberts Is. Drain	3/11/03	9:00	ND	24	74%
Mid-Roberts Is. Drain	3/14/03	8:50	ND	360	66%
Mid-Roberts Is. Drain	3/18/03	15:40	ND	60	83%
Mid-Roberts Is. Drain	3/21/03	12:10	ND	35	72%
Mid-Roberts Is. Drain	3/25/03	12:00	ND	31	72%
Mid-Roberts Is. Drain	3/28/03	11:30	ND	16	78%
Mid-Roberts Is. Drain	4/1/03	13:20	ND	19	81%
Mid-Roberts Is. Drain	4/4/03	11:30	ND	22	77%
Mid-Roberts Is. Drain	4/8/03	11:10	ND	49	73%
Mid-Roberts Is. Drain	4/14/03	12:50	ND	13	73%
Mid-Roberts Is. Drain	4/22/03	12:00	ND	ND	65%
Mid-Roberts Is. Drain	4/28/03	11:40	ND	ND	75%
Mid-Roberts Is. Drain	5/6/03	10:00	ND	72	88%
Mid-Roberts Is. Drain	5/12/03	9:50	ND	12	83%
Mid-Roberts Is. Drain	5/19/03	12:00	ND	ND	89%
French Camp Slough	6/18/02	10:20	ND	ND	102%
French Camp Slough	7/23/02	10:30	ND	ND	100%
French Camp Slough	8/20/02	10:10	ND	ND	91%
French Camp Slough	9/17/02	9:30	ND	ND	94%
French Camp Slough	10/24/02	14:00	ND	ND	86%
French Camp Slough	11/19/02	8:30	77	ND	90%
French Camp Slough	12/19/02	9:40	ND	ND	80%
French Camp Slough	1/22/03	12:00	64	ND	66%
French Camp Slough	2/18/03	12:00	160	ND	75%
French Camp Slough	3/3/03	12:20	58	ND	84%
French Camp Slough	3/11/03	8:40	ND	ND	79%
French Camp Slough	3/14/03	9:10	ND	62	80%
French Camp Slough	3/18/03	16:50	30	13	82%
French Camp Slough	3/21/03	12:30	ND	14	84%

Table A1 (continued). Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
French Camp Slough	3/25/03	11:30	ND	ND	73%
French Camp Slough	3/28/03	12:00	ND	ND	72%
French Camp Slough	4/1/03	13:50	ND	ND	81%
French Camp Slough	4/4/03	11:50	ND	ND	71%
French Camp Slough	4/8/03	11:30	ND	ND	71%
French Camp Slough	4/14/03	13:10	ND	ND	74%
French Camp Slough	4/22/03	12:20	ND	ND	59%
French Camp Slough	4/28/03	12:10	ND	ND	73%
French Camp Slough	5/6/03	10:30	ND	ND	83%
French Camp Slough	5/12/03	10:15	ND	ND	67%
French Camp Slough	5/19/03	12:40	ND	ND	88%
Paradise Cut	6/18/02	10:50	ND	ND	102%
Paradise Cut	7/23/02	11:00	ND	ND	91%
Paradise Cut	8/20/02	10:40	ND	11	97%
Paradise Cut	9/17/02	10:00	ND	20	97%
Paradise Cut	10/22/02	9:55	ND	ND	70%
Paradise Cut	11/19/02	9:05	ND	ND	88%
Paradise Cut	12/19/02	10:05	ND	ND	84%
Paradise Cut	1/22/03	13:40	ND	ND	63%
Paradise Cut	2/18/03	11:10	ND	ND	67%
Paradise Cut	3/3/03	11:50	ND	ND	83%
Paradise Cut	3/12/03	14:50	ND	11	77%
Paradise Cut	3/19/03	16:20	ND	ND	89%
Paradise Cut	3/26/03	10:20	ND	ND	77%
Paradise Cut	4/2/03	14:30	ND	ND	75%
Paradise Cut	4/8/03	12:00	ND	ND	57%
Paradise Cut	4/14/03	13:40	ND	ND	73%
Paradise Cut	4/22/03	12:50	ND	ND	59%
Paradise Cut	4/28/03	12:30	ND	ND	72%
Paradise Cut	5/6/03	11:00	ND	ND	85%
Paradise Cut	5/12/03	11:00	ND	ND	77%
Paradise Cut	5/19/03	13:30	ND	ND	81%
Old River	6/18/02	11:30	L	L	L
Old River	7/23/02	11:30	ND	ND	94%
Old River	8/20/02	11:10	ND	ND	96%
Old River	9/17/02	10:30	ND	ND	97%
Old River	9/17/02	11:40	28	ND	100%
Old River	10/22/02	10:30	ND	ND	58%
Old River	11/19/02	9:30	ND	ND	81%
Old River	12/19/02	10:30	ND	ND	81%
Old River	1/22/03	14:20	ND	ND	79%
Old River	2/18/03	10:50	ND	ND	83%
Old River	3/3/03	11:20	ND	ND	77%
Old River	3/12/03	14:30	ND	37	73%
Old River	3/19/03	15:50	ND	ND	84%
Old River	3/26/03	10:00	ND	ND	74%

Table A1 (continued). Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
Old River	4/2/03	15:10	ND	ND	79%
Old River	4/8/03	12:30	ND	ND	73%
Old River	4/14/03	14:50	ND	ND	67%
Old River	4/22/03	14:30	ND	ND	56%
Old River	4/28/03	13:00	ND	ND	72%
Old River	5/6/03	12:00	ND	ND	85%
Old River	5/12/03	11:50	ND	ND	80%
Old River	5/19/03	14:00	ND	ND	83%
Marsh Creek	6/18/02	12:30	44	ND	109%
Marsh Creek	7/23/02	12:20	ND	ND	97%
Marsh Creek	8/20/02	12:10	ND	ND	98%
Marsh Creek	10/22/02	11:30	ND	ND	74%
Marsh Creek	11/19/02	10:30	ND	ND	77%
Marsh Creek	12/19/02	11:10	ND	24	82%
Marsh Creek	1/21/03	15:30	66	ND	73%
Marsh Creek	1/22/03	12:50	380	ND	82%
Marsh Creek	1/23/03	10:30	100	ND	83%
Marsh Creek	1/24/03	14:50	39	ND	84%
Marsh Creek	1/25/03	11:30	28	ND	69%
Marsh Creek	2/13/03	13:00	190	ND	79%
Marsh Creek	2/14/03	12:00	ND	ND	79%
Marsh Creek	2/15/03	11:40	150	ND	68%
Marsh Creek	2/16/03	13:30	160	ND	87%
Marsh Creek	2/17/03	11:20	37	ND	77%
Marsh Creek	3/4/03	11:20	ND	ND	84%
Marsh Creek	3/11/03	12:40	ND	ND	88%
Marsh Creek	3/13/03	9:50	ND	ND	84%
Marsh Creek	3/17/03	13:10	54	ND	60%
Marsh Creek	3/20/03	13:40	ND	ND	87%
Marsh Creek	3/24/03	12:10	92	15	93%
Marsh Creek	3/27/03	12:20	ND	ND	82%
Marsh Creek	3/31/03	13:00	27	ND	91%
Marsh Creek	4/3/03	12:30	ND	ND	80%
Marsh Creek	4/8/03	13:20	37	ND	72%
Marsh Creek	4/14/03	15:40	ND	ND	75%
Marsh Creek	4/22/03	15:20	ND	ND	61%
Marsh Creek	4/28/03	13:40	ND	ND	76%
Marsh Creek	5/6/03	12:50	ND	ND	88%
Marsh Creek	5/13/03	11:20	ND	ND	88%
Marsh Creek	5/19/03	15:10	ND	ND	92%
Ulatris Creek	6/18/02	14:00	ND	ND	101%
Ulatris Creek	7/23/02	14:25	ND	ND	89%
Ulatris Creek	8/20/02	14:40	ND	ND	81%
Ulatris Creek	9/17/02	13:50	ND	ND	92%
Ulatris Creek	10/22/02	13:30	ND	ND	62%
Ulatris Creek	11/19/02	12:30	ND	ND	86%

