471274-00

Bayer CropScience

May 14, 2007

Ms. Venus Eagle, PM Team 1
Registration Branch
Office of Pesticide Programs
U.S. Environmental Protection Agency
One Potomac Yard
2777 S. Crystal Drive
Arlington, Virginia 22202

Methamidophos (EPA Reg No. 264-741). Submission of Report on Effects Determination for the California Red-legged Frog Exposed to Methamidophos.

Bayer CropScience
RTP
P.O. Box 12014
RTP, NC 27709
Tel 919 549-2000

Dear Ms. Eagle:

The California red-legged frog (Rana aurora draytonii) is endemic to California and Baja California, Mexico and is listed as a threatened species.
The U.S. Environmental Protection Agency (EPA) must determine whether 66 pesticides currently authorized for use in California may adversely affect the California red-legged frog (CRLF). The purpose of this assessment is to make an "effects determination" for the federally listed California red-legged frog for direct and indirect effects associated with exposure to the insecticide methamidophos. The effects determination focuses on methamidophos containing products that are produced by Bayer CropScience and that are registered for use in California.

The information presented in this report summarizes the risk conclusions and effects determination for the CRLF.

The risk quotients derived in the effects determination using scenarios appropriate for California indicate that aquatic-phase California red-legged frogs and their prey items are not likely at risk from exposure to methamidophos from the application of Monitor® 4 according to the label permitted uses (potato, cotton & tomato) for California.
The risk quotients derived from a refined effects determination indicate that terrestrial phase California red-legged frogs and their prey items may be at risk from exposure to methamidophos from the application of Monitor ® 4. However, after considering the geospatial analysis for the use of a methamidophos in California in relation to the observations of the CRLF in the state the likelihood of effects is low. Thus, an effect determination of "may effect, but unlikely to adversely effect" the aquatic California red-legged frogs, terrestrial-phase California red-legged frogs and their prey is made.

We are submitting three copies of the following study:

Kern M.; Ramanarayanan T .and Rupprecht K. (2007), Effects Determination for the California Red-legged Frog Exposed to Methamidophos. Bayer CropScience, Research Triangle Park, Study Number EBTAY001. April 17, 2007. 94 pages.

Please phone me at (919) 549-2156 or e-mail at Sherry.Movassaghi@bayercropscience.com if you have any questions.

Sincerely,

Sherry Movassaghi

Sherry Movassaghi, Ph.D.
Registration Manager

Bayer CropScience

DOCUMENT 1

TRANSMITTAL DOCUMENT

Submission of Effects Determination for the California Red-legged Frog Exposed to Methamidophos

TRANSMITTAL DATE

May 14, 2007

Bayer CropScience
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RTP, NC 27709
Tel 919 549-2000

Sherry Movassaghi

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BIBLIOGRAPHY OF SUBMITTED DATA

Document 1 **MRID Number:**

Transmittal Document

Document 2 **MRID Number:** 47127401

Kern M.; Ramanarayanan T .and Rupprecht K. (2007), Effects Determination for the California Red-legged Frog Exposed to Methamidophos. Bayer CropScience, Research Triangle Park, Study Number EBTAY001. April 17, 2007. 94 pages.

471274-01

Volume 2 of 2

Bayer CropScience

EBTAY001

STUDY TITLE

Effects Determination for the California Red-legged Frog
Exposed to Methamidophos

DATA REQUIREMENTS

FIFRA Guideline: None

AUTHORS

M. Kern, T. Ramanarayanan and K. Rupprecht

STUDY COMPLETION DATE

April 17, 2007

SPONSOR

Bayer CropScience
2 TW Alexander Drive
Research Triangle Park, NC 27709

BAYER REPORT NUMBER

EBTAY001

Bayer CropScience

STATEMENT OF NO DATA CONFIDENTIALITY

No claim of confidentiality is made for any information contained in this study on the basis of its falling within the scope of FIFRA 10(d)(1)(A), (B) or (C).

Company: Bayer CropScience

Company Agent: Sherry Movassaghi Date: April 17, 2007

Sherry Movassaghi,
Regulatory Manager

These data are the property of Bayer CropScience, and as such, are considered to be confidential for all purposes other than compliance with FIFRA 10. Submission of these data in compliance with FIFRA does not constitute a waiver of any right to confidentiality, which may exist under any other statute or in any other country.

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GOOD LABORATORY PRACTICE CERTIFICATION

Good laboratory practice requirements of 40 CFR Part 160 is not required for, and do not apply to the study described in this document, which is an ecological risk assessment.

Sponsor/Submitter: Bayer CropScience

Sherry Movassaghi Date: 4/17/2007

Sherry Movassaghi,
Regulatory Manager

Study Director: Matt Kern Date: April 17, 2007

Matt Kern,
Product Responsible Scientist

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1.0 Background

The California red-legged frog (*Rana aurora draytonii*) is endemic to California, and Baja California, Mexico. The species has been extirpated from 70 percent of its former range. Populations remain in approximately 256 streams or drainages in 28 counties in California. The Endangered Species Act (ESA) is the primary Federal law that provides protection for the California red-legged frog, given its listing as a threatened species in 1996.

The U.S. Environmental Protection Agency (EPA) must determine whether 66 pesticides currently authorized for use in California may adversely affect the California red-legged frog (CRLF). These effects determinations must be completed in three years in accordance with a recent settlement agreement. The purpose of this assessment is to make an "effects determination" for the federally listed California red-legged frog for direct and indirect effects associated with exposure to the insecticide mthamidophos. The effects determination focuses on methamidophos containing products that are produced by Bayer CropScience and that are registered for use in California.

2.0 Introduction

Methamidophos *O,S*-Dimethyl phosphoramidothioate (CAS No. 10265-92-6) is one of the 66 pesticides under investigation. Methamidophos was first registered for use in 1972. It is a broad spectrum non-fumigant systemic/contact organophosphate insecticide sold only in an emulsifiable concentrate form under the sole trade name MONITOR 4®. Methamidophos is used as a foliar treatment applied during the growing season to control a variety of insect pests. Multiple foliar applications are used with application rates and timing dependant on the pest being controlled. Currently, there are agriculture crop registrations for potato, cotton and tomatoes in California. All tomato registrations are Special Local Need (SLN) registrations (also referred to as FIFRA 24(c) registrations). Methamidophos is a restricted use pesticide only to be applied by certified applicators, or persons under there direct supervision, holding certification for these uses. Products containing methamidophos are not intended for sale to homeowners and there are no uses registered for residential areas.

The purpose of this assessment is to make an "effects determination" for CRLFs exposed to methamidophos. The following assessment endpoints were evaluated: (1) direct toxic effects of methamidophos on the survival, reproduction, and growth of the CRLF; (2) indirect effects to CRLF prey resulting in reduced food supply; and (3) indirect effects resulting from habitat modification (e.g., aquatic vascular plants). As part of the effects determination a conclusion of "no affect", "may affect, but not likely to adversely affect", or "likely to adversely affect" will be assigned to each of the assessment endpoints.

This effects determination was completed in accordance with guidance and methods described in the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS)

Endangered Species Consultation Handbook (USFWS/NMFS, 1998), the August 5, 2004 Joint Counterpart Endangered Species Act Section 7 Consultation Regulations specified in 50 CFR Part 402 (USFWS/NMFS, 2004a; FR 69 47732-47762), the effects determinations for Barton Springs salamanders (EPA, 2006a), Alabama sturgeon (EPA, 2006b) and six Federally listed endangered species in Chesapeake Bay (EPA, 2006c), the Agency's Overview Document (EPA, 2004), and the generic problem formulation document prepared CropLife America (CEI, 2006).

3.0 Problem Formulation

The objective of this problem formulation is to identify the routes of exposure, assessment endpoints, measures of exposure and effect, and exposure scenarios that will be assessed. The assessment builds upon past assessments of methamidophos, including the EPA EFED assessments (EPA 1999 & 2002).

The problem formulation includes the information used to create a generic conceptual model, and identify assessment endpoints and measures of exposure and effects. The information is also used to develop the exposure scenarios that will be assessed in the analysis and risk characterization phases of the effects determination. The problem formulation concludes with an analysis plan outlining the approach that will be used to assess risks to the CRLF.

3.1 Use Patterns

Methamidophos is applied by aerial or ground spray applications. It is registered as an emulsifiable concentrate containing 4 lbs ai per gallon. Maximum application rates are 1.0 lb ai/A for all crops. Maximum number of applications for all crops (cotton, potatoes and tomatoes) are 4 per year. Applications for cotton should be up to 50 days before harvest and before bolls open. For potatoes it is recommended that methamidophos be applied in a 7 to 10 day preventative program. No application should occur later than 14 days before harvest. Uses are outlined in Table 1. These uses also represent those registered in California.

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Table 1. Crop uses and application rates for Monitor® 4 Liquid Insecticide				
Crop/Time of Application	Range of Application Rates (lbs a.i./Acre)	Application Method	Maximum Applications per season	Application Instructions
Cotton				
Foliar up to 50 days before harvest, before bolls open	0.1 to 1.0 (pest dependant)	Aerial or ground spray	4	Do not exceed total of 4 lbs a.i./acre/season
Potatoes				
7- to 10- day preventive program or as necessary, not to be applied later than 14 days before harvest	0.75 to 1.0	Aerial or ground spray	4	Do not exceed total of 4 lbs a.i./acre/season
Tomatoes				
7- to 10- day application intervals, not to be applied within 7 days of harvest	1.0	Aerial or ground spray	4	Do not exceed total of 4 lbs a.i./acre/season

The MONITOR®4 label clearly outlines requirements for reducing spray drift of methamidophos (see below). Further, the label makes it clear that the product should not be applied directly to water or to areas where surface water is present.

MONITOR®4Label Statement:

Do not apply under conditions where possible drift to unprotected persons or to foof, forage, or other plantings that might be damaged or the crops thereof rendered unfit for sale, use or consumption can occur.

1. *For aerial applications, the spray boom should be mounted on the aircraft so as to minimize drift caused by wing tip vortices. The minimum practical boom length should be used and must not exceed 75% of the wing span or rotor diameter.*
2. *Use the largest droplet size consistent with acceptable efficacy. Formation of very small droplets may be minimized by appropriate nozzle selection, by orienting nozzles away from the air stream as much as possible and by avoiding excessive spray boom pressure.*
3. *For aerial application, spray should be released at the lowest hight consistent with efficacy and flight safety. Applications more than 10 feet above the crop canopy should be avoided.*
4. *Make aerial or ground applications when the wind velocity favors on-target product deposition (approximately 3 to 10 mph). Do not apply when wind velocity exceeds 15 mph. Avoid applications when wind gusts approach 15 mph.*
5. *Do not make aerial or ground applications during temperature inversions. Inversions are characterized by stable air and increasing temperatures with increasing distance above ground. Mist or fog may indicate the presence of an inversion in humid areas. The applicator may detect the presence of an inversion by producing smoke and observing a smoke layer near the ground surface.*
6. *Low humidity and high temperatures increase the evaporation rate of spray droplets and therefore the*

likelihood of increased spray drift. Avoid spraying during conditions of low humidity and/or high temperature.

7. *Do not apply within 150 feet by air or 100 feet by ground of any unprotected person(s) or occupied dwelling.*
8. *All aerial and ground application equipment must be properly maintained and calibrated using appropriate carriers.*

3.1.1 Methamidophos Use in California

The California Pesticide Use Database (CPUR) is one of the most extensive pesticide use databases available (see http://www.cdpr.ca.gov/docs/pur/purmain.htm) (Cal DPR, 2001-2005). Since 1995, all agricultural pesticide use in California must be reported monthly to the county agricultural commissioner who, in turn, reports the data to the California Department of Pesticide Regulation (Cal DPR). These reports include the date and location (section, township, and range) where the application was made, the kind and amount of pesticides used and, if the pesticide is applied to a crop, the type of commodity. Identification numbers (IDs) for the site and the pesticide user ("operator") and the number of planted and treated acres (Cal DPR, 2000) are included. Before buying or using pesticides, every operator is required to obtain a unique operator ID from each county where pest control work will be performed. Growers obtain a site ID from the county agricultural commissioner for each location and crop/commodity where pest control work is anticipated, and it is recorded on the restricted material permit or other approved form. California has a broad definition of "agricultural use". Thus, reporting requirements include pesticide applications to parks, golf courses, cemeteries, rangeland, pastures, and along roadside and railroad rights-of-way. In addition, all post-harvest pesticide treatments of agricultural commodities must be reported, along with all pesticide treatments in poultry and fish production, and some livestock applications. Exceptions to the full use reporting requirements are home and garden use and most industrial and institutional uses (Cal DPR, 2000).

Data for methamidophos were downloaded from the CPUR database and imported into MS-Access 2003. Total methamidophos use data from 2001 to 2005 were then queried to determine the amount of methamidophos (all products), as active ingredient and formulated product, used in each California (Table 2).

