M A N A

September 23, 2008

OPP Regulatory Public Docket (7502P)
U. S. Environmental Protection Agency
2777 S. Crystal Drive
Arlington, VA 22202-4501

RE: Docket Identification Number EPA-HQ-OPP-2008-0351
Federal Register Volume 73, No. 123, Wednesday, June 25th, 2008, Pages 36077-36080
Diazinon Registration Review - Usage Information

Dear OPP –

On June 25th 2008, EPA announced in the Federal Register the opening of the Diazinon Registration Review docket for public comment. Makhteshim Agan of North America, Inc (MANA), on behalf of ourselves and our parent company, Makhteshim Chemical Works (MCW), is submitting a series of entries to the public docket as our response to the call for comments. MANA and MCW hold technical and end use registrations for pesticide products containing diazinon.

This set of comments and information provides some additional use data regarding diazinon.

Enclosed, please find an in-depth report from Lenwood W. Hall, Jr. and Ronald D. Anderson, entitled "Analysis of Diazinon Environmental Monitoring Data from the San Joaquin River Watershed – 2001 – 2007."

Sincerely,

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Report
September 2008

Analysis of Diazinon Environmental Monitoring Data from the San Joaquin River Watershed: 2001 – 2007

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INTRODUCTION

California's San Joaquin River basin drains approximately 7,345 square miles, including 4,299 square miles in the Sierra Nevada, 2,224 square miles in the San Joaquin River Valley, and 802 square miles in the Coastal ranges (Kratzer et al., 2002). Agricultural activity and associated pesticide use is intense in the San Joaquin watershed. Diazinon, a broad-spectrum organophosphorus insecticide, is widely used on fruit and nut orchards including almonds, peaches, nectarines, plums, apples, cherries, apricots and prunes. Diazinon has been widely used for many years by growers in the San Joaquin River watershed because it is relatively inexpensive and has both a broad-spectrum and simple application method for controlling pests. In the winter, diazinon is generally applied as a dormant spray application to replace one or more in-season applications. Dormant spraying of diazinon in the winter (December – March) is advantageous for the following reasons: (1) potential ecological risk is reduced because less volume of insecticide is used to control pests; and (2) worker exposure is minimized since field activities (i.e., irrigation, tractor work) are reduced compared to in-season field activities. Diazinon is also applied, but in lower quantities, during the irrigation season (April – November) to control pests.

Diazinon tends to move into the liquid phase in a wet environment because it has a relatively high water solubility and low adsorptive capacity. Therefore, rainfall provides a transport mechanism for diazinon movement into water bodies since the dormant spray application period occurs during the wet season (winter) in the San Joaquin River watershed. Various tributaries in the San Joaquin River watershed, such as Del Puerto Creek, Orestimba Creek and Salt Slough, have been listed as impaired water bodies (303 d list) due to the presence of diazinon based on historical (outdated) data sets (www.swrcb.ca.gov). There has been a significant reduction (~66%) in diazinon use in the San Joaquin River Drainage from 2001 to 2006 (Robert Ehn, R3 Ag Consulting LLC, personal communication). This resulted from the USEPA Interim Registration Eligibility decision for diazinon in July of 2002 which affected the diazinon label and resulted in reduced use of this product in both agricultural and urban areas (Robert Ehn, R3 Ag Consulting LLC, personal communication).

Diazinon has been monitored in surface waters of the San Joaquin River Watershed since 1991 by various agencies (Spurlock, 2002). Diazinon monitoring data from 50 sites sampled during 1991 to 2001 in the San Joaquin River watershed has been analyzed and declining concentrations have been reported from a representative mainstem and tributary site since 1991 (Hall, 2003). Declining surface water concentrations are likely related to reduced use of diazinon in conjunction with improved management practices within the watershed. The goal of this study is to extend the effort described above with more recent diazinon monitoring data from the San Joaquin River watershed.

The primary objective of this study was to analyze diazinon water column monitoring data from 6 different data sources in the San Joaquin River watershed from 2001 to 2007 to assess possible temporal and spatial trends. This analysis was conducted to determine if surface water concentrations of diazinon have changed or if adequate data are available to assess change. A secondary objective was to evaluate temporal exceedances of the chronic (100 ng/L) Total Maximum Daily Load (TMDL) diazinon target for the San Joaquin River watershed (Regional Water Quality Control Board Central Valley Region, 2007). Exceedances of the diazinon target were determined annually for various site designations that considered both water body size and season.

METHODS

Diazinon monitoring data used for this historical analysis (2001-2007) were obtained from the following sources: California Department of Pesticide Regulation, Central Valley Regional Water Quality Control Board, U. S. Geological Survey, Westside Water Quality Coalition, East San Joaquin Water Quality Coalition and University of California at Davis. All diazinon measurements included in these data sets were based on Gas Chromatograph (GC) analysis. ELISA data were not included due to quality control issues. Monitoring data were available for 8 mainstem and 123 tributary sites displayed in Figures 1a, 1b and 1c.

Diazinon monitoring data were assembled using the following site designation groupings for various parts of the analysis:

- All sites
- Mainstem sites
- Tributary sites
- All sites dormant season (December – March)
- Mainstem sites dormant season
- Tributary sites dormant season
- All sites irrigation season (April – November)
- Mainstem sites irrigation season
- Tributary sites irrigation season

These site designation groupings allowed for a more diagnostic approach for data analysis as both water body size and season for use were considered.

Data analysis was conducted using the following basic approaches: (1) figures including regression analysis for mainstem and tributary sites with mean diazinon concentrations presented annually by site for sites covering a span of 5 to 6 years; (2) t-test or Mann-Whitney Rank Sum Test of annual means for temporal rich data sets with only two years of data; (3) probabilistic analysis of the distribution of exposure data (90^{th} centiles), including probability of exceeding the diazinon, target by site designation for the entire data set; (4) temporal regression analysis of

% of samples exceeding TMDL target (100 ng/L) for various site designations using an arcsine square root transformation; (5) probability of exceeding the TMDL target annually for all site designations (arcsine square root transformation used) and (6) annual comparison of 90th centiles by site designation (log transformation used).

Approximately two thirds of the entire diazinon data set contained measurements that were below the level of detection (LOD). The range of detection limits for these data ranged from 1 to 500 ng/L. These values, which are less than the LOD, are considered to be “censored to the left” because data values below the LOD are not known. Various approaches can be used for assigning a value less than the LOD as described in Gilbert (1987). Due to the wide range of detection limits reported for the various studies, non-detected diazinon concentrations were assigned a random value between 0 and the detection limit for calculation of mean values by site or graphical presentation of annual concentrations by site (Gilbert, 1987). The approach used for addressing non-detected diazinon concentrations in the probabilistic analysis is described below.

The probabilistic analysis was conducted by organizing the exposure data by site designations as previously described. A log normal distribution of the exposure data was assumed as documented in the literature (Solomon et al., 1996; Hall et al., 1999). The distribution of exposure data was calculated based on the measured values and the concentrations below the detection limit were assumed to be distributed along a lower extension of this distribution but these non-detected concentrations did not have an assigned value (Hall et al., 1999). The observations in each data set were ranked by concentration and for each observation the percentile ranking was calculated as n/(N+1), where n is the rank sum of the observation and N is the total number of observations, including the non-detects. Percentile rankings were converted to percentiles of the normal distribution and a linear regression was performed using the logarithm of concentration as the independent variable and the normalized rank percentile as the dependent variable. Although non-detected observations were not included in the regression analysis, they were included in the calculation of observation ranks. The 90th centile concentration (exceedance of a value only 10% of the time) was calculated for site designations that included both waterbody size and season. The 90th centile is a well accepted "exposure benchmark" used in probabilistic ecological risk assessment because it reflects a measure of the distribution of the exposure data (i.e., 90% of the values are below the 90th centile) as described in Solomon et al. (1996).

The probability of exceeding the chronic (100 ng/L) diazinon target was determined with the distribution of exposure data by site designation. Temporal trends of both 90th centiles and probability of exceedance of the target were also determined by site designation.

RESULTS AND DISCUSSION

General Data Description

A total of 2,603 diazinon measurements were conducted in the San Joaquin River watershed from 8 mainstem and 123 tributary sites from 2001 to 2007 (Table 1, Figures 1a, 1b and 1c). Diazinon concentrations ranged from non-detected to 3,600 ng/L with approximately two thirds of the values below the LOD. Detection limits for the various studies ranged from 1 to 500 ng/L. The mean diazinon values by site ranged from 0 to 718 ng/L for all sites. Maximum and mean site concentrations were much higher for tributary sites than mainstem sites. Approximately 36% of the samples from 2001 – 2007 were collected during the dormant season. The number of samples measured by site for the 7 year period ranged from 2 for a number of sites to 234 at the mainstem San Joaquin River site at Vernalis. Diazinon data spanning 6 years were available for 3 mainstem and 6 tributary sites. Diazinon data spanning 5 years were available for 1 mainstem and 4 tributary sites. The diazinon target concentration of 100 ng/L was exceeded more than once at 21 tributary sites and 2 mainstem sites during the 2001 to 2007 time period.

Diazinon Trends for Sites with Temporal Rich Data

Sites with the longest temporal record for diazinon measurements were selected for graphical presentation using regression analysis to initially determine possible temporal trends in diazinon concentrations in the San Joaquin River watershed (Table 1). Annual mean values were used in the regression in order to weight the annual measurements equally. Data spanning 6 years ranging from 2001 to 2007 were available for 3 mainstem sites and 6 tributary sites as presented in Figures 2-10. Based on regression analysis, temporal data for two of the mainstem sites showed a statistically significant declining trend in diazinon concentrations from 2001 to 2007 at San Joaquin River at Lander Avenue site (Figure 9) and the San Joaquin River at Vernalis site (Figure 10). Temporal data for the tributary sites also showed a statistically significant ($p = 0.10$) declining trend in diazinon concentrations based on a 6 year time period at Hospital Creek at River Road (Figure 2), Mud Slough at San Luis drain (Figure 5), and Salt Slough at Lander Avenue (Figure 7). A declining trend in diazinon concentrations was also reported for Orestimba Creek at River Road although this trend was not statistically significant (Figure 6).

Diazinon data spanning 5 years were available for 1 mainstem and 4 tributary sites (Figures 11-15). A statistically significant declining trend in diazinon concentrations was reported for the San Joaquin River at Patterson mainstem site from an annual comparison of mean values from 2001 and 2006 (Figure 13). For tributary sites with 5 years of data, a statistically significant declining trend ($p = 0.10$) in diazinon concentrations was reported for the Merced River at River Road Site (Figure 11) and the Stanislaus River at Caswell Park site (Figure 14). The Tuolumne

River at Shiloh Fishing Access site (Figure 15) showed that diazinon concentrations were greater in 2001 and 2002 than in 2006 based on an ANOVA.

Based on the above analysis, the weight of evidence of both mainstem and tributary sites with 5 and 6 years of data clearly demonstrated that diazinon concentrations have declined in the San Joaquin River watershed from 2001 to 2007.

90th Centiles and Probability of Exceeding Diazinon Target by Site Designations

The 90th centiles for all the 9 site designations ranged from 5.4 ng/L for tributary sites during the irrigation season to 123 ng/L for all tributary sites for the dormant season during the 2001 to 2007 time period (Table 2). This is logical as higher concentrations of diazinon would be expected at tributary sites during the high use dormant spray season. As expected, the 90th centiles for all three site designations was higher during the dormant season than the irrigation season. It is noteworthy that the 90th centiles for mainstem sites (38.2 ng/L) was slightly higher than the 90th centiles for tributary sites (30 ng/L). This result is generally not expected as higher concentrations should be found in smaller water bodies. The large percentage of non-detected concentrations for both water body types likely influenced these results. The probability of exceeding the diazinon target (100 ng/L) ranged from 0.421 % for mainstem sites during the irrigation season to 11.6% for tributary sites during the dormant season. Results from analysis presented below explored temporal trends in both diazinon concentrations and exceedances of the diazinon target.

Annual Diazinon Target Exceedances by Site Designations

Temporal regression analysis of the percent of samples exceeding the diazinon target by site designation showed a declining slope at all sites where a regression line was developed (Figures 16 - 24). A statistically significant declining slope (p = 0.10) was reported for tributary sites during the irrigation season (Figure 24). For all mainstem sites (Figure 17) and mainstem sites sampled during the dormant season (Figure 20) diazinon target exceedances only occurred during 2001 but not after 2001. There were no target exceedances during the 7 year period for all mainstem sites sampled during the irrigation season (Figure 23).

Annual Probability of Exceeding Diazinon Target by Site Designations

Temporal regression analysis of the probability of exceeding the diazinon target by site designation showed a declining trend for all site designations as presented in Figures 25- 33. A statistically significant declining trend (p = 0.10) from 2001 to 2007 was reported for all tributary sites during the irrigation season (Figure 33). It is noteworthy that P-values less than 0.13, which suggests a substantial decline over the 7 year period, were reported for all tributary sites (Figure 27) and all sites during the irrigation season (Figure 31). This regression analysis provides further support for documenting declining concentrations diazinon concentrations in the San Joaquin River watershed from 2001 to 2007.

Temporal Trends of Diazinon 90th centles by Site Designations

Temporal regression analysis of diazinon 90th centiles by site designation in Figures 34-42 demonstrated a declining trend in 90th centiles from 2001 to 2007 for all site designations. Statistically significant declining trends (p = 0.10) for 90th centiles were reported for the following 6 site designations: all sites (Figure 34); mainstem sites (Figure 35); tributary sites (Figure 36); mainstem sites during the dormant season (Figure 38); all sites during the irrigation season (Figure 40); and tributary sites during the irrigation season (Figure 42). This analysis also supported the declining temporal trends of diazinon exceedances described above and adds additional evidence to demonstrate reductions in diazinon concentrations in the San Joaquin River watershed during the 7 year period.

CONCLUSIONS

A total of 2,603 diazinon measurements were available from 131 mainstem and triburary sites in the San Joaquin River watershed from 2001 to 2007. Diazinon concentrations ranged from non-detected to 3,600 ng/L with approximately two thirds of the values below the LOD. Detection limits for the various studies ranged from 1 to 500 ng/L. Maximum and mean diazinon site concentrations were much higher for tributary sites (particularly during the dormant season) than mainstem sites.

Diazinon monitoring data spanning 6 years (2001 to 2007) were available for 3 mainstem sites and 6 tributary sites. Based on regression analysis of annual means values, temporal data for two mainstem sites showed a statistically significant declining trend in diazinon concentrations from 2001 to 2007. Temporal data for 3 tributary sites also showed a statistically significant declining trend in diazinon concentrations based on six years of data. Diazinon monitoring data spanning 5 years were available for 1 mainstem and 4 tributary sites. A statistically significant declining trend in diazinon concentrations was reported for the mainstem site and 2 tributary sites.

Temporal regression analysis of the percent of samples exceeding the diazinon target (100 ng/L) by site designation showed a declining slope at all sites where a regression line was developed. Further temporal regression analysis of the probability of exceeding the diazinon target by site designation also showed a declining trend for all site designations. Temporal regression analysis of diazinon 90^{th} centiles by site designation demonstrated a declining trend in 90^{th} centiles from 2001 to 2007 for all site designations. Statistically significant declining trends ($p = 0.10$) for 90^{th} centiles were reported for 6 of the 9 site designations.

In summary, the various types of trends analysis described above provides strong evidence to support both declining diazinon concentrations and significant reductions in diazinon target exceedances in the San Joaquin River watershed from 2001 to 2007. A similar result was reported from historical analysis of diazinon monitoring data from 2001 to 2007 in the Sacramento and Feather River watersheds (Hall, 2008). Declining surface water concentrations in the San Joaquin River watershed are likely related to reduced use of diazinon in conjunction with improved management practices within the watershed. Long term consistent monitoring programs with adequate spatial and temporal scale at representative mainstem and tributary sites are recommended to measure progress in reducing concentrations of pesticides such as diazinon. A clear definition of progress endorsed by all stakeholders is always difficult to establish but adequate data necessary to document a declining trend in diazinon concentrations is certainly critical. An assessment of progress should be evaluated at 5 year intervals (or longer) rather than relying on limited annual comparisons.

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Table 1. Summary of diazinon monitoring data (2001-2007) for San Joaquin River watershed tributary and mainstem sites including number of samples, non-detects, concentration range, mean, detection limit range, date range, years of data and number of measurements exceeding 100 ng/L. * Means calculated with random numbers in place of non-detected values.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Hospital Cr at River Rd	Tributary	24	17	ND – 180	28	3 – 250	06/21/01 – 08/14/07	6	1
Ingram Cr at River Rd	Tributary	26	21	ND – 77	16	1 – 50	06/21/01 – 08/14/07	6	0
Los Banos Cr at Hwy 140	Tributary	47	45	ND – 7	10	1 – 50	06/20/01 – 12/11/07	6	0
Mud Slough u/s of San Luis Drain	Tributary	67	47	ND – 325	16	1 – 50	04/11/01 – 12/11/07	6	1
Orestimba Cr at River Rd	Tributary	187	93	ND – 533	25	1 – 50	01/02/01 – 08/14/07	6	5
Salt Slough at Lander Ave	Tributary	81	59	ND – 184	15	1 – 50	04/11/01 – 12/11/07	6	1
San Joaquin River at Crows Landing	Mainstem	27	5	ND – 50	8	1 – 5	04/11/01 – 07/26/07	6	0
San Joaquin River at Lander Ave	Mainstem	98	68	ND – 289	27	1 – 50	01/04/01 – 12/11/07	6	9
San Joaquin River near Vernalis	Mainstem	234	103	ND – 235	21	1 – 40	01/02/01 – 12/18/07	6	14
Merced River at River Rd	Tributary	138	97	ND – 435	15	1 – 7	01/04/01 – 08/31/06	5	3
Salado Cr near Olive Ave	Tributary	6	2	ND – 3600	620	5 – 500	06/21/01 – 06/12/07	5	1
San Joaquin River at Patterson	Mainstem	52	11	ND – 67	15	1 – 7	01/04/01 – 08/31/06	5	0
Stanislaus River at Caswell Park	Tributary	72	40	ND – 83	12	1 – 7	01/04/01 – 08/31/06	5	0
Tuolumne River at Shiloh Fishing Access	Tributary	92	48	ND – 201	14	1 – 40	01/04/01 – 08/31/06	5	4

Table 1 – continued.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Del Puerto Cr at Vineyard Ave	Tributary	45	18	ND – 158	23	1 – 40	04/11/01 – 03/01/06	4	1
Deadman Cr (Dutchman) at Gurr Rd	Tributary	16	16	ND – ND	4	4 – 28	07/31/04 – 09/18/07	3	0
Del Puerto Cr near Cox Rd	Tributary	22	21	ND – 290	23	20 – 50	07/06/04 – 08/14/07	3	1
Duck Cr at Hwy 4	Tributary	15	13	ND – 110	15	4 – 28	08/24/04 – 09/04/07	3	1
Duck Slough at Gurr Rd	Tributary	28	27	ND – 20	4	3 – 28	07/31/04 – 09/18/07	3	0
Littlejohns Cr at Jack Tone Rd	Tributary	32	23	ND – 110	13	3 – 28	08/24/04 – 09/04/07	3	1
Lone Tree Cr at Jack Tone Rd	Tributary	26	20	ND – 1180	60	3 – 28	08/24/04 – 09/04/07	3	3
Marshall Rd Drain near River Rd	Tributary	21	18	ND – 280	36	20 – 50	07/06/04 – 08/14/07	3	2
Merced River at Santa Fe	Tributary	25	25	ND – ND	2	4 – 28	07/31/04 – 09/11/07	3	0
Mokelumne River at Bruella Rd	Tributary	24	24	ND – ND	3	4 – 28	08/24/04 – 09/04/07	3	0
Mormon Slough at Jack Tone Rd	Tributary	18	15	ND – 52	5	3 – 4	07/14/04 – 09/04/07	3	0
Newman Wasteway near Hills Ferry Rd	Tributary	24	24	ND – ND	12	20 – 50	07/13/04 – 08/14/07	3	0
Orestimba Cr at Hwy 33	Tributary	23	18	ND – 1200	76	20 – 100	07/06/04 – 08/14/07	3	2
Pixley Slough at Eightmile Rd	Tributary	31	16	ND – 770	167	3 – 3	07/14/04 – 10/25/07	3	14
Ramona Lake near Fig Ave	Tributary	16	16	ND – ND	11	20 – 50	07/06/04 – 08/14/07	3	0

Table 1 – continued.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Salt Slough at Sand Dam	Tributary	25	23	ND – 19	10	20 – 50	07/13/04 – 08/14/07	3	0
Bear Cr at Alpine Rd	Tributary	23	12	ND – 1100	90	3 – 3	01/27/05 – 10/25/07	2	5
Bear Cr at Kibby Rd	Tributary	21	21	ND – ND	1	4 – 4	03/21/05 – 09/18/07	2	0
Calaveris River at Pezzi Rd	Tributary	27	16	ND – 128	21	3 – 3	01/27/05 – 11/28/07	2	2
Consumnes River at Michigan Bar	Tributary	13	13	ND – ND	3	5 – 5	10/12/01 – 03/28/04	2	0
Cottonwood Cr at Rd 20	Tributary	19	18	ND – 20	3	4 – 4	02/16/05 – 08/21/07	2	1
Del Puerto Cr at Hwy 33	Tributary	20	16	ND – 3300	280	20 – 350	07/06/04 – 05/08/07	2	2
Drainy Cr at Rd 18	Tributary	13	12	ND – 130	11	4 – 4	08/16/05 – 08/21/07	2	2
Drainy Cr at Wellsford Rd	Tributary	23	21	ND – 34	4	4 – 4	02/15/05 – 09/11/07	2	0
Duck Slough at Hwy 99	Tributary	23	23	ND – ND	1	4 – 4	02/16/05 – 09/18/07	2	0
French Camp Slough at Airport Way	Tributary	22	17	ND – 110	15	4 – 4	02/16/05 – 09/04/07	2	2
Grant Line Canal at Clifton Court Rd	Tributary	22	21	ND – 38	3	4 – 4	02/16/05 – 09/04/07	2	0
Grant Line Canal near Calpack Rd	Tributary	22	21	ND – 12	2	4 – 4	02/16/05 – 09/04/07	2	0
Highline Canal at Hwy 99	Tributary	19	18	ND – 48	4	4 – 4	05/10/05 – 09/11/07	2	0
Highline Canal at Lombardy Rd	Tributary	22	20	ND – 98	7	4 – 4	02/15/05 – 09/11/07	2	0

Table 1 – continued.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Highline Canal Spillway near Hilmar	Tributary	8	0	1 – 64	30	1 – 5	06/20/01 – 02/27/04	2	0
Hilmar Drain at Central Ave	Tributary	22	22	ND – ND	1	4 – 4	02/15/05 – 09/11/07	2	0
Jones Drain at Oakdale Rd	Tributary	22	21	ND – 11	2	4 – 4	02/16/05 – 09/11/07	2	0
Los Banos Cr at China Camp Rd	Tributary	8	8	ND – ND	11	20 – 20	12/29/04 – 07/10/07	2	0
Prairie Flower Drain at Crows Landing Rd	Tributary	22	21	ND – 13	2	4 – 4	02/15/05 – 09/11/07	2	0
Terminous Tract Drain at Hwy 12	Tributary	22	21	ND – 25	3	4 – 4	02/16/05 – 09/04/07	2	0
Turner Slough at Edminster Rd	Tributary	14	13	ND – 21	12	20 – 20	03/08/05 – 07/10/07	2	0
Ash Slough at Ave 21	Tributary	10	10	ND – ND	2	4 – 4	06/14/05 – 09/12/06	1	0
Berenda Slough along Ave 18 1/2	Tributary	10	10	ND – ND	2	4 – 4	05/16/06 – 08/21/07	1	0
Black Rascal Cr at Yosemite Rd	Tributary	13	12	ND – 28	4	4 – 4	05/18/06 – 09/18/07	1	0
Culvert Discharge to Mustang Cr at Monte Vista Ave	Tributary	27	1	ND – 297	93	5 – 5	12/16/02 – 02/25/04	1	9
Deadman Cr at Hwy 59	Tributary	13	13	ND – ND	2	4 – 4	05/17/06 – 09/18/07	1	0
Delta Drain Terminous Tract off Glasscock Rd	Tributary	17	16	ND – 16	3	4 – 4	02/16/05 – 03/15/06	1	0
Kellogg Cr along Hoffman Ln	Tributary	16	16	ND – ND	2	4 – 4	09/20/05 – 09/04/07	1	0
Kellogg Cr at Hwy 4	Tributary	9	9	ND – ND	1	4 – 4	02/16/05 – 03/15/06	1	0