Table A1 (continued). Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
Ulatis Creek	12/19/02	12:35	ND	32	82%
Ulatis Creek	1/21/03	9:30	36	75	80%
Ulatis Creek	1/22/03	8:00	96	49	86%
Ulatis Creek	1/23/03	15:10	380	60	67%
Ulatis Creek	1/24/03	9:00	98	110	71%
Ulatis Creek	1/25/03	7:50	130	110	71%
Ulatis Creek	2/13/03	7:50	62	10	74%
Ulatis Creek	2/14/03	7:50	83	73	47%
Ulatis Creek	2/14/03	7:50	97	69	47%
Ulatis Creek	2/15/03	8:20	89	83	91%
Ulatis Creek	2/16/03	8:10	42	22	81%
Ulatis Creek	2/17/03	8:00	ND	16	18%
Ulatis Creek	2/17/03	8:00	ND	15	18%
Ulatis Creek	2/18/03	9:00	ND	ND	82%
Ulatis Creek	3/4/03	15:50	ND	ND	87%
Ulatis Creek	3/11/03	10:50	ND	ND	83%
Ulatis Creek	3/13/03	8:10	ND	ND	81%
Ulatis Creek	3/17/03	15:00	52	ND	58%
Ulatis Creek	3/20/03	16:30	ND	ND	75%
Ulatis Creek	3/24/03	14:20	ND	ND	73%
Ulatis Creek	3/27/03	14:10	ND	ND	82%
Ulatis Creek	3/31/03	15:10	ND	ND	86%
Ulatis Creek	4/3/03	14:20	ND	ND	70%
Ulatis Creek	4/8/03	14:50	ND	ND	73%
Ulatis Creek	4/15/03	15:40	350	12	82%
Ulatis Creek	4/22/03	17:10	ND	ND	56%
Ulatis Creek	4/29/03	12:30	30	ND	74%
Ulatis Creek	5/6/03	14:20	46	ND	86%
Ulatis Creek	5/13/03	7:40	ND	ND	84%
Ulatis Creek	5/19/03	17:00	ND	ND	89%
Duck Slough	6/24/02	11:00	ND	ND	72%
Duck Slough	7/24/02	8:10	ND	ND	88%
Duck Slough	8/21/02	8:05	ND	ND	94%
Duck Slough	9/18/02	8:30	ND	ND	92%
Duck Slough	10/24/02	10:15	ND	ND	54%
Duck Slough	11/21/02	9:10	ND	ND	83%
Duck Slough	12/23/02	9:20	ND	24	80%
Duck Slough	1/21/03	12:50	30	ND	77%
Duck Slough	1/22/03	10:40	25	ND	90%
Duck Slough	1/23/03	13:50	58	ND	72%
Duck Slough	2/13/03	11:40	ND	ND	92%
Duck Slough	2/14/03	10:20	ND	ND	80%
Duck Slough	2/15/03	10:20	ND	ND	85%
Duck Slough	2/16/03	12:00	ND	12	85%
Duck Slough	2/17/03	10:10	ND	ND	80%
Duck Slough	3/4/03	14:10	ND	ND	81%

Table A1 (continued). Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
Duck Slough	3/11/03	15:30	ND	ND	80%
Duck Slough	3/13/03	11:30	ND	ND	70%
Duck Slough	3/17/03	10:20	ND	ND	80%
Duck Slough	3/20/03	10:40	ND	ND	87%
Duck Slough	3/24/03	10:50	ND	ND	78%
Duck Slough	3/27/03	9:40	ND	ND	81%
Duck Slough	3/31/03	10:30	ND	ND	83%
Duck Slough	4/3/03	9:50	ND	ND	85%
Duck Slough	4/15/03	13:00	ND	ND	76%
Duck Slough	4/29/03	10:30	ND	ND	72%
Duck Slough	5/13/03	9:40	ND	ND	83%
Steamboat Slough	7/24/02	9:50	ND	ND	98%
Steamboat Slough	8/20/02	8:35	ND	ND	97%
Steamboat Slough	9/18/02	9:00	ND	ND	96%
Steamboat Slough	10/24/02	10:45	ND	ND	88%
Steamboat Slough	11/21/02	10:10	ND	ND	83%
Steamboat Slough	12/23/02	9:45	ND	33	81%
Steamboat Slough	1/21/03	13:20	ND	ND	64%
Steamboat Slough	1/22/03	11:10	ND	ND	76%
Steamboat Slough	1/23/03	13:10	ND	ND	84%
Steamboat Slough	1/24/03	12:30	ND	ND	81%
Steamboat Slough	1/25/03	10:40	ND	ND	57%
Steamboat Slough	2/13/03	12:00	ND	ND	90%
Steamboat Slough	2/14/03	10:50	ND	ND	81%
Steamboat Slough	2/15/03	10:40	ND	ND	75%
Steamboat Slough	2/16/03	12:30	ND	ND	84%
Steamboat Slough	2/17/03	10:30	ND	ND	77%
Steamboat Slough	3/4/03	13:40	ND	ND	82%
Steamboat Slough	3/11/03	15:00	ND	ND	84%
Steamboat Slough	3/13/03	11:50	ND	ND	65%
Steamboat Slough	3/17/03	11:00	ND	ND	82%
Steamboat Slough	3/20/03	11:10	ND	ND	85%
Steamboat Slough	3/24/03	11:20	ND	ND	83%
Steamboat Slough	3/27/03	10:20	ND	ND	81%
Steamboat Slough	3/31/03	11:00	ND	ND	65%
Steamboat Slough	4/3/03	10:20	ND	ND	84%
Steamboat Slough	4/15/03	13:30	ND	ND	80%
Steamboat Slough	4/29/03	10:10	ND	ND	69%
Steamboat Slough	5/13/03	10:30	ND	ND	86%
Cache Slough	7/24/02	10:40	ND	ND	100%
Cache Slough	8/20/02	9:05	ND	ND	92%
Cache Slough	9/18/02	9:25	ND	ND	90%
Cache Slough	10/24/02	11:15	ND	ND	87%
Cache Slough	11/21/02	10:40	ND	ND	83%
Cache Slough	12/23/02	10:15	ND	36	81%
Cache Slough	1/21/03	12:30	ND	ND	67%

Table A1 (continued). Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
Cache Slough	1/22/03	10:10	ND	ND	88%
Cache Slough	1/23/03	14:10	ND	ND	66%
Cache Slough	1/24/03	11:20	ND	ND	82%
Cache Slough	1/25/03	10:20	ND	ND	53%
Cache Slough	1/26/03	10:10	ND	ND	82%
Cache Slough	2/13/03	11:10	ND	ND	86%
Cache Slough	2/14/03	9:50	ND	ND	90%
Cache Slough	2/15/03	9:50	ND	ND	85%
Cache Slough	2/16/03	11:40	ND	ND	92%
Cache Slough	2/17/03	9:50	ND	ND	68%
Cache Slough	2/18/03	9:30	ND	ND	85%
Cache Slough	3/4/03	14:40	ND	ND	83%
Cache Slough	3/11/03	16:00	ND	ND	81%
Cache Slough	3/13/03	11:00	ND	ND	74%
Cache Slough	3/17/03	11:40	ND	ND	84%
Cache Slough	3/20/03	11:40	ND	ND	89%
Cache Slough	3/24/03	10:20	ND	ND	75%
Cache Slough	3/27/03	10:50	ND	ND	77%
Cache Slough	3/31/03	11:30	ND	ND	80%
Cache Slough	4/3/03	10:50	ND	ND	78%
Cache Slough	4/15/03	14:00	ND	ND	75%
Cache Slough	4/29/03	10:50	ND	ND	72%
Cache Slough	5/13/03	9:20	ND	ND	80%
Sac River at Rio Vista	7/24/02	10:55	ND	ND	97%
Sac River at Rio Vista	8/20/02	9:40	ND	ND	91%
Sac River at Rio Vista	9/18/02	9:50	ND	ND	98%
Sac River at Rio Vista	10/24/02	12:15	ND	ND	83%
Sac River at Rio Vista	11/21/02	10:50	ND	ND	82%
Sac River at Rio Vista	12/19/02	11:50	40	30	83%
Sac River at Rio Vista	12/23/02	10:30	ND	36	84%
Sac River at Rio Vista	1/21/03	11:40	ND	ND	68%
Sac River at Rio Vista	1/22/03	9:40	ND	ND	78%
Sac River at Rio Vista	1/23/03	14:30	ND	ND	71%
Sac River at Rio Vista	1/24/03	10:50	ND	ND	68%
Sac River at Rio Vista	1/25/03	9:30	ND	ND	78%
Sac River at Rio Vista	1/26/03	9:40	ND	ND	47%
Sac River at Rio Vista	1/26/03	9:40	ND	ND	48%
Sac River at Rio Vista	2/13/03	10:50	ND	ND	88%
Sac River at Rio Vista	2/14/03	9:20	ND	ND	47%
Sac River at Rio Vista	2/15/03	9:20	ND	ND	84%
Sac River at Rio Vista	2/16/03	11:10	ND	ND	92%
Sac River at Rio Vista	2/17/03	9:20	ND	ND	80%
Sac River at Rio Vista	2/19/03	8:00	ND	ND	83%
Sac River at Rio Vista	3/4/03	15:00	ND	ND	85%
Sac River at Rio Vista	3/11/03	16:20	ND	ND	77%
Sac River at Rio Vista	3/13/03	10:40	ND	ND	73%

Table A1 (continued). Diazinon and chlorpyrifos concentrations.

Site ID	Date Collected	Time Collected	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Chlorpyrifos Methyl (Surrogate)
Sac River at Rio Vista	3/17/03	12:00	ND	ND	81%
Sac River at Rio Vista	3/20/03	12:10	ND	ND	90%
Sac River at Rio Vista	3/24/03	9:40	ND	ND	80%
Sac River at Rio Vista	3/27/03	11:10	ND	ND	81%
Sac River at Rio Vista	3/31/03	11:50	ND	ND	75%
Sac River at Rio Vista	4/3/03	11:20	ND	ND	83%
Sac River at Rio Vista	4/15/03	14:20	ND	ND	78%
Sac River at Rio Vista	4/29/03	11:30	ND	ND	67%
Sac River at Rio Vista	5/13/03	8:50	ND	ND	88%
Fabian and Bell Canal	3/12/03	14:20	ND	15	75%
Fabian and Bell Canal	3/19/03	15:30	ND	ND	87%
Fabian and Bell Canal	3/26/03	9:50	ND	ND	79%
Fabian and Bell Canal	4/2/03	15:30	ND	ND	76%
Middle River	3/12/03	13:50	ND	14	78%
Middle River	3/19/03	14:50	ND	14	84%
Middle River	3/26/03	9:30	ND	ND	80%
Middle River	4/2/03	16:00	ND	ND	74%
San Joaquin River at Hwy4	3/11/03	7:50	ND	12	74%
San Joaquin River at Hwy4	3/18/03	16:00	ND	16	84%
San Joaquin River at Hwy4	3/25/03	12:20	ND	ND	79%
San Joaquin River at Hwy4	4/1/03	14:10	ND	ND	81%
San Joaquin at Antioch	3/13/03	9:10	ND	ND	83%
San Joaquin at Antioch	3/20/03	15:10	ND	ND	80%
San Joaquin at Antioch	3/27/03	11:50	ND	ND	76%
San Joaquin at Antioch	4/3/03	13:20	ND	ND	61%
Sac River nr Freeport	3/12/03	17:30	ND	ND	69%
Sac River nr Freeport	3/19/03	12:50	ND	ND	82%
Sac River nr Freeport	3/26/03	12:00	ND	ND	73%
Sac River nr Freeport	4/2/03	17:20	ND	ND	82%

*ND = none detected or below LOQ

NW = no water

L = sample lost

Table A2. Pesticide results (excluding diazinon and chlorpyrifos).