Table 2. Methamidophos agriculture use in California during 2001-2005.	
Use Data Year	Applied (lbs)
2001	47857
2002	30611
2003	34545
2004	31124
2005	37837
Minimum	**30611**
Maximum	**47857**
Mean	**36395**

Source: Cal DPR, 2001-2005; CNDDB, 2006; US DOI, 2006.

As discussed earlier, current labeling and registrations in the state of California for methamidophos are for cotton, potatoes and tomatoes. Total use (2001-2005) of these crops in California are presented in Table 3.

Table 3. Methamidophos use in California by currently labels crops (cotton, potatoes, tomatoes) during 2001-2005.

	Applied (lbs)		
Use Data Year	Cotton	Potatoes	Tomatoes
2001	7,867	4,862	14729
2002	5035	7101	11367
2003	6755	6426	15828
2004	9201	5569	6743
2005	9458	3274	9689
Minimum	**5035**	**3274**	**6743**
Maximum	**9458**	**7101**	**15828**
Mean	**7663**	**5446**	**11671**

Source: Cal DPR, 2001-2005; CNDDB, 2006; US DOI, 2006.

This data was then broken down to determine the amount of methamidophos used on agriculture in the state of California on a county level from 2001-2005. This information is presented in Table 4. In addition, CRLF location by critical habitat and observations are presented in this table.

Table 4. Methamidophos agriculture use totals (lbs) in California by county during 2001-2005 and CRLF locations.

County	Presence of CRLF Critical Habitat[1]	CRLF Observations (1996-2006)[2]	2001	2002	2003	2004	2005	Min	Max	Mean
COLUSA	No	No	34	0	96	0	232	**0**	**232**	**72**
FRESNO	No	Yes	21,357	9,925	11,711	14,210	15,290	**9,925**	**21,357**	**14,498**
IMPERIAL	No	No	5,347	1,435	1,610	1,186	152	**152**	**5,347**	**1,946**
KERN	Yes	No	1,021	1,285	595	1,425	1,551	**595**	**1,551**	**1,176**
KINGS	Yes	No	3,694	637	939	3,409	9,592	**637**	**9,592**	**3,655**
LAKE	No	No	32	0	0	0	0	**0**	**32**	**6**
LOS ANGELES	Yes	Yes	235	0	378	863	0	**0**	**863**	**295**
MADERA	No	No	33	0	0	106	0	**0**	**106**	**28**
MERCED	Yes	Yes	2,752	546	868	815	1,139	**546**	**2,752**	**1,224**
MODOC	No	No	410	2,608	3,437	2,034	2,297	**410**	**3,437**	**2,157**
MONTEREY	Yes	Yes	967	604	0	17	11	**0**	**967**	**320**
ORANGE	No	No	26	220	0	0	0	**0**	**220**	**49**
RIVERSIDE	No	Yes	556	0	0	269	328	**0**	**556**	**231**
SACRAMENTO	No	No	296	334	425	222	16	**16**	**425**	**259**
SAN DIEGO	No	No	1,006	1,412	882	1,212	0	**0**	**1,412**	**903**
SAN JOAQUIN	No	Yes	2,276	1,823	1,063	488	972	**488**	**2,276**	**1,324**
SAN LUIS OBISPO	Yes	Yes	0	0	74	0	0	**0**	**74**	**15**
SAN MATEO	Yes	Yes	0	0	56	0	0	**0**	**56**	**11**
SANTA BARBARA	Yes	Yes	816	439	660	619	0	**0**	**816**	**507**
SISKIYOU	No	No	145	1,896	1,299	917	367	**145**	**1,896**	**925**
SOLANO	Yes	Yes	890	1,401	1,023	105	285	**105**	**1,401**	**741**
STANISLAUS	Yes	Yes	385	23	708	74	0	**0**	**708**	**238**
SUTTER	No	No	2,183	1,715	1,541	910	0	**0**	**2,183**	**1,270**
TULARE	No	No	98	0	0	0	0	**0**	**98**	**20**
VENTURA	Yes	Yes	125	45	97	273	1,387	**45**	**1,387**	**385**
YOLO	No	No	3,172	4,264	7,083	1,971	4,217	**1,971**	**7,083**	**4,141**

[1] - Indicates presence of CRLF Critical Habitat as defined by F&WS April 2006 (US DOI, 2006).
[2] - Indicates observations of CRLFs from April 1996 to May 2006 (CNDDB, 2006)

3.2 Physical and Chemical Properties of Methamidophos

Methamidophos is a colorless to white crystalline solid with a strong mercaptan-like odor. It is an organophospate insecticide. Methamidophos and its metabolites are presented in Table 5.

Table 5. Methamidophos and its metabolites

Chemical	CAS Number	PC Code Number	Chemical names and synonyms
Methamidophos	10265-92-6	101201	*O,S*-Dimethyl phosphoramidothioate
O-Desmethyl methamidophos	17808-29-6	-	S-methyl phosphoramidothioate
DMPT	42576-53-4	-	*O,S*-Dimethyl phosphorothioate; desamino-methamidophos; deaminated methamidophos
Methyl mercaptan	-	-	Methyl mercaptan
Dimethyl disulfide	-	-	Dimethyl disulfide
Methyl disulfide	-	-	Methyl disulfide

The physical and chemical properties of methamidophos are presented in Table 6. Information on metabolites of methamidophos and physical chemical properties of methamidophos are taken directly from EFED assessments unless otherwise indicated by a specific reference (EPA, 1999 & 2002). Methamidophos is sold under the trade name Monitor® 4 *Liquid Insecticide* (registration number 264-729) and is only produced as an emulsifiable concentrate containing 40% active ingredient gallon.

Table 6. Physical and chemical properties of Methamidophos

Physical – Chemical Property	Methamidophos
Chemical Name	*O,S*-Dimethyl phosphoramidothioate
Common Name	Methamidophos
CAS No.	10265-92-6
Molecular Formula	$C_2H_8NO_2PS$
Molecular Weight	141.14 g/mol
Density	1.343 g/mL at 20°C (Technical)
Physical State	Clear colorless liquid at 23°C (Technical)
Odor	Pungent, mercaptan-like (Technical)
Melting Point	N/A (Technical)
Boiling Point	Decomposes above 150°C
Vapor Pressure	2.3×10^{-5} hPa at 20°C [1.725×10^{-5} mm Hg]
Water Solubility	> 200 g/L
Henry's Law Constant	1.6×10^{-11} atm m^3/mole
Octanol-Water Partition Coefficient (K_{ow})	0.16 at 20°C; Log K_{ow} : -0.796

3.3 Exposure Characterization

Data presented in this exposure characterization are taken directly from the EPA assessments unless a specific reference to a study is presented (EPA 1999 & 2002). Some sited information has been generated since the EPA assessments or was not sited at that time.

3.3.1 Environmental Fate Assessment

Brief summaries from environmental fate and metabolism studies conducted for methamidophos are provided in this section and the environmental fate properties of methamidophos are summarized in Table 7.

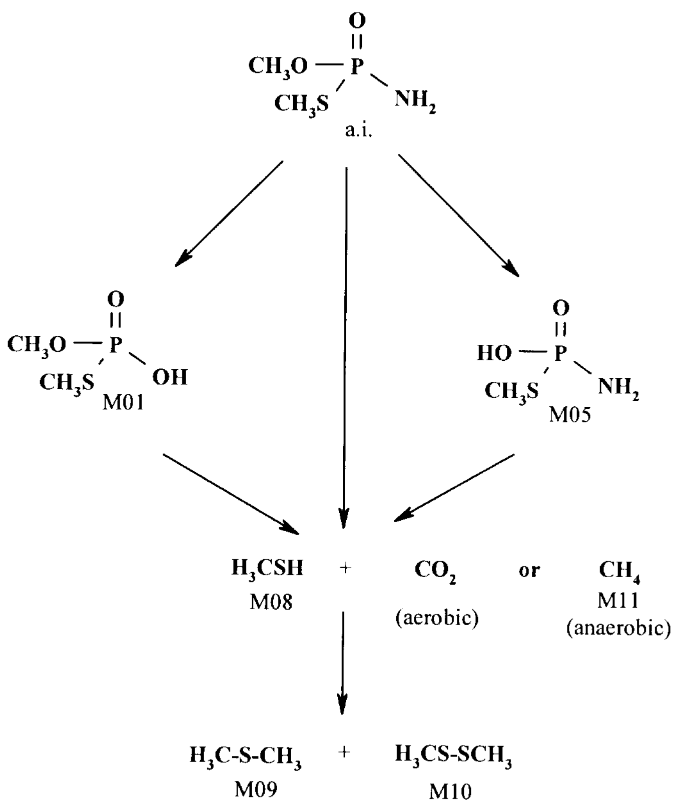
Table 7. Summary of environmental fate properties of Methamidophos

Aqueous Hydrolysis	Half-life: 309 days (pH 5) Half-life: 27 days (pH 7) Half-life: 3 days (pH 9)
Aqueous Photolysis	Half-life: 90 days in sunlight
Soil Photolysis	Half-life: 63 hours
Aerobic Soil Metabolism	Half-life: <1 day
Field Soil Dissipation	Half-life: 0.62 days, DT_{90}: 2.05 days
Adsorption to Soil	K_{oc}: < 1
Aerobic Aquatic Metabolism	4-6 days (two sediments, total system DT_{50})
Anaerobic Aquatic Metabolism	7-13 days (two sediments, total system DT_{50})

3.3.2 Degradation

Aerobic Soil Metabolism

Aerobic soil metabolism is a major degradative process for methamidophos. In the laboratory the soil half life was calculated to be 14 hours in a study conducted using a nominal application rate of 6.5 ppm in a sandy loam soil. This application rate is far above the maximum application rate of 0.5 ppm (concentration in the maximum label rate of 1 lb ai/A). Methamidophos was metabolized to O-desmethyl methamidophos which in turn rapidly metabolized to carbon dioxide via soil microbes (half life < 5 days). DMPT has also been identified as a major metabolite degrading rapidly in soil (half life < 5 days). Figure 1 shows the proposed degradation pathway of methamidophos in soil.



a.i. = methamidophos
M01 = desamino-methamidophos
M05 = S-methyl phosphoramidothioate
M08 = methyl mercaptan
M09 = dimethyl sulfide
M10 = dimethyl disulfide
M11 = methane

Figure 1. Proposed metabolic pathway of methamidophos in soil

Aerobic Aquatic Metabolism

The degradation and metabolism of methamidophos under aerobic aquatic conditions was investigated in the laboratory by Brumhard et al. (1995) in two water/sediment systems. The sediments were classified as loamy silt (Ijzendoorn) and loamy sand (Lienden) with an organic carbon content of 3.18% and 0.42% and a pH (in $CaCl_2$) of 7.3 both, respectively.

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Methamidophos mineralized extensively in both the systems, with 70% to 71% percent of applied radioactivity captured in the volatile traps, of which more than 66% characterized as CO_2. The calculated half-life values (first-order) of methamidophos in the entire sediment/water systems were 4.1 and 5.8, respectively in the two systems.

Anaerobic Aquatic Metabolism

Under anaerobic aquatic conditions methamidophos degrades rapidly to methane and carbon dioxide. The study was conducted with a nominal application rate of 0.224 ppm in a silty clay sediment. The half-life (first-order nonlinear kinetics) for methamidophos in anaerobic water and in the entire system was 6.8 days and 12.6 days, respectively (Mislankar and Dallstream, 2006).

Photodegradation in Soil

Methamidophos photodegrades rapidly on soil. A dark-control-corrected half-life of 62.6 hours was determined for methamidophos on soil irradiated with a mercury vapor lamp. Degradates included desmehtylmethamidophos and DMPT.

Photodegradation in Water

Methamidophos degrades relatively slowly in sterile buffered solution under both artificial and natural light conditions with a calculated half-life of 90 days. The dark-control-corrected photolysis half-life was determined to be 200.5 days.

Photodegradation in Air

Methamidophos is not expected to volatilize in significant amounts based on it's vapor pressure of 1.725×10^{-5} mm Hg/Torr and its calculated Henry's constant of 1.6×10^{-11} atm mole/m^3. Significant residues of methamidophos are not expected to be in the air.
Therefore, significant dissipation of methamidophos by photodegradation in air is not expected.

Abiotic Hydrolysis

The hydrolysis of methamidophos is dependant on pH. Sterile aqueous buffered solutions conducted at pH's of 7 and 9 resulted in calculated hydrolysis half-lives of 27 and 3.2 days, respectively. The major degradate at pH 7 was dimethyldisulfide. At pH 9 dimethyldisulfide and O-desmethylmethamidophos were formed. At pH 5 less than 10% of the parent material degraded after 30 days of incubation, with an extrapolated half-life of 309 days.