Table 1 – continued.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Marsh Cr at Balfour Ave	Tributary	9	9	ND – ND	2	4 – 4	02/16/05 – 03/15/06	1	0
Marsh Cr at Concord Ave	Tributary	8	7	ND – 14	2	4 – 4	09/20/05 – 04/11/07	1	0
Mustang Cr at Bifurcation Structure near Ballico	Tributary	19	0	21 – 176	61	5 – 5	12/20/02 – 02/27/04	1	2
Mustang Cr at East Ave	Tributary	7	7	ND – ND	2	4 – 4	05/18/06 – 06/19/07	1	0
Mustang Cr at Monte Vista Ave near Montpelier	Tributary	24	2	ND – 359	78	5 – 5	12/16/02 – 03/02/04	1	5
Orestimba Cr at Kilburn Rd	Tributary	9	3	ND – 80	15	3 – 3	07/15/04 – 03/01/06	1	0
Potato Slough at Hwy 12	Tributary	11	11	ND – ND	6	4 – 28	08/24/04 – 03/15/06	1	0
Roberts Island Drain along House Rd	Tributary	13	13	ND – ND	2	4 – 4	05/16/06 – 09/04/07	1	0
Roberts Island Drain at Holt Rd	Tributary	13	13	ND – ND	2	4 – 4	05/16/06 – 09/04/07	1	0
Sand Cr at Hwy 4 Bypass	Tributary	13	12	ND – 450	36	4 – 4	05/16/06 – 09/04/07	1	2
Silva Drain at Meadow Drain	Tributary	14	14	ND – ND	2	4 – 4	05/18/06 – 09/11/07	1	0
South Slough at Quinley Rd	Tributary	6	6	ND – ND	1	4 – 4	07/11/06 – 08/21/07	1	0
Unnamed Drain to Lone Tree Cr at Jack Tone Rd	Tributary	12	11	ND – 72	8	4 – 4	06/20/06 – 09/04/07	1	0
August Rd Drain u/s of Crows Landing Br	Tributary	3	3	ND – ND	12	28 – 28	07/31/04 – 09/29/04	0	0
Bear Cr at Bert Crane Rd near Merced	Tributary	2	1	ND – 2	3	1 – 5	06/20/01 – 08/01/01	0	0

Table 1 – continued.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Bear Cr at Harney Ln	Tributary	4	4	ND – ND	1	3 – 3	06/15/05 – 07/27/05	0	0
Berenda Cr at Ave 17 1/2 west of Madera	Tributary	18	5	ND – 562	87	3 – 3	01/27/05 – 08/03/05	0	3
Boundary Drain at Henry Miller Ave	Tributary	4	4	ND – ND	1	3 – 3	06/22/05 – 08/03/05	0	0
Calaveras River at Belota Intake	Tributary	2	2	ND – ND	4	28 – 28	08/24/04 – 09/23/04	0	0
Calaveras River at Clements Rd	Tributary	4	4	ND – ND	2	3 – 3	06/15/05 – 07/27/05	0	0
Ceres Main Canal at Faith Home and Hatch Rd	Tributary	4	4	ND – ND	1	3 – 3	08/22/07 – 10/03/07	0	0
Cottonwood Cr at Hwy 145 in Madera County	Tributary	3	3	ND – ND	1	3 – 3	07/22/04 – 08/17/04	0	0
Drain to Grant Line Canal off Wing Levee Rd	Tributary	13	4	ND – 169	48	3 – 3	07/21/04 – 02/16/05	0	2
Drain to North Canal at South Bonetti Rd	Tributary	13	6	ND – 129	25	3 – 3	07/21/04 – 02/16/05	0	1
Drain to San Joaquin River off South Manthey Rd	Tributary	13	5	ND – 728	258	3 – 3	07/21/04 – 02/16/05	0	8
Drainy Cr at J9	Tributary	5	5	ND – ND	1	3 – 3	07/20/04 – 09/15/04	0	0
Drainy Crk at Ave 21	Tributary	2	2	ND – ND	4	10 – 10	08/23/04 – 02/15/05	0	0
Duck Slough at Arboleda Drive	Tributary	11	8	ND – 33	6	3 – 3	07/20/04 – 02/04/05	0	0
El Nido Canal at W Washington Rd	Tributary	4	4	ND – ND	1	3 – 3	08/22/07 – 10/03/07	0	0
Fairfield Canal at Olive Ave	Tributary	4	4	ND – ND	1	3 – 3	08/22/07 – 10/03/07	0	0

Table 1 – continued.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Harding Drain at Carpenter Rd near Patterson	Tributary	2	0	13 – 38	26	5 – 5	06/21/01 – 08/02/01	0	0
Hatch Drain at Tuolumne Rd	Tributary	5	5	ND – ND	1	4 – 4	05/15/07 – 09/11/07	0	0
Ingalsbe Slough at J17	Tributary	5	5	ND – ND	0	3 – 3	07/20/04 – 09/15/04	0	0
Island Field Drain at Catrina Rd	Tributary	4	4	ND – ND	0	3 – 3	06/22/05 – 08/03/05	0	0
Lateral 5 at Paradise Rd	Tributary	4	4	ND – ND	1	3 – 3	08/22/07 – 10/03/07	0	0
Lateral 6 at Central Ave	Tributary	4	4	ND – ND	0	3 – 3	08/22/07 – 10/03/07	0	0
Livingston Canal at Cressey Way	Tributary	8	8	ND – ND	0	3 – 3	06/28/07 – 10/03/07	0	0
Livingston Canal at Livingston Treatment Plant	Tributary	2	2	ND – ND	0	5 – 5	06/20/01 – 08/01/01	0	0
Livingston Drain at Robin Ave	Tributary	5	5	ND – ND	2	4 – 4	05/15/07 – 09/11/07	0	0
Lone Tree Cr at Austin Rd	Tributary	8	0	8 – 246	61	3 – 3	01/14/06 – 04/25/06	0	1
Lone Tree Cr at Bernnan Rd	Tributary	3	1	ND – 31	17	4 – 4	09/20/05 – 03/15/06	0	0
Lone Willow Slough at Madera Ave	Tributary	5	4	ND – 18	5	4 – 4	02/16/05 – 07/12/05	0	0
Lower Lateral 2 at Grayson Rd	Tributary	4	4	ND – ND	1	3 – 3	08/22/07 – 10/03/07	0	0
McHenry storm drain at Bodem St Modesto	Tributary	10	0	334 – 947	718	5 – 5	01/23/01 – 01/26/01	0	10
Mid Roberts Island Drain at Woodsbro Rd	Tributary	2	2	ND – ND	1	3 – 3	07/14/05 – 07/28/05	0	0

Table 1 – continued.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Miles Cr at Reilly Rd	Tributary	5	5	ND – ND	1	4 – 4	05/29/07 – 09/18/07	0	0
Mormon Slough at Copperopolis Rd	Tributary	8	6	ND – 14	4	3 – 3	01/14/06 – 04/25/06	0	0
Mosher Cr at Thornton Rd	Tributary	4	3	ND – 6	2	3 – 3	04/19/07 – 07/12/07	0	0
Mustang Cr at Newport Rd near Ballico	Tributary	7	0	19 – 98	47	5 – 5	11/08/02 – 12/20/02	0	0
Mustang Cr below reservoir near Oakdale Rd	Tributary	4	0	13 – 31	22	5 – 5	12/16/02 – 12/20/02	0	0
Newman Wasteway at Hwy 33 near Gustine	Tributary	2	0	4 – 36	20	1 – 5	06/20/01 – 08/01/01	0	0
Owens Cr at Gurr Rd	Tributary	4	4	ND – ND	1	3 – 3	06/22/05 – 08/03/05	0	0
Paddy Cr at Jack Tone Rd	Tributary	4	4	ND – ND	2	3 – 3	06/15/05 – 07/27/05	0	0
Pixley Slough at Ham Ln	Tributary	12	4	ND – 132	47	3 – 3	06/16/05 – 04/25/06	0	3
Poso Drain at Turner Island and Palazzo Rd	Tributary	5	0	4 – 11	8	3 – 3	07/15/04 – 09/09/04	0	0
San Joaquin River at Laird Park	Mainstem	20	4	ND – 67	17	5 – 5	04/11/01 – 08/21/01	0	0
San Joaquin River at Maze Rd Br near Modesto	Mainstem	20	0	2 – 29	10	1 – 5	04/11/01 – 08/21/01	0	0
San Joaquin River at Sack Dam	Mainstem	4	4	ND – ND	26	20 – 50	07/13/04 – 02/15/05	0	0
San Joaquin River below Toulumne River	Mainstem	2	0	7 – 20	14	5 – 5	06/21/01 – 08/02/01	0	0
Spanish Grant Combined Drain near Patterson	Tributary	2	0	29 – 34	32	5 – 5	06/20/01 – 08/01/01	0	0

Table 1 – continued.

Station Name	Site Type	n	Non-detect n	Conc. Range (ng/L)	Random Means* (ng/L)	DL Range (ng/L)	Date Range	No. Years Data	n > 100 ng/l
Stevinson Lower Lateral at Faith Home Rd	Tributary	5	4	ND – 5	2	3 – 3	07/15/04 – 09/09/04	0	0
Storm Drain to Marsh Cr at Sand Cr Rd	Tributary	2	2	ND – ND	2	4 – 4	09/12/07 – 09/12/07	0	0
Sycamore Slough at Cotta Rd (near Guard Rd)	Tributary	9	9	ND – ND	1	3 – 3	06/28/07 – 11/28/07	0	0
TID Lateral #2 on Service Rd	Tributary	4	4	ND – ND	1	3 – 3	06/28/07 – 08/08/07	0	0
Turlock Irrig Dist Drain #3 at Jennings Rd Br	Tributary	17	17	ND – ND	20	40 – 40	06/10/03 – 09/30/03	0	0
Unnamed Canal at Howard Rd	Tributary	4	4	ND – ND	1	3 – 3	06/16/05 – 07/28/05	0	0
Unnamed Canal at West End of Woodbridge Rd	Tributary	5	5	ND – ND	2	3 – 3	07/14/04 – 09/08/04	0	0
Unnamed Drain at Pomelo Ave near Paradise Ave	Tributary	17	17	ND – ND	21	40 – 40	06/10/03 – 09/30/03	0	0
Walthall Slough	Tributary	3	2	ND – 55.4	19	10 – 10	08/23/04 – 02/15/05	0	0
Westley Wasteway near Cox Rd	Tributary	17	17	ND – ND	11	20 – 50	07/06/04 – 08/14/07	0	0
Westport Drain at Vivian Rd	Tributary	5	5	ND – ND	2	4 – 4	05/15/07 – 09/11/07	0	0
Westport Drain near Modesto	Tributary	10	6	ND – 119	35	1 – 40	06/21/01 – 03/07/02	0	1

Table 2. 90th centiles and probability of exceeding diazinon target (100 ng/L) for all site designations from 2001 to 2007.

Site Designation	90th Centile	Probability of Exceeding 100 ng/L Target
All Sites	32.6	4.57
Mainstem Sites	38.2	3.50
Tributary Sites	30.0	4.70
All Sites – Dormant Season	111	10.8
Mainstem Sites – Dormant Season	78.9	8.02
Tributary Sites – Dormant Season	123	11.6
All Sites – Irrigation Season	8.46	1.21
Mainstem Sites – Irrigation Season	16.9	.421
Tributary Sites – Irrigation Season	5.42	1.35

Figure 1a. Diazinon monitoring sites for the San Joaquin River watershed (North Panel).

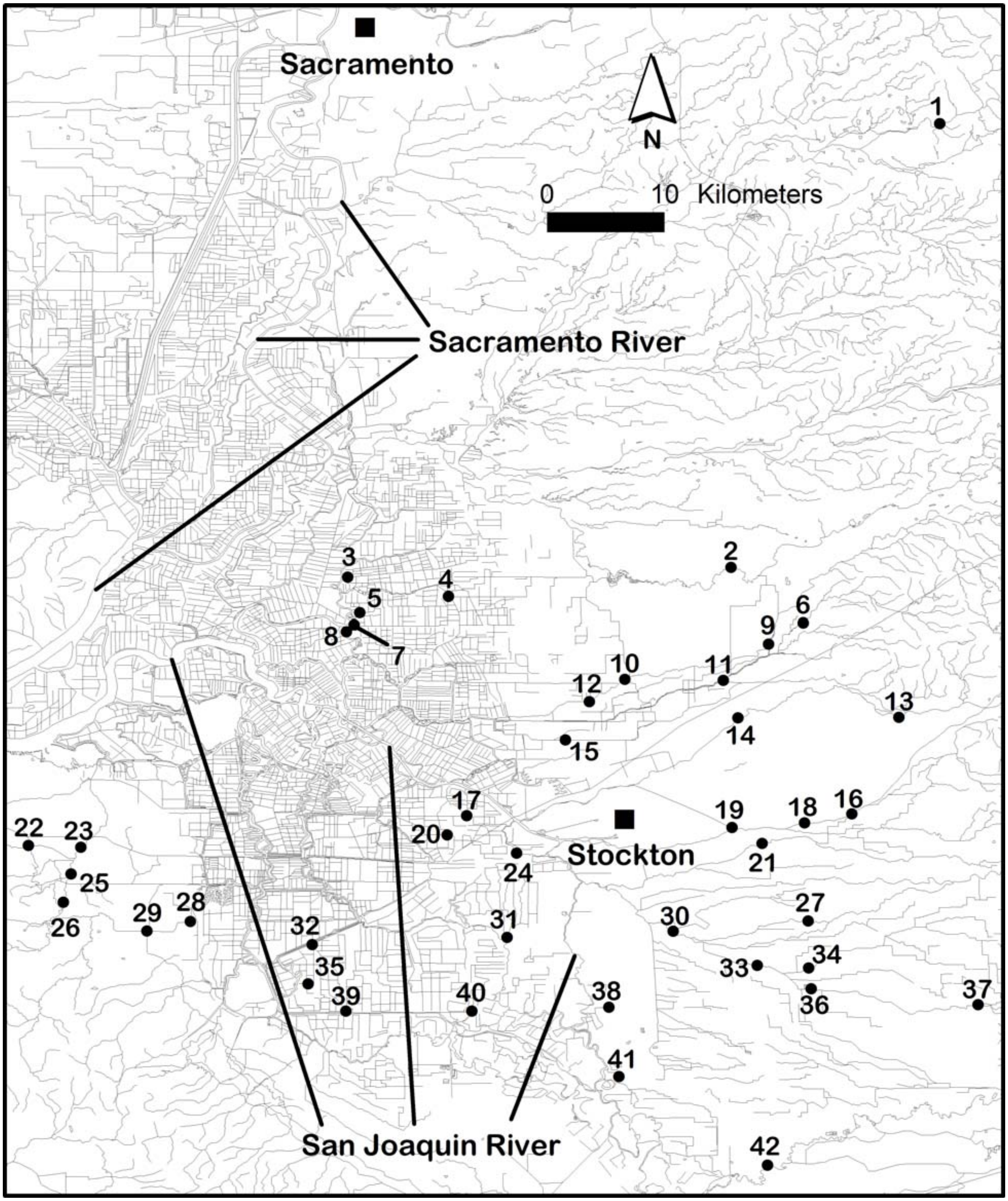


Figure 1b. Diazinon monitoring sites for the San Joaquin River watershed (West Panel).

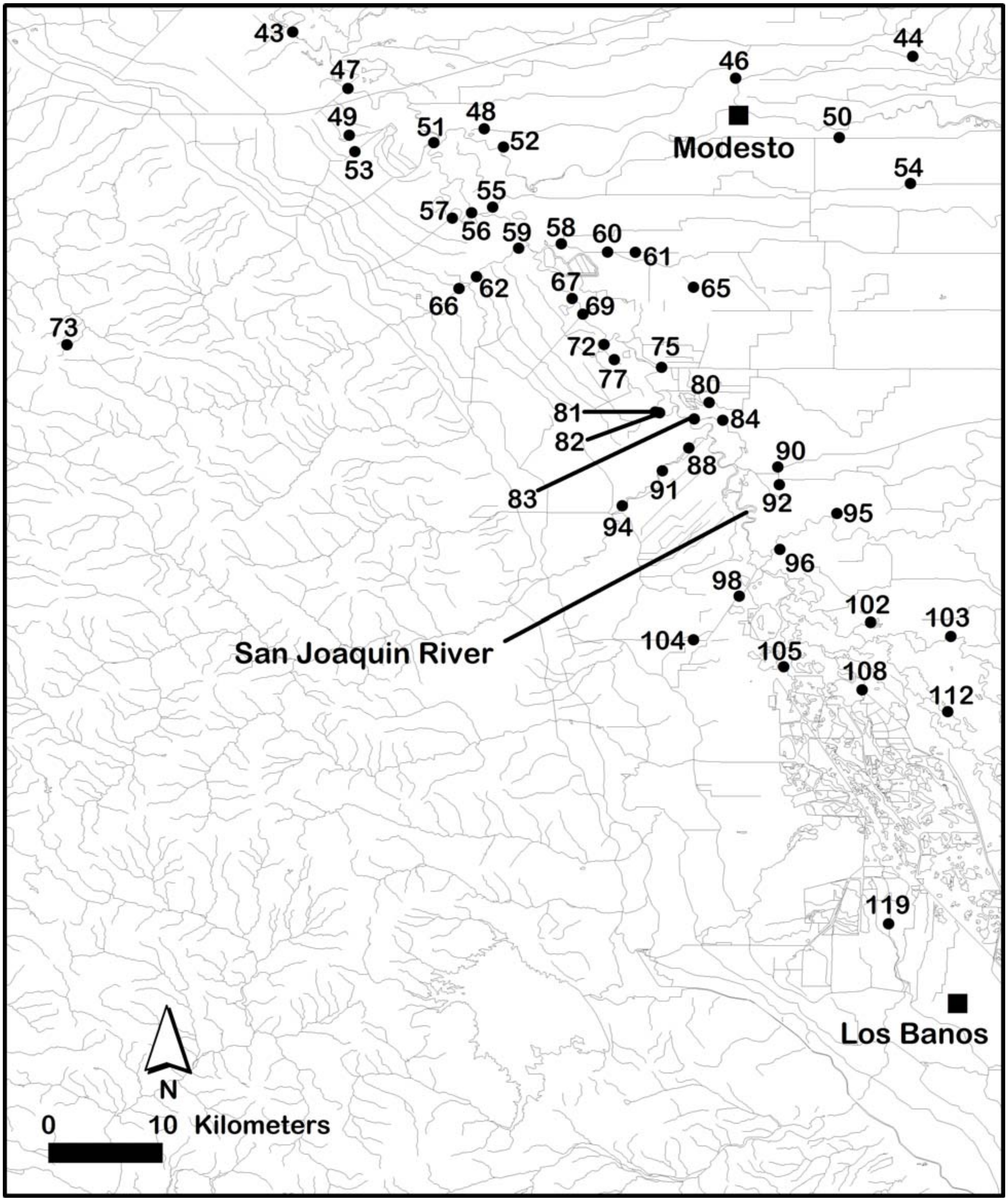
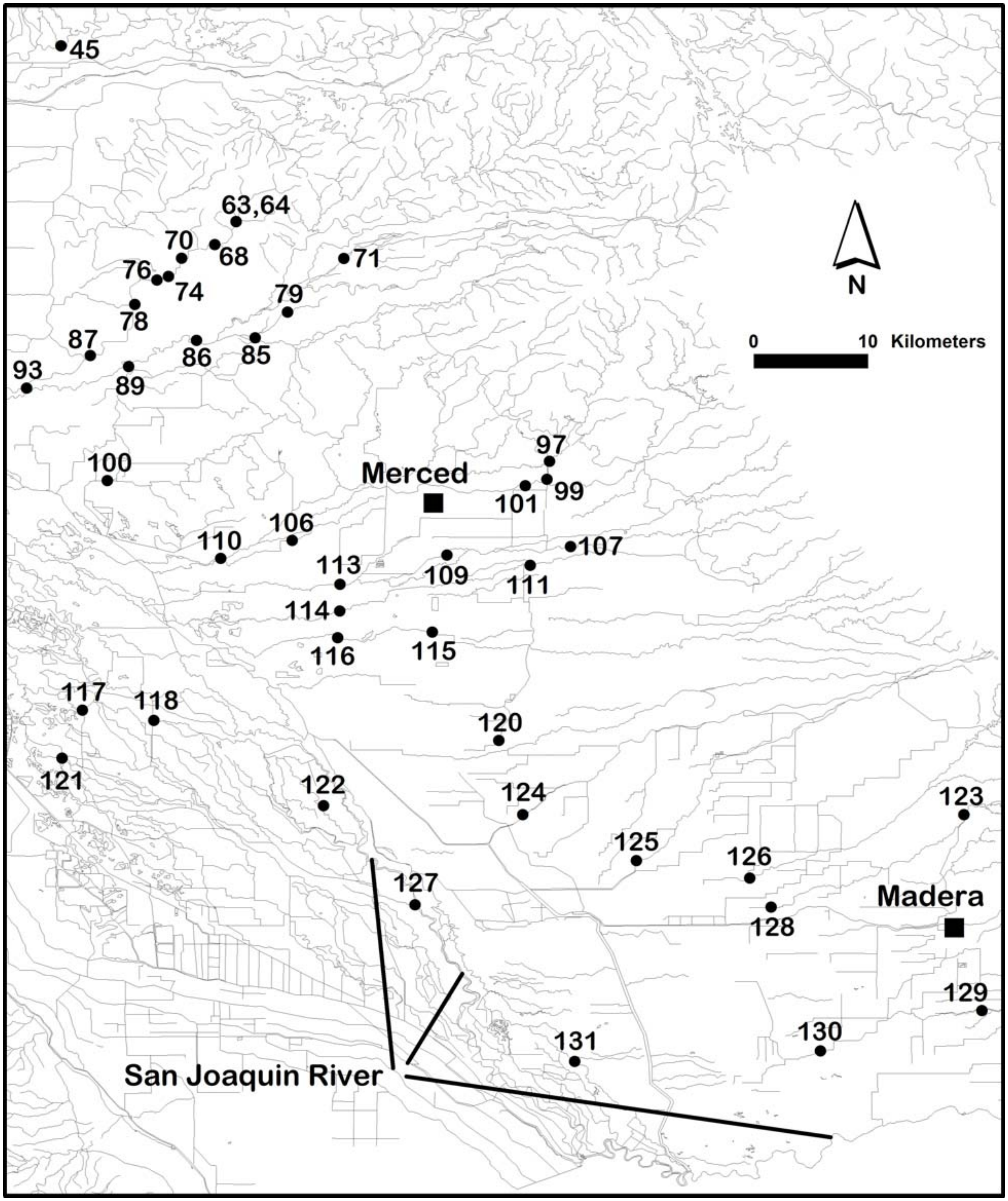


Figure 1c. Diazinon monitoring sites for the San Joaquin River watershed (East Panel).



Site numbers, descriptions and coordinates of diazinon monitoring sites from 2001-2007.