(Concentrations are in units of µg/L. ND: Not detected. BQL: the concentrations were above the detection limit but below the quantification level, so the values were estimated. Every sample was also analyzed for propargite, 1-cyhalothrin, cyfluthrin, cypermethrin, and esfenvalerate, which were not present at detectable levels).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Dacthal (DCFA)	Methidathion	Bifenthrin	Azinphos methyl
Delt01	6/18/02	7:25	ND	BQL (0.012 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	7/23/02	7:50	ND	BQL (0.009 J)	ND	ND	BQL (0.011 J)	ND	ND	ND	ND	ND
Delt01	8/20/02	11:20	ND	ND	ND	ND	ND	ND	ND	ND	0.084	ND
Delt01	9/18/02	11:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	10/24/02	14:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	11/21/02	12:15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	12/23/02	11:50	ND	BQL (0.11 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	1/21/03	18:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	1/22/03	16:10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	1/23/03	8:10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	1/24/03	17:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	1/25/03	15:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	2/13/03	15:20	ND	BQL (0.011 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	2/14/03	14:10	ND	BQL (0.016 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	2/15/03	14:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	2/16/03	15:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	2/17/03	14:40	ND	BQL (0.021 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	3/4/03	9:10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	3/12/03	15:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	3/19/03	13:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	3/26/03	11:20	ND	BQL (0.009 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	4/2/03	10:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	4/15/03	11:30	ND	BQL (0.052 J)	ND	0.11	ND	ND	ND	ND	ND	ND
Delt01	4/29/03	7:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt01	5/13/03	12:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt02	6/18/02	8:10	ND	BQL (0.046 J)	ND	ND	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt02	7/23/02	8:40	ND	BQL (0.066 J)	ND	ND	BQL (0.018 J)	ND	ND	ND	ND	ND

Table A2 (continued).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Dacthal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt02	8/20/02	10:35	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND	ND	0.340
Delt02	9/18/02	10:35	ND	BQL (0.020 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt02	10/24/02	12:55	ND	BQL (0.006 J)	ND	BQL (0.008 J)	ND	ND	ND	ND	ND	ND
Delt02	11/21/02	11:35	ND	BQL (0.031 J)	ND	0.13	ND	ND	ND	ND	ND	ND
Delt02	12/23/02	11:15	ND	0.55	ND	BQL (0.015 J)	0.030	ND	ND	ND	ND	ND
Delt02	1/21/03	17:50	ND	0.35	ND	BQL (0.009 J)	ND	ND	ND	ND	ND	ND
Delt02	1/22/03	11:00	ND	0.42	ND	BQL (0.012 J)	ND	ND	ND	ND	ND	ND
Delt02	1/23/03	9:20	ND	0.49	ND	BQL (0.014 J)	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt02	1/24/03	17:00	ND	0.24	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND
Delt02	1/25/03	14:40	ND	0.31	ND	BQL (0.009 J)	ND	ND	ND	ND	ND	ND
Delt02	2/13/03	14:50	ND	0.23	ND	0.031	ND	ND	ND	ND	ND	ND
Delt02	2/14/03	13:40	ND	BQL (0.18 J)	ND	0.04	ND	ND	ND	BQL (0.012 J)	ND	ND
Delt02	2/15/03	14:20	ND	0.21	ND	BQL (0.019 J)	ND	ND	ND	BQL (0.011 J)	ND	ND
Delt02	2/17/03	14:10	ND	BQL (0.070 J)	ND	0.1	ND	ND	ND	ND	ND	ND
Delt02	3/3/03	14:50	ND	BQL (0.12 J)	ND	BQL (0.014 J)	ND	ND	ND	ND	ND	ND
Delt02	3/11/03	10:10	ND	BQL (0.10 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt02	3/14/03	8:20	ND	BQL (0.089 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt02	3/18/03	14:00	ND	BQL (0.055 J)	ND	0.082	BQL (0.007 J)	ND	BQL (0.007 J)	ND	ND	ND
Delt02	3/21/03	11:10	ND	BQL (0.068 J)	ND	0.076	ND	ND	ND	ND	ND	ND
Delt02	3/25/03	9:30	ND	BQL (0.11 J)	ND	0.032	ND	ND	ND	ND	ND	ND
Delt02	3/28/03	10:50	ND	BQL (0.072 J)	ND	0.028	ND	ND	ND	ND	ND	ND
Delt02	4/1/03	11:50	ND	BQL (0.099 J)	ND	0.036	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt02	4/4/03	10:40	ND	BQL (0.061 J)	ND	0.43	ND	ND	ND	ND	ND	ND
Delt02	4/14/03	11:30	ND	BQL (0.042 J)	ND	0.14	0.021	ND	BQL (0.008 J)	ND	ND	ND
Delt02	4/28/03	10:00	ND	BQL (0.018 J)	BQL (0.014 J)	0.31	BQL (0.012 J)	ND	ND	ND	ND	ND
Delt02	5/12/03	8:20	ND	BQL (0.031 J)	ND	0.087	BQL (0.010 J)	ND	ND	ND	ND	ND
Delt02	6/18/02	8:30	ND	0.22	ND	ND	BQL (0.016 J)	ND	ND	ND	ND	ND
Delt03	7/23/02	8:50	ND	BQL (0.025 J)	ND	ND	BQL (0.009 J)	ND	ND	ND	ND	ND
Delt03	8/20/02	10:50	ND	BQL (0.009 J)	ND	ND	0.026	ND	ND	ND	ND	ND
Delt03	9/18/02	10:45	ND	BQL (0.010 J)	ND	ND	BQL (0.016 J)	ND	ND	ND	ND	ND
Delt03	10/24/02	13:10	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	11/21/02	11:50	ND	ND	ND	0.13	ND	ND	ND	ND	ND	ND
Delt03	12/23/02	11:20	ND	BQL (0.016 J)	ND	BQL (0.011 J)	ND	ND	ND	ND	ND	ND
Delt03	1/21/03	17:00	ND	BQL (0.057 J)	ND	BQL (0.018 J)	ND	ND	ND	ND	0.063 BQL (0.009 J)	ND
Delt03	1/22/03	10:10	ND	BQL (0.057 J)	ND	BQL (0.012 J)	ND	ND	ND	BQL (0.015 J)	ND	ND
Delt03	1/23/03	9:30	ND	BQL (0.078 J)	ND	BQL (0.014 J)	ND	ND	ND	BQL (0.017 J)	ND	ND
Delt03	1/24/03	16:40	ND	BQL (0.013 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	1/25/03	14:30	ND	BQL (0.092 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	2/13/03	14:30	ND	BQL (0.15 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	2/14/03	13:20	ND	BQL (0.14 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	2/15/03	14:00	ND	BQL (0.16 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	2/16/03	15:10	ND	BQL (0.047 J)	ND	BQL (0.013 J)	ND	ND	ND	ND	ND	ND