3.3.3 Mobility

Methamidophos is very soluble (>200 g/L) and classified as very highly mobile with a K_{oc} of 0.9

determine in the laboratory. A K_{oc} of 1.6 was determined for the degradate DMPT. All degradates are likely to be very mobile. However, Methamidophos and its degradates, do not pose a significant threat to groundwater because of their rapid degradation under both aerobic and anaerobic conditions.

Based on the calculated Henry's constant (1.6×10^{-11} atm mole/m^3) and its rapid metabolism in soil, volatilization from soil or water is not expected to be a major route of dissipation for methamidophos.

3.3.4 Bioaccumulation

Bioaccumulation of methamidophos was shown to be insignificant in a study with largemouth bass. The maximum bioconcentration factor was 0.09X in whole fish and occurred on day 28 and decreased to <0.014 ppm (LOQ) after one day depuration. This is consistent with the low K_{OW} of 0.16 and high water solubility of >200 g/L.

3.3.5 Field Dissipation

A terrestrial field dissipation study was conducted on bare ground in loamy sand soil in Ephrata, Washington (Wyatt, 2006). Monitor 4 was sprayed at 1.10 lb a.i. /acre on four replicate plots using a single application. The application rate corresponds to 110% of the proposed label rate. Soil samples were taken at 0, 4, and 8 hours, and at 1, 2, 3, 5, and 7 days post application. The major transformation products observed were O-desmethylmethamidophos and DMPT. The maximum average concentration of O-desmethylmethamidophos was 27.1 ug/kg and DMPT was 14.3 ug/kg observed at the 0 hour sampling. Residues of O-desmethylmethamidophos were not detected at 1 day after application. Residues of DMPT were not detected at 2 days after application. The kinetics modeling approach was examined to fit the measured data. A simple (single) first-order kinetics model was used to fit the measured data for methamidophos. The initial concentration of methamidophos and the dissipation rate constant were estimated. Methamidophos had a DT_{50} value of 0.62 days and a DT_{90} value of 2.05 days. This study shows the very rapid half-life and methamidophos as well as its major degradates in soil.

3.4 Species Profile of the California Red-legged Frog

3.4.1 Species Listing Status

The U.S. Fish and Wildlife Service (FWS) listed the California red-legged frog (CRLF) (*Rana aurora draytonii)* as a threatened species on June 24, 1996. This rule does not extend to CRLFs that inhabit:

1. The state of Nevada.
2. Humboldt, Trinity, and Mendocino counties, California.

3. Glenn, Lake, and Sonoma counties, California, west of the Central Valley Hydrological Basin.
4. Sonoma and Marin counties north and west of the Napa River, Sonoma Creek, and Petaluma River drainages, and north of the Walker Creek drainage.

The FWS has given the California red-legged frog a recovery priority number of 6C. This code identifies the species as having a high degree of threat and a low potential for recovery. Threats to the CRLF include, but are not limited to trematode and chytrid fungal disease, direct and indirect impacts from some human recreational activities, flood control maintenance activities, water diversions, unmanaged overgrazing activities, competition and predation by nonnative species (e.g., warm water fish, bullfrog), habitat removal and alteration by urbanization, and some agricultural pesticides and fertilizers (FWS, 2006). All of these stressors contribute to the existing Environmental Baseline for California red-legged frog.

3.4.2 Description and Taxonomy

The California red-legged frog is endemic to California and Baja California, Mexico. It is one of two subspecies of red-legged frog (Rana aurora). The other is the northern red-legged frog (R. a. aurora) that ranges from Vancouver Island, British Columbia, south along the Pacific coast to northern California (FWS, 2002a). The CRLF is the largest native frog in the western United States (Wright and Wright, 1949).

3.4.3 Distribution

The historical distribution of the California red-legged frog is believed to have included 46 counties in California from the Point Reyes National Seashore, Marin County, California, and inland from Redding and Shasta County, California, south to northwestern Baja California, Mexico (FWS, 2002a, 2006). The CRLF has been extirpated from 24 of these counties accounting for 70% of its former range (FWS, 2002a, 2006). The current distribution of the CRLF includes the coastal drainages of central California, from Marin County, CA, south to northern Baja California, Mexico, and in a limited number of drainages in the Sierra Nevada, northern Coast, and northern Transverse Ranges (Figure 2) (FWS, 1996, 2002b, 2006). Figure 3a through 3c shows the final critical habitats delineated by the USFWS (FWS 2006). These critical habitats are deemed as the protection areas for CRLF during terrestrial and aquatic life stages.

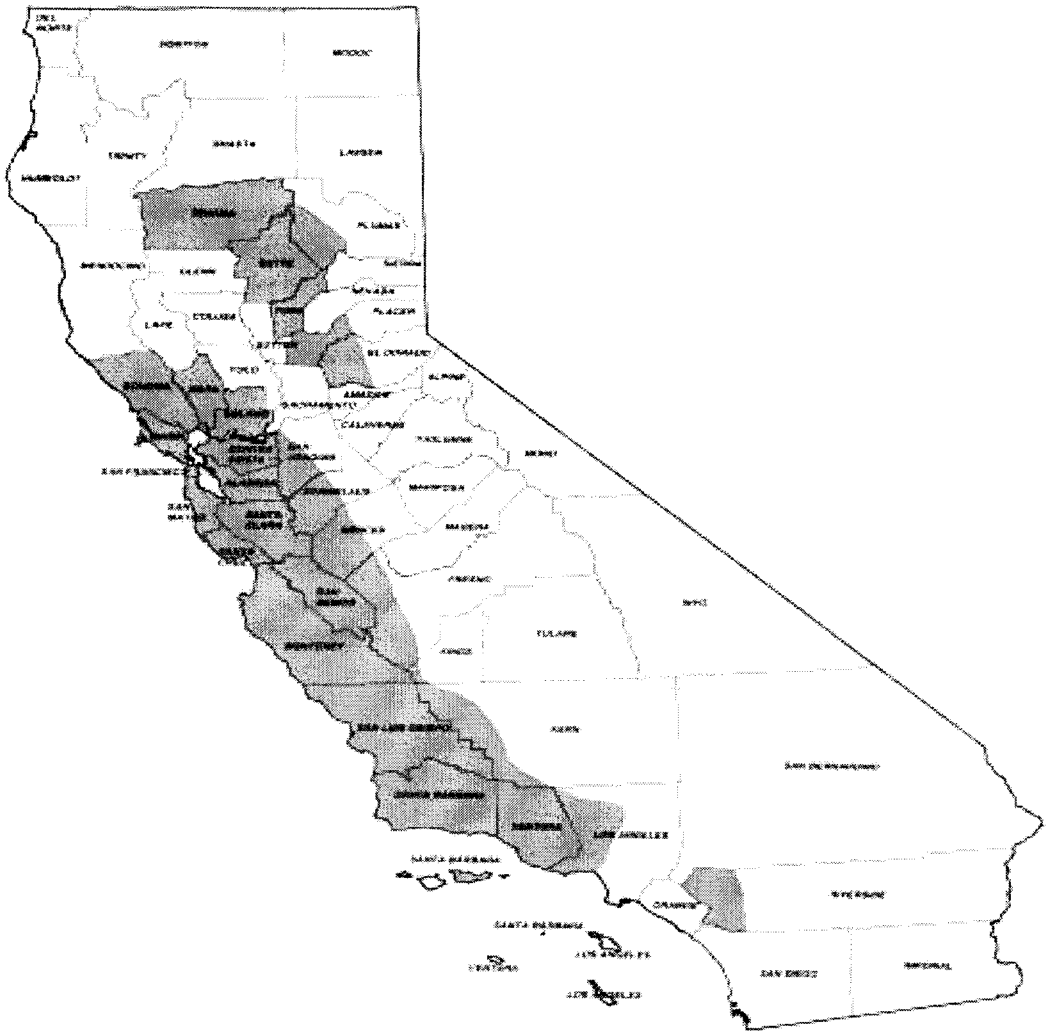

Figure 2. Current distribution of the California red-legged frog by county (FWS, 2002a).

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The FWS recovery plan summarizes the present status of the California red-legged frog in different portions of its current range (FWS, 2002a). This information is useful in understanding the current Environmental Baseline for CRLF.

Sierra Nevada Foothills and Central Valley
Most of this region has not been surveyed, thus the true status of the CRLF is unknown. CRLFs have been observed in a few drainages in the foothills of the Sierra Nevada. In Butte County, CRLF populations have been documented in French and Indian Creeks. These populations are on private lands near the Plumas National Forest (FWS, 2002a). In 2000, another population of CRLFs was discovered in this county on the Feather River Ranger District of the Plumas National Forest (FWS, 2002a). Populations of CRLFs have also been reported in El Dorado County (1997 and 1998), and in 2001 a single CRLF was observed in Placer County on U.S. Forest Service land near the confluence of the Rubican River and middle fork of the American River (FWS, 2002a).

North Coast Range Foothills and Western Sacramento River Valley
CRLF have historically been observed in the tributaries of several counties in this recovery unit, including Glenn Colusa, and Lake Counties (FWS, 2002a). More recently, sightings have been reported in upper and lower Napa and Lake Counties.

North Coast and North San Francisco Bay
Populations of CRLFs occur around Point Reyes in Marin County, including locations in Point Reyes National Seashore and the Golden Gate National Recreation Area (FWS, 2002a). CRLFs have also been observed on Mount Tamalpais and the Tiburon Peninsula in Marin County. A large breeding population of CRLFs occurs in Ledson Marsh in Annadel State Park, Sonoma County. Three occurrences have been reported in Solano County near Suisun Marsh (FWS, 2002a).

South and East San Francisco Bay
The most recent sighting of CRLF in San Francisco County occurred in 1993, in Golden Gate Park. These populations face severe barriers that are expected to inhibit dispersal between populations (FWS, 2002a). Populations are known to occur in the canals near the San Francisco International Airport in San Mateo County. CRLF reproduction has been confirmed for some of the populations.

Contra Costa and Alameda Counties contain most of the known CRLF populations in the San Francisco Bay area. Healthy populations of CRLFs occur in the eastern portions of Contra Costa and Alameda Counties (FWS, 2002a). Many of the ponds and creeks found in the Simas Valley in Contra Costa County support populations of CRLF (FWS, 2002a). Recent CRLF sightings have been made in ponds and seeps in the foothills of Mount Diablo, Contra Costa County. Populations have also been observed in Corral Hollow Creek in San Joaquin County and near the San Joaquin/Alameda County border (FWS, 2002a).

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Central Coast

The Central Coast region spans San Francisco to Santa Barbara County and has the greatest number of drainages currently populated by CRLF (FWS, 2002a). Most of the coastal drainages of San Mateo and Santa Cruz Counties support populations of CRLF. CRLFs are found throughout Monterey County in nearly every coastal drainage system. In San Luis Obispo County, CRLFs are found in suitable water bodies on the coastal plain and western slopes of the Santa Lucia Range (FWS, 2002a).

Diablo Range and Salinas Valley

The CRLF was once abundant in the inner Coast ranges between the Salinas River system and the San Joaquin Valley (FWS, 2002a). It currently occupies ≤10% of its historic range in these localities. Several populations of CRLF occur on the eastern side of the Diablo range in creeks in Fresno and Merced Counties (FWS, 2002a). In Monterey County, CRLF occur in the Elkhorn Slough watershed.

Northern Transverse Ranges and Tehachapi Mountains

This region is comprised of all of Santa Barbara and parts of Ventura, Los Angeles and Kern Counties. CRLFs occur on the Santa Maria River, Santa Barbara County, up and downstream of the Twitchell Reservoir (FWS, 2002a). Locations to the south (San Antonio Creek, Terrace, and Lagoon) are considered among the most productive CRLF locations in Santa Barbara County (FWS, 2002a). Most of these locations are found on Vandenberg Air Force Base. The habitat in this area has been relatively undisturbed and there are few occurrences of exotic species (e.g., bullfrogs). The largest populations in the northern Transverse Range are located on creeks that flow into the Cuyama and Sisquoc Rivers (FWS, 2002a). Poor habitat and introduction of aquatic predators have resulted in smaller populations of CRLFs in the Santa Ynez River Basin in Santa Barbara County. Recent surveys for CRLFs in the Tehachapi Mountains are not available (FWS, 2002a).

Southern Transverse and Peninsular Ranges

The California red-legged frog is native to parts of Los Angeles, San Bernardino, Orange, Riverside, and San Diego counties (FWS, 2002a). In 1999, a population of 15 to 25 adults was reported in the Angeles National Forest, Los Angeles County. Non-native predators, disease and parasites threaten this population (FWS, 2002a). A breeding population of 20 to 25 adults, 10 to 15 juveniles and several hundred tadpoles was recently discovered in East Las Virgenes Creek, Ventura County. South of the Tehachapi Mountains, CRLFs are currently known to occur in Amargosa Creek, Los Angeles County, and Cole Creek, Riverside County (FWS, 2002a). Bullfrog predation is believed to be the reason for the reduction in population size.