Station Name	Latitude	Longitude	Map ID
Consumnes River at Michigan Bar	38.50019	-121.04522	1
Mokelumne River at Bruella Rd	38.16015	-121.20510	2
Unnamed Canal at West End of Woodbridge Rd	38.15266	-121.49860	3
Sycamore Slough at Cotta Rd (near Guard Rd)	38.13794	-121.42144	4
Delta Drain Terminous Tract off Glasscock Rd	38.12550	-121.48936	5
Paddy Cr at Jack Tone Rd	38.11790	-121.14973	6
Terminous Tract Drain at Hwy 12	38.11658	-121.49369	7
Potato Slough at Hwy 12	38.11118	-121.49953	8
Bear Cr at Harney Ln	38.10171	-121.17643	9
Pixley Slough at Ham Ln	38.07474	-121.28630	10
Bear Cr at Alpine Rd	38.07402	-121.21093	11
Pixley Slough at Eightmile Rd	38.05765	-121.31350	12
Calaveras River at Clements Rd	38.04563	-121.07661	13
Calaveris River at Pezzi Rd	38.04536	-121.19982	14
Mosher Cr at Thornton Rd	38.02834	-121.33187	15
Mormon Slough at Copperopolis Rd	37.97166	-121.11253	16
Roberts Island Drain along House Rd	37.97020	-121.40740	17
Mormon Slough at Jack Tone Rd	37.96470	-121.14880	18
Calaveras River at Belota Intake	37.96125	-121.20440	19
Roberts Island Drain at Holt Rd	37.95560	-121.42230	20
Duck Cr at Hwy 4	37.94910	-121.18120	21
Sand Cr at Hwy 4 Bypass	37.94750	-121.74300	22
Storm Drain to Marsh Cr at Sand Cr Rd	37.94603	-121.70271	23
Mid Roberts Island Drain at Woodsbro Rd	37.94163	-121.36930	24
Marsh Cr at Balfour Ave	37.92559	-121.71020	25
Marsh Cr at Concord Ave	37.90393	-121.71627	26
Littlejohns Cr at Jack Tone Rd	37.88960	-121.14610	27
Kellogg Cr at Hwy 4	37.88924	-121.61901	28
Kellogg Cr along Hoffman Ln	37.88188	-121.65221	29
French Camp Slough at Airport Way	37.88172	-121.24933	30
Unnamed Canal at Howard Rd	37.87696	-121.37656	31
Drain to North Canal at South Bonetti Rd	37.87150	-121.52560	32
Lone Tree Cr at Austin Rd	37.85556	-121.18500	33
Unnamed Drain to Lone Tree Cr at Jack Tone Rd	37.85360	-121.14570	34
Grant Line Canal at Clifton Court Rd	37.84140	-121.52880	35
Lone Tree Cr at Jack Tone Rd	37.83760	-121.14376	36
Lone Tree Cr at Bernnan Rd	37.82552	-121.01591	37
Drain to San Joaquin River off South Manthey Rd	37.82340	-121.29850	38

Site numbers – continued.

Station Name	Latitude	Longitude	Map ID
Grant Line Canal near Calpack Rd	37.82050	-121.49990	39
Drain to Grant Line Canal off Wing Levee Rd	37.82050	-121.40350	40
Walthall Slough	37.77030	-121.29100	41
Stanislaus River at Caswell Park	37.70250	-121.17722	42
San Joaquin River near Vernalis	37.67556	-121.26417	43
Drainy Cr at Wellsford Rd	37.66017	-120.87432	44
Drainy Cr at J9	37.65894	-120.77867	45
McHenry storm drain at Bodem St Modesto	37.64640	-120.98560	46
San Joaquin River at Maze Rd Br near Modesto	37.63993	-121.22938	47
Lateral 5 at Paradise Rd	37.61453	-121.14380	48
Hospital Cr at River Rd	37.61056	-121.22861	49
Ceres Main Canal at Faith Home and Hatch Rd	37.60900	-120.92043	50
San Joaquin River below Toulumne River	37.60576	-121.17549	51
Tuolumne River at Shiloh Fishing Access	37.60306	-121.13167	52
Ingram Cr at River Rd	37.60022	-121.22506	53
TID Lateral #2 on Service Rd	37.58013	-120.87577	54
Lower Lateral 2 at Grayson Rd	37.56522	-121.13846	55
San Joaquin River at Laird Park	37.56170	-121.15170	56
Westley Wasteway near Cox Rd	37.55822	-121.16372	57
Westport Drain near Modesto	37.54215	-121.09521	58
Del Puerto Cr near Cox Rd	37.53936	-121.12206	59
Turlock Irrig Dist Drain #3 at Jennings Rd Br	37.53690	-121.06610	60
Westport Drain at Vivian Rd	37.53682	-121.04861	61
Del Puerto Cr at Vineyard Ave	37.52139	-121.14861	62
Culvert Discharge to Mustang Cr at Monte Vista Ave	37.52083	-120.64111	63
Mustang Cr at Monte Vista Ave near Montpelier	37.52056	-120.64111	64
Hatch Drain at Tuolumne Rd	37.51487	-121.01221	65
Del Puerto Cr at Hwy 33	37.51406	-121.15956	66
Salado Cr near Olive Ave	37.50764	-121.08850	67
Mustang Cr below reservoir near Oakdale Rd	37.50250	-120.65778	68
San Joaquin River at Patterson	37.49778	-121.08167	69
Mustang Cr at East Ave	37.49180	-120.68390	70
Ingalsbe Slough at J17	37.49167	-120.55640	71
Ramona Lake near Fig Ave	37.47875	-121.06839	72
Livingston Canal at Cressey Way	37.47864	-121.40605	73
Mustang Cr at Bifurcation Structure near Ballico	37.47750	-120.69417	74
Harding Drain at Carpenter Rd near Patterson	37.46438	-121.03215	75
Mustang Cr at Newport Rd near Ballico	37.47466	-120.70326	76
Unnamed Drain at Pomelo Ave near Paradise Ave	37.46920	-121.06190	77

Site numbers – continued.

Station Name	Latitude	Longitude	Map ID
Highline Canal at Lombardy Rd	37.45560	-120.72071	78
Jones Drain at Oakdale Rd	37.44951	-120.60069	79
Prairie Flower Drain at Crows Landing Rd	37.44220	-121.00236	80
Marshall Rd Drain near River Rd	37.43631	-121.03617	81
Spanish Grant Combined Drain near Patterson	37.43577	-121.03354	82
San Joaquin River at Crows Landing	37.43194	-121.01167	83
August Rd Drain u/s of Crows Landing Br	37.43113	-120.99371	84
Silva Drain at Meadow Drain	37.42919	-120.62605	85
Merced River at Santa Fe	37.42714	-120.67208	86
Highline Canal at Hwy 99	37.41530	-120.75570	87
Orestimba Cr at River Rd	37.41361	-121.01500	88
Livingston Canal at Livingston Treatment Plant	37.40660	-120.72548	89
Lateral 6 at Central Ave	37.40163	-120.95913	90
Orestimba Cr at Kilburn Rd	37.39918	-121.03168	91
Hilmar Drain at Central Ave	37.39058	-120.95820	92
Highline Canal Spillway near Hilmar	37.38966	-120.80576	93
Orestimba Cr at Hwy 33	37.37722	-121.05690	94
Stevinson Lower Lateral at Faith Home Rd	37.37240	-120.92194	95
Merced River at River Rd	37.34972	-120.95778	96
Black Rascal Cr at Yosemite Rd	37.33208	-120.39469	97
Newman Wasteway near Hills Ferry Rd	37.32036	-120.98336	98
Fairfield Canal at Olive Ave	37.31795	-120.39669	99
Livingston Drain at Robin Ave	37.31693	-120.74229	100
Bear Cr at Kibby Rd	37.31280	-120.41378	101
Turner Slough at Edminster Rd	37.30411	-120.90083	102
San Joaquin River at Lander Ave	37.29528	-120.85028	103
Newman Wasteway at Hwy 33 near Gustine	37.29327	-121.01215	104
Los Banos Cr at Hwy 140	37.27619	-120.95547	105
South Slough at Quinley Rd	37.26983	-120.59711	106
Duck Slough at Arboleda Drive	37.26500	-120.37818	107
Mud Slough u/s of San Luis Drain	37.26164	-120.90614	108
Miles Cr at Reilly Rd	37.25821	-120.47546	109
Bear Cr at Bert Crane Rd near Merced	37.25578	-120.65325	110
Duck Slough at Hwy 99	37.25017	-120.41001	111
Salt Slough at Lander Ave	37.24797	-120.85225	112
Owens Cr at Gurr Rd	37.23534	-120.55953	113
Duck Slough at Gurr Rd	37.21423	-120.55958	114
Deadman Cr at Hwy 59	37.19810	-120.48690	115
Deadman Cr (Dutchman) at Gurr Rd	37.19356	-120.56124	116

Site numbers – continued.

Station Name	Latitude	Longitude	Map ID
Salt Slough at Sand Dam	37.13664	-120.76194	117
Poso Drain at Turner Island and Palazzo Rd	37.12854	-120.70565	118
Los Banos Cr at China Camp Rd	37.11447	-120.88953	119
El Nido Canal at W Washington Rd	37.11292	-120.43459	120
Boundary Drain at Henry Miller Ave	37.09884	-120.77777	121
Island Field Drain at Catrina Rd	37.06142	-120.57228	122
Drainy Crk at Ave 21	37.05450	-120.06900	123
Ash Slough at Ave 21	37.05448	-120.41575	124
Berenda Slough along Ave 18 ½	37.01820	-120.32650	125
Berenda Cr at Ave 17 1/2 west of Madera	37.00448	-120.23746	126
San Joaquin River at Sack Dam	36.98353	-120.50050	127
Drainy Cr at Rd 18	36.98180	-120.22056	128
Cottonwood Cr at Hwy 145 in Madera County	36.90021	-120.05489	129
Cottonwood Cr at Rd 20	36.86860	-120.18180	130
Lone Willow Slough at Madera Ave	36.86030	-120.37493	131

Figure 2. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the Hospital Creek at River Road site (r^2=0.883; P=0.018).

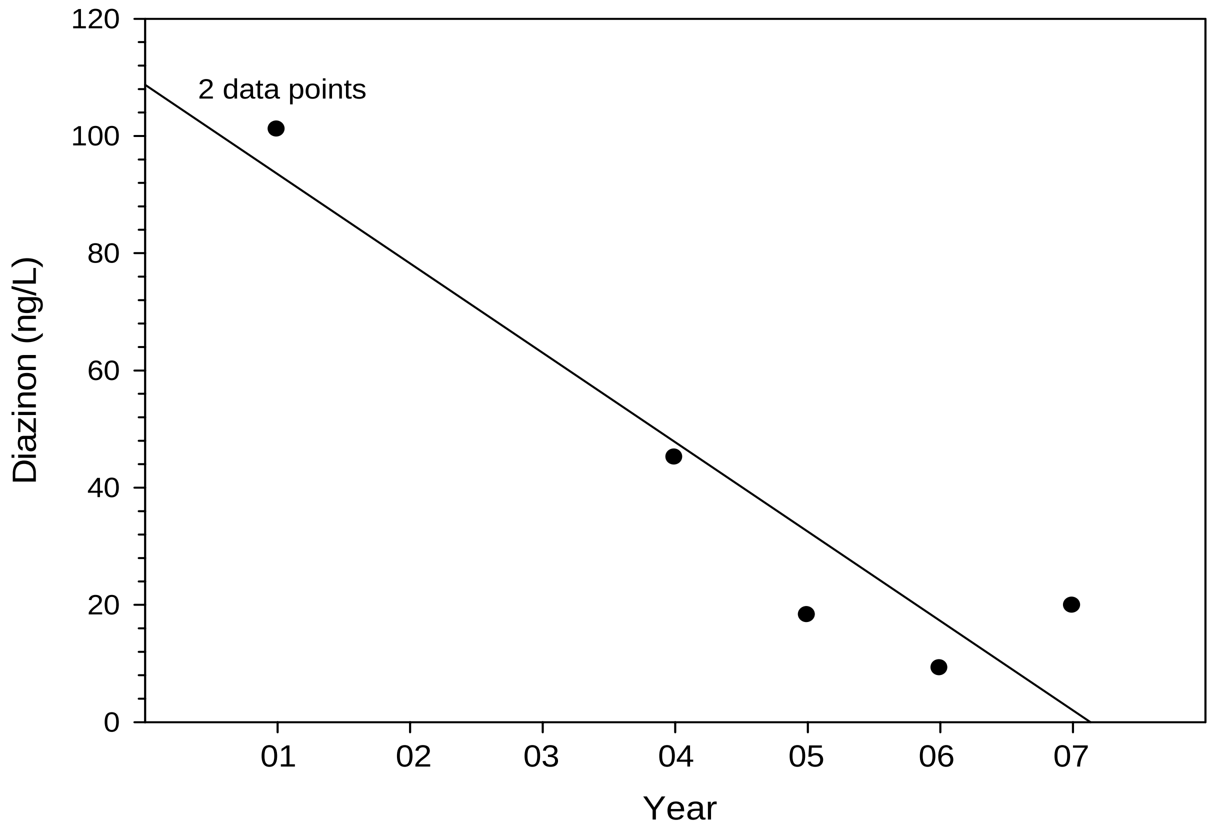


Figure 3. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the Ingram Creek at River Road site (r^2<0.001; P=0.991).

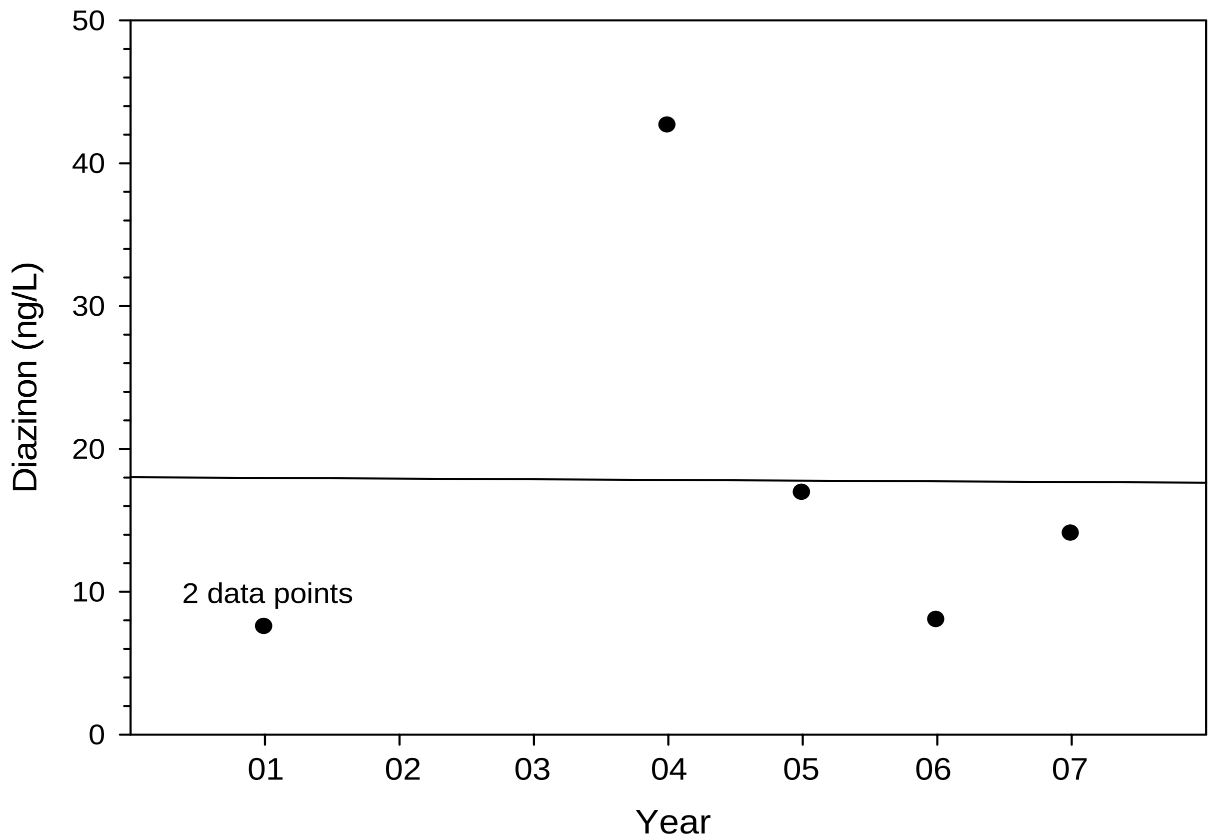


Figure 4. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the Los Banos Creek at Highway 140 site (r^2=0.093; P=0.618).

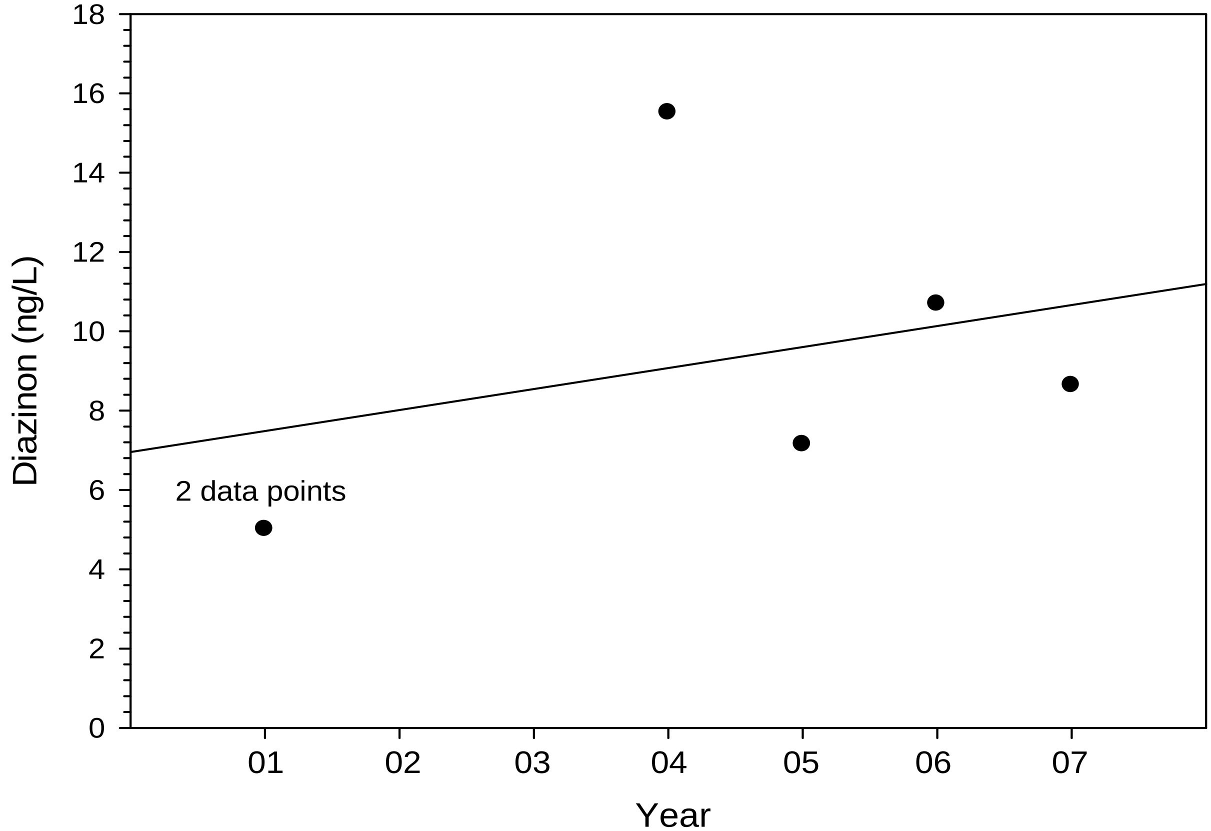


Figure 5. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the Mud Slough upstream of San Luis Drain site (r^2=0.865; P=0.022).

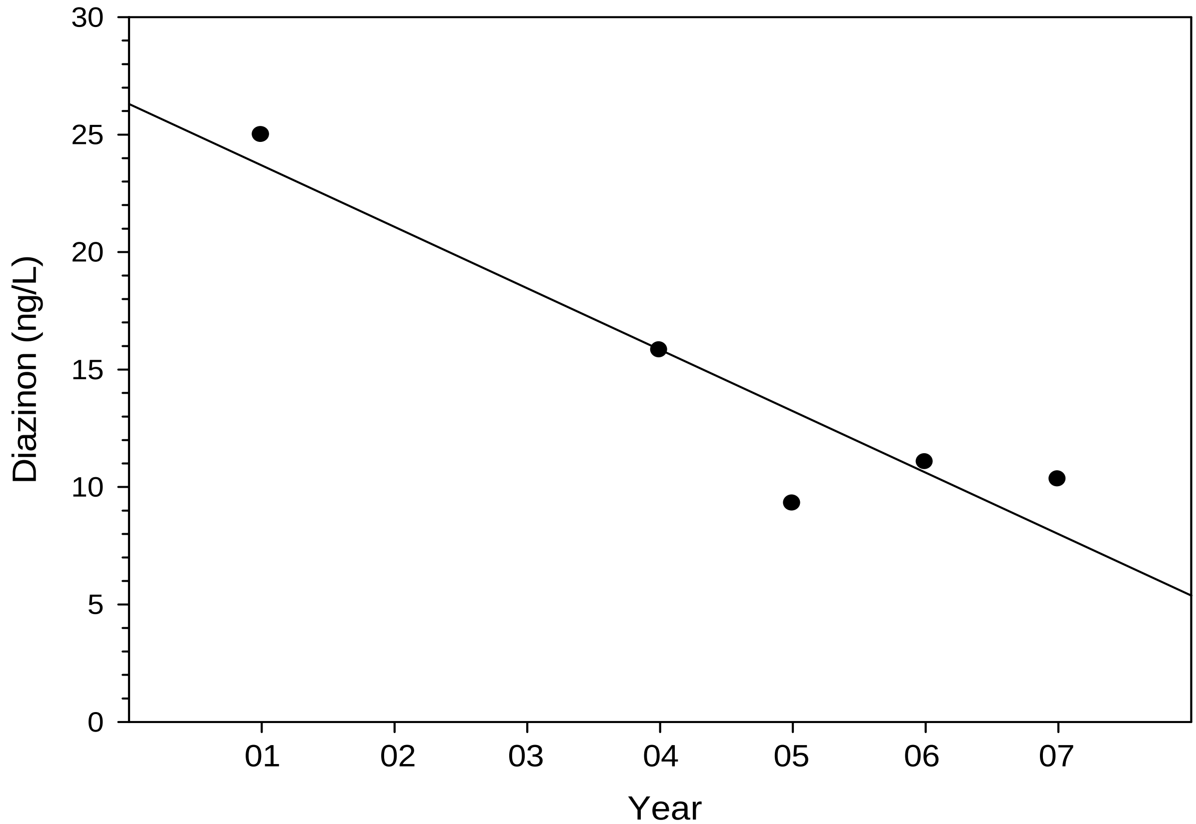


Figure 6. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the Orestimba Creek at River Road site (r^2=0.253; P=0.250).