Table A2 (continued).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Daethal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt03	2/17/03	14:00	ND	BQL (0.093 J)	ND	0.03	ND	ND	ND	ND	ND	ND
Delt03	3/3/03	14:40	ND	BQL (0.14 J)	ND	ND	ND	ND	ND	ND	BQL(0.008 J)	ND
Delt03	3/11/03	10:00	ND	BQL (0.16 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	3/14/03	8:30	ND	BQL (0.10 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	3/18/03	14:20	ND	BQL (0.048 J)	ND	0.076	ND	ND	ND	ND	ND	ND
Delt03	3/21/03	11:30	ND	BQL (0.072 J)	ND	BQL (0.018 J)	ND	ND	ND	ND	ND	ND
Delt03	3/25/03	10:00	ND	BQL (0.039 J)	ND	BQL (0.012 J)	ND	ND	ND	ND	ND	ND
Delt03	3/28/03	11:10	ND	BQL (0.11 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt03	4/1/03	12:10	ND	BQL (0.12 J)	ND	0.058	ND	ND	ND	ND	ND	ND
Delt03	4/4/03	11:00	ND	BQL (0.071 J)	ND	0.12	ND	ND	ND	ND	ND	ND
Delt03	4/14/03	11:40	ND	BQL (0.066 J)	ND	0.10	BQL (0.013 J)	ND	ND	ND	ND	ND
Delt03	4/28/03	10:20	ND	BQL (0.031 J)	ND	0.092	BQL (0.013 J)	ND	ND	ND	ND	ND
Delt03	5/12/03	8:50	ND	BQL (0.049 J)	ND	ND	0.025	ND	ND	ND	ND	ND
Delt04	6/18/02	8:50	ND	BQL (0.030 J)	ND	ND	0.062	ND	ND	ND	ND	ND
Delt04	7/23/02	9:20	ND	BQL (0.076 J)	ND	ND	0.036	ND	ND	ND	ND	ND
Delt04	8/20/02	8:40	ND	BQL (0.016 J)	ND	ND	0.048	ND	ND	ND	ND	ND
Delt04	9/17/02	8:40	ND	BQL (0.005 J)	ND	ND	ND	ND	ND	ND	ND	BQL (0.022 J)
Delt04	12/19/02	8:50	ND	1.23	ND	ND	ND	ND	ND	ND	ND	ND
Delt04	1/22/03	14:50	ND	BQL (0.14 J)	ND	ND	ND	ND	ND	BQL (0.029 J)	ND	ND
Delt04	2/18/03	14:10	ND	0.49	ND	0.036	0.045	ND	BQL (0.007 J)	BQL (0.017 J)	ND	ND
Delt04	3/3/03	14:10	ND	0.23	ND	ND	BQL(0.019 J)	ND	ND	ND	ND	ND
Delt04	3/18/03	14:50	ND	0.43	ND	ND	BQL(0.007 J)	ND	ND	ND	ND	ND
Delt04	3/25/03	10:30	ND	BQL (0.070 J)	ND	0.27	ND	ND	ND	ND	ND	ND
Delt04	4/8/03	10:30	ND	BQL (0.078 J)	ND	0.20	BQL (0.010 J)	ND	ND	ND	ND	ND
Delt04	4/14/03	12:10	ND	BQL (0.076 J)	ND	0.20	0.022	ND	BQL (0.015 J)	ND	ND	ND
Delt04	4/22/03	11:20	ND	BQL (0.062 J)	ND	ND	BQL (0.019 J)	ND	ND	ND	ND	ND
Delt04	4/28/03	11:00	ND	BQL (0.076 J)	ND	0.26	BQL (0.016 J)	ND	ND	ND	ND	ND
Delt04	5/6/03	9:30	ND	BQL (0.038 J)	ND	ND	BQL (0.012 J)	ND	ND	ND	ND	ND
Delt04	5/12/03	9:10	no water									
Delt04	5/19/03	11:20	ND	BQL (0.024 J)	ND	ND	BQL (0.013 J)	ND	ND	ND	ND	ND
Delt05	6/18/02	9:40	ND	BQL (0.086 J)	ND	BQL (0.009 J)	0.140	ND	ND	ND	ND	ND
Delt05	7/23/02	10:10	ND	BQL (0.042 J)	ND	ND	1.8 E (AQL)	ND	ND	ND	ND	ND
Delt05	8/20/02	9:40	ND	BQL (0.022 J)	ND	ND	0.260	ND	ND	ND	ND	ND
Delt05	9/17/02	9:00	ND	BQL (0.008 J)	ND	ND	0.059	ND	ND	ND	ND	ND
Delt05	10/24/02	13:30	BQL (0.025 J)	BQL (0.012 J)	ND	ND	0.040	ND	ND	ND	ND	ND
Delt05	11/19/02	8:10	ND	BQL (0.083 J)	ND	ND	0.056	ND	ND	ND	ND	ND
Delt05	12/19/02	9:20	ND	1.95	ND	ND	0.30	ND	ND	ND	ND	ND
Delt05	1/22/03	11:30	ND	BQL (0.19 J)	ND	ND	0.043	ND	ND	ND	ND	ND
Delt05	2/18/03	15:00	ND	BQL (0.074 J)	ND	ND	0.04	ND	ND	ND	ND	ND
Delt05	3/3/03	12:40	ND	BQL (0.048 J)	ND	ND	0.036	ND	ND	ND	ND	ND
Delt05	3/11/03	9:00	ND	BQL (0.084 J)	ND	ND	0.037	ND	ND	ND	ND	ND

Table A2 (continued).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Daethal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt05	3/14/03	8:50	ND	BQL (0.070 J)	ND	ND	0.035	ND	ND	ND	ND	ND
Delt05	3/18/03	15:40	ND	BQL (0.12 J)	ND	ND	2.4	ND	ND	ND	ND	ND
Delt05	3/21/03	12:10	ND	BQL (0.13 J)	ND	ND	0.15	ND	ND	ND	ND	ND
Delt05	3/25/03	12:00	ND	BQL (0.12 J)	ND	ND	1.9	ND	ND	ND	ND	ND
Delt05	3/28/03	11:30	ND	BQL (0.072 J)	ND	ND	0.10	ND	ND	ND	ND	ND
Delt05	4/1/03	13:20	ND	BQL (0.051 J)	ND	ND	0.13	ND	ND	ND	ND	ND
Delt05	4/4/03	11:30	ND	BQL (0.082 J)	ND	ND	1.9	ND	ND	ND	ND	ND
Delt05	4/8/03	11:10	ND	BQL (0.091 J)	ND	ND	0.064	ND	ND	ND	ND	ND
Delt05	4/14/03	12:50	8.8	BQL (0.035 J)	ND	ND	0.54	ND	ND	ND	ND	ND
Delt05	4/22/03	12:00	0.31	BQL (0.029 J)	ND	ND	0.91	ND	ND	ND	ND	ND
Delt05	4/28/03	11:40	2.6	BQL (0.10 J)	ND	ND	0.92	ND	ND	ND	ND	ND
Delt05	5/6/03	10:00	5.8	BQL (0.063 J)	ND	ND	0.27	ND	ND	ND	ND	ND
Delt05	5/12/03	9:50	5.40	BQL (0.041 J)	ND	ND	0.20	ND	ND	ND	ND	ND
Delt05	5/19/03	12:00	1.7	BQL (0.027 J)	ND	ND	0.32	ND	ND	ND	ND	ND
Delt06	6/18/02	10:20	ND	BQL (0.053 J)	ND	ND	BQL (0.011 J)	0.100	ND	ND	ND	ND
Delt06	7/23/02	10:30	ND	BQL (0.035 J)	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt06	8/20/02	10:10	0.069	BQL (0.006 J)	ND	ND	BQL (0.010 J)	ND	ND	ND	ND	ND
Delt06	9/17/02	9:30	ND	BQL (0.005 J)	ND	ND	BQL (0.012 J)	ND	ND	ND	ND	ND
Delt06	10/24/02	14:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	11/19/02	8:30	ND	0.58	ND	0.042	BQL (0.011 J)	BQL (0.033 J)	ND	ND	ND	ND
Delt06	12/19/02	9:40	ND	0.58	ND	ND	0.031	ND	ND	ND	ND	ND
Delt06	1/22/03	12:00	ND	BQL (0.032 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	2/18/03	12:00	ND	BQL (0.034 J)	ND	BQL (0.012 J)	BQL (0.012 J)	ND	ND	0.031	ND	ND
Delt06	3/3/03	12:20	ND	BQL (0.028 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	3/11/03	8:40	ND	BQL (0.084 J)	ND	ND	ND	ND	BQL (0.009 J)	ND	ND	ND
Delt06	3/14/03	9:10	ND	BQL (0.10 J)	ND	ND	ND	ND	ND	BQL (0.019 J)	ND	ND
Delt06	3/18/03	16:50	ND	BQL (0.14 J)	ND	ND	ND	ND	BQL (0.012 J)	ND	ND	ND
Delt06	3/21/03	12:30	ND	BQL (0.028 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	3/25/03	11:30	ND	BQL (0.018 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	3/28/03	12:00	ND	BQL (0.18 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	4/1/03	13:50	ND	BQL (0.057 J)	ND	0.12	ND	ND	ND	ND	ND	ND
Delt06	4/4/03	11:50	ND	BQL (0.033 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	4/8/03	11:30	ND	BQL (0.015 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	4/14/03	13:10	ND	BQL (0.039 J)	ND	BQL (0.013 J)	ND	ND	ND	ND	ND	ND
Delt06	4/22/03	12:20	ND	BQL (0.015 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	4/28/03	12:10	ND	BQL (0.020 J)	ND	BQL (0.019 J)	ND	ND	ND	ND	ND	ND
Delt06	5/6/03	10:30	ND	BQL (0.020 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	5/12/03	10:15	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt06	5/19/03	12:40	ND	BQL (0.023 J)	ND	ND	BQL (0.012 J)	ND	ND	ND	ND	ND
Delt07	6/18/02	10:50	BQL (0.045 J)	BQL (0.045 J)	ND	ND	1.26	ND	ND	ND	ND	ND
Delt07	7/23/02	11:00	0.440	BQL (0.030 J)	ND	ND	0.430	ND	ND	ND	ND	ND