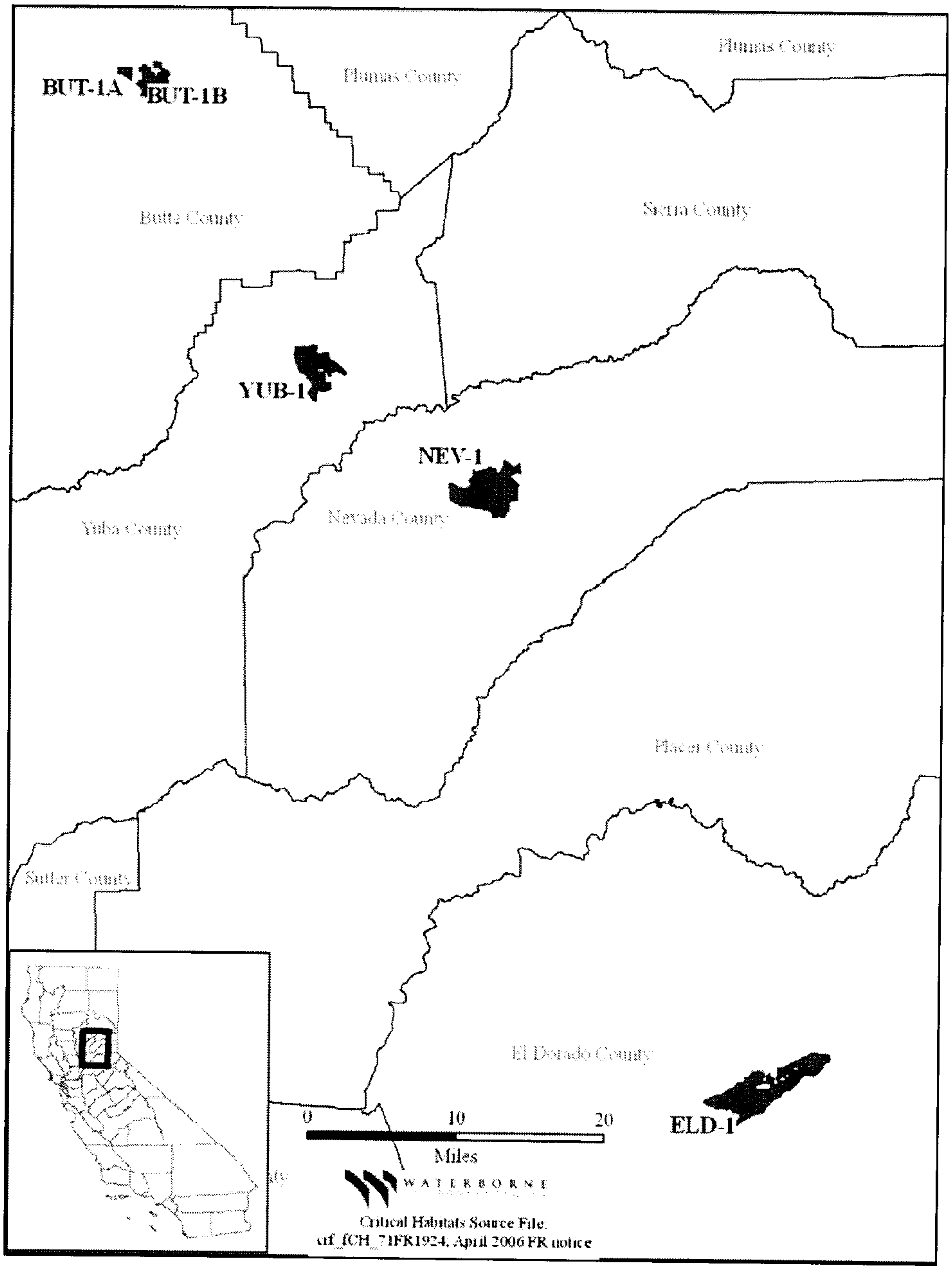

Figure 3a. Critical habitat for the California red-legged frog in northern California.

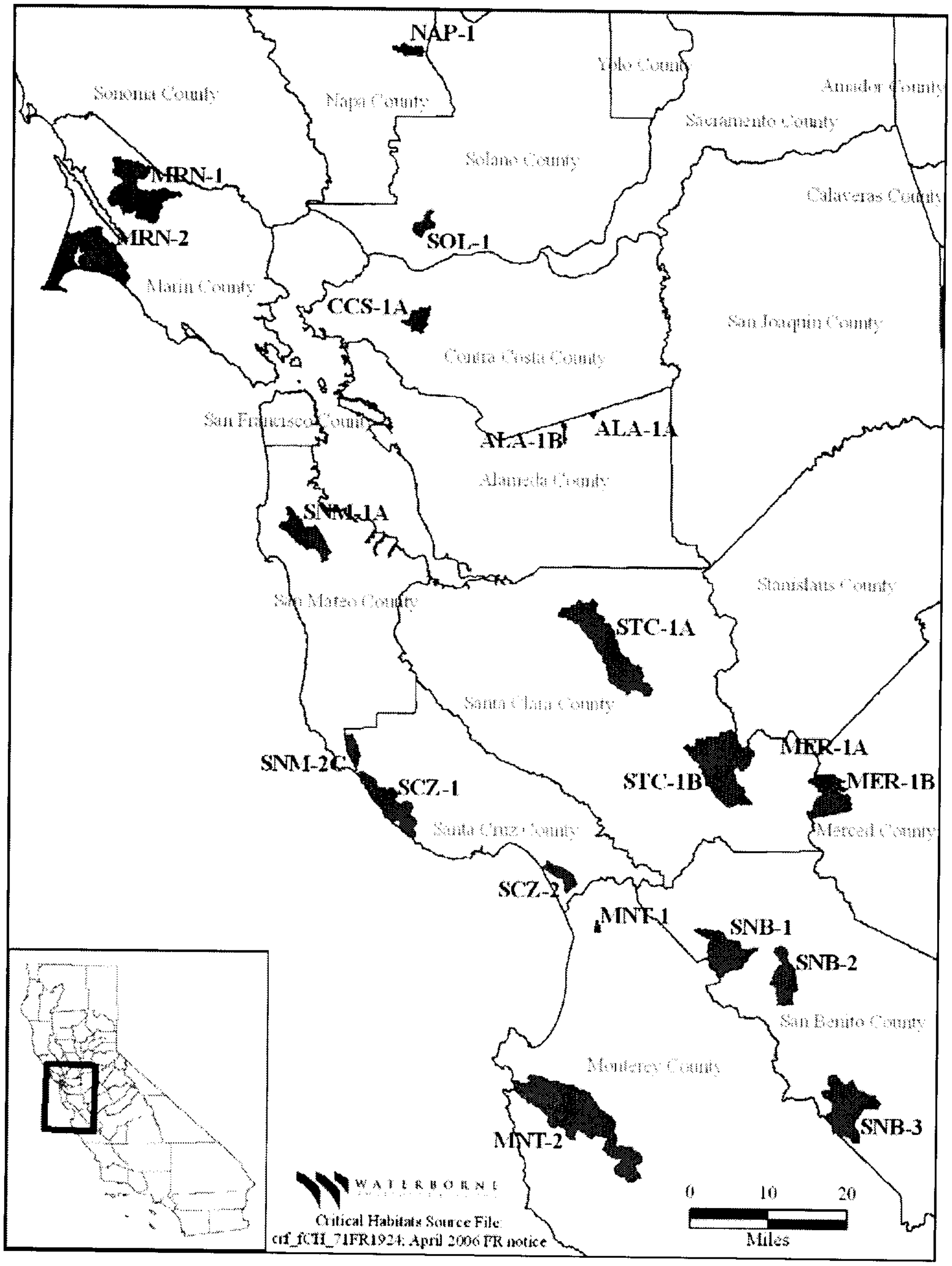

Figure 3b. **Critical habitat for the California red-legged frog in central California.**

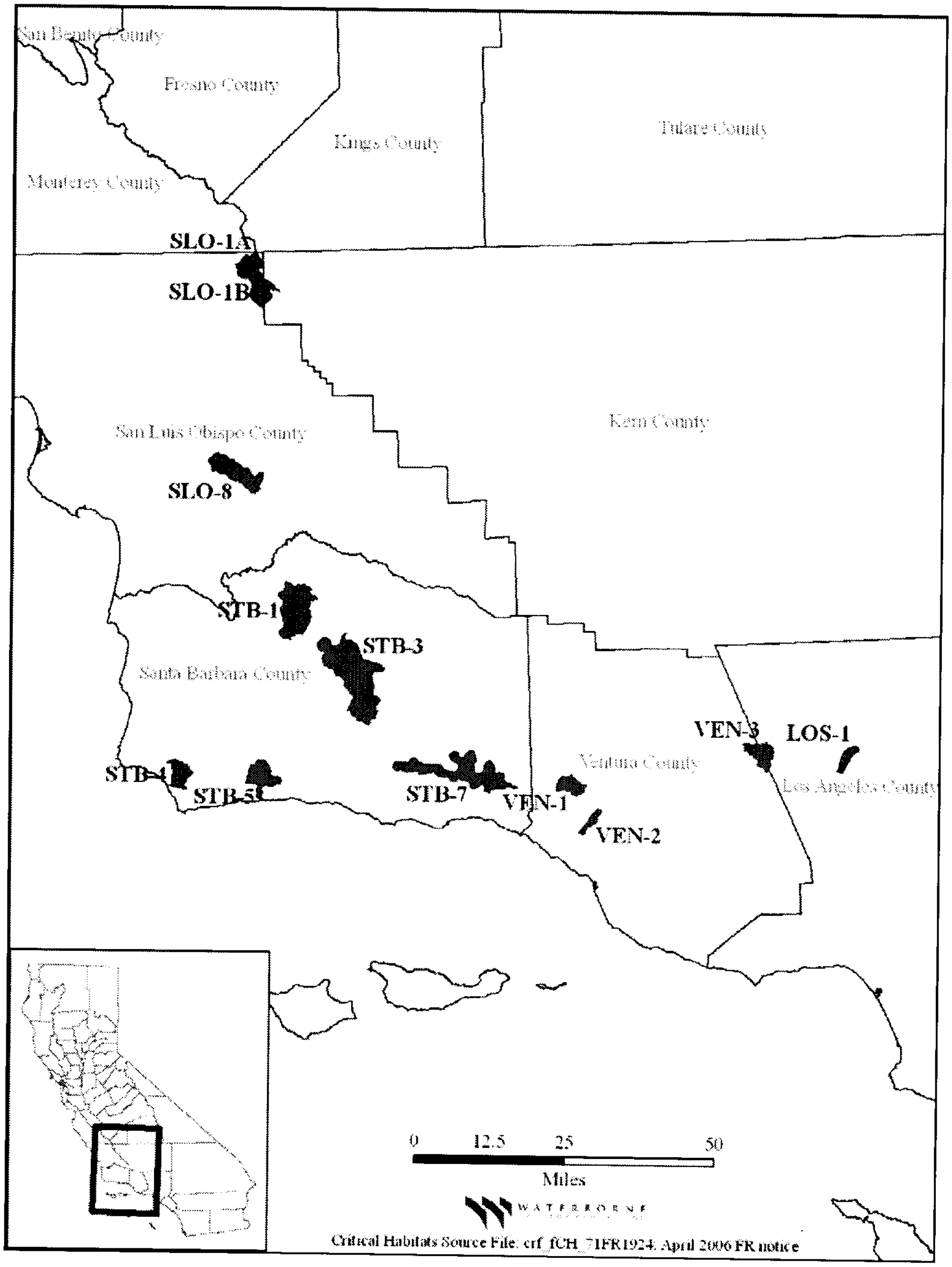

Figure 3c. **Critical habitat identified for the California red-legged frog in southern California.**

3.4.4 California Natural Diversity Database

Historical and current CRLF observations were documented by California Department of Fish and Game in their California Natural Diversity Database (CNDDB). The observation records and location information (polygons) were obtained as of July 30, 2006. The California Public Land Survey System (PLSS) sections that spatially correspond to the CRLF locations from CNDDB were identified using a GIS (Figure 4). These sections are deemed as the protection areas for the terrestrial life stages of the CRLF.