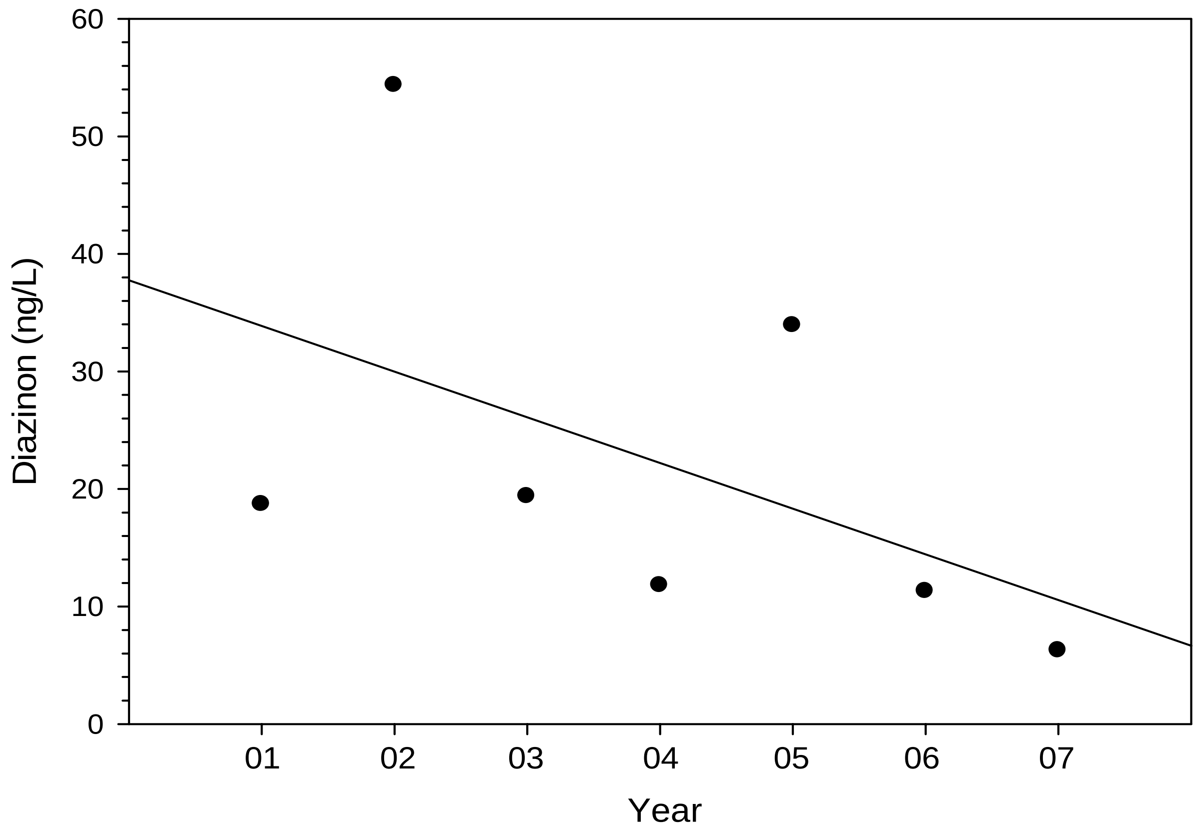


Figure 7. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the Salt Slough at Lander Avenue site (r^2=0.558; P=0.088).

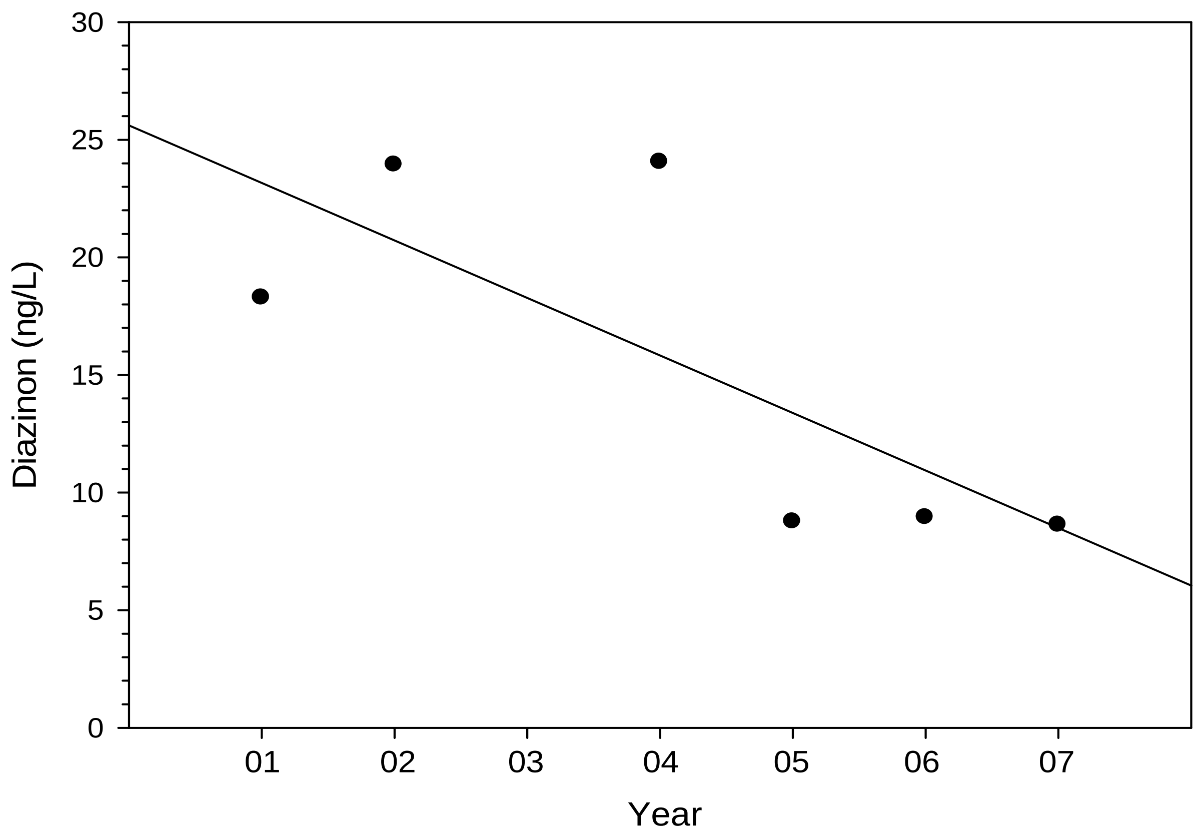


Figure 8. Statistical analysis of annual mean diazinon concentrations from 2001 to 2007 for the San Joaquin River at Crows Landing site. Differences between the two years with data were non-significant (P=0.192). A Mann-Whitney Rank Sum Test was used instead of a t-Test because no data transformations could be found to satisfy assumptions of homogeneity and normality.

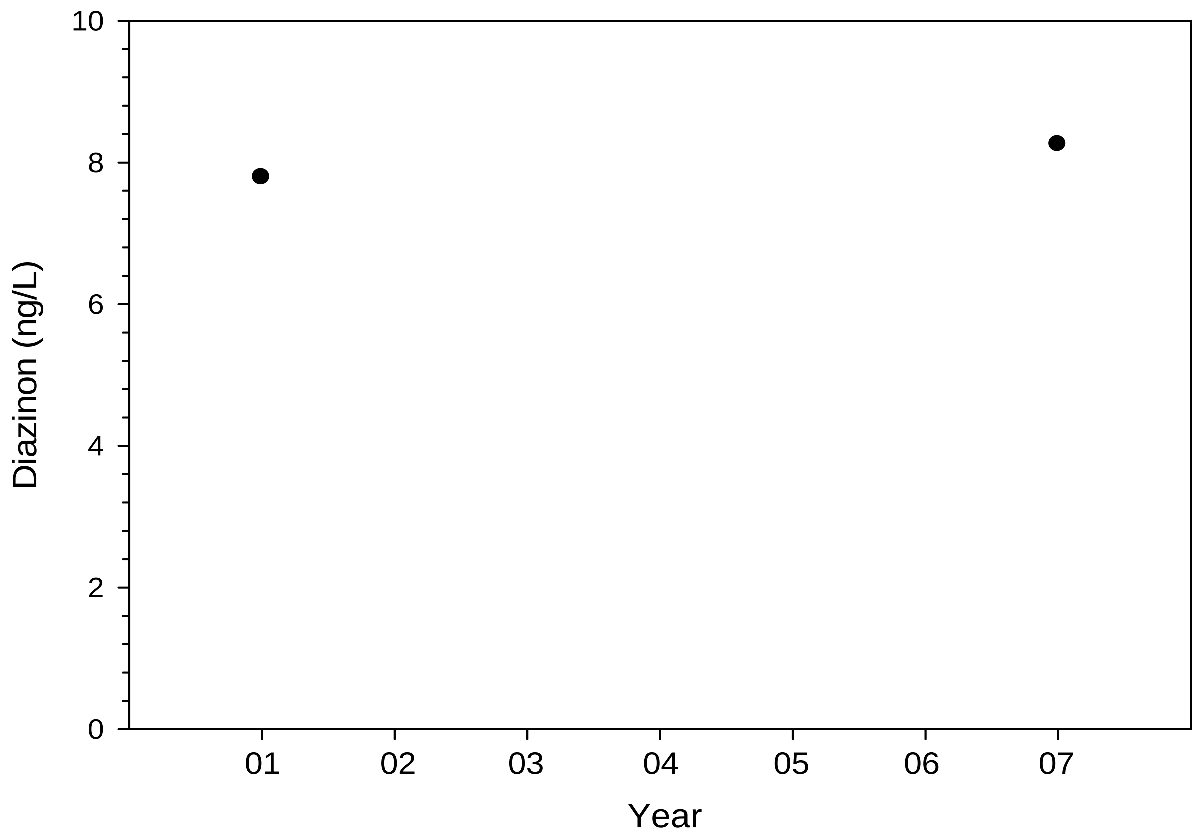


Figure 9. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the San Joaquin River at Lander Avenue site (r^2=0.923; P=0.009).

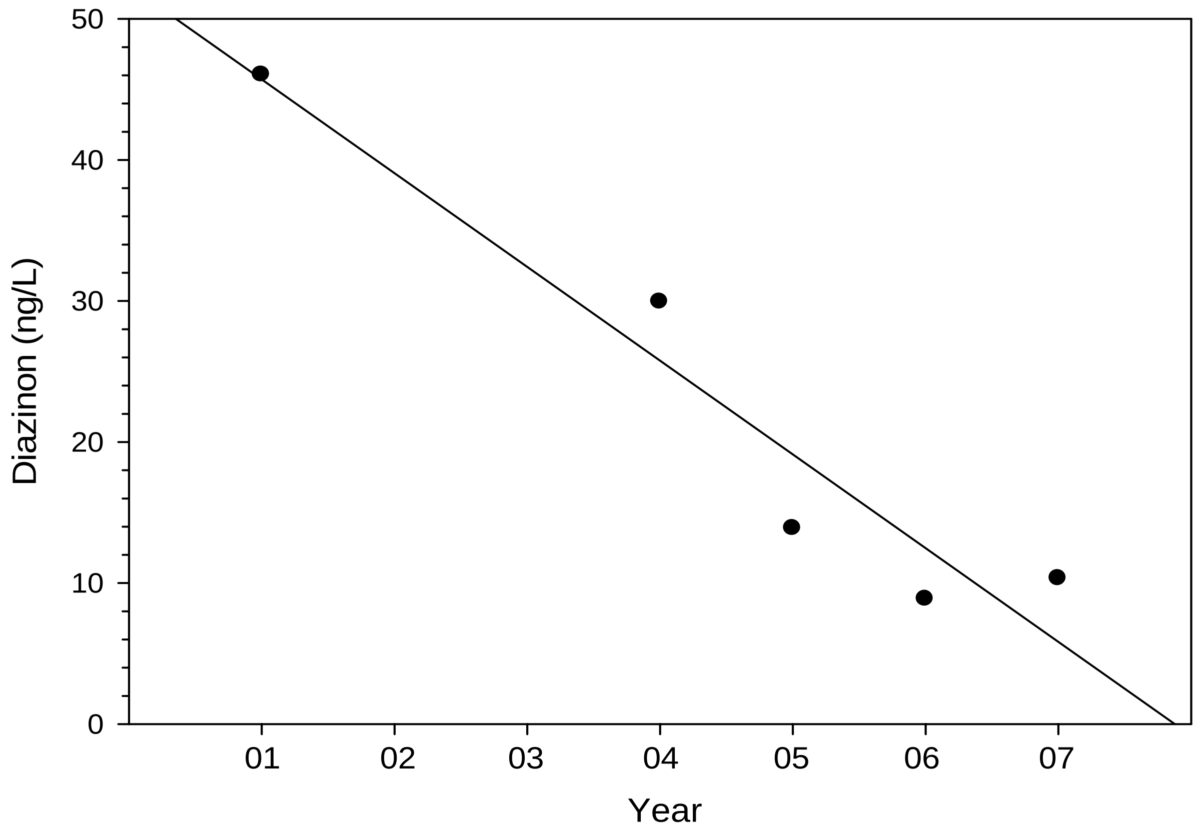


Figure 10. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the San Joaquin River at Vernalis site. Data was log transformed after plotting to satisfy assumptions of equal variance (r^2=0.775; P=0.009).

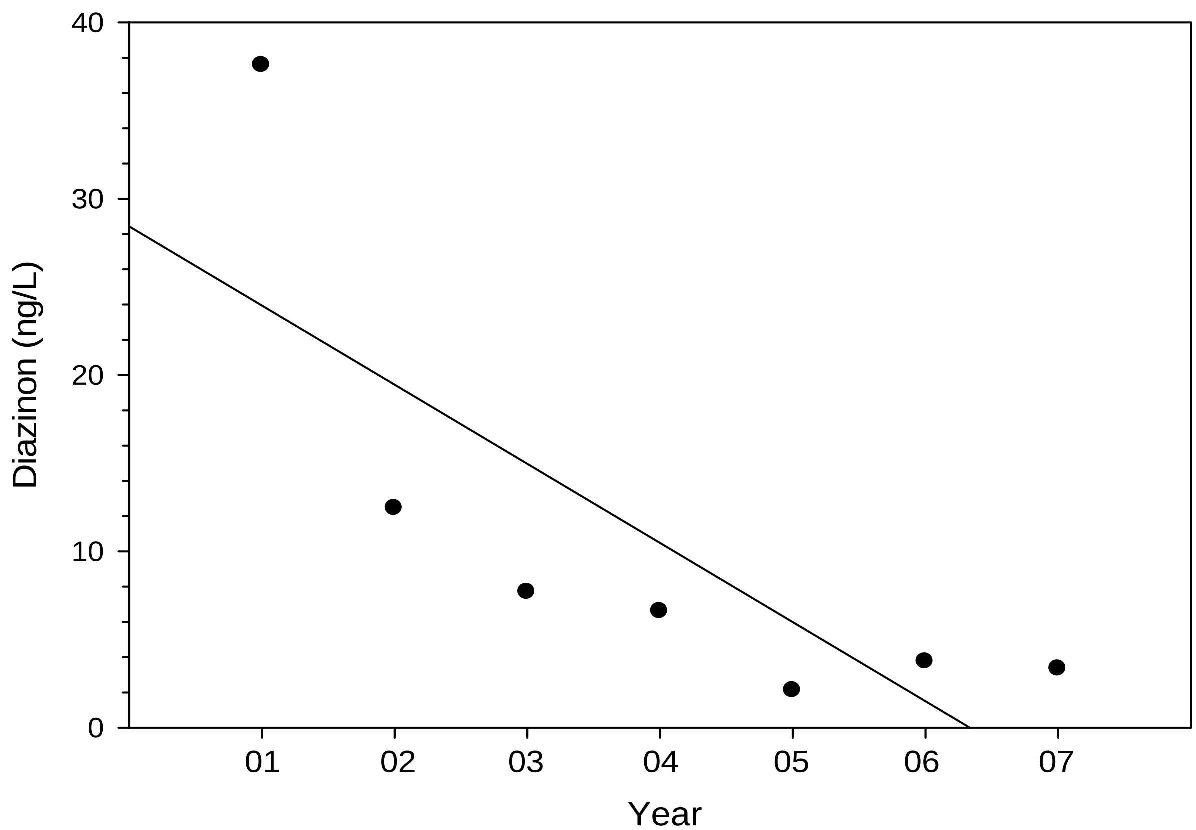


Figure 11. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the Merced River at River Road site. Data was log transformed after plotting to satisfy assumptions of equal variance (r^2=0.473; P=0.068).

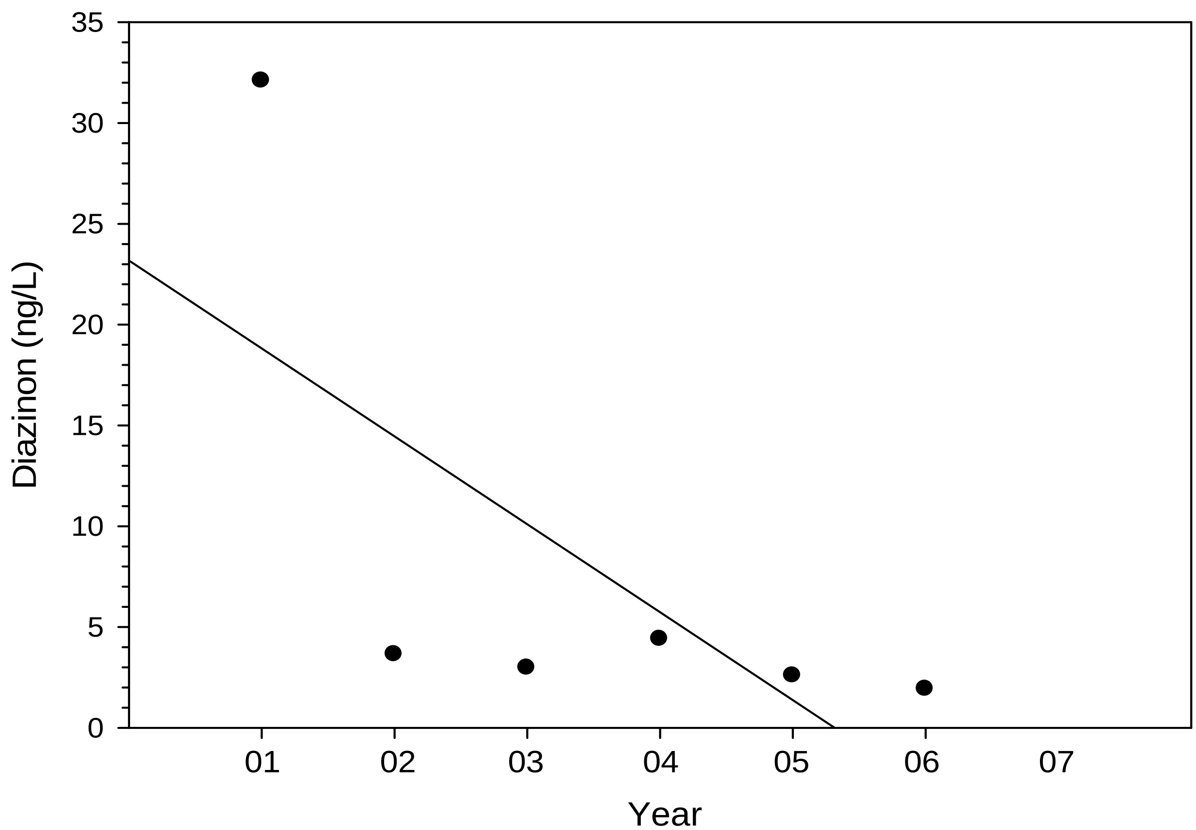


Figure 12. Regression analysis of annual mean diazinon concentrations from 2001 to 2007 for the Salado Creek at Olive Avenue site (r^2<0.001; P=0.997).

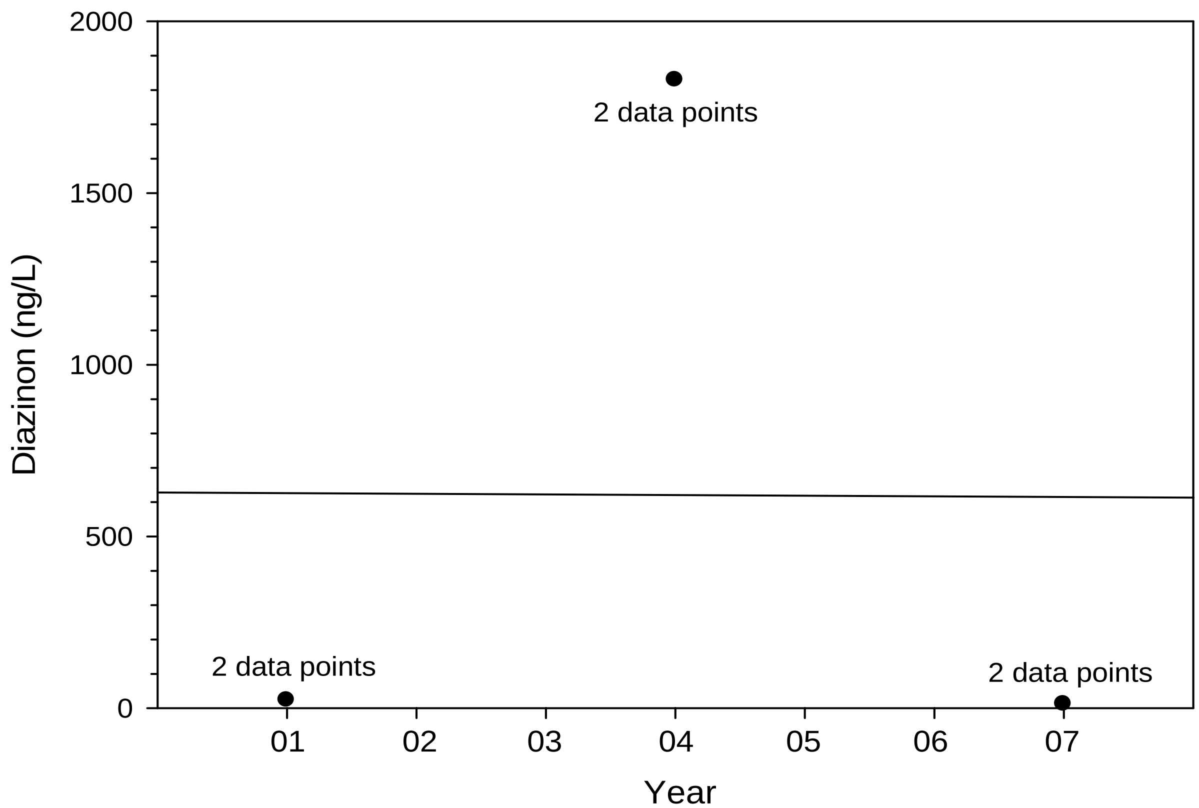


Figure 13. Statistical analysis of annual mean diazinon concentrations from 2001 to 2007 for the San Joaquin River at Patterson site. Differences between the two years with data were significant (P<0.001; t-Test).