Table A2 (continued).												
Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Daethal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt07	8/20/02	10:40	BQL (0.023 J)	BQL (0.007 J)	ND	ND	0.180	ND	ND	ND	ND	ND
Delt07	9/17/02	10:00	ND	BQL (0.007 J)	ND	ND	0.11	ND	ND	ND	ND	ND
Delt07	10/22/02	9:55	ND	ND	ND	ND	0.11	ND	ND	ND	ND	ND
Delt07	11/19/02	9:05	ND	BQL (0.006 J)	ND	ND	0.049	ND	ND	ND	ND	ND
Delt07	12/19/02	10:05	ND	BQL (0.016 J)	ND	ND	BQL (0.012 J)	ND	ND	ND	ND	ND
Delt07	1/22/03	13:40	ND	BQL (0.039 J)	ND	ND	BQL (0.0082 J)	ND	ND	ND	ND	ND
Delt07	2/18/03	11:10	ND	BQL (0.012 J)	ND	ND	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt07	3/3/03	11:50	ND	BQL (0.018 J)	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt07	3/12/03	14:50	ND	BQL (0.017 J)	ND	ND	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt07	3/19/03	16:20	ND	BQL (0.014 J)	ND	ND	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt07	3/26/03	10:20	ND	BQL (0.019 J)	ND	ND	BQL (0.012 J)	ND	ND	ND	ND	ND
Delt07	4/2/03	14:30	ND	BQL (0.036 J)	ND	ND	0.022	ND	ND	ND	ND	ND
Delt07	4/8/03	12:00	0.45	BQL (0.022 J)	ND	ND	BQL (0.013 J)	ND	ND	ND	ND	ND
Delt07	4/14/03	13:40	0.18	BQL (0.024 J)	ND	ND	BQL (0.015 J)	ND	ND	ND	ND	ND
Delt07	4/22/03	12:50	ND	BQL (0.015 J)	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt07	4/28/03	12:30	BQL (0.028 J)	BQL (0.014 J)	ND	ND	0.32	ND	ND	ND	ND	ND
Delt07	5/6/03	11:00	0.078	BQL (0.016 J)	ND	ND	0.58	ND	ND	ND	ND	ND
Delt07	5/12/03	11:00	0.86	BQL (0.008 J)	ND	ND	0.53	ND	ND	ND	ND	ND
Delt07	5/19/03	13:30	9.80	BQL (0.015 J)	ND	ND	0.89	ND	ND	ND	ND	ND
Delt08	6/18/02	11:30	ND	BQL (0.083 J)	ND	ND	0.200	ND	ND	ND	ND	ND
Delt08	7/23/02	11:30	0.120	BQL (0.029 J)	ND	ND	0.110	ND	ND	ND	ND	ND
Delt08	8/20/02	11:10	ND	ND	ND	ND	0.038	ND	ND	ND	ND	ND
Delt08	9/17/02	10:30	ND	BQL (0.008 J)	ND	ND	BQL (0.016 J)	ND	ND	ND	ND	ND
Delt08	9/17/02	11:40	ND	1.1	ND	0.36	ND	ND	ND	ND	ND	ND
Delt08	10/22/02	10:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt08	11/19/02	9:30	ND	BQL (0.041 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt08	12/19/02	10:30	ND	BQL (0.11 J)	ND	ND	BQL (0.015 J)	ND	ND	ND	ND	ND
Delt08	1/22/03	14:20	ND	BQL (0.026 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt08	2/18/03	10:50	ND	BQL (0.012 J)	ND	0.035	ND	ND	ND	ND	ND	ND
Delt08	3/3/03	11:20	BQL (0.048 J)	BQL (0.020 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt08	3/12/03	14:30	ND	BQL (0.024 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt08	3/19/03	15:50	ND	BQL (0.10 J)	ND	ND	BQL (0.010 J)	ND	ND	ND	ND	ND
Delt08	3/26/03	10:00	ND	BQL (0.047 J)	ND	ND	BQL (0.010 J)	ND	ND	ND	ND	ND
Delt08	4/2/03	15:10	ND	BQL (0.031 J)	ND	ND	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt08	4/8/03	12:30	BQL (0.030 J)	BQL (0.023 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt08	4/14/03	14:50	ND	BQL (0.018 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt08	4/22/03	14:30	0.095	BQL (0.013 J)	ND	ND	BQL (0.010 J)	ND	ND	ND	ND	ND
Delt08	4/28/03	13:00	0.37	BQL (0.029 J)	ND	ND	0.028	ND	ND	ND	ND	ND

Table A2 (continued).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Daethal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt08	5/6/03	12:00	0.52	BQL (0.016 J)	ND	ND	0.22	ND	ND	ND	ND	ND
Delt08	5/12/03	11:50	0.33	BQL (0.016 J)	ND	ND	0.65	ND	ND	ND	ND	ND
Delt08	5/19/03	14:00	0.52	BQL (0.009 J)	ND	ND	0.22	ND	ND	ND	ND	ND
Delt09	6/18/02	12:30	ND	BQL (0.045 J)	ND	ND	0.690	ND	ND	ND	ND	ND
Delt09	7/23/02	12:20	ND	BQL (0.022 J)	ND	ND	0.038	ND	ND	ND	ND	ND
Delt09	8/20/02	12:10	ND	BQL (0.006 J)	ND	ND	0.025	ND	ND	ND	ND	ND
Delt09	10/22/02	11:30	ND	BQL (0.027 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	11/19/02	10:30	ND	BQL (0.019 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	12/19/02	11:10	ND	BQL (0.018 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	1/21/03	15:30	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	1/22/03	12:50	ND	BQL (0.010 J)	ND	0.034	ND	ND	ND	ND	ND	ND
Delt09	1/23/03	10:30	ND	BQL (0.008 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	1/24/03	14:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	1/25/03	11:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	2/13/03	13:00	ND	BQL (0.026 J)	ND	0.034	0.021	ND	ND	ND	BQL (0.008 J)	ND
Delt09	2/14/03	12:00	ND	ND	0.11	ND	BQL (0.017 J)	ND	ND	ND	ND	ND
Delt09	2/15/03	11:40	ND	BQL (0.011 J)	ND	N	ND	ND	ND	ND	ND	ND
Delt09	2/16/03	13:30	ND	BQL (0.014 J)	ND	0.029	BQL (0.013 J)	ND	ND	ND	BQL (0.014 J)	ND
Delt09	2/17/03	11:20	ND	BQL (0.007 J)	ND	BQL (0.008 J)	ND	ND	ND	ND	ND	ND
Delt09	3/4/03	11:20	ND	BQL (0.008 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	3/11/03	12:40	ND	BQL (0.005 J)	ND	0.058	ND	ND	ND	ND	ND	ND
Delt09	3/13/03	9:50	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	3/17/03	13:10	ND	BQL (0.010 J)	ND	0.12	0.31	ND	ND	ND	ND	ND
Delt09	3/20/03	13:40	ND	BQL (0.009 J)	ND	BQL (0.023 J)	BQL (0.019 J)	ND	ND	ND	ND	ND
Delt09	3/24/03	12:10	ND	BQL (0.010 J)	ND	0.34	BQL (0.009 J)	ND	ND	ND	ND	ND
Delt09	3/27/03	12:20	ND	BQL (0.008 J)	ND	0.023	BQL (0.009 J)	ND	ND	ND	ND	ND
Delt09	3/31/03	13:00	ND	BQL (0.010 J)	ND	ND	BQL (0.010 J)	ND	ND	ND	ND	ND
Delt09	4/3/03	12:30	ND	BQL (0.019 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt09	4/8/03	13:20	ND	BQL (0.008 J)	ND	0.056	ND	ND	ND	ND	ND	ND
Delt09	4/14/03	15:40	ND	ND	ND	0.052	BQL (0.015 J)	ND	ND	ND	ND	ND
Delt09	4/22/03	15:20	ND	BQL (0.013 J)	ND	0.023	ND	ND	ND	ND	ND	ND
Delt09	4/28/03	13:40	ND	BQL (0.008 J)	ND	BQL (0.015 J)	0.12	ND	ND	ND	ND	ND
Delt09	5/6/03	12:50	ND	ND	ND	ND	0.046	ND	ND	ND	ND	ND
Delt09	5/13/03	11:20	ND	BQL (0.007 J)	ND	ND	0.056	ND	ND	ND	ND	ND
Delt09	5/19/03	15:10	ND	BQL (0.052 J)	ND	ND	0.23	ND	ND	ND	ND	ND
Delt10	6/18/02	14:00	ND	BQL (0.095 J)	ND	ND	0.065	ND	ND	ND	ND	ND
Delt10	7/23/02	14:25	ND	BQL (0.093 J)	ND	ND	0.067	ND	ND	ND	ND	ND
Delt10	8/20/02	14:40	ND	BQL (0.023 J)	ND	ND	0.040	ND	ND	ND	ND	ND
Delt10	9/17/02	13:50	ND	BQL (0.022 J)	ND	ND	BQL (0.011 J)	ND	ND	ND	ND	ND
Delt10	10/22/02	13:30	ND	BQL (0.024 J)	ND	ND	BQL (0.011 J)	ND	ND	ND	ND	ND
Delt10	11/19/02	12:30	ND	BQL (0.038 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	12/19/02	12:35	ND	BQL (0.12 J)	ND	BQL (0.007 J)	BQL (0.008 J)	ND	ND	ND	ND	ND