For the aquatic life stage, the watersheds contributing to the locations were deemed influential. The actual exposure level of pesticides to the water bodies depend on the fraction of land area where the pesticide could be used and the amount of pesticide used within the watershed. In order to delineate the watersheds for the CNDDB-CRLF locations, NHD-Plus dataset from USEPA and USGS were utilized. NHD-Plus dataset includes several enhancements to National Hydrography Dataset (USGS) such as catchments delineated from each stream segment, land use land cover summarization for each catchment based on National Land Cover Data and many other value-added attributes to the water bodies and catchment spatial entities. More details about NHD-Plus and the dataset may be obtained from http://www.horizon-systems.com/nhdplus/.

First, the NHD-Plus catchments that spatially correspond with CNDDB-CRLF locations were identified (Figure 5). Using the stream navigation tools included with the NHD-Plus dataset, the catchments that contribute to the CRLF-catchments were delineated, which forms the watersheds of the CRLF locations (Figure 5). It should be noted that the delineated watersheds represent a conservative domain of aquatic influence because of the spatial limitations of the NHD-Plus catchments. For example, the watershed will not have any influence on the locations that are located upstream of the main stream-segments in each catchment even though the catchment may spatially correspond with the CRLF location. The characteristics of these watersheds are included in Appendix 1.

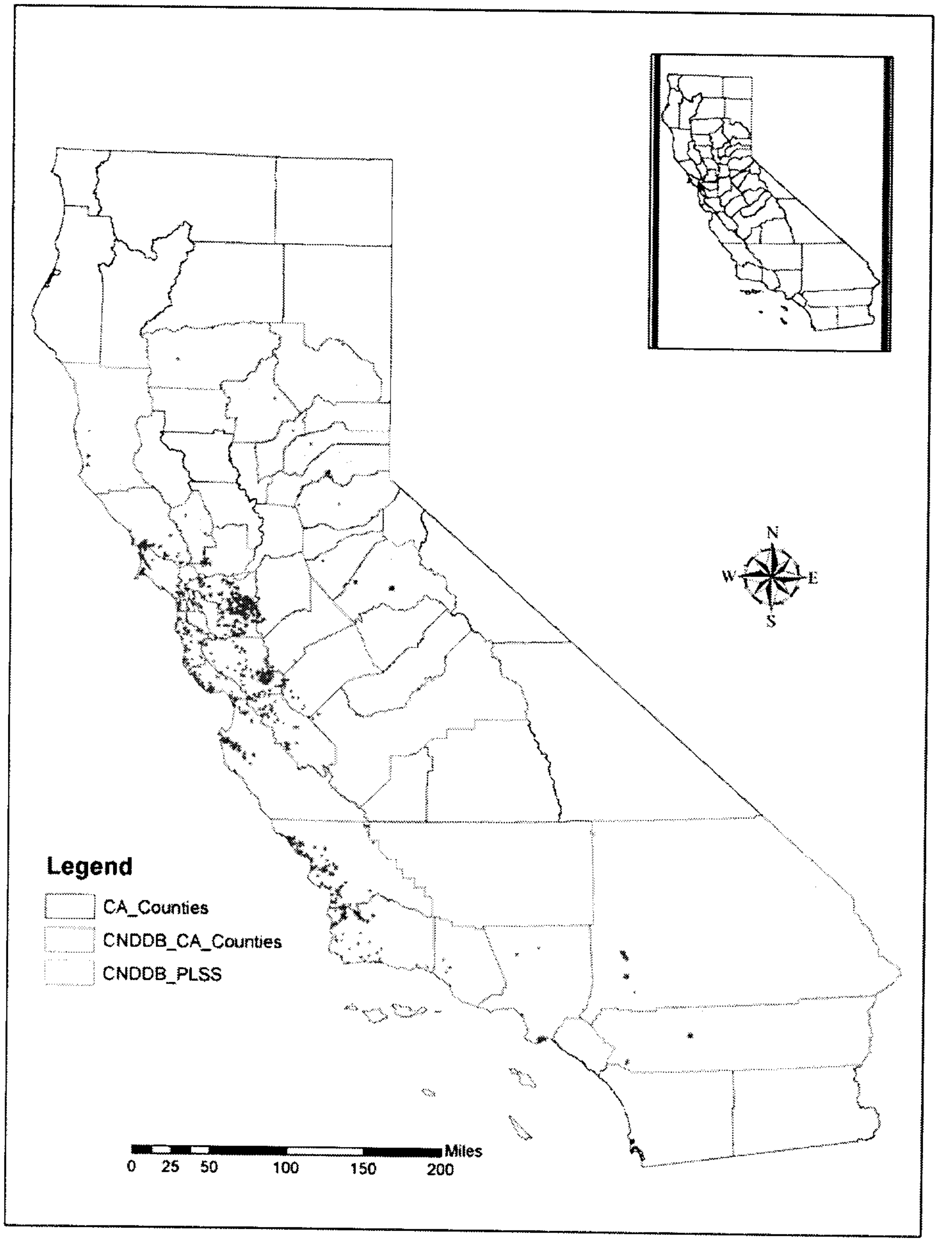

Figure 4. **California Public Land Survey System sections corresponding to the California red-legged frog locations according to the California Natural Diversity Database records**

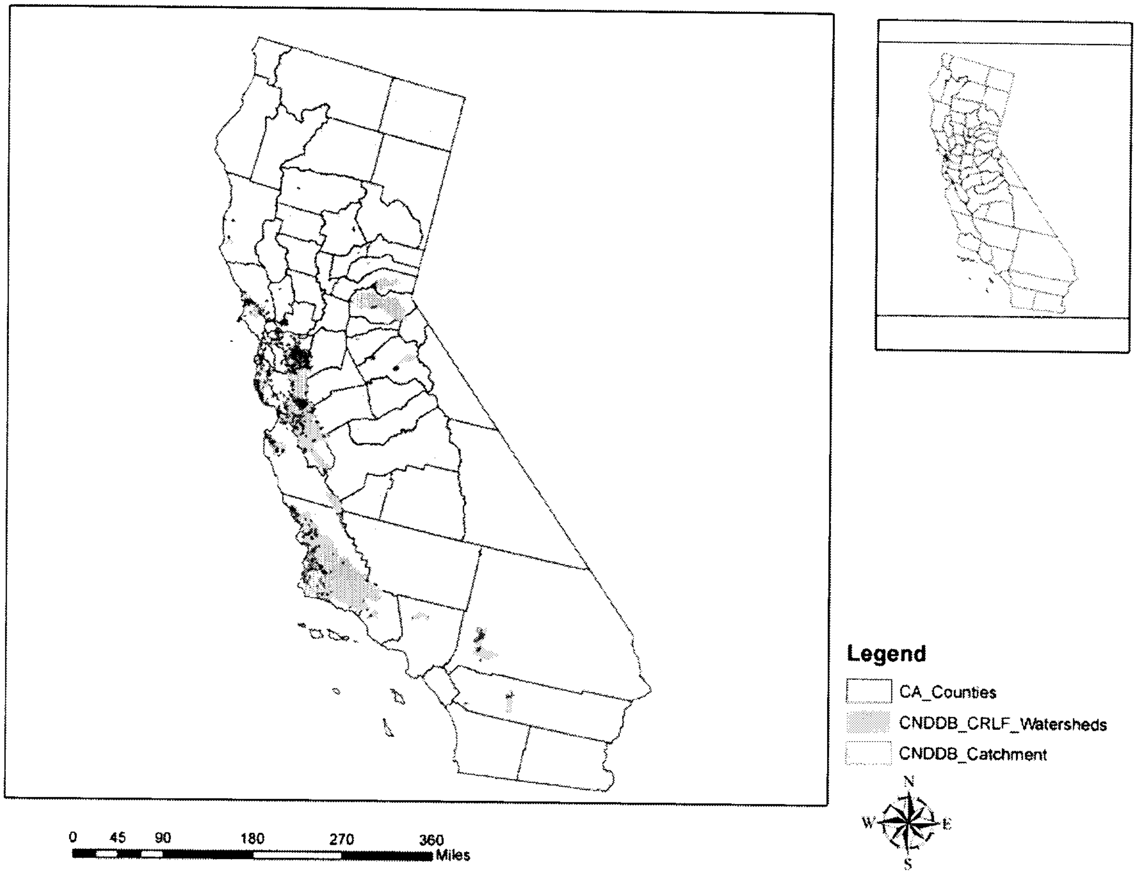

Figure 5. NHD-Plus catchments and watersheds that correspond to California red-legged frog locations according to the California Natural Diversity Database records

3.4.5 CRLF Habitat

California red-legged frogs use a variety of aquatic, riparian, and upland habitats from sea level to an elevation of 1,500 meters (FWS, 2002b). Dispersal and habitat use depend on climate, habitat suitability, and life stage (FWS, 2002a). Preferred breeding and summer habitat includes still or slow-moving permanent streams with deep water (>0.7 meters) and dense riparian vegetation (FWS, 2002a, 1996). Alternate habitats include marshes, ponds, damp woods and meadows. California red-legged frogs will breed in artificial impoundments such as stock ponds (FWS, 2002b). The CRLF is active year-round in coastal areas (Bulger et al., 2003). Upland summer habitats include small mammal burrows and moist leaf litter (Jennings and Hayes, 1994), the underside of boulders, rocks, and debris, various agricultural features (FWS, 2002a), and cracks in the bottom of dried ponds (FWS, 2002a).

During the summer, some CRLFs may leave breeding areas and migrate to upland habitats. Research has focused on CRLFs in aquatic habitats and little is known about their terrestrial movements. Bulger et al. (2003) studied the terrestrial movements of CRLFs inhabiting a coastal watershed in Santa Cruz County, California. This study examined the use of terrestrial habitats in relation to season, breeding chronology, and precipitation. Over 75% of the individuals monitored traveled short distances to upland areas following rain events, but returned to aquatic habitat after a short period (Bulger et al., 2003). Ninety percent of these individuals remained within 60 meters of water at all times (Bulger et al., 2003). The authors referred to these individuals as non-migrating frogs. Non-migrating frogs were almost always within 5 meters of their summer aquatic habitat, but would move as far as 130 meters upland during rain events for a median period of approximately 4 to 6 days (Bulger et al., 2003). The higher levels of rain that occur in November and early December increase the median distance of CRLFs from water (15 to 25 meters) and median time in upland habitats (20 to 30 days). CRLFs make little use of upland habitats as winter passes and the breeding season approaches (mid December) (Bulger et al., 2003). From February to May, 90% of the non-migrating frogs remained within 6 meters of water (Bulger et al., 2003).

The remainder of the adult population (<25%) made additional overland trips between different aquatic sites and were referred to as migrating frogs. Twenty-five migration events, ranging from 200 to 2,800 meters, were observed (Bulger et al., 2003). CRLFs traveled shorter distances (<300 meters) in 1 to 3 days and took up to 2 months to complete longer journeys (Bulger et al., 2003). These migrations occurred through coniferous forests and agricultural and range lands (Bulger et al., 2003). Rather than using corridors, CRLFs followed straight-line migrations between habitats (Bulger et al., 2003). The authors estimated that 11 to 22% of the adult population made annual migrations from their breeding habitat. The study suggested that adequate protection of CRLFs could be accomplished by maintaining suitable habitat within 100 meters of aquatic sites and managing human activities on a seasonal basis in these areas (Bulger et al., 2003).

3.4.6 Life History and Ecology

The following sections describe the physical characteristics, foraging behavior, and reproduction of the California red-legged frog.

Body Size

The California red-legged frog is the largest native frog in the western United States (Wright and Wright, 1949). Adult females are generally longer than males (F: 8.7 to 13.8 cm, M: 7.8 to 11.6 cm) (Hayes and Miyamoto, 1984). Larvae range in length from 1.4 to 8.0 cm (Storer, 1925). Bulger et al. (2003) reported body weights for male and female California red-legged frogs ranging from 48 to 214 g. In a ten year study in San Luis Obispo County, California, Scott and Rathbun (2001) collected body length and weight data for 459 California red-legged frogs. Body lengths ranged from 3.5 to 13.9 cm and weights ranged from 4.3 to 247 g. USGS (2004) conducted a survey of CRLF in Big Lagoon, Golden Gate National Recreation Area from 2002 to 2003. Big Lagoon is a wetland project area located in the Point Reyes Critical Habitat Unit #12. Nine male CRLFs were caught during the study. Their body lengths ranged from 8.2 to 9.5 cm with mean and median length of 8.7 cm. Body weights for the nine male CRLFs ranged from 54.7 to 94.0 g with mean and geometric mean body weights of 76.5 and 75.3 g, respectively (USGS, 2004).