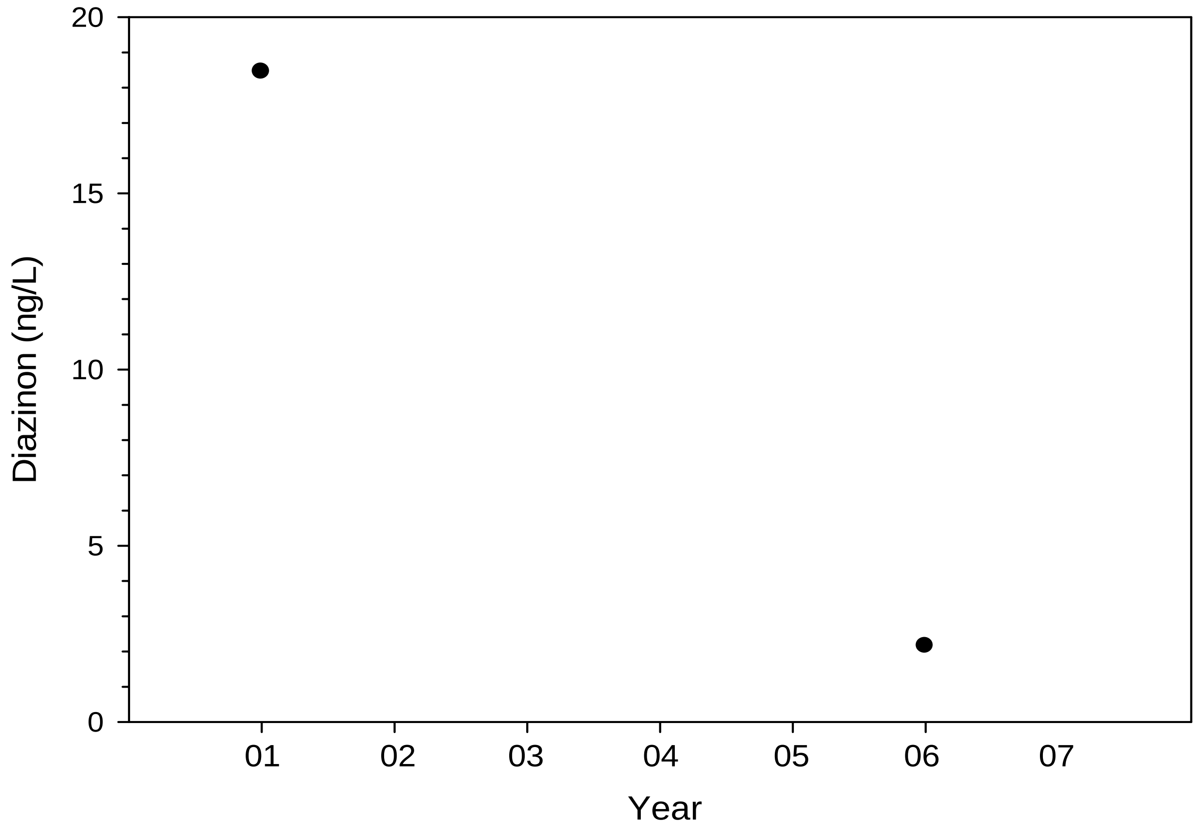


Figure 14. Statistical analysis of annual mean diazinon concentrations from 2001 to 2007 for the San Joaquin River at Caswell State Park site. Differences between the two years with data were significant (P=0.014; Mann-Whitney Rank Sum Test).

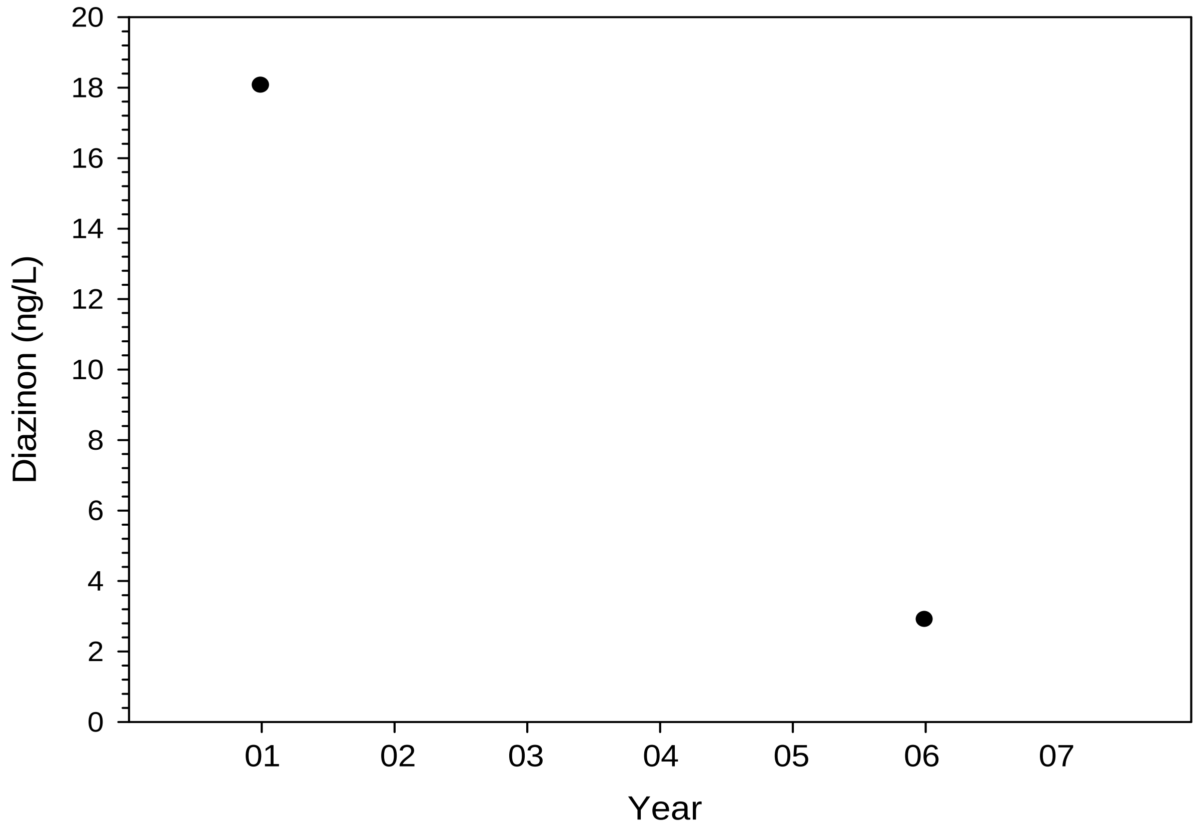


Figure 15. Statistical analysis of annual mean diazinon concentrations from 2001 to 2007 for the Tuolumne River at Shiloh Fishing Access site. No data transformations could be found for the regression that satisfied assumptions of normality and homogeneity so an ANOVA procedure was used on the raw data which did meet assumptions for ANOVA. Means from the years 2001 and 2002 (A) were significantly greater (P<0.05) than the year 2006 (B).

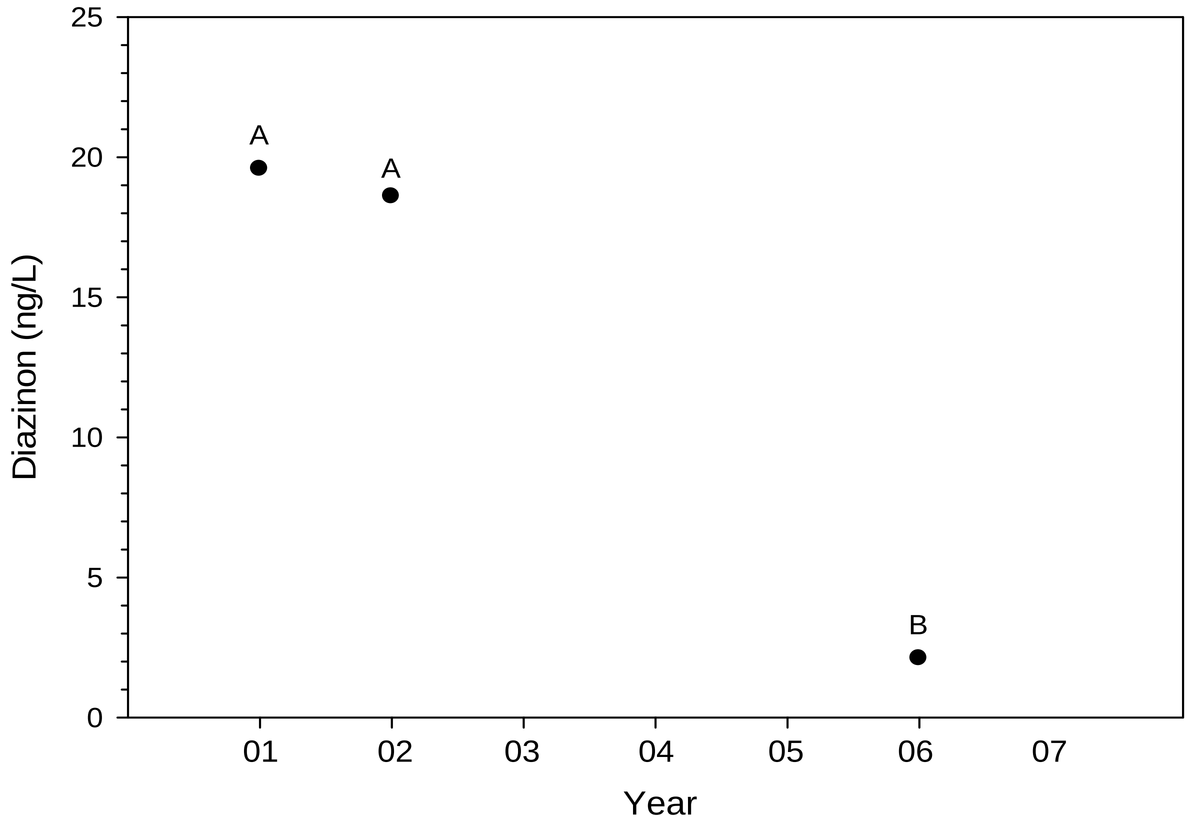


Figure 16. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all sites from 2001 to 2007 (r^2=0.239; P=0.265).

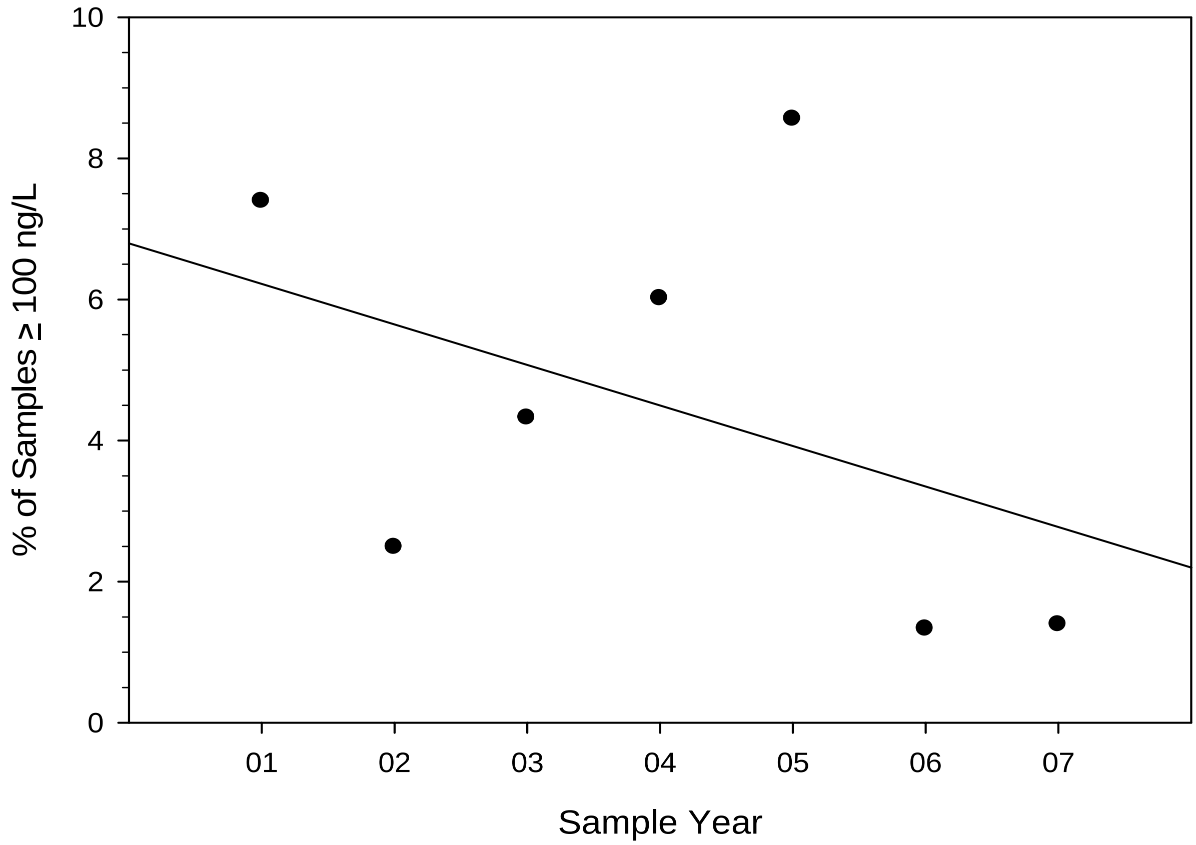


Figure 17. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all mainstem sites from 2001 to 2007. Target exceedances occurred in 2001 only.

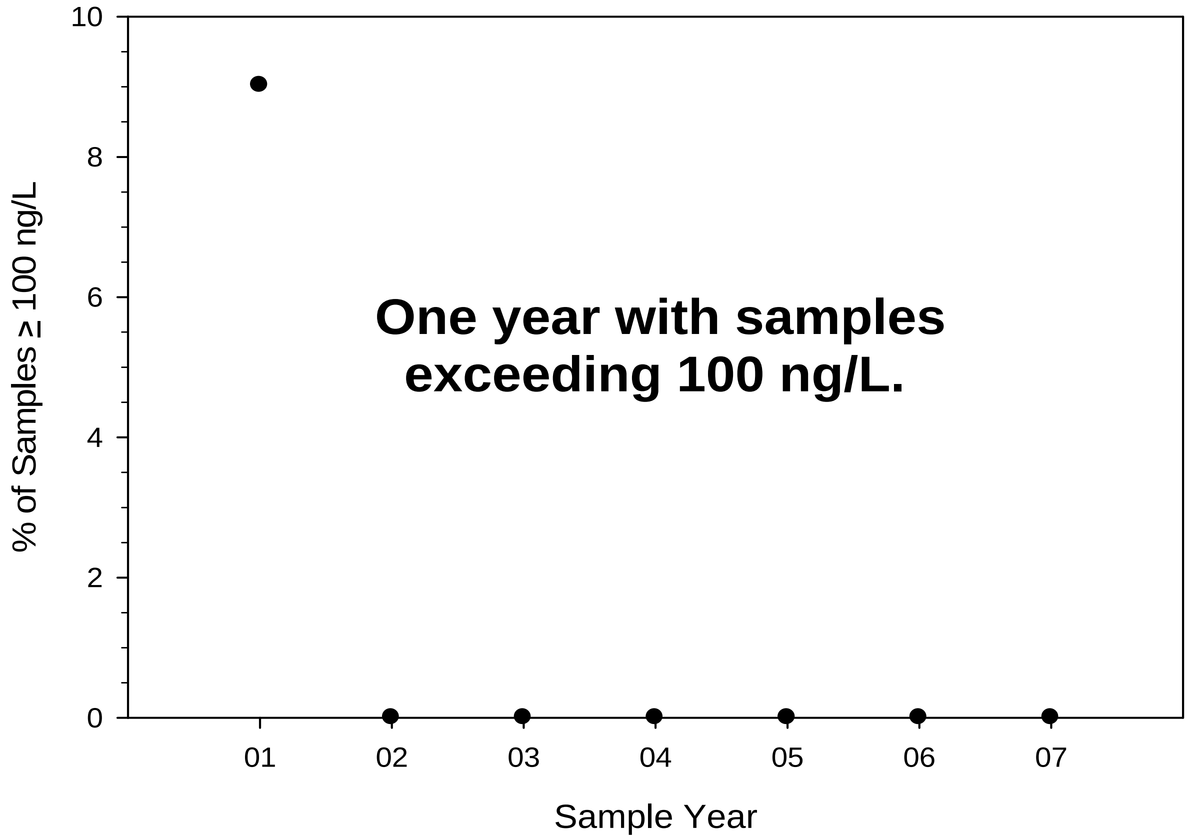


Figure 18. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all tributary sites from 2001 to 2007 (r^2=0.215; P=0.294).

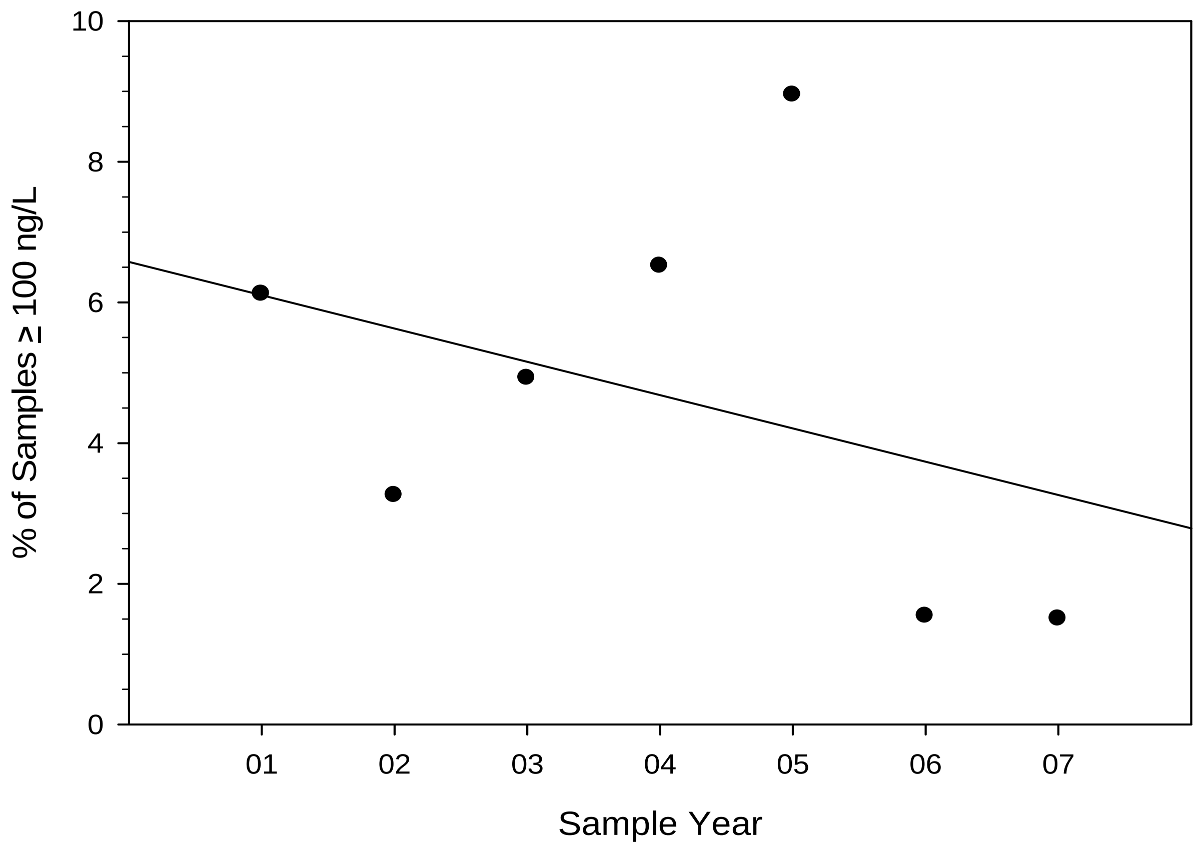


Figure 19. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all sites during the dormant season from 2001 to 2007 (r^2=0.049; P=0.635).

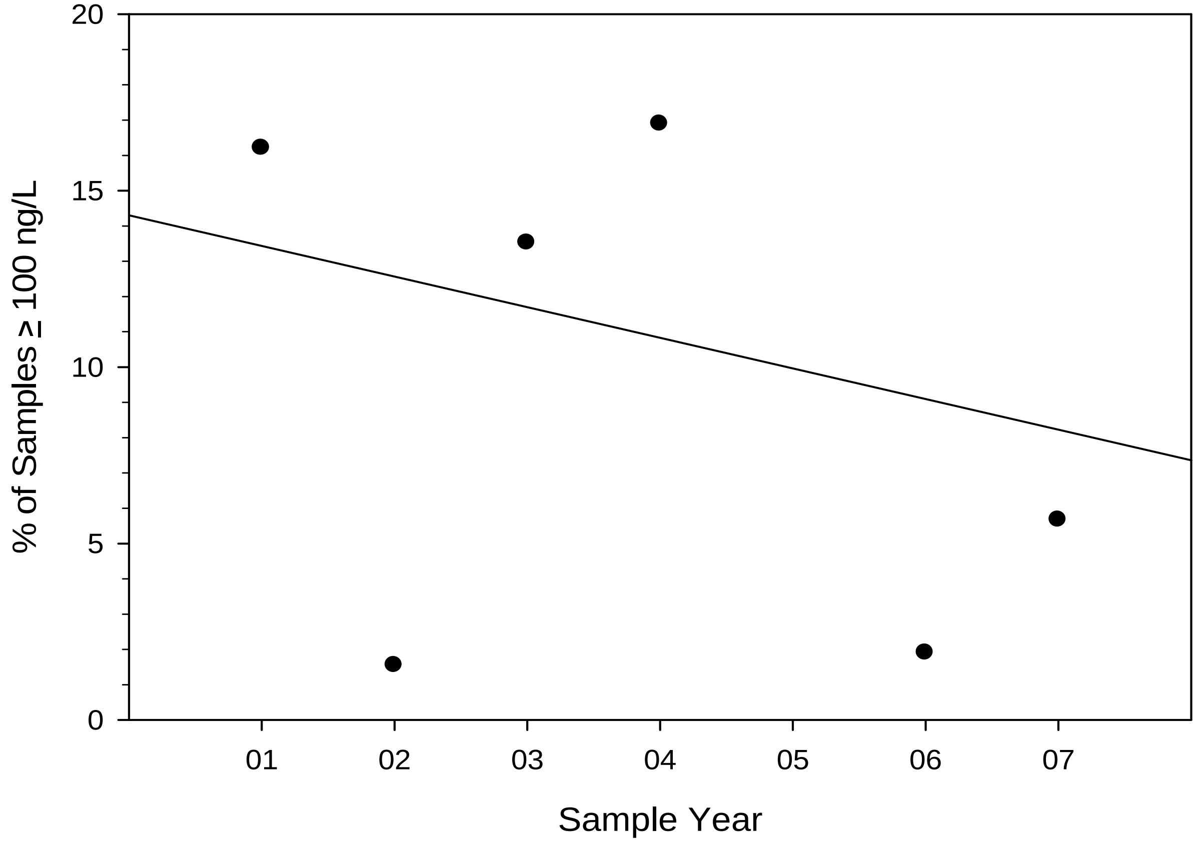


Figure 20. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all mainstem sites during the dormant season from 2001 to 2007. Target exceedances only occurred during 2001.

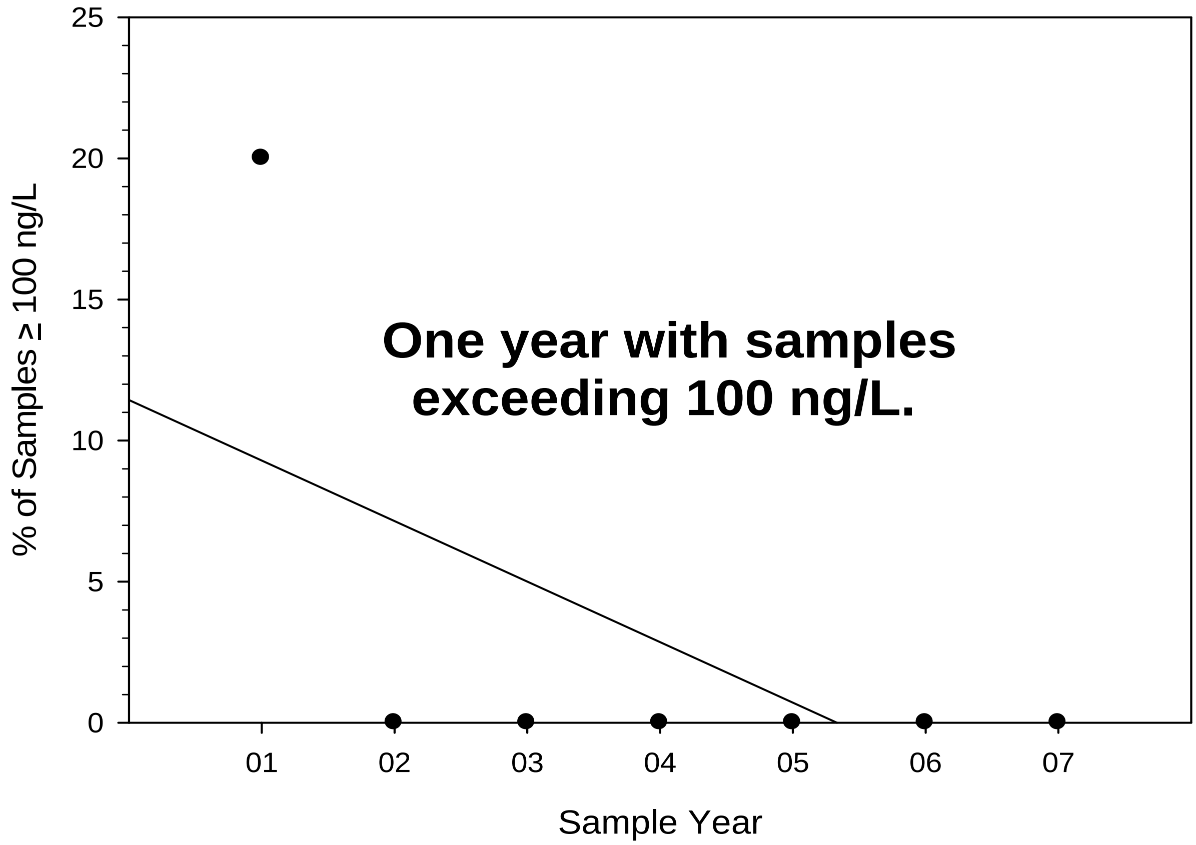


Figure 21. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all tributary sites during the dormant season from 2001 to 2007 (r^2=0.019; P=0.770).