Table A2 (continued).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Daethal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt10	1/21/03	9:30	ND	BQL (0.080 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	1/22/03	8:00	ND	0.45	ND	ND	0.024	ND	ND	ND	ND	ND
Delt10	1/23/03	15:10	ND	0.51	ND	ND	0.036	ND	ND	ND	ND	ND
Delt10	1/24/03	9:00	ND	0.35	ND	ND	0.026	ND	ND	ND	ND	ND
Delt10	1/25/03	7:50	ND	0.27	ND	ND	BQL (0.019 J)	ND	ND	ND	ND	ND
Delt10	2/13/03	7:50	ND	0.82	ND	0.035	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt10	2/14/03	7:50	ND	0.62	ND	ND	BQL (0.009 J)	ND	ND	ND	ND	ND
Delt10	2/14/03	7:50	ND	0.64	ND	ND	BQL (0.009 J)	ND	ND	ND	ND	ND
Delt10	2/15/03	8:20	ND	0.89	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt10	2/16/03	8:10	ND	1	ND	0.031	0.05	ND	ND	ND	ND	ND
Delt10	2/17/03	8:00	ND	BQL (0.17 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	2/18/03	9:00	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	3/4/03	15:50	ND	BQL (0.030 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	3/11/03	10:50	ND	BQL (0.025 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	3/13/03	8:10	ND	BQL (0.022 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	3/17/03	15:00	ND	0.59	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	3/20/03	16:30	ND	BQL (0.13 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	3/24/03	14:20	ND	BQL (0.052 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	3/27/03	14:10	ND	BQL (0.040 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	3/31/03	15:10	ND	BQL (0.041 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	4/3/03	14:20	ND	BQL (0.056 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	4/8/03	14:50	ND	0.21	ND	ND	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt10	4/15/03	15:40	ND	BQL (0.19 J)	ND	0.12	BQL (0.07 J)	ND	ND	ND	ND	ND
Delt10	4/22/03	17:10	ND	BQL (0.056 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	4/29/03	12:30	ND	BQL (0.034 J)	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND
Delt10	5/6/03	14:20	ND	BQL (0.074 J)	ND	ND	BQL (0.014 J)	ND	ND	ND	ND	ND
Delt10	5/13/03	7:40	ND	BQL (0.039 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt10	5/19/03	17:00	ND	BQL (0.062 J)	ND	ND	0.11	ND	ND	ND	ND	ND
Delt11	6/24/02	11:00	ND	BQL (0.034 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	7/24/02	8:10	ND	BQL (0.016 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	8/21/02	8:05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	9/18/02	8:30	ND	ND	ND	ND	BQL (0.015 J)	ND	ND	ND	ND	ND
Delt11	10/24/02	10:15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	11/21/02	9:10	ND	BQL (0.11 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	12/23/02	9:20	ND	2.8	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt11	1/21/03	12:50	ND	0.21	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	1/22/03	10:40	ND	0.31	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	1/23/03	13:50	ND	BQL (0.17 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	2/13/03	11:40	ND	BQL (0.068 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	2/14/03	10:20	ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	2/15/03	10:20	ND	BQL (0.11 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	2/16/03	12:00	ND	BQL (0.17 J)	ND	ND	ND	ND	ND	ND	ND	ND

Table A2 (continued).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Daethal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt11	2/17/03	10:10	ND	0.27	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	3/4/03	14:10	ND	BQL (0.063 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	3/11/03	15:30	ND	BQL (0.067 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	3/13/03	11:30	ND	BQL (0.063 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	3/17/03	10:20	ND	BQL (0.056 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	3/20/03	10:40	ND	BQL (0.036 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	3/24/03	10:50	ND	BQL (0.14 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	3/27/03	9:40	ND	BQL (0.070 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	3/31/03	10:30	ND	BQL (0.055 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	4/3/03	9:50	ND	BQL (0.062 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	4/15/03	13:00	ND	BQL (0.023 J)	ND	0.032	ND	ND	ND	ND	ND	ND
Delt11	4/29/03	10:30	ND	BQL (0.046 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt11	5/13/03	9:40	ND	BQL (0.033 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	7/24/02	9:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	8/20/02	8:35	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	9/18/02	9:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	10/24/02	10:45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	11/21/02	10:10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	12/23/02	9:45	ND	BQL (0.039 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	1/21/03	13:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	1/22/03	11:10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	1/23/03	13:10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	1/24/03	12:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	1/25/03	10:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	2/13/03	12:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	2/14/03	10:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	2/15/03	10:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	2/16/03	12:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	2/17/03	10:30	ND	BQL (0.007 J)	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND
Delt12	3/4/03	13:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	3/11/03	15:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	3/13/03	11:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	3/17/03	11:00	ND	BQL (0.011 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	3/20/03	11:10	ND	BQL (0.027 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	3/24/03	11:20	ND	BQL (0.011 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	3/27/03	10:20	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	3/31/03	11:00	ND	BQL (0.005 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	4/3/03	10:20	ND	BQL (0.005 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	4/15/03	13:30	ND	BQL (0.006 J)	ND	0.076	ND	ND	ND	ND	ND	ND
Delt12	4/29/03	10:10	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt12	5/13/03	10:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	7/24/02	10:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table A2 (continued).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Daethal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt13	8/20/02	9:05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	9/18/02	9:25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	10/24/02	11:15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	11/21/02	10:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	12/23/02	10:15	ND	BQL (0.065 J)	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt13	1/21/03	12:30	ND	BQL (0.015 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	1/22/03	10:10	ND	BQL (0.012 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	1/23/03	14:10	ND	BQL (0.014 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	1/24/03	11:20	ND	BQL (0.008 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	1/25/03	10:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	1/26/03	10:10	ND	ND	BQL (0.013 J)	ND	ND	ND	ND	ND	ND	ND
Delt13	2/13/03	11:10	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	BQL (0.011 J)	ND	ND
Delt13	2/14/03	9:50	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	2/15/03	9:50	ND	BQL (0.005 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	2/16/03	11:40	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	2/17/03	9:50	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	2/18/03	9:30	ND	BQL (0.009 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	3/4/03	14:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	3/11/03	16:00	ND	BQL (0.010 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	3/13/03	11:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	3/17/03	11:40	ND	BQL (0.028 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	3/20/03	11:40	ND	BQL (0.10 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	3/24/03	10:20	ND	BQL (0.042 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	3/27/03	10:50	ND	BQL (0.027 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	3/31/03	11:30	ND	BQL (0.029 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	4/3/03	10:50	ND	BQL (0.019 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	4/15/03	14:00	ND	BQL (0.012 J)	ND	0.043	ND	ND	ND	ND	ND	ND
Delt13	4/29/03	10:50	ND	BQL (0.011 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt13	5/13/03	9:20	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	7/24/02	10:55	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	8/20/02	9:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	9/18/02	9:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	10/24/02	12:15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	11/21/02	10:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	12/19/02	11:50	ND	0.38	ND	ND	0.037	ND	ND	ND	ND	ND
Delt14	12/23/02	10:30	ND	BQL (0.061 J)	ND	ND	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt14	1/21/03	11:40	ND	BQL (0.016 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	1/22/03	9:40	ND	BQL (0.010 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	1/23/03	14:30	ND	BQL (0.015 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	1/24/03	10:50	ND	BQL (0.020 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	1/25/03	9:30	ND	BQL (0.017 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	1/26/03	9:40	ND	ND	BQL (0.012 J)	ND	ND	ND	ND	ND	ND	ND

Table A2 (continued).

Site ID	Date Collected	Time	EPTC (Eptam)	Simazine	Disulfoton	Carbaryl	Metolachlor	Cyanazine	Daethal (DCPA)	Methidathion	Bifenthrin	Azinphos methyl
Delt14	1/26/03	9:40	ND	ND	BQL (0.011 J)	ND	ND	ND	ND	ND	ND	ND
Delt14	2/13/03	10:50	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	2/14/03	9:20	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	2/15/03	9:20	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	2/16/03	11:10	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	2/17/03	9:20	ND	BQL (0.007 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	2/19/03	8:00	ND	BQL (0.019 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	3/4/03	15:00	ND	BQL (0.013 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	3/11/03	16:20	ND	BQL (0.008 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	3/13/03	10:40	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	3/17/03	12:00	ND	BQL (0.020 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	3/20/03	12:10	ND	BQL (0.099 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	3/24/03	9:40	ND	BQL (0.061 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	3/27/03	11:10	ND	BQL (0.038 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	3/31/03	11:50	ND	BQL (0.024 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	4/3/03	11:20	ND	BQL (0.017 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	4/15/03	14:20	ND	BQL (0.012 J)	ND	0.036	ND	ND	ND	ND	ND	ND
Delt14	4/29/03	11:30	ND	BQL (0.010 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt14	5/13/03	8:50	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt15	3/12/03	14:20	ND	BQL (0.022 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt15	3/19/03	15:30	ND	BQL (0.044 J)	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt15	3/26/03	9:50	ND	BQL (0.047 J)	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt15	4/2/03	15:30	ND	BQL (0.027 J)	ND	ND	BQL (0.007 J)	ND	ND	ND	ND	ND
Delt16	3/12/03	13:50	ND	BQL (0.026 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt16	3/19/03	14:50	ND	BQL (0.092 J)	ND	ND	0.029	ND	ND	ND	ND	ND
Delt16	3/26/03	9:30	ND	BQL (0.062 J)	ND	ND	BQL (0.010 J)	ND	ND	ND	ND	ND
Delt16	4/2/03	16:00	ND	BQL (0.039 J)	ND	ND	BQL (0.008 J)	ND	ND	ND	ND	ND
Delt17	3/11/03	7:50	ND	BQL (0.035 J)	ND	0.028	ND	ND	ND	ND	ND	ND
Delt17	3/18/03	16:00	ND	BQL (0.10 J)	ND	BQL (0.008 J)	BQL (0.010 J)	ND	BQL (0.026 J)	ND	ND	ND
Delt17	3/25/03	12:20	ND	BQL (0.056 J)	ND	ND	0.050	ND	ND	ND	ND	ND
Delt17	4/1/03	14:10	ND	BQL (0.034 J)	ND	ND	BQL (0.011 J)	ND	ND	ND	ND	ND
Delt18	3/13/03	9:10	ND	BQL (0.008 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt18	3/20/03	15:10	ND	BQL (0.008 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt18	3/27/03	11:50	ND	BQL (0.037 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt18	4/3/03	13:20	ND	BQL (0.022 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt19	3/12/03	17:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Delt19	3/19/03	12:50	ND	BQL (0.030 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt19	3/26/03	12:00	ND	BQL (0.006 J)	ND	ND	ND	ND	ND	ND	ND	ND
Delt19	4/2/03	17:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table A3. Field spike percent recovery