Diet

The foraging behavior of the CRLF is highly variable and is defined by life stage and habitat (Hayes and Tennant, 1985; FWS, 2002a). The diet of larvae has not been well studied, but they are primarily algal grazers (FWS, 2002a). They also consume organic debris, plant tissue and minute organisms (NatureServe, 2006). Their anatomy enables them to filter and entrap suspended algae (Seale and Beckvar, 1980) and their mouthparts are designed for effective grazing of periphyton (Wassersug, 1984; Kupferberg et al., 1994; Kupferberg, 1997; Altig and McDiarmid, 1999). Some of the more common food items consumed by larvae include filamentous green algae (Dickman, 1968), filamentous blue-green algae (Pryor, 2003), epiphytic diatoms (Kupferberg, 1997) and detritus and various other algae (Jenssen, 1967). Larvae are also known to feed on algal species that are considered nuisance species or form blooms (Bold and Wynne, 1985).

Adult CRLFs consume a variety of invertebrate and vertebrate species found along the shoreline and on the water surface. They will also forage several meters into dense riparian vegetation along the shoreline (FWS, 2002a). A study examining the gut contents of 35 CRLFs reported prey from forty-two taxa (Hayes and Tennant, 1985). The prey groups observed most often included carabid and tenebrionid beetles, water striders, lycosid spiders, and larval neuropterans (Hayes and Tennant, 1985). The most commonly observed prey species were larval alderflies (Sialis cf. californica), pillbugs (Armadillidrium vulgare), and water striders (Gerris sp.) (Hayes and Tennant, 1985). A preference for particular prey species was not observed in this study, and CRLFs appeared to select prey based on availability (Hayes and Tennant, 1985). The largest prey items consumed by large CRLFs (snout-vent length (SVL) >10 cm) were Pacific tree frogs (Hyla regilla) and California mice (Peromyscus californicus). In this study, vertebrates accounted for over half of the prey mass of larger frogs (Hayes and Tennant, 1985). The study observed juveniles (SVL $\leq$ 6.5 cm) feeding day and night. Adult and sub-adult frogs (SVL >6.5 cm) feed only at night.

Observations made during the study suggested that predatory instincts are triggered by movement (Hayes and Tennant, 1985). This led the authors to conclude that CRLFs are not good at identifying prey and tend to forage in an indiscriminant manner (Hayes and Tennant, 1985). The study did not make an effort to observe CRLFs foraging underwater and the prey observed in gut analyses suggest that limited feeding occurs underwater. However, similar studies for ranid frogs have observed the consumption of fish, thus this forage item should not be disregarded (Hayes and Tennant, 1985).

Reproduction

California red-legged frogs breed from November to March, with most egg laying occurring in March (FWS, 2002a). Breeding typically occurs during or shortly after major rainfall events (Hayes and Miyamoto, 1984).

Males arrive at breeding sites 2 to 4 weeks prior to females and call as individuals or groups of 2 to 7 frogs (Storer, 1925; FWS, 2002a). Breeding usually occurs in still to slow-moving water greater than 0.7 meters in depth and near dense shrubby riparian vegetation (Hayes and Jennings, 1988). The eggs are laid on emergent vegetation such as bulrushes, cattails, roots, and twigs (Hayes and Miyamoto, 1984). The time to egg hatching depends on water temperature and generally takes 6 to 14 days (Jennings, 1988). Eggs take 20 to 22 days to develop to tadpoles and then 11 to 20 weeks to develop into terrestrial frogs (Bobzien et al., 2000; Storer, 1925; Wright and Wright, 1949). Males and females reach sexual maturity in 2 and 3 years, respectively, and adults can live up to 10 years (FWS, 2002a).

3.5 Action Area

Methamidophos is highly soluble, mobile in soil, and has a short half-life in soil and water. Transport to terrestrial and aquatic environments occurs via surface runoff and subsurface interflow. However, methamidophos or its degradates are not expected to leach to groundwater because they degrade rapidly under aerobic or anaerobic conditions. Based on the calculated Henry's constant (1.6×10^{-11} atm m^3/mol) and its rapid metabolism in soil, volatilization from soil or water is not expected to be a major route of dissipation for methamidophos. These properties limit the potential for atmospheric transport.

The action area for methamidophos includes: (1) those areas in California with crops to which methamidophos may be applied according to the pesticide label, and (2) those areas in California to which methamidophos could be transported following application. The transport of methamidophos to aquatic habitats will be limited to downstream movement through runoff and erosion from the point of application and downwind spray drift from the applied area. The transport to terrestrial habitats is expected to be predominantly through downwind spray drift. The physical-chemical properties of methamidophos and the application methods used with methamidophos reduce the potential for atmospheric transport to adjacent areas.

The land use and land cover information for California were obtained from two sources: USGS 1992 National Land Cover Data (NLCD'92) and Land Cover data from California Department of Natural Resources. In the NHD-Plus dataset, the land cover information in NLCD'92 were summarized to the NHD stream catchments, which can be used to define and refine action area. Although the land cover information from CA-DNR is incomplete, it is more current than NLCD'92. These existing land use/land cover information can be used within a GIS to further our understanding of the scope of the action area for a given pesticide. Further, actual five year use data for Methamidophos from the state of California provides information concerning the potential impacts of Methamidophos to the CRLF. This information will be included in this risk assessment as a reliable indicator of likely use area in the state of California.

3.6 Routes of Exposure and Transport

Based on the physical-chemical properties and environmental fate of methamidophos, the potential routes of transport of methamidophos to aquatic and terrestrial life stages of the California red-legged frog, their prey, and their habitat are via surface runoff, subsurface interflow, groundwater discharge, spray drift. Volatilization of methamidophos from soil surfaces is a minor route of transport. Based on the properties of the methamidophos, atmospheric transport is an unlikely route of exposure. Methamidophos is not considered to be volatile from surface waters and is not expected to bind to sediments. The reported half-lives for methamidophos in aerobic and anaerobic soil and aquatic environments are relatively short. Methamidophos is considered to have a low bioconcentration potential and it has not been found to accumulate in tissues over long-term exposures. The following sections describe the most likely routes of exposure to methamidophos for terrestrial and aquatic-phase California red-legged frogs, their prey, and their habitat given the information that has been reported in the previous sections.

3.7 Ecological Effects Characterization

Data presented in this ecological effects characterization are taken directly from the EPA assessments unless a specific reference to a study is presented (EPA 1999 & 2002). Some sited information has been generated since the EPA assessments or was not sited at that time.

The following section provides an overview of the toxicity of the active ingredient methamidophos and its formulations to aquatic and terrestrial biota. Effects data for amphibians is limited; therefore birds are used as surrogate species for terrestrial-phase CRLFs and fish species are used to assess potential direct effects to aquatic-phase CRLFs, as outlined in EPA (2004). Given that the CRLFs depend on aquatic and terrestrial vertebrates and invertebrates for food, toxicity information for these groups was considered in the effects determination. Methamidophos is not expected to have any adverse effects on terrestrial or aquatic plants at recommended application rates. Its mode of action does not target plants and plants do not possess the enzyme that is inhibited by methamidophos. Thus, plants are considered in the effects determination for CRLFs exposed to methamidophos based on these facts.

3.7.1 Aquatic Biota

Fish

Methamidophos is slightly toxic for freshwater fish; risk quotients indicate that there would be minimal effects to freshwater fish (EPA, 1999). A number of fish acute studies have been carried out with methamidophos to include both cold and warm water species. Lethal acute toxicity values for freshwater fish exposed to methamidophos range from 96 hr LC50 values of 25,000 ug/L for rainbow trout (*Oncorhynchus mykiss*) to 68,000 µg/L for carp (*Cyprinpus carpio*). Studies on methamidophos toxicity have included a variety of freshwater fish species including bluegill sunfish (*Lepomis macrochirus*), rainbow trout (*Oncorhynchus mykiss*), carp (*Cyprinpus carpio*) and others. A freshwater fish early life-stage test is not has not been required because the EEC in water is less than 0.01 of any fish acute LC_{50} value (EPA, 1999). The bioconcentration of methamidophos in fish is low.

Invertebrates

Laboratory studies indicate that methamidophos is very highly toxic to freshwater invertebrates. Reliable tests conducted with *Daphnia magna* resulted in 48 hour EC50 values from 26 to 50 ug/L. An acute study was conducted on a commercial variety of freshwater prawn (*Macrobrachium rosenbergii)* in Mexico which resulted in an LC_{50} value of 42 ng/L. The study was not corroborated by the EPA and was not used to calculate RQ values in the USEPA RED assessment (EPA 1999). Similarly, due to the questionable quality of the study, it was marginally considered as part of this evaluation. A 21-day chronic exposure with *Daphnia magna* exposed to methamidophos resulted in an NOEC of 4.49 ug/L based on adult body weight (Kern & Lam, 2005).

Plants

Studies examining toxicity of methamidophos to aquatic plants and algae are limited. Currently, aquatic plant testing has not been required for this insecticide (EPA, 1999). Phytotoxicity to non-target aquatic plants is not expected based on the application rates and mode of action for this organophosphate insecticide.

3.7.2 Terrestrial Biota

Birds

Orally administered acute LD_{50} values range from 1.78 mg/kg for redwing blackbird to 29.5 mg/kg for mallard duck (*Anas platyrhynchos)*. Studies have been performed using a number of bird species, including: northern bobwhite (*Colinus virginianus*), mallard duck (*Anas platyrhynchos*), dark eyed junco *(Junco hyemalis)*, common grackle *(Quiscalur quiscula)*, starling and redwing blackbird. Bases on laboratory studies, methamidophos is categorized as highly toxic to very highly toxic to avian species on an acute oral basis.

Subacute dietary LD_{50} values range from 42 ppm for northern bobwhite (*Colinus virginianus*) to 1650 ppm for mallard duck (*Anas platyrhynchos)*. Multiple studies have been conducted with both of these species as well as with the Japanese quail (*Coturnix coturnix japonica*). Bases on laboratory studies, methamidophos is categorized as slightly toxic to very highly toxic to avian species on an acute oral basis.

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Avian reproduction studies were conducted with the northern bobwhite (*Colinus virginianus*) and mallard duck (*Anas platyrhynchos)* resulting in NOAEC of 3 and >15 ppm, respectively. The NOAEC for the quail study was base on effects seen on egg shell thinkness.

Plants

Phytotoxicity to non-target aquatic plants is not expected based on the application rates and mode of action for this organophosphate insecticide. This is reinforced by a non-target terrestrial plant study conducted using four monocot species (corn, onion, rye grass and oat) and six dicot species (radish, lettuce, cucumber, cabbage, soybean and tomato). The application rate used for this study was the maximal seasonal application rate of 4 lbs a.i./acre used the labels formulated product Monitor 4. Both the emergence and the vegetative vigor of the plants were evaluated. No significant effects were noted at the 25% adverse effect trigger for this tier one study (Christ & Lam, 2005).

3.8 Acute Versus Chronic Exposure

Several studies have shown that most mortality occurs in the first 24 to 48 hours of a bioassay (Thun, 1990; EPA, 1981). As a result, LC50s and other effects endpoints do not change much after the initial 24 to 48 hours of the bioassay. Thus, chronic exposure (>96 hr) to methamidophos is unlikely to result in significant additional mortalities. Additional reasons why chronic toxicity are not considered a major concern include:

- Methamidophos is a fast-acting cholinesterase (ChE) inhibitor.
- The aquatic half-life of methamidophos is short, thus chronic exposure to aquatic organisms is unlikely to occur.
- Methamidophos is not persistent and does not bioconcentrate

Despite the fact that some adverse effects from chronic exposure are unlikely to occur, the effects determination for California red-legged frogs did consider a longer exposure duration.

3.9 Conceptual Model

The conceptual model provides a written and visual description of the possible exposure routes between ecological receptors and a stressor. The model includes risk hypotheses for how a stressor might come in contact with, and affect, receptors at a site. Risk hypotheses are derived using professional judgment and information available on the sources of exposure, characteristics of the stressor (e.g., chemistry, fate and transport), the ecosystems at risk, and anticipated effects to ecological receptors.

3.9.1 Risk Hypotheses

Risk hypotheses are specific assumptions about potential adverse effects (i.e. changes in assessment endpoints) and may be based on theory and logic, empirical data, mathematical models, or probability models (EPA, 1998). For this assessment, the risk is stressor-linked, where the stressor is the release of methamidophos to the environment. Based on the results of the EFED risk assessment for Methamidophos (EPA, 1999 & 2002), the following risk hypotheses are put forth for this effects determination:

- Methamidophos in spray drift, surface water and/or runoff from treated areas may directly affect CRLFs by causing mortality, or adversely affecting growth or reproduction;

- Methamidophos in spray drift, surface water and/or runoff from treated areas may indirectly affect CRLFs by reducing or changing the abundance and composition of aquatic and terrestrial prey populations; and

- Methamidophos in spray drift, surface water and/or runoff from treated areas may indirectly affect CRLFs by reducing or changing the composition of the aquatic and terrestrial plant communities in CRLF habitat, thus affecting primary productivity and/or cover.

3.9.2 Diagram

Figure 6 presents the conceptual model for evaluating risks to the aquatic and terrestrial life stages of the California red-legged frog from the use of Methamidophos. The conceptual model shows the anticipated sequence of events following application of Methamidophos.