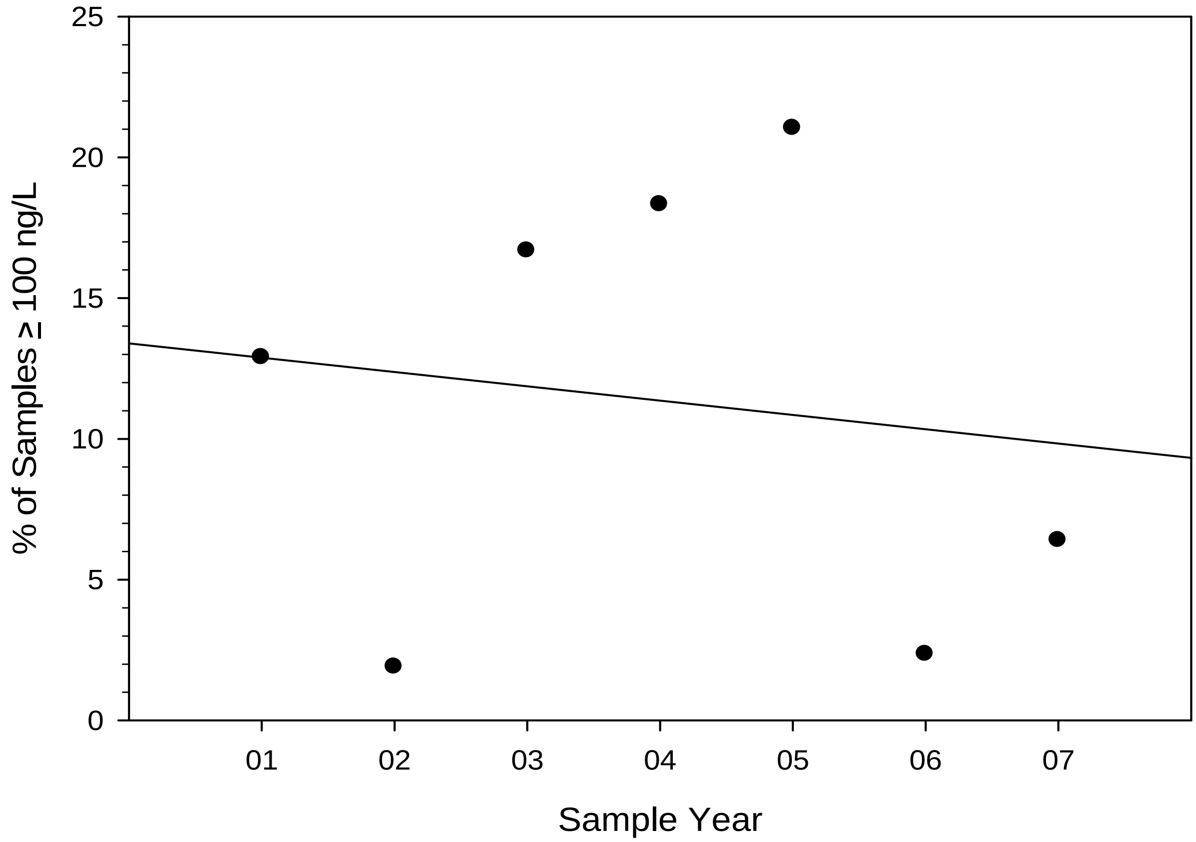


Figure 22. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all sites during the irrigation season from 2001 to 2007 (r^2=0.019; P=0.147).

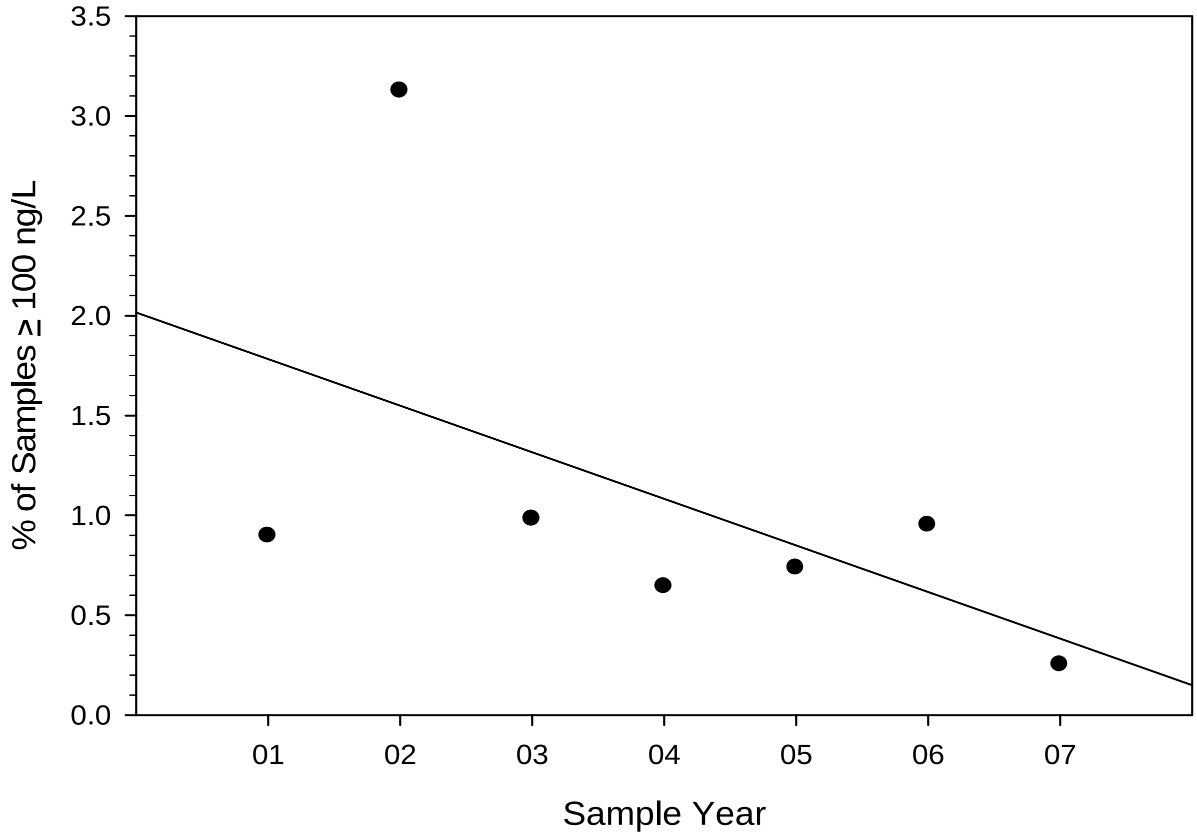


Figure 23. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all mainstem sites during the irrigation season from 2001 to 2007. There were no samples exceeding the target for any year.

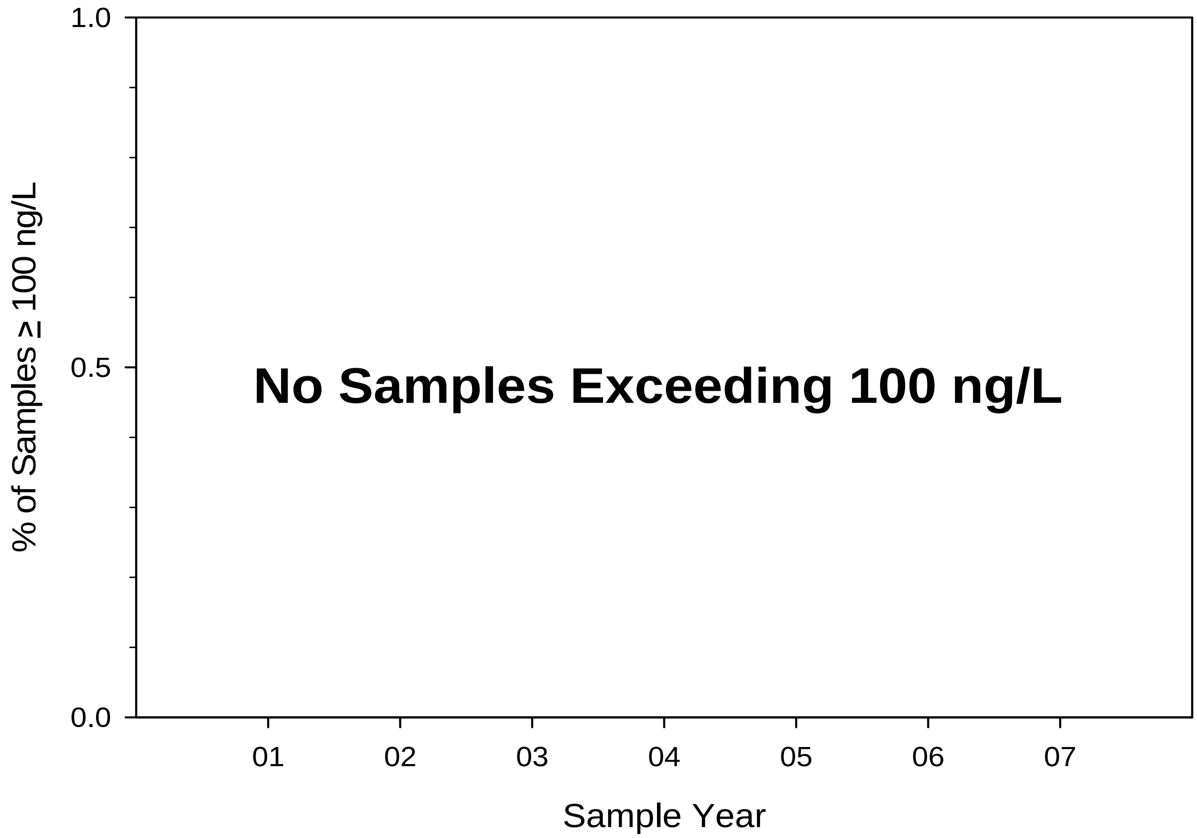


Figure 24. Regression analysis of annual % of samples exceeding 100 ng/l (diazinon target) for all tributary sites during the irrigation season from 2001 to 2007 (r^2=0.487; P=0.081).

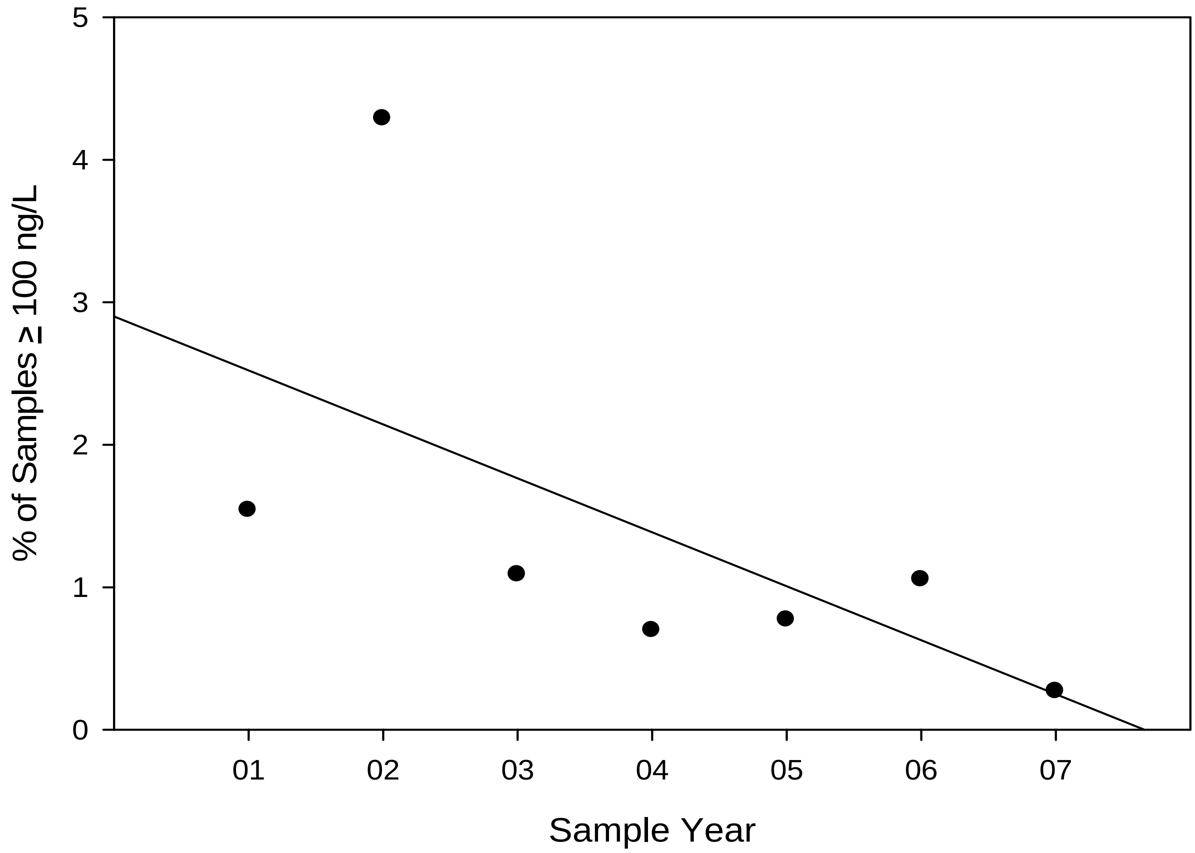


Figure 25. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all sites from 2001 to 2007 (r^2=0.311; P=0.193).

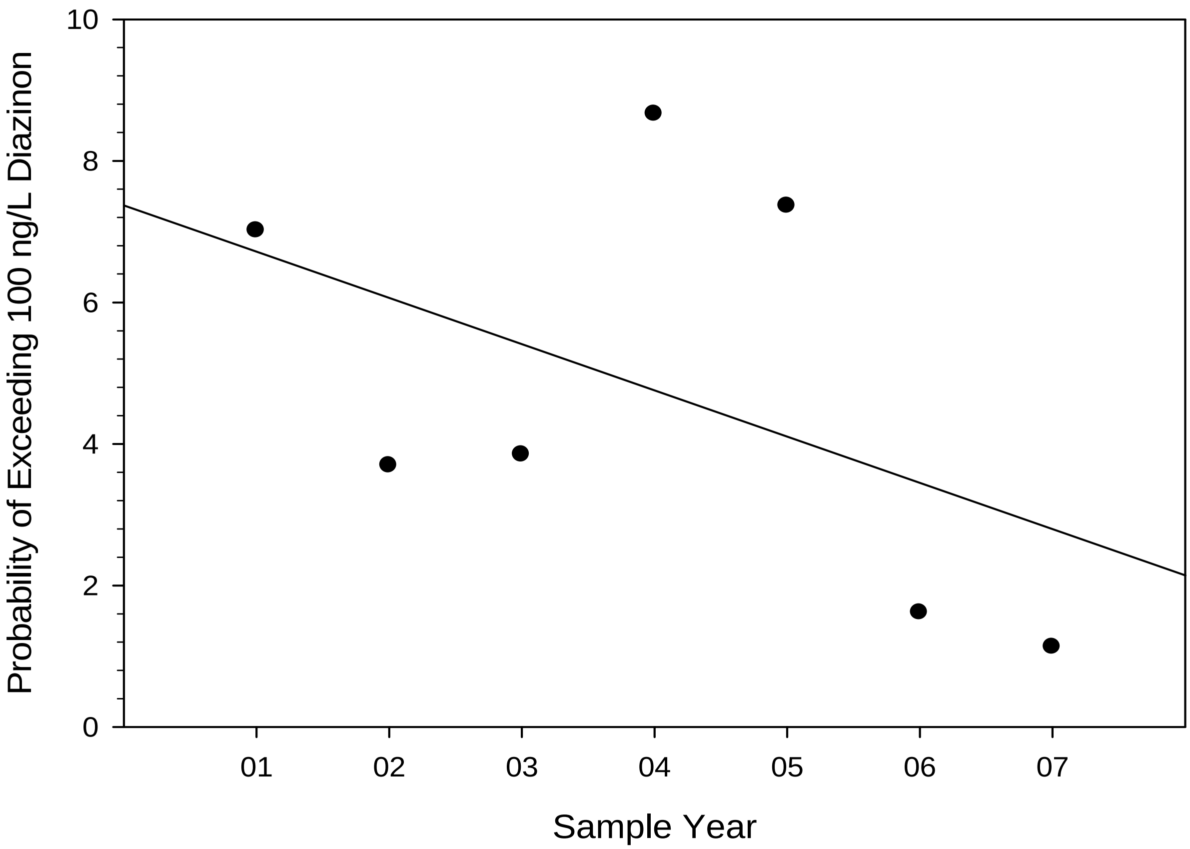


Figure 26. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all mainstem sites from 2001 to 2007 (r^2=0.424; P=0.161).

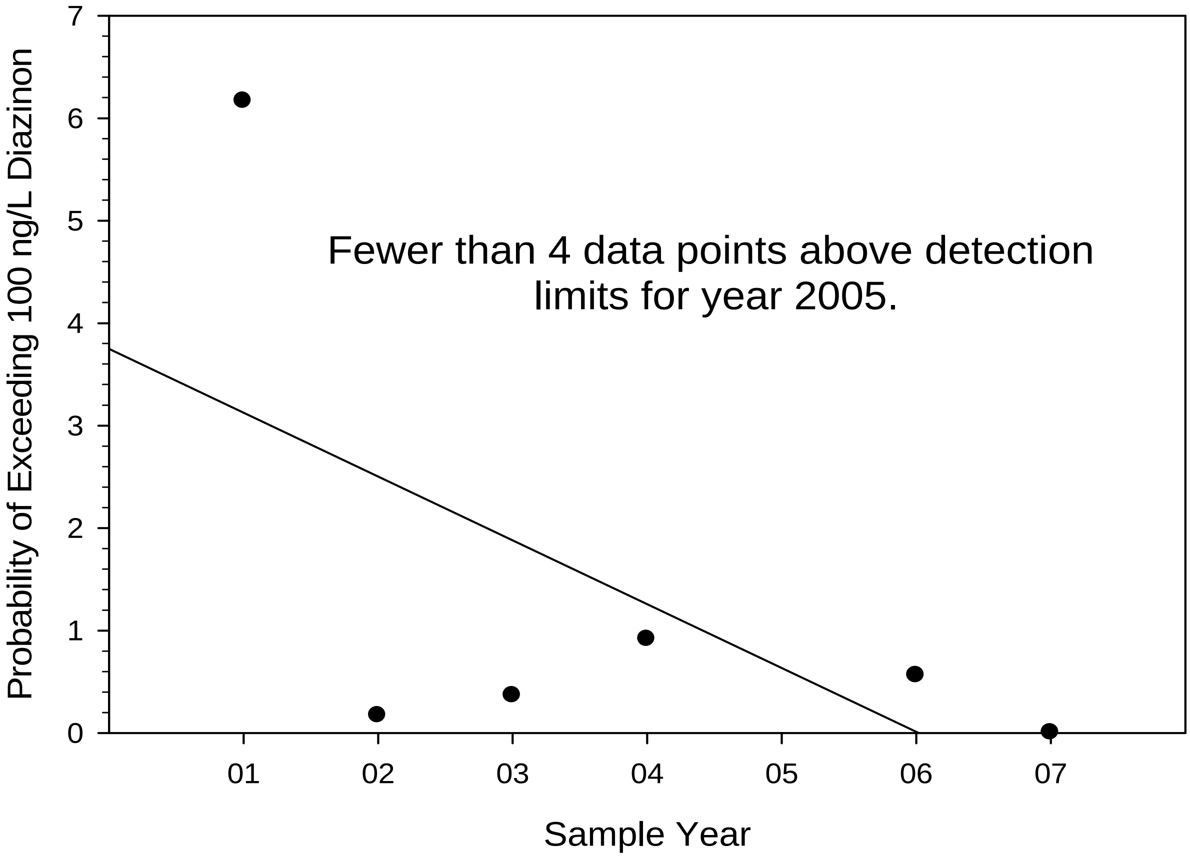


Figure 27. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all tributary sites from 2001 to 2007 (r^2=0.404; P=0.125).

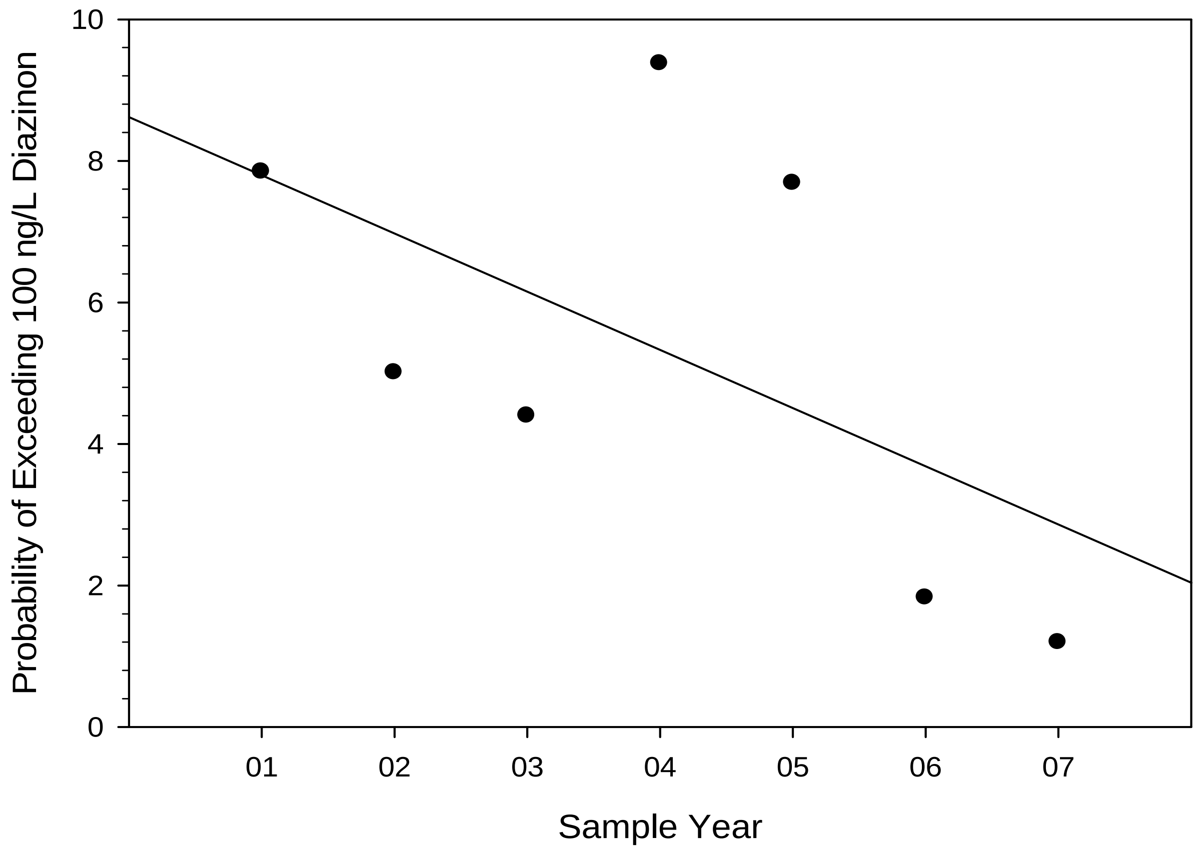


Figure 28. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all sites during the dormant season from 2001 to 2007 (r^2=0.067; P=0.575).