Site ID	Date Collected	Time	Diazinon	Chlorpyrifos	Bifenthrin	Chlorpyrifos Methyl (Surrogate)
Delt01	1/21/03	18:20	72%	75%	61%	72%
Delt02	2/14/03	13:40	66%	121%	70%	78%
Delt03	3/28/03	11:10	48%	65%	38%	57%
Delt03	3/28/03*	11:10	48%	NA	43%	52%
Delt03	4/28/03	10:20	71%	83%	47%	76%
Delt03	4/28/03*	10:20	NA	NA	41%	92%
Delt04	3/18/03	14:50	78%	71%	40%	87%
Delt04	3/18/03*	14:50	NA	NA	47%	79%
Delt05	2/18/03	15:00	70%	60%	43%	86%
Delt06	4/14/03	13:10	90%	68%	57%	68%
Delt08	3/12/03	14:30	65%	63%	38%	75%
Delt08	3/12/03*	14:30	NA	NA	39%	69%
Delt09	8/20/02	12:10	142%	86%	85%	100%
Delt09	1/24/03	14:50	44%	26%	29%	59%
Delt09	1/24/03*	14:50	48%	62%	34%	65%
Delt09	4/28/03	13:40	79%	76%	76%	75%
Delt10	2/13/03	7:50	94%	94%	58%	88%
Delt10	3/27/03	14:10	77%	86%	79%	84%
Delt10	4/22/03	17:10	62%	57%	61%	62%
Delt11	2/15/03	10:20	78%	74%	52%	83%
Delt12	3/11/03	15:00	75%	76%	56%	80%
Delt13	10/24/02	11:15	157%	86%	72%	87%
Delt13	3/24/03	10:20	69%	75%	59%	80%
Delt13	4/15/03	14:00	55%	53%	62%	65%
Delt14	5/13/03	8:50	118%	67%	96%	85%
Delt19	4/2/03	17:20	65%	61%	47%	74%
Delt19	4/2/03*	17:20	NA	NA	60%	64%

* ReInjection

NA = not analyzed

Table A4. Field duplicates

Site ID	Date	Time	Diazinon (ng/L)	Chlorpyrifos (ng/L)	Bifenthrin (ng/L)	Chlorpyrifos Methyl (Surrogate)	Type of samples
Delt01	2/17/03	14:40	ND	ND	ND	91%	Primary
Delt01	2/17/03	14:45	ND	ND	ND	83%	Duplicate
Delt02	1/22/03	11:00	100	ND	ND	80%	Primary
Delt02	1/22/03	11:05	110	ND	ND	82%	Duplicate
Delt04	1/22/03	14:50	54	ND	ND	78%	Primary
Delt04	1/22/03	14:55	42	ND	ND	62%	Duplicate
Delt05	10/24/02	13:30	ND	ND	ND	84%	Primary
Delt05	10/24/02	13:40	ND	ND	ND	85%	Duplicate
Delt05	11/19/02	8:10	ND	ND	ND	80%	Primary
Delt05	11/19/02	8:10	ND	ND	ND	79%	Duplicate
Delt05	3/11/03	9:00	ND	24	ND	74%	Primary
Delt05	3/11/03	9:05	ND	25	ND	79%	Duplicate
Delt06	9/17/02	9:30	ND	ND	ND	94%	Primary
Delt06	9/17/02	9:30	ND	ND	ND	90%	Duplicate
Delt06	5/12/03	10:15	ND	ND	ND	67%	Primary
Delt06	5/12/03	10:20	ND	ND	ND	74%	Duplicate
Delt06	5/19/03	12:40	ND	ND	ND	88%	Primary
Delt06	5/19/03	12:45	ND	ND	ND	82%	Duplicate
Delt07	8/20/02	10:40	ND	11	ND	97%	Primary
Delt07	8/20/02	10:40	ND	4	ND	85%	Duplicate
Delt07	12/19/02	10:05	ND	ND	ND	84%	Primary
Delt07	12/19/02	10:05	ND	ND	ND	81%	Duplicate
Delt08	7/23/02	11:30	ND	ND	ND	94%	Primary
Delt08	7/23/02	11:33	ND	ND	ND	97%	Duplicate
Delt09	3/13/03	9:50	ND	ND	ND	84%	Primary
Delt09	3/13/03	9:55	ND	ND	ND	84%	Duplicate
Delt10	4/8/03	14:50	ND	ND	ND	73%	Primary
Delt10	4/8/03	14:55	ND	ND	ND	73%	Duplicate
Delt11	6/24/02	11:00	ND	ND	ND	72%	Primary
Delt11	6/24/02	11:05	ND	ND	ND	73%	Duplicate
Delt11	12/23/02	9:20	ND	24	ND	80%	Primary
Delt11	12/23/02	9:20	ND	27	ND	85%	Duplicate
Delt11	4/3/03	9:50	ND	ND	ND	85%	Primary
Delt11	4/3/03	9:55	ND	ND	ND	79%	Duplicate
Delt12	2/16/03	12:30	ND	ND	ND	84%	Primary
Delt12	2/16/03	12:35	ND	ND	ND	83%	Duplicate
Delt12	3/20/03	11:10	ND	ND	ND	85%	Primary
Delt12	3/20/03	11:15	ND	ND	ND	85%	Duplicate
Delt13	1/24/03	11:20	ND	ND	ND	82%	Primary
Delt13	1/24/03	11:25	ND	ND	ND	79%	Duplicate
Delt14	11/21/02	10:50	ND	ND	ND	82%	Primary
Delt14	11/21/02	10:55	ND	ND	ND	87%	Duplicate
Delt14	3/31/03	11:50	ND	ND	ND	75%	Primary
Delt14	3/31/03	11:55	ND	ND	ND	84%	Duplicate
Delt15	3/19/03	15:30	ND	ND	ND	87%	Primary
Delt15	3/19/03	15:35	ND	ND	ND	87%	Duplicate
Delt17	3/25/03	12:20	ND	ND	ND	79%	Primary
Delt17	3/25/03	12:25	ND	ND	ND	76%	Duplicate

ND = not detected

Table A5. Lab blank data

(No pesticides were present at detectable levels. The pesticides include azinphos methyl, bifenthrin, carbaryl, chlorpyrifos, cyanazine, l-cyhalothrin, cyfluthrins, cypermethrins, diazinon, disulfoton, dacthal (DCPA), esfenvalerate, EPTC (Eptam), metolachlor, methidathion, propargite, simazine)

Date Analyzed	Chlorpyrifos Methyl (Surrogate): Recovery	Date Analyzed	Chlorpyrifos Methyl (Surrogate): Recovery
7/7/02	101%	3/17/03	70%
7/9/02	66%	3/17/03	70%
8/6/02	95%	3/20/03	72%
8/6/02	81%	3/19/03	74%
8/28/02	93%	3/20/03	72%
8/29/02	92%	3/26/03	75%
9/30/02	85%	3/27/03	70%
10/1/02	89%	4/2/03	78%
11/8/02	85%	4/3/03	86%
11/7/02	82%	4/4/03	81%
12/6/02	76%	4/4/03	81%
12/6/02	79%	4/9/03	75%
1/8/03	79%	4/9/03	75%
1/8/03	85%	4/10/03	79%
1/27/03	80%	4/15/03	76%
1/28/03	82%	4/15/03	76%
1/28/03	82%	4/17/03	83%
2/2/03	82%	4/17/03	83%
2/4/03	82%	4/17/03	83%
2/3/03	80%	4/19/03	67%
2/4/03	82%	4/30/03	54%*
2/21/03	87%	4/21/03	63%
2/21/03	87%	4/30/03	58%*
3/1/03	82%	4/21/03	63%
3/2/03	84%	4/30/03	58%*
3/6/03	63%	4/28/03	45%
4/2/03	66%*	4/30/03	47%*
3/10/03	70%	5/2/03	69%
03/10/03	70%	5/13/03	88%*
3/14/03	63%	5/2/03	69%
3/14/03	62%*	5/13/03	88%*
3/14/03	63%		
3/14/03	62%*		