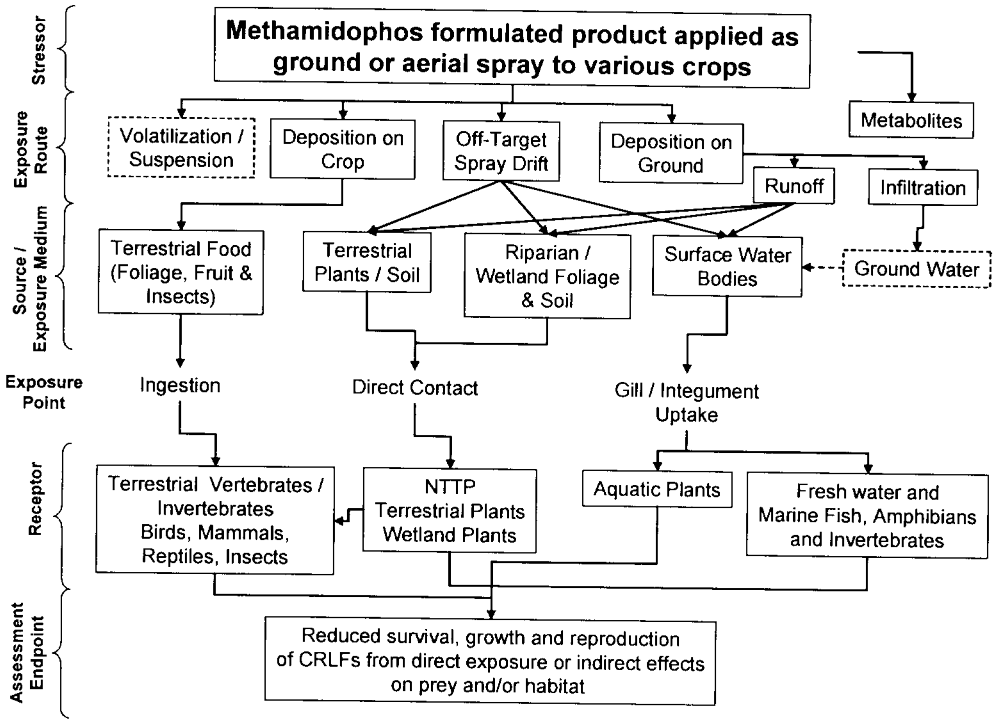

Figure 6. Conceptual model for the application of methamidophos in California, leading to exposure of California red-legged frogs, their prey and their habitat.

Methamidophos may be transported to nearby aquatic systems via surface runoff, subsurface/interflow, groundwater discharge and spray drift. Uptake through the gills and integument of aquatic organisms and ingestion of prey containing methamidophos residues were considered for the aquatic-phase CRLFs and their prey. The routes of exposure for terrestrial CRLFs and their prey are through direct contact and ingestion of prey items. Based on the physical and chemical properties of methamidophos, bioconcentration and biomagnification through the food chain were not considered significant exposure pathways.

3.10 Protection Goals and Assessment Endpoints

Protection goals are defined by scientific knowledge and societal values. They describe the overall aim of a risk assessment or effects determination and are used as the basis for defining assessment endpoints. In turn, assessment endpoints are ecological characteristics that are deemed important to evaluate and protect (e.g., survival of California red-legged frogs). They guide the assessment by providing a basis for assessing potential risks to receptors. Factors considered in selecting assessment endpoints include mode of action, potential exposure pathways, and sensitivity of ecological receptors. Assessment endpoints can be general (e.g., bird reproduction) or specific (e.g., nesting success of red-winged blackbirds) but must be relevant to the ecosystem they represent and susceptible to the stressors of concern (EPA, 1998).

Section 7(a)(2) of The Endangered Species Act, and implementing regulations consistently indicate that the protection goal with respect to listed species potentially exposed to pesticides is the jeopardy of the continued existence of listed species or destruction or adverse modification of their habitat. Therefore, the protection goal for the California red-legged frog is to ensure that exposure to methamidophos is not likely to jeopardize the continued existence of the California red-legged frog, result in the destruction or adverse modification of the habitat of this species, or cause indirect effects to prey the CRLF depends on. For direct toxic effects to the California red-legged frog, the starting assessment endpoint is the survival, reproduction and growth of this species. An organism-level assessment endpoint is used for the assessment of direct toxic effects to the California red-legged frog.

The following assessment endpoints were chosen to address indirect effects of methamidophos to the California red-legged frog:

- Primary productivity of the algal community in aquatic environments that contain or potentially contain early life stages of the California red-legged frog. Early life stages of California red-legged frog are algal grazers and thus require that an abundance of this prey item be maintained. This assessment endpoint is at the community level of organization because it is unlikely that CRLFs would graze solely on a few sensitive species of algae.

- Productivity of invertebrates and small vertebrates associated with aquatic and terrestrial habitats of adult California red-legged frogs. Adult California red-legged frogs forage opportunistically on a variety of invertebrate and vertebrate prey in or near their preferred aquatic habitats. This assessment endpoint is at the community level of organization because it is unlikely that adults forage solely on a few sensitive invertebrate or vertebrate species.

- Structure of the plant community in the near-shore environments that contain or potentially contain early and adult life stages of the California red-legged frog. The assessment endpoint for habitat is at the community level of organization because it is unlikely that the absence of one or a few sensitive plant species would adversely affect the habitat of the California red-legged frog.

In addition to the need to have a general assessment endpoint for indirect effects to CRLF habitat, there is a need to have assessment endpoints for CRLF critical habitats, as defined by the Fish and Wildlife Service (FWS, 2006). Critical habitat is defined in Section 3 of the Endangered Species Act as: (i) the specific areas within the geographical area occupied by the species…on which are found those physical and biological features essential to the conservation of the species and that may require special management considerations or protection, and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential in the conservation of the species. In determining which areas to designate as critical habitat, FWS considers those physical and biological features (PCEs) that are essential to the conservation of the California red-legged frog. The FWS final rule on critical habitat for the CRLF took effect on May 15, 2006. Approximately 450,228 acres of critical habitat has been designated for the California red-legged frog (Figures 3,a,b,c) (FWS, 2006). Critical habitat is either occupied by the CRLF, is within the historic range of the CRLF, and/or contains sufficient primary constituent elements (PCE) to support at least one life history function of the CRLF. Primary constituent elements are physical and biological features that are considered essential to the conservation of the CRLF. Four PCEs have been identified that represent the life history functions of the CRLF: aquatic breeding habitat, aquatic non-breeding habitat, upland habitat, and dispersal habitat.

Because of the special concern associated with protection of critical habitats of the California red-legged frogs, the following assessment endpoints were developed for each of the primary constituent elements of CRLF critical habitats:

- Community structure of the plant community that constitutes aquatic breeding habitat of the California red-legged frog.
- Community structure of the plant community that constitutes aquatic non-breeding habitat of the California red-legged frog.
- Community structure of the plant community that constitutes upland habitat of the California red-legged frog.
- Community structure of the plant community that constitutes dispersal habitat of the California red-legged frog.

The PCE assessment endpoints for critical habitat are at the community level of organization because it is unlikely that the absence of one or a few sensitive plant species would lead to adverse effects to the California red-legged frog.

3.11 Measures of Exposure

Aquatic EECs were calculated for methamidophos use on representative crops and regions relevant to California. The EECs are based on standard aquatic exposure assessment scenarios developed by the US EPA, with the environmental fate parameters for the assessment scenarios conservatively selected based on EPA guidelines. Since the uses of methamidophos for California limited potatoes, cotton and tomatoes, EECs were derived from standard EPA aquatic exposure assessment scenarios. These scenarios are viewed as relevant and better estimates of EECs for uses in California.

Exposure estimates on potential foods items for assessing risk to the terrestrial phase of the CRLF were determined based on the EPA nomogram ("Kenaga" estimates). Estimates were expressed in terms of a maximum dietary concentration (ppm). While the screening level analysis used the EPA default 35-day foliar half-life, a refined analysis using half-life values derived from avian field studies was also conducted. Further refined insect residue values for small ground-dwelling insects were considered in the refined assessment. Small ground-dwelling insects are likely to make up the principle insect diet base for the CRLF as they themselves are ground-dwelling in their adult phase.

3.12 Measures of Effects

Measures of ecological effects are available from a suite of guideline laboratory studies conducted with surrogate species. This includes data on aquatic invertebrates and fish as well as a number of avian species. Studies examining toxicity of methamidophos to aquatic plants and algae are limited. Currently, aquatic plant testing has not been required for this insecticide (EPA 2002). Phytotoxicity to non-target aquatic and terrestrial plants is not expected based on the application rates and mode of action for this organophosphate insecticide. However, some data does exist for non-target terrestrial plants and is included in this evaluation.

3.13 Analysis Plan

3.13.1 Risk Quotients, Levels of Concern & Initial Risk Characterization

Standard EPA EFED risk assessment procedures (Urban and Cook, 1986; EPA 2004) were followed in conducting this ecological risk assessment. The risk assessment procedures used are dependent on the calculation of a risk quotient (RQ), which is simply the ratio of estimated environmental concentration (EEC) to the acute or chronic endpoints (EC25, EC50, LC50, LD50 or NOAEC) from the relevant laboratory toxicity studies. The EC25 or EC50 is the effective concentration estimated to cause an effect to 25 or 50 percent of the test population, respectively. Similarly, the LC50 or LD50 is the lethal concentration or lethal dose estimated to cause mortality to 50% of the test population. The NOAEC is the No observed Adverse Effect Concentration or the concentration that caused no biologically or statistically different adverse effect in the test population. An example of the RQ calculation is EEC/LC50 = RQ. The RQ is then compared to a Level of Concern (LOC) which is a risk criteria set by the USEPA (Table 1). If the RQ is less than the prescribed level of LOC value for the specific risk category/taxa, no effects in the environment are expected and the risk to that group is minimal. If the RQ exceeds a LOC, then a presumption of risk exists, and a more refined assessment may be conducted to better characterize the potential risk in the environment. The effects, exposure, and risk characterization itself can all be further refined.

Table 8. Levels of Concern as described by the USEPA		
Risk Category	**Risk Quotient**	**Level of Concern if Risk Quotient Exceeds:**
Birds		
Acute high risk	EEC/LD50 or LC50	0.5
Acute endangered species	EEC/LD50 or LC50	0.1
Chronic risk	EEC/NOAEC	1
Aquatic Invertebrate and Fish		
Acute high risk	EEC/LC50 or EC50	0.5
Acute endangered species	EEC/LC50 or EC50	0.05
Chronic risk	EEC/NOAEC	1
Non-target Aquatic or Terrestrial Plants		
Aquatic Plants	EEC/EC50	1
Terrestrial Plants	EEC/EC25	1
Endangered Plants	EEC/NOAEC	1

3.13.2 GeoSpatial Analysis

A number of refinements are possible to gain a better understanding of potential exposure of the CRLF to methamidophos. In this risk assessment specific to California, it is possible to consider the proximity of the CRLF to the actual use of methamidophos in the state. Extensive product use data exists for methamidophos in California (Cal DPR, 2006). For this assessment, methamidophos agriculture use data from 2001 to 2005 was collected and compared to historical observations of the CRLF (CNDDB, 2006). The five years of use data is considered highly representative of current and likely future use of methamidophos in the state. This data serves to provide added detail on the exposure potential that exists for the CRLF to methamidophos.

3.13.3 Final Conclusions on Risk of Methamidophos to the California Red-legged Frog

The Effects Determination for the CRLF is made based on a wealth of effects and exposure data. Building on the screening level assessment, refinements to exposure scenarios were possible. Further, product use data from the state of California can be integrated in a geospatial analysis to refine exposure potential. An effects determination for the CRLF is made for current uses of methamidophos using a weight of evidence approach.

4.0 Screening and Refined Effects Determination

4.1 Aquatic Resource Exposure Assessment

The estimated environmental concentrations (EECs) in surface water for Methamidophos were calculated using the Tier II PRZM/EXAMS models with the standard EPA-Environmental Fate and Effects Division (EFED) aquatic ecological exposure assessment scenario. PRZM is used to simulate pesticide transport as a result of runoff and erosion from a 10-ha agricultural field, and EXAMS considers environmental fate and transport of pesticides in surface water and predicts EECs in a standard pond (10,000-m^2 pond, 2-m deep), with the assumption that the small field is cropped at 100%. Calculations are carried out with the linkage program shell PE4.pl - which incorporates the standard scenarios developed by EFED. Additional information on these models can be found at: http://www.epa.gov/oppefed1/models/water/index.htm.