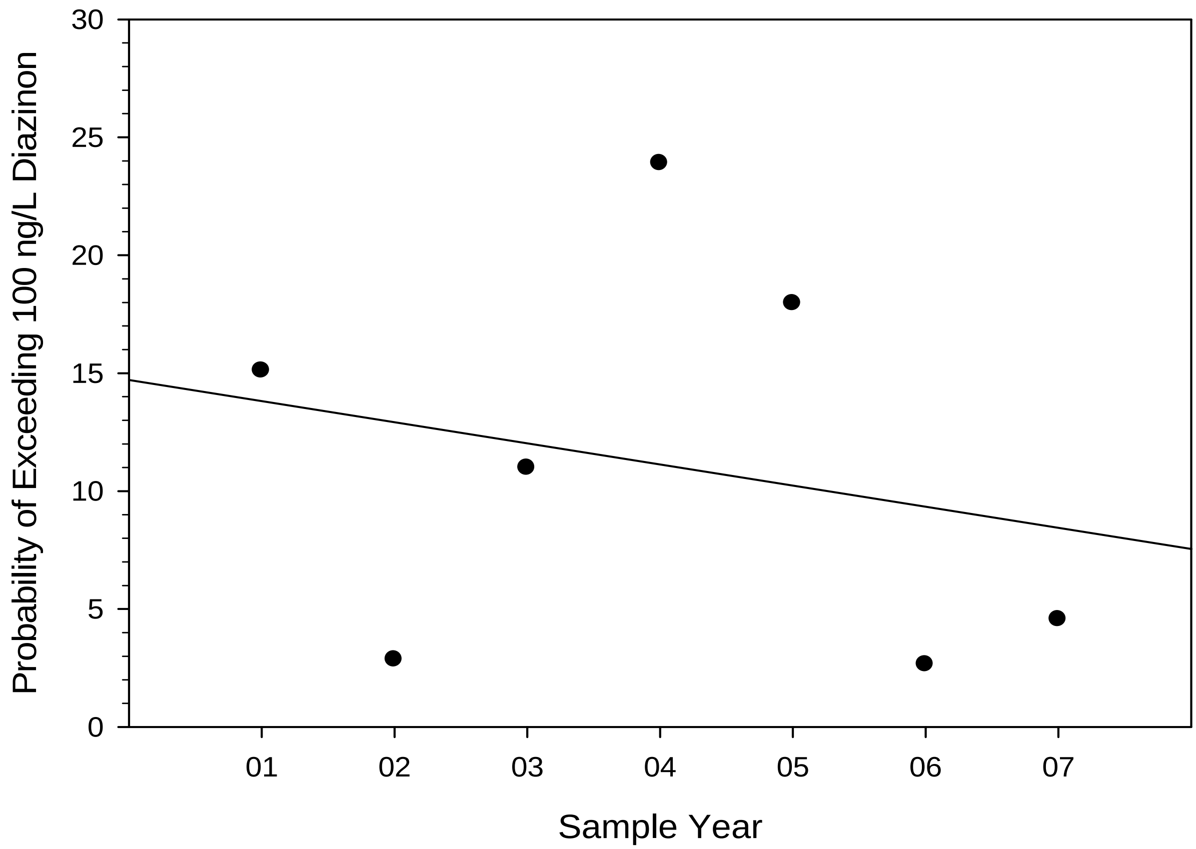


Figure 29. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all mainstem sites during the dormant season from 2001 to 2007 (r^2=0.314; P=0.325).

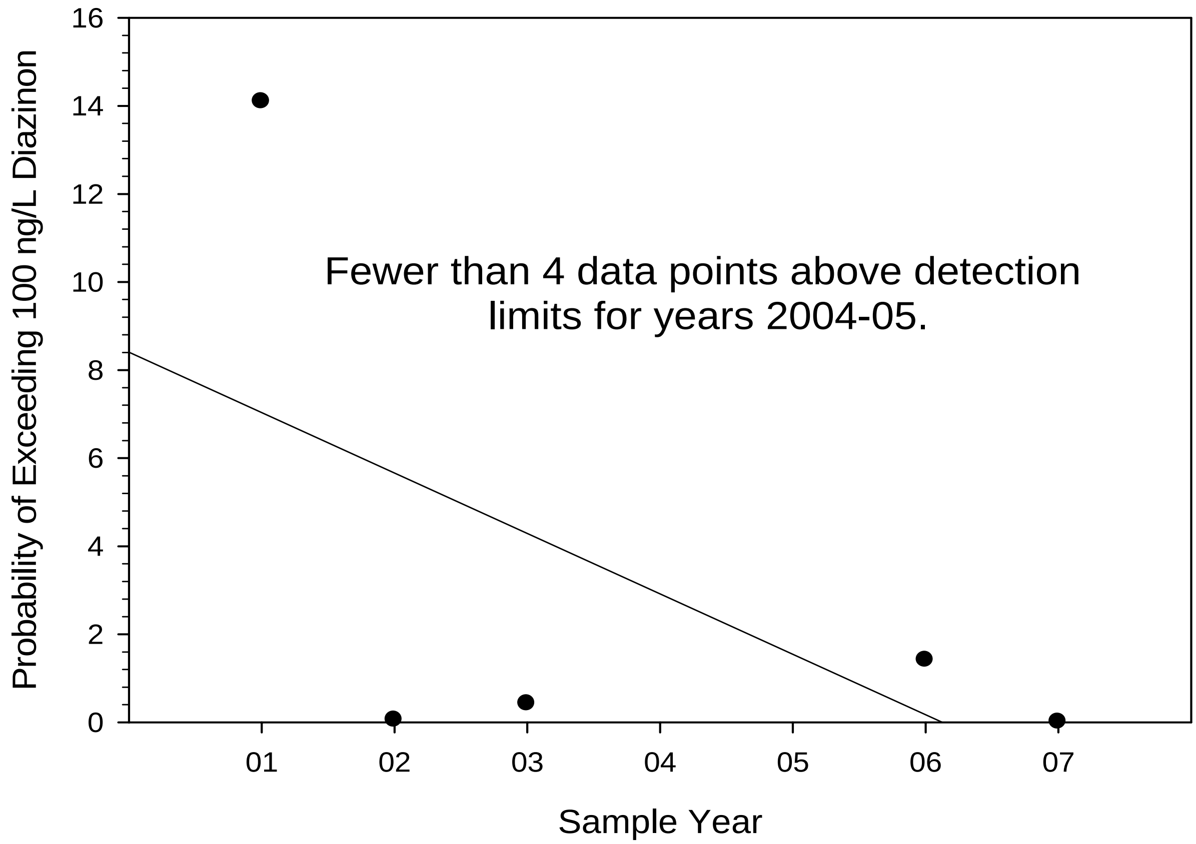


Figure 30. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all tributary sites during the dormant season from 2001 to 2007 (r^2=0.106; P=0.475).

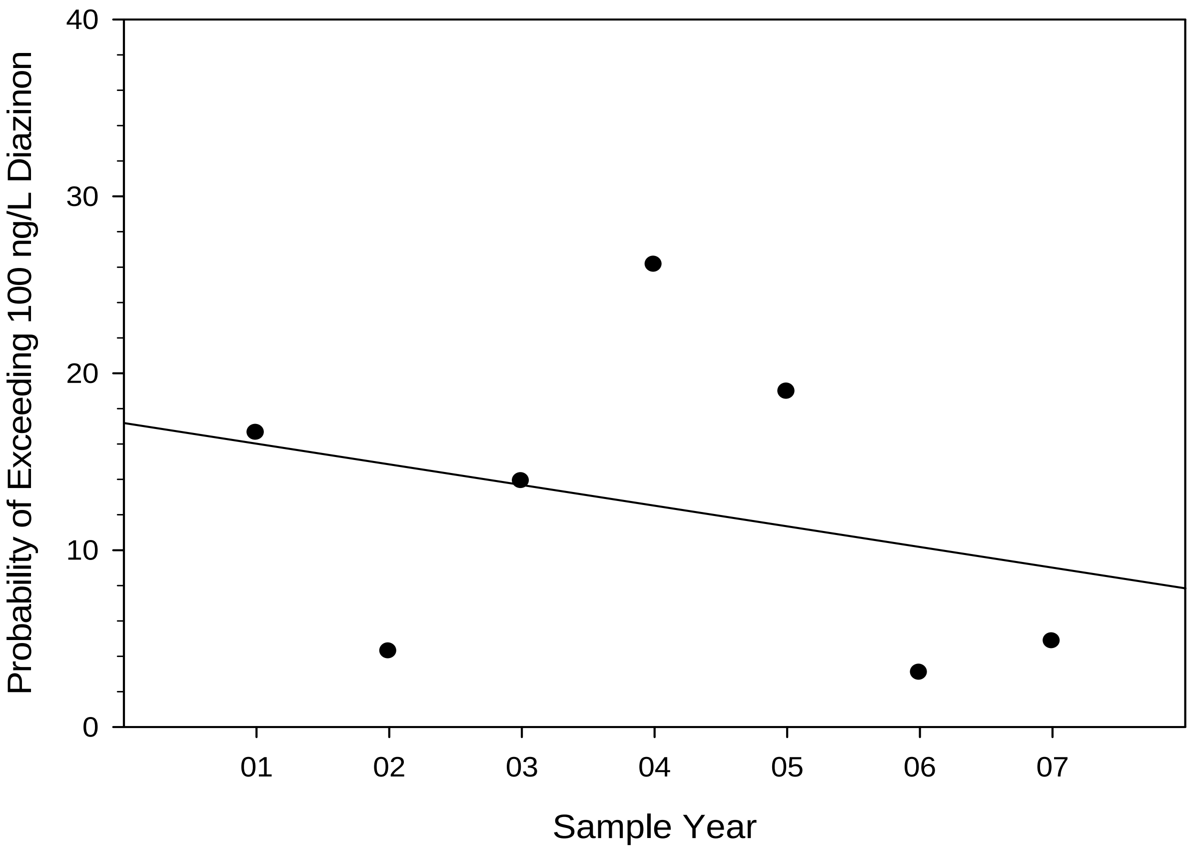


Figure 31. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all sites during the irrigation season from 2001 to 2007 (r^2=0.398; P=0.129).

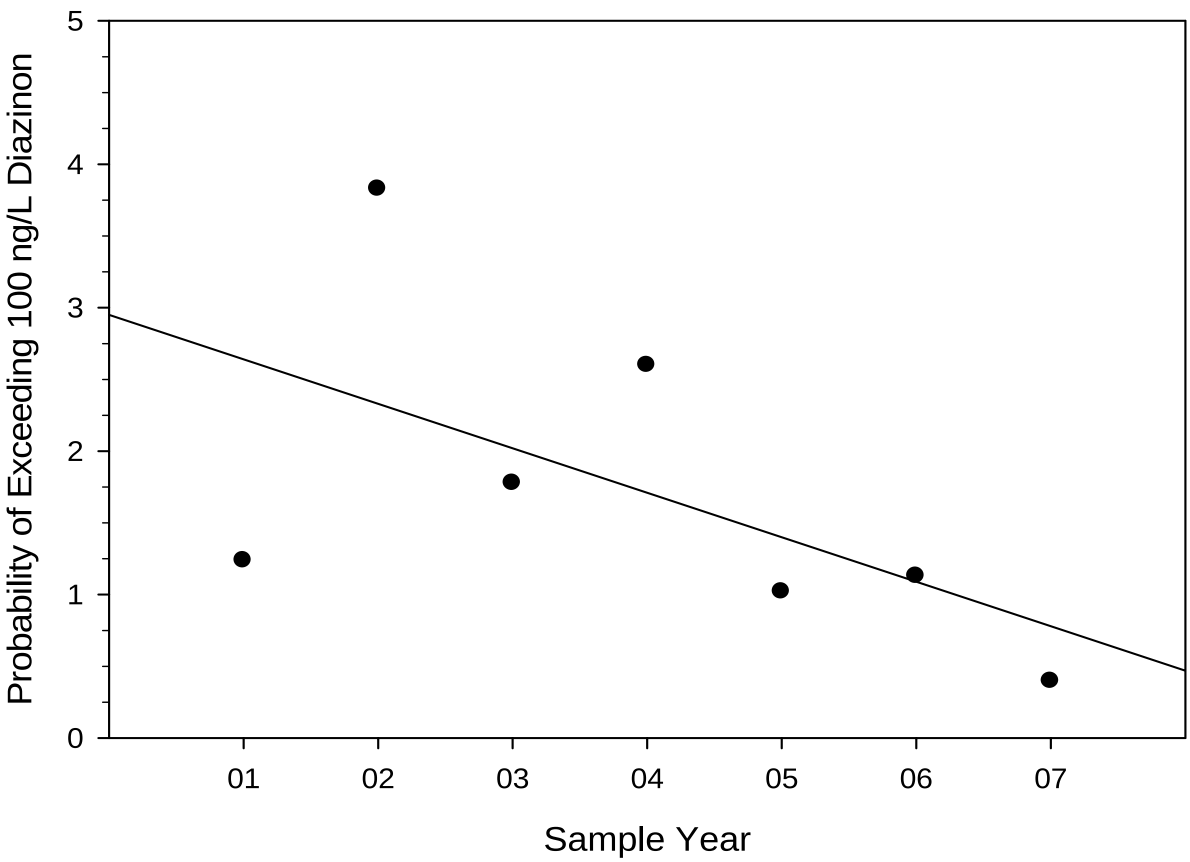


Figure 32. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all mainstem sites during the irrigation season from 2001 to 2007 (r^2=0.303; P=0.450).

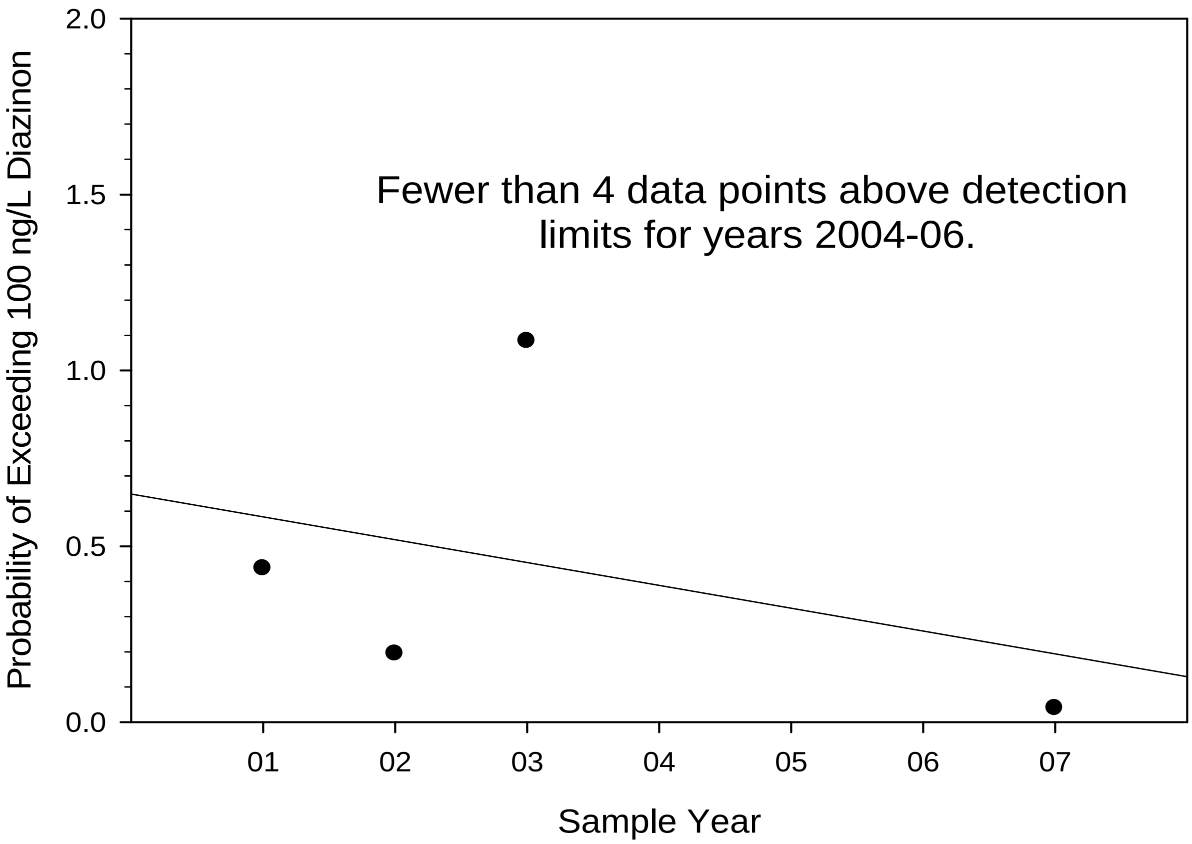


Figure 33. Regression analysis of annual probability of exceeding the diazinon target (100 ng/l) for all tributary sites during the irrigation season from 2001 to 2007 (r^2=0.572; P=0.048).

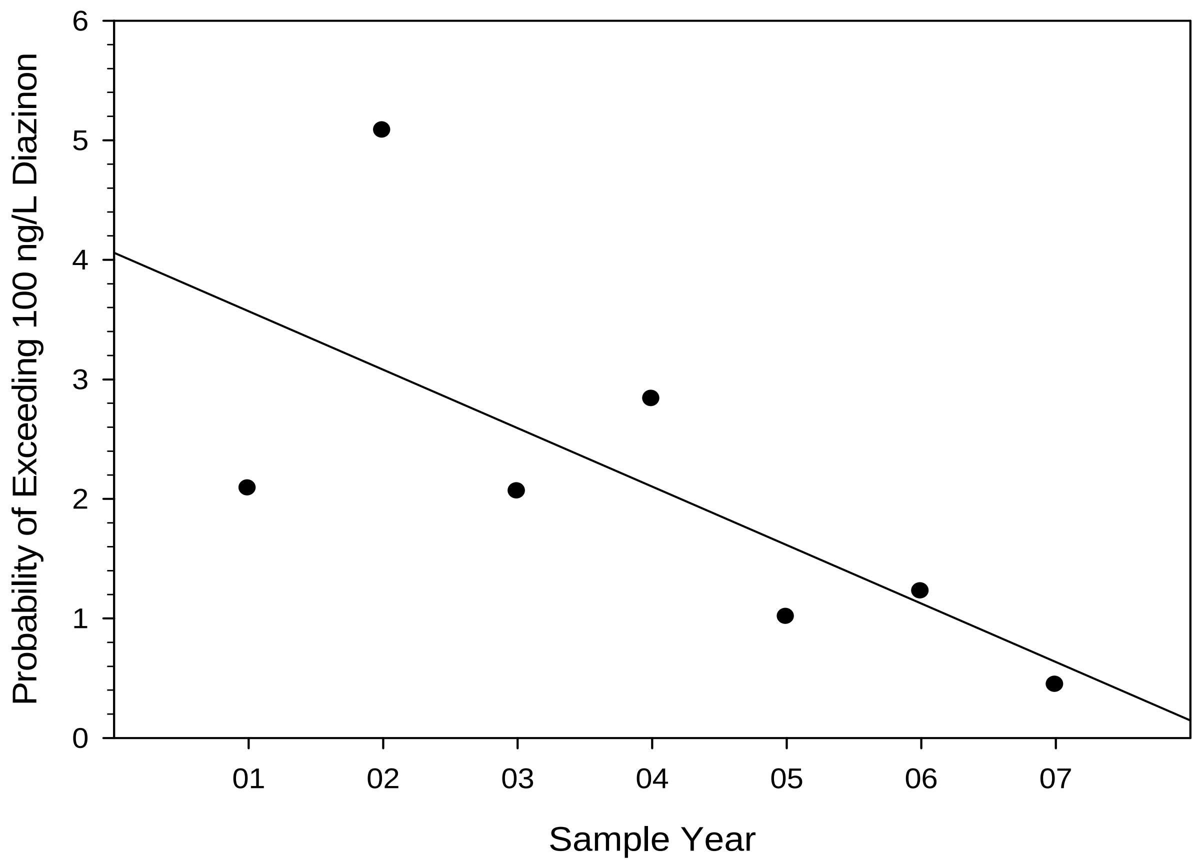


Figure 34. Regression analysis of annual 90th centiles for all sites from 2001 to 2007 (r^2=0.550; P=0.056).

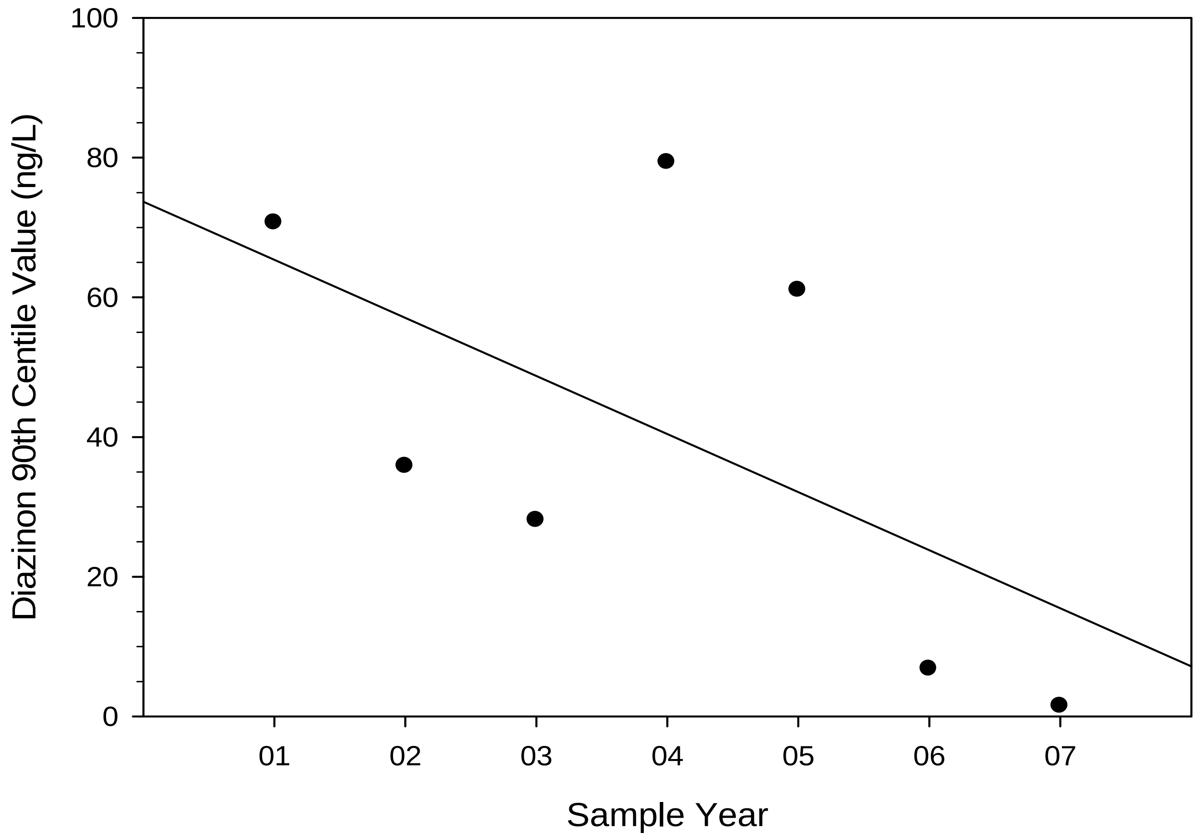


Figure 35. Regression analysis of annual 90th centiles for all mainstem sites from 2001 to 2007 (r^2=0.732; P=0.030).