* Reinjection

Table A6. Recovery of lab spikes and surrogates

Date Analyzed	Diazinon	Chlorpyrifos	Bifenthrin	Surrogate	Date Analyzed	Diazinon	Chlorpyrifos	Bifenthrin	Surrogate
7/7/02	70%	97%	94%	74%	3/20/03	62%	59%	70%	67%
7/9/02	67%	83%	69%	65%	4/8/03*	62%	57%	73%	65%
8/6/02	73%	99%	102%	76%	3/26/03	68%	73%	61%	83%
8/6/02	80%	105%	104%	86%	4/8/03*	73%	80%	83%	80%
8/28/02	132%	74%	101%	85%	4/1/03	61%	61%	86%	70%
8/29/02	140%	74%	98%	89%	4/2/03*	61%	60%	94%	71%
9/30/02	121%	70%	93%	85%	4/2/03	64%	61%	90%	72%
10/1/02	151%	81%	100%	94%	4/8/03*	66%	62%	86%	73%
11/8/02	129%	81%	72%	85%	4/3/03	75%	82%	97%	90%
11/7/02	117%	84%	66%	80%	4/4/03	77%	77%	76%	89%
12/6/02	98%	64%	88%	68%	4/5/03	77%	77%	76%	89%
12/6/02	136%	68%	92%	84%	4/9/03	76%	76%	104%	80%
1/8/03	140%	83%	94%	76%	4/9/03	76%	76%	104%	80%
1/8/03	164%	97%	98%	85%	4/10/03	79%	81%	96%	81%
1/27/03	74%	73%	79%	78%	4/15/03	103%	72%	97%	75%
1/28/03	81%	86%	86%	84%	4/15/03	103%	72%	97%	75%
1/28/03	81%	86%	86%	84%	4/17/03	61%	56%	72%	66%
2/2/03	84%	81%	80%	92%	4/29/03*	63%	56%	NR	56%
2/4/03	75%	76%	72%	84%	4/17/03	61%	56%	72%	66%
2/3/03	66%	68%	75%	70%	4/29/03*	63%	56%	NR	56%
3/5/03*	67%	76%	82%	74%	4/17/03	61%	56%	72%	66%
2/4/03	75%	76%	72%	84%	4/29/03*	63%	56%	NR	56%
2/21/03	80%	88%	83%	89%	4/19/03	66%	64%	71%	68%
2/21/03	80%	88%	83%	89%	4/30/03*	69%	61%	71%	64%
2/21/03	80%	88%	83%	89%	4/21/03	88%	64%	90%	66%
3/1/03	74%	78%	59%	80%	4/30/03*	NR	60%	NR	63%
3/1/03*	NR	NR	81%	78%	4/21/03	88%	64%	90%	66%
3/2/03*	77%	78%	73%	84%	4/30/03*	NR	60%	NR	63%
3/6/03	69%	72%	68%	77%	4/28/03	47%	46%	71%	48%
4/2/03*	70%	73%	78%	77%	4/30/03*	49%	51%	69%	50%
3/10/03*	95%	84%	119%	76%	5/2/03	70%	66%	83%	71%
03/10/03	94%	92%	87%	76%	5/2/03*	NR	72%	NR	89%
3/14/03	89%	79%	94%	77%	5/2/03	70%	66%	83%	71%
3/14/03	89%	79%	94%	77%	5/2/03*	NR	72%	NR	89%
3/17/03	68%	62%	80%	72%	5/12/03	102%	59%	83%	77%
4/10/03*	65%	69%	82%	72%	5/13/03*	NR	65%	NR	81%
3/20/03	62%	59%	70%	67%	5/18/03	105%	75%	101%	70%
4/8/03*	62%	57%	73%	65%	5/18/03	105%	75%	101%	70%
3/19/03	66%	69%	66%	80%	6/4/03	121%	71%	101%	80%
4/8/03*	68%	67%	69%	76%					

* Reinjection
 NR = not reported

Table A7. Flow rates and instantaneous loads

Site ID	Date	Flow (cfs)	Diazinon Concentration (ng/L)	Chlorpyrifos Concentration (ng/L)	Diazinon Load (g/day)	Chlorpyrifos Load (g/d)
Delt01	1/21/03	NM ¹	ND ²	ND	NC ³	NC
Delt01	1/22/03	NM	8	ND	NC	NC
Delt01	1/23/03	NM	ND	ND	NC	NC
Delt01	1/24/03	NM	ND	ND	NC	NC
Delt01	1/25/03	NM	ND	ND	NC	NC
Delt01	2/13/03	159	14	ND	5.45	NC
Delt01	2/14/03	NM	8	ND	NC	NC
Delt01	2/15/03	NM	ND	ND	NC	NC
Delt01	2/16/03	41	ND	ND	NC	NC
Delt01	2/17/03	79	ND	ND	NC	NC
Delt01	3/4/03	234	ND	ND	NC	NC
Delt01	3/12/03	233	ND	ND	NC	NC
Delt01	3/19/03	NM	ND	ND	NC	NC
Delt01	3/26/03	NM	ND	ND	NC	NC
Delt01	4/2/03	233	ND	ND	NC	NC
Delt01	4/15/03	NM	11	ND	NC	NC
Delt01	4/29/03	170	ND	ND	NC	NC
Delt01	5/13/03	73	ND	ND	NC	NC
Delt04	7/23/02	12	ND	ND	NC	NC
Delt04	8/20/02	5	35	9	0.47	0.12
Delt04	9/17/02	NM	110	ND	NC	NC
Delt04	12/20/02	NM	ND	ND	NC	NC
Delt04	1/22/03	14	54	6	1.82	0.20
Delt04	2/18/03	NM	220	ND	NC	NC
Delt04	3/3/03	NM	150	ND	NC	NC
Delt04	3/18/03	NM	52	16	NC	NC
Delt04	3/25/03	NM	350	13	NC	NC
Delt04	4/8/03	NM	170	6	NC	NC
Delt04	4/14/03	NM	130	ND	NC	NC
Delt04	4/22/03	NM	42	ND	NC	NC
Delt04	4/28/03	NM	76	ND	NC	NC
Delt04	5/6/03	NM	29	ND	NC	NC
Delt04	5/19/03	NM	49	ND	NC	NC
Delt09	7/23/02	8	10	ND	0.20	NC
Delt09	8/20/02	13	18	ND	0.58	NC
Delt09	9/17/02	7	NM	NM	NC	NC
Delt09	10/22/02	3	ND	ND	NC	NC
Delt09	11/19/02	2	ND	24	NC	0.11
Delt09	1/21/03	15	66	ND	2.42	NC
Delt09	1/22/03	9	380	9	8.39	0.20
Delt09	1/23/03	7	100	5	1.82	0.09
Delt09	1/24/03	8	39	ND	0.72	NC
Delt09	1/25/03	6	28	ND	0.39	NC
Delt09	2/13/03	11	190	ND	5.32	NC
Delt09	2/14/03	4	22	12	0.24	0.13
Delt09	2/15/03	4	150	ND	1.37	NC
Delt09	2/16/03	20	160	ND	7.93	

Table A7. (continued) Flow rates and instantaneous loads

SiteID	Date	Flow Rate (cfs)	Diazinon concentration (ng/L)	Chlorpyrifos concentration (ng/L)	Diazinon Load (g/day)	Chlorpyrifos Load (g/d)
Delt09	2/17/03	17	37	ND	1.54	NC
Delt09	3/4/03	5	11	ND	0.13	NC
Delt09	3/11/03	5	ND	ND	NC	NC
Delt09	3/13/03	1	10	ND	0.03	NC
Delt09	3/17/03	19	54	ND	2.48	NC
Delt09	3/20/03	11	16	ND	0.43	NC
Delt09	3/24/03	6	92	15	1.35	0.22
Delt09	3/27/03	4	18	ND	0.16	NC
Delt09	3/31/03	9	27	ND	0.61	NC
Delt09	4/3/03	9	10	ND	0.22	NC
Delt09	4/8/03	5	37	ND	0.48	NC
Delt09	4/14/03	27	19	ND	1.25	NC
Delt09	4/22/03	9	16	ND	0.35	NC
Delt09	4/28/03	18	14	ND	0.61	NC
Delt09	5/6/03	18	17	ND	0.74	NC
Delt09	5/13/03	13	17	ND	0.56	NC
Delt09	5/19/03	11	ND	ND	NC	NC
Delt10	7/23/02	30	ND	8	NC	0.59
Delt10	8/20/02	56	ND	ND	NC	NC
Delt10	9/17/02	8	ND	ND	NC	NC
Delt10	10/22/02	30	ND	ND	NC	NC
Delt10	11/19/02	23	ND	ND	NC	NC
Delt10	12/20/02	NM	ND	32	NC	NC
Delt10	1/21/03	123	36	75	10.85	22.61
Delt10	1/22/03	112	96	49	26.41	13.48
Delt10	1/23/03	172	380	60	159.90	25.25
Delt10	1/24/03	128	98	110	30.63	34.38
Delt10	1/25/03	91	130	110	29.14	24.66
Delt10	2/13/03	509	62	10	77.36	12.48
Delt10	2/14/03	96	90	71	21.18	16.71
Delt10	2/15/03	71	89	83	15.42	14.38
Delt10	2/16/03	1115	42	22	114.73	60.10
Delt10	2/17/03	131	12	16	3.86	5.15
Delt10	3/4/03	35	ND	6	NC	0.52
Delt10	3/11/03	40	ND	5	NC	0.49
Delt10	3/13/03	42	ND	5	NC	0.51
Delt10	3/17/03	185	52	10	23.53	4.52
Delt10	3/20/03	87	9	6	1.92	1.28
Delt10	3/24/03	43	9	4	0.95	0.42
Delt10	3/27/03	39	ND	ND	NC	NC
Delt10	3/31/03	62	ND	ND	NC	NC
Delt10	4/3/03	65	ND	ND	NC	NC
Delt10	4/8/03	57	ND	ND	NC	NC
Delt10	4/15/03	65	350	12	55.71	1.91
Delt10	4/22/03	17	ND	ND	NC	NC
Delt10	4/29/03	72	30	ND	5.32	NC

Table A7. (continued) Flow rates and instantaneous loads

SiteID	Date	Flow Rate (cfs)	Diazinon concentration (ng/L)	Chlorpyrifos concentration (ng/L)	Diazinon Load (g/day)	Chlorpyrifos Load (g/d)
Delt10	5/6/03	62	46	ND	6.96	NC
Delt10	5/13/03	36	ND	ND	NC	NC
Delt10	5/19/03	15	ND	ND	NC	NC

¹NM = flow rate was not measured/measurable or water sample was lost

²ND = below the limit of quantitation (BQL) and the limit of detection (LOD)

³NC = load not calculated (no flow rate and/or concentration data)

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Directory: C:\TEMP
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Title: Draft
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Author: Zhimin Lu
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