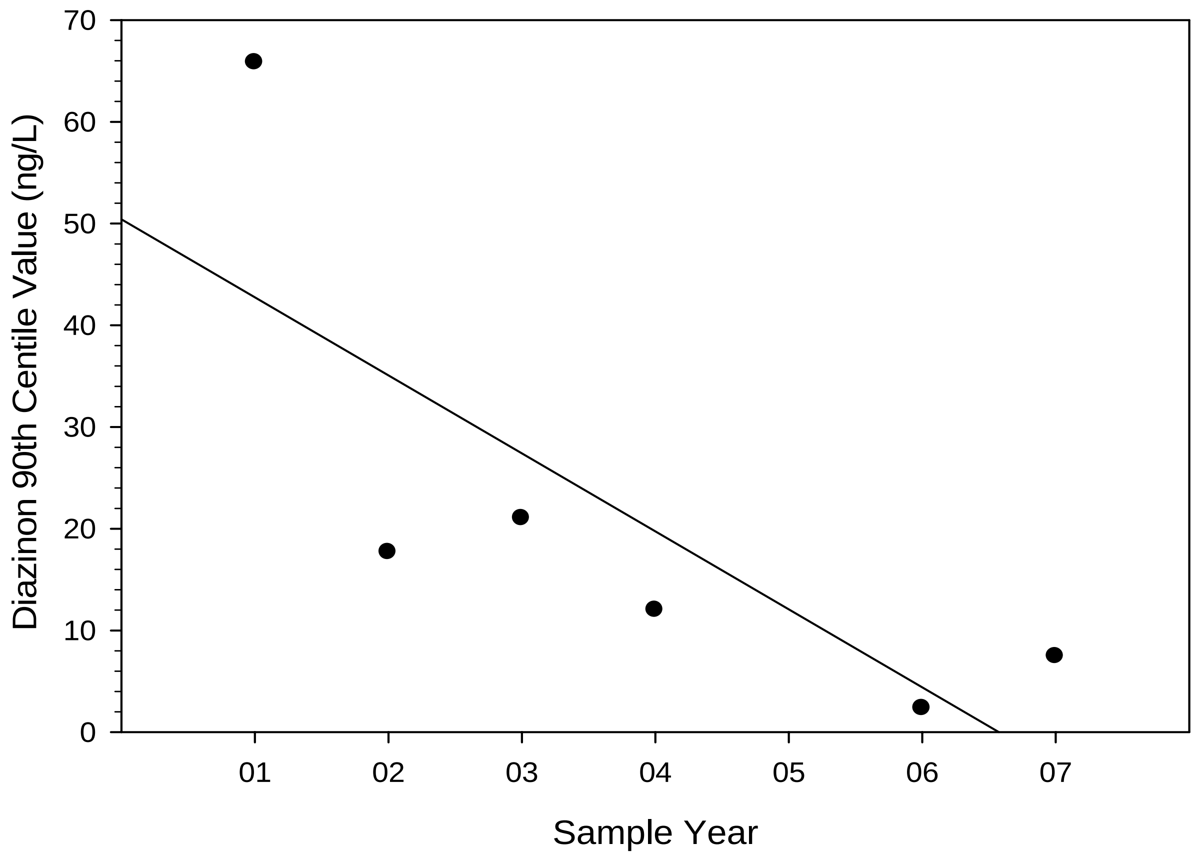


Figure 36. Regression analysis of annual 90th centiles for all tributary sites from 2001 to 2007 (r^2=0.546; P=0.058).

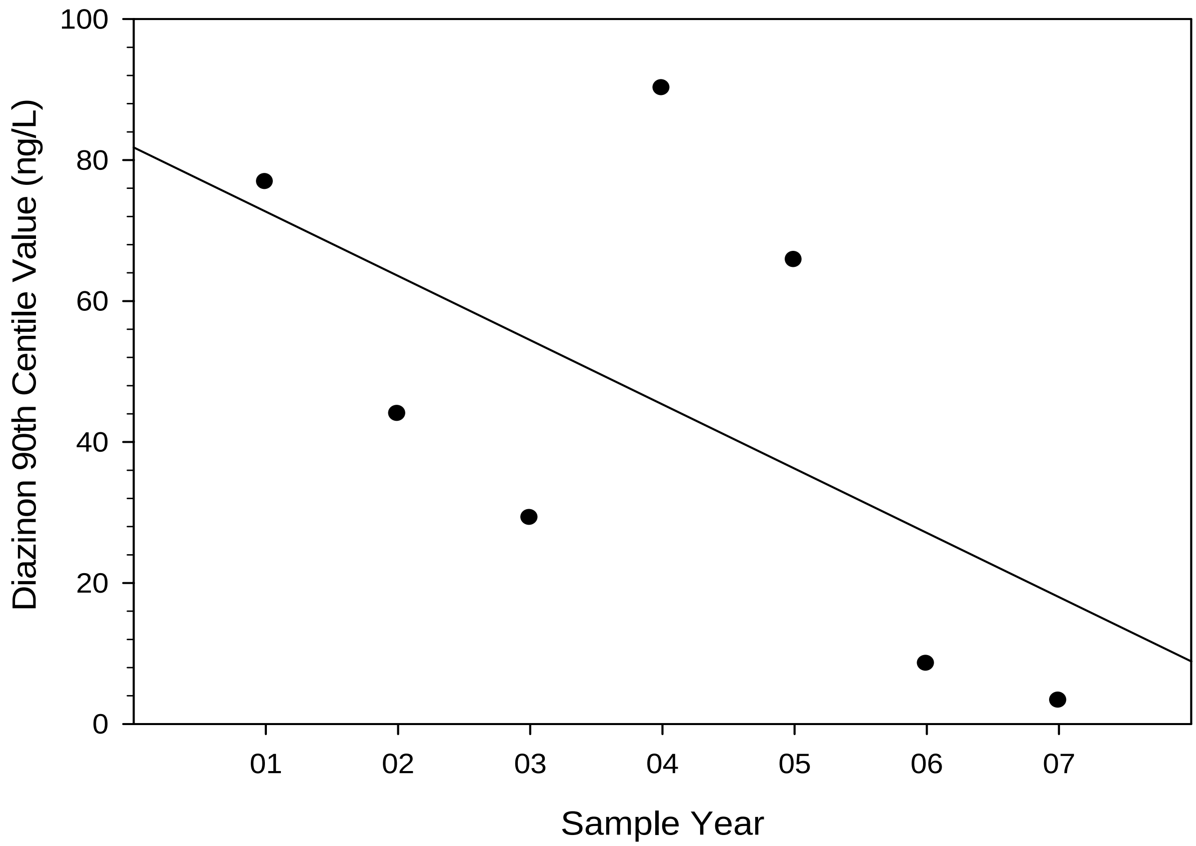


Figure 37. Regression analysis of annual 90th centiles for all sites during the dormant season from 2001 to 2007 (r^2=0.229; P=0.278).

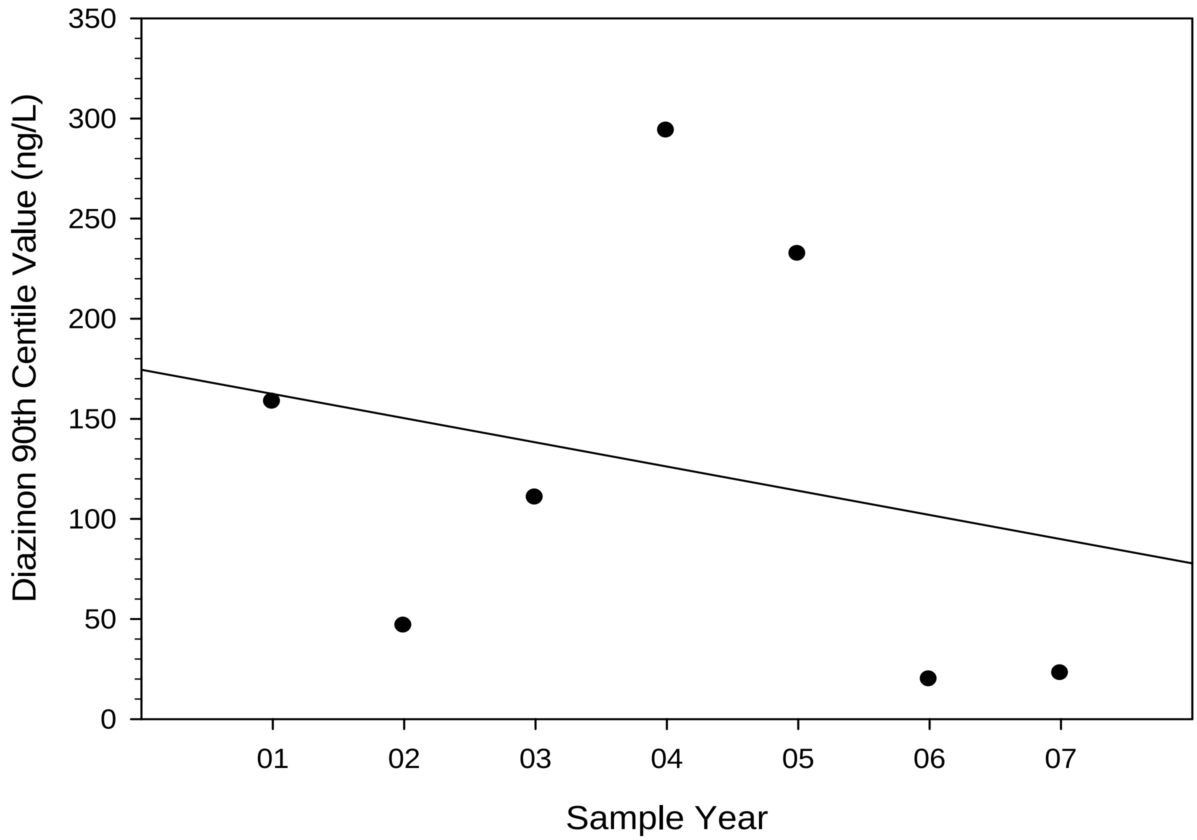


Figure 38. Regression analysis of annual 90th centiles for all mainstem sites during the dormant season from 2001 to 2007 (r^2=0.770; P=0.050).

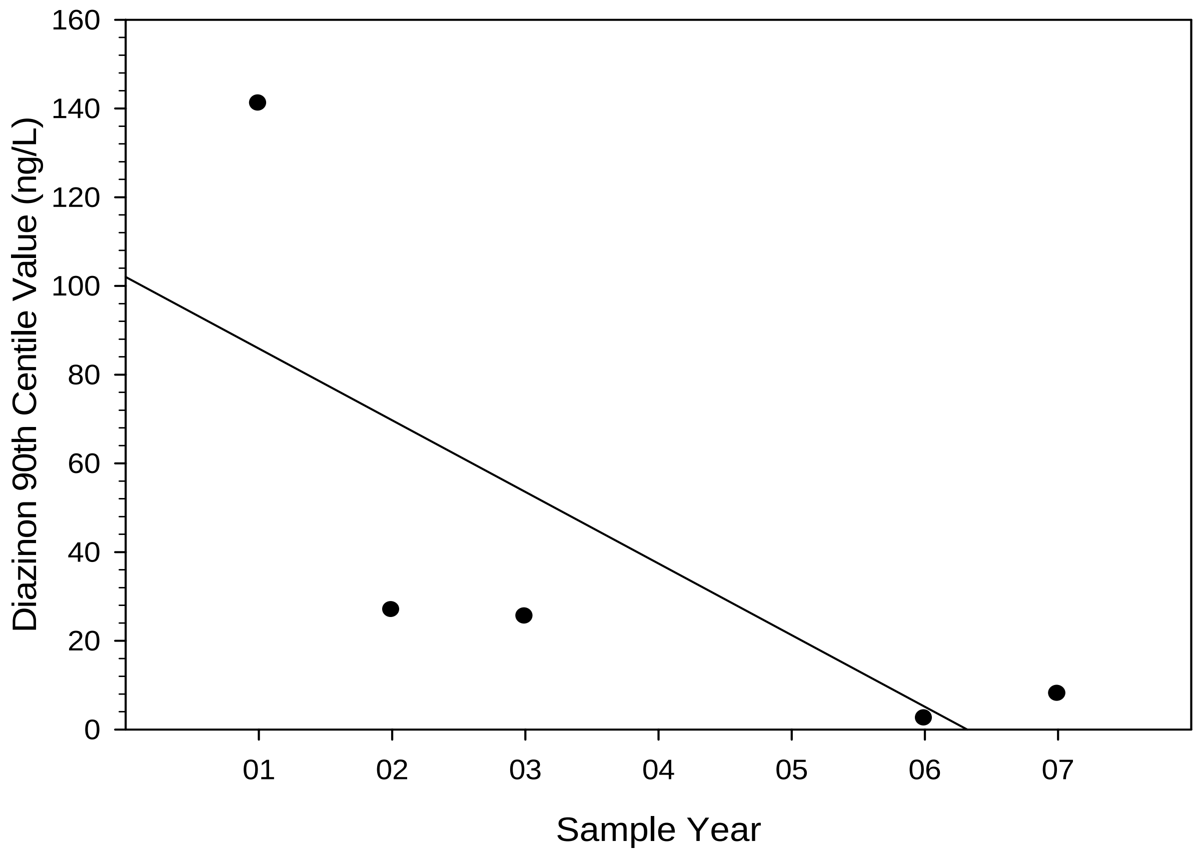


Figure 39. Regression analysis of annual 90th centiles for all tributary sites during the dormant season from 2001 to 2007 (r^2=0.175; P=0.350).

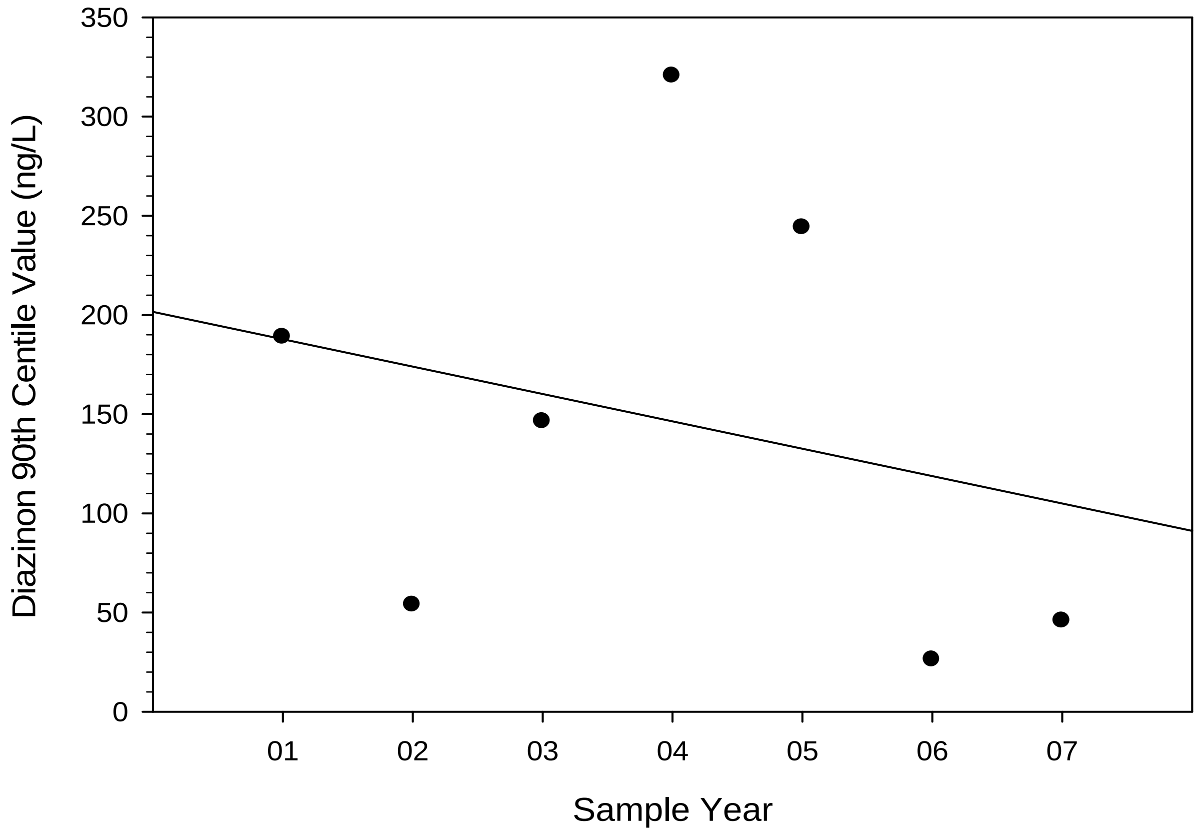


Figure 40. Regression analysis of annual 90th centiles for all sites during the irrigation season from 2001 to 2007 (r^2=0.930; P<0.001).

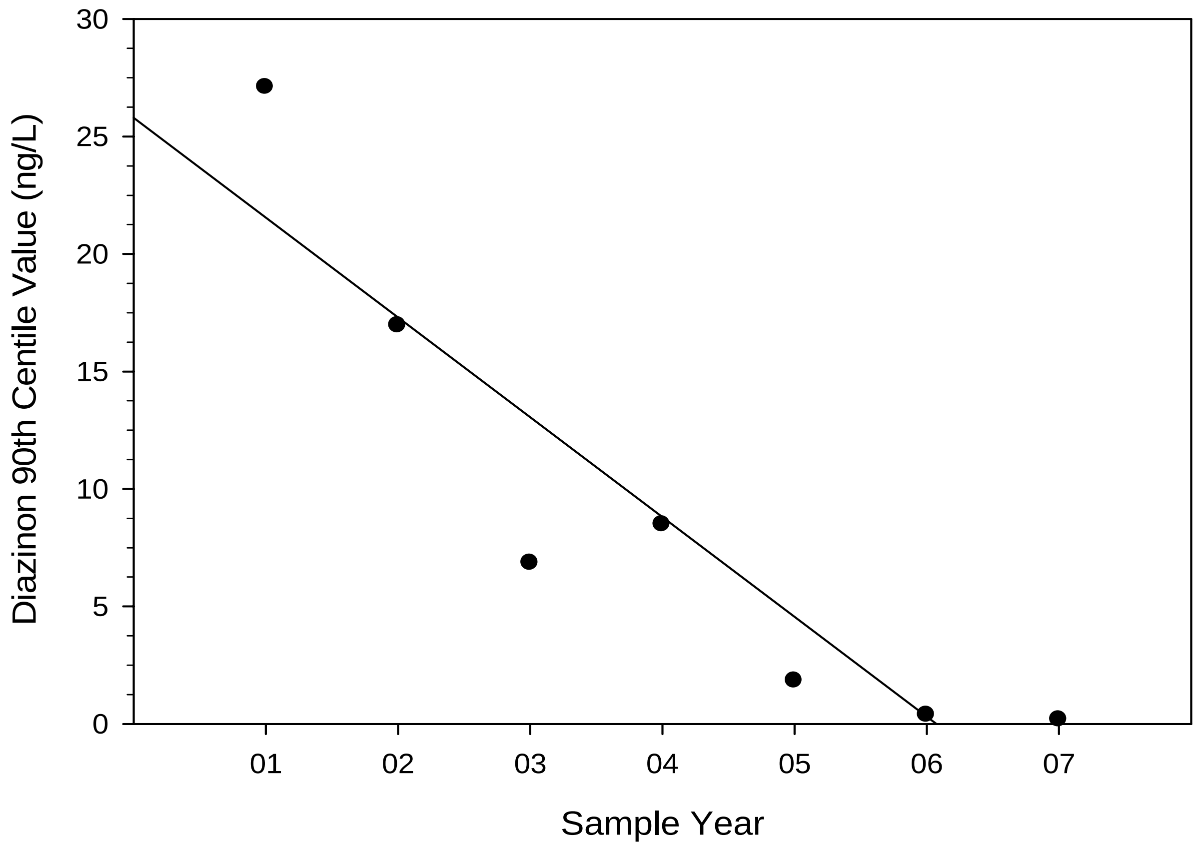


Figure 41. Regression analysis of annual 90th centiles for all mainstem sites during the irrigation season from 2001 to 2007 (r^2=0.475; P=0.310).

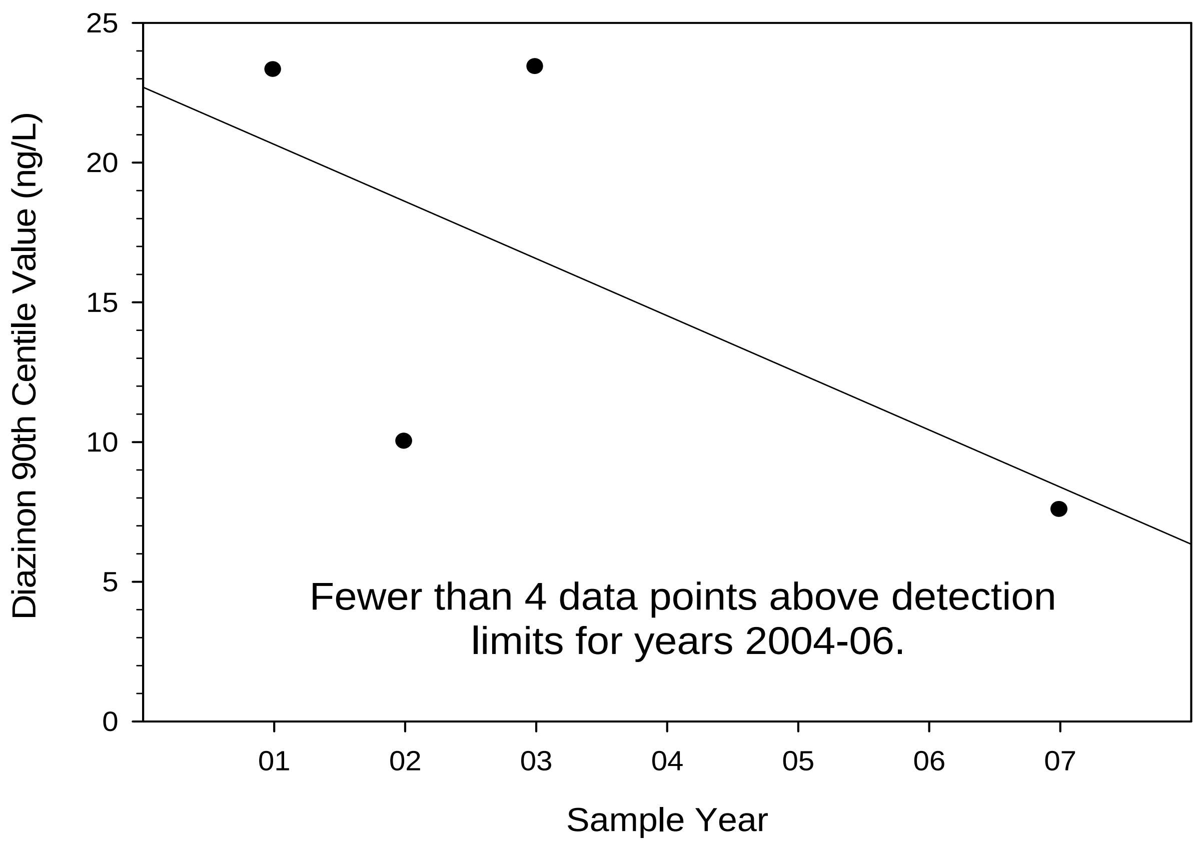


Figure 42. Regression analysis of annual 90th centiles for all tributary sites during the irrigation season from 2001 to 2007 (r^2=0.860; P=0.003).