Use patterns for maximum application rates on the label are summarized in Table 1. The modeling runs were for maximum proposed application rates, and were based on standard scenarios developed by EFED. The modeled EFED scenarios are provided in Table 9. These scenarios were chosen based on the methamidophos uses in California and are thus deemed more appropriate for this assessment. Compound specific characteristics were determined according to EFED input guidelines (EPA, 2002a) and are summarized in Table 6. The PE4 input and output files are given in Appendix 2.

It should be noted that the standard EFED modeling approach results in conservative estimates of EECs in aquatic systems at the edge of a treated field. Specifically, the ecological pond, which represents a static water body with constant water volume and no overflow, does not allow for dissipation of the compound by overflow. Therefore, while scenarios chosen were based on those most relevant to California, they still represent a highly conservative estimate of aquatic environmental concentrations. In reality, the aquatic exposure concentrations are unlikely to be higher than the estimated values.

Table 9. Input Data Used to Run PRZM/Exams Models		
Parameter	Units	Value
Application Rate (Table 4)	kg/ha	1.12
Number of Applications (Table 4)	--	4
Days Between Applications (Table 4)	days	7
Application Method (Table 4)	--	Cotton and Potato - Ground and Aerial Tomato - Ground
Date for First Application (table)	--	Cotton – July 3 Potato – June 20 Tomato – June 20
Application Efficiency	fraction	Ground – 0.99 Aerial – 0.95
Incorporation Depth	cm	0.0
Drift	%	Ground – 1% Aerial – 5%
Molecular Weight	g/mol	141.14
Solubility	mg/L	2×10^5
Vapor pressure	torr	1.725×10^{-5}
Henry's Constant	atm m^3 mol^{-1}	1.6×10^{-11}
Partition Coefficient (K_d)	--	0.029
Runoff Flow Option	No Flow	
Hydrolysis Half-Life	days	Assumed stable
Aerobic Soil Half-Life	days	1.4
Aerobic Aquatic Half-Life [b]	days	7.6
Anaerobic Aquatic Half-Life	days	20.4
Water Photolysis	days	Assumed stable

4.1.1 PRZM/EXAMS Estimated EECs

The upper 90th percentile values for the peak, 96-hour, 21-day, 60-day, 90-day and yearly average concentrations are summarized in Table 10. The annual peak concentrations ranged from 5.25 to 5.35 ppb, and the 90-day concentrations were between 1.29 to 1.3 ppb. The EECs show that spray drift is the critical route of loading of methamidophos residues in aquatic environment. The EECs for sugar beet and tomato scenarios are essentially the same because the application regime and the weather input are the same.

Table 10. PRZM/Exams Estimates of Methamidophos in Surface Water for the Uses on the label using California relevant scenarios

Scenario	Use Patterns		Upper 90th Percentile Values (ppb)					
			Peak	4 Day	21 Day	60 Day	90 Day	Yearly
CA- Cotton	4 X 1.12 (kg ai/ha) @ 7 day interval	Ground	5.25	4.34	3.45	1.90	1.29	0.32
		Aerial	1.05	0.87	0.69	0.38	0.26	0.06
CA-Sugar Beet (representing Potato)	4 X 1.12 (kg ai/ha) @ 7 day interval	Ground	5.35	4.41	3.60	1.94	1.31	0.32
		Aerial	1.07	0.88	0.72	0.39	0.26	0.06
CA-Tomato	4 X 1.12 (kg ai/ha) @ 7 day interval	Ground	5.35	4.41	3.60	1.94	1.31	0.32
		Aerial	1.07	0.88	0.72	0.39	0.26	0.06

4.1.2 Terrestrial Organism Exposure Assessment

Exposure estimates (concentration) for birds in typical food items is usually based on the EPA nomogram (Hoerger and Kenaga, 1972; Fletcher et al., 1994). The nomogram predicts maximum residue levels (in ppm or mg ai/kg feed item) per unit application rate immediately after application for four food item categories: 1) short grass, 2) long (tall) grass, 3) broadleaf or forage plants, and small insects, and 4) fruits, seeds, and large insects.

The residue estimates, or Estimated Environmental Concentrations (EECs), of methamidophos on potential terrestrial food items for the representative use patterns of methamidophos were calculated using USEPA EFED's T-REX program (Version 1.2.3, August 8, 2005; USEPA, 2005). Since maximum food residues for the CRLF would come primarily from ground dwelling insects, the broadleaf plants/small insects scenario was used to estimate EEC's.

As a first tier estimate, the peak daily residues were estimated using the EPA default 35 day foliar half-life, and assuming first order kinetics with a daily time step. Both upper bound and peak (single day with the maximum residue) EECs are reported (Table 11). The upper bound estimates are a very conservative estimate, since it implicitly assumes that the organism of concern will only eat food items that have maximum residue on them. This is a highly unlikely event, especially when one considers the probability of two concurrent applications both producing maximum residues.

Table 11. Screening Level (Tier 1, 35-d foliar DT50) Methamidophos Upper Bound and Mean Residue Exposure Estimates (EECs) for Terrestrial CRLF Food Items Using the Food-Chain Nomogram

Food Item	Kenaga Upper Bound EECs (ppm or mg ai/kg feed)	Kenaga Mean EECs (ppm or mg ai/kg feed)
Broadleaf plants/sm Insects	444	148

EEC = calculated using T-REX program (Version 1.2.3) and are based upon the maximum application, maximum number of applications and shortest application interval for Cotton, Potato and Tomato (1 lb ai/A, 4 applications, 7-d interval)

Refined exposure estimates for birds were also calculated using existing foliar half-life for methamidophos in cotton, potatoes and sugar beet. These foliar half-life values are derived from avian field studies. Additionally, an EEC values were calculated using initial residue data from ground-dwelling invertebrates collected in the field (Barber et al. 2005). The upper 95th percentile value (14.3 ppm/lb ai/acre applied) was taken from this data set for ground-dwelling insects and multiplied by the maximum use rate for methamidophos (4 lb ai/acre) and the actual foliar half-life values mentioned above. The refined terrestrial exposure estimates are presented in Table 12. The highest EEC comes from the cotton scenarios. Therefore, it will be considered in the risk characterization.

Table 12. Refined Methamidophos Upper Bound Residue Exposure Estimates (EECs) for Terrestrial CRLF Food Items Using the Food-Chain Nomogram

Food Item	Foliar Half-Life	Refined EECs (ppm or mg ai/kg feed)
Cotton	8.2 days (Perritt et al. 1990)	29.0
Potatoes	5.5 days (Menkens et al. 1989a)	23.7
Tomato (sugar beet)	3 days (Menkens et al. 1989b)	17.8

EEC = calculated using T-REX program (Version 1.2.3) and are based upon the maximum application, maximum number of applications and shortest application interval.
The default foliar half-life (35 days) was replaced with actual foliar half-life data.
EEC in mg ai/kg food item (terrestrial invertebrates) calculated for the maximum application rate using the 95th percentile 14.3 ppm/lb ai/acre applied for ground-dwelling invertebrate residues multiplied by the maximum use rate of 4 lbs ai/acre and actual foliar half-life values.

4.2 Risk Characterization

4.2.1 Aquatic Risk Characterization

The two most important routes of exposure for the aquatic life stage of the CRLF (i.e., larvae and tadpoles) are direct exposure to freely-dissolved methamidophos in the water column and ingestion of algae and aquatic plants that contain methamidophos residues. Effects to algae and aquatic plants resulting from exposure to methamidophos were considered in that they may indirectly affect the CRLF via reduction in food and habitat availability.

Based on the high water solubility and mobility of methamidophos in soil, the most likely routes of transport of methamidophos to nearby surface waters are via surface runoff, subsurface interflow, groundwater discharge. Groundwater discharge is a minor route of transport because of short half-life of methamidophos in aquatic systems, and the slow transport typical of groundwater. Spray drift is also a potential source of methamidophos to water bodies containing the CRLF. Thus, the effects determination for aquatic-phase CRLF focused on exposure of California red-legged frogs, their prey and habitat by direct contact in water (e.g., gills and skin). Exposure of aquatic-phase CRLFs and other biota to methamidophos in sediment and pore water was not estimated because methamidophos was not expected to occur at elevated concentrations in sediment given is physical-chemical properties and fate and behavior characteristics.

Direct application of methamidophos to aquatic environments (e.g., farm ponds, streams) is not permitted, as specified on the product labels.

4.2.1.1 Direct Effects

Fish

The acute RQ value for fish was determined to be 0.0002 which is well below the LOC (0.05) for endangered fish species (Table 13). Further, due to the low toxicity to fish, no chronic fish study is required because the expected EEC in water is < 0.01 of any fish acute LC_{50} value (EPA 1999).

Since the endangered species LOC for fish was not exceeded, the presumed direct effects and thus risk of methamidophos to the CRLF are considered minimal. Therefore, the data available is sufficient to provide an effects determination for the direct effects of methamidophos to the aquatic phase of the CRLF.

4.2.1.2 Indirect Effects

Aquatic Invertebrates

The acute RQ value for aquatic invertebrates was determined to be 0.21 which is below the LOC (0.5) for aquatic invertebrate species (Table 13). This is based on the most sensitive EC50 value from three studies conducted with the water flea (*Daphnia magna*). As discussed earlier, an acute study was conducted on a commercial variety of freshwater prawn (*Macrobrachium rosenbergii)* in Mexico which resulted in an LC_{50} value of 42 ng/L. The study was not corroborated by the EPA and was not used to calculate RQ values in the USEPA RED assessment (EPA 1999). Further, indirect effects considered here are at the community level of organization because it is unlikely that the absence of one or a few sensitive species will have an adversely indirect effect on the CRLF. CRLF is known to be an opportunistic feeder that can quickly react to changes in food availability. This assessment of indirect effects on aquatic invertebrates will be based on corroborated values taken form the agencies risk assessment (EPA 1999).

The chronic RQ value for aquatic invertebrates was determined to be 0.11 which is also below the LOC (1.0) for endangered aquatic invertebrate species (Table 13).

Since the LOC for aquatic invertebrates was not exceeded, the presumed indirect effects and thus risk of methamidophos to the CRLF aquatic invertebrate prey base are considered minimal. Therefore, the data available is sufficient to provide an effects determination for the indirect effects of methamidophos to the aquatic phase of the CRLF.

Aquatic Plants

Phytotoxicity to non-target aquatic plants is not expected based on the application rates and mode of action of methamidophos (i.e., cholinesterase inhibition). Based on the EFED assessment of methamidophos, no aquatic plant testing is needed at this time for this insecticide (EPA, 1999 & 2002). Therefore, based on the characteristics of this compound, sufficient information exists to make an effects determination for the indirect effects of methamidophos to the community structure of the plant community that constitutes aquatic breeding and non-breeding habitat of the CRLF.

Table 13. Screening level and refined risk characterization for the aquatic CRLF					
Endpoint	EEC (ppb)	Toxicity (ppb)	Species	RQ	LOC
Direct Effects					
Fish acute LC50	5.35 ppb[a]	25,000 ppb[c]	Rainbow Trout	0.0002	0.05
Indirect Effects					
Invertebrate acute EC50	5.35 ppb[a]	26 ppb[c]	Waterflea	0.21	0.5
Invertebrate acute EC50	5.35 ppb[a]	27 ppb[c]	Waterflea	0.20	0.5
Invertebrate acute EC50	5.35 ppb[a]	50 ppb[c]	Waterflea	0.11	0.5
Invertebrate chronic NOEC	3.6 ppb[b]	4.49 ppb	Waterflea	0.80	1

[a]Peak values taken from Tier II Surface Water Exposure Assessment using PRZM-EXAMS for California sugar beet and tomato scenarios for aerial applications.
[b]Value taken from Tier II Surface Water Exposure Assessment using PRZM-EXAMS 21 Day California sugar beet and tomato for aerial applications.
[c]Values taken from EPA's Analysis of Risks to Endangered and Threatened Salmon and Steelhead. April 23, 2004 and RED documents (1999 and 2002).

4.2.2 Terrestrial Risk Characterization

Methamidophos applied to a field can be transported to terrestrial-phase CRLFs, their prey and habitat by several exposure pathways. Routes of potential exposure for adult CRLFs and their prey include direct contact with methamidophos in the water column (e.g., gills and integument), ingestion of water, contaminated prey, dermal contact and inhalation. Plants in soils treated with methamidophos or in areas receiving run-off from treated fields could be exposed through the uptake of soil pore water, as methamidophos is designed to be adsorbed by roots and transported throughout the plant.

The effects determination for terrestrial-phase CRLF focused on the direct contact (e.g., gills and integument and spray drift) and indirect effects (e.g. effects on vertebrate, invertebrate prey items and terrestrial plants as habitat). Terrestrial-phase CRLFs spend most of their time along shorelines and in aquatic environments. Thus, exposure from direct contact with surface waters is a potential route of exposure. The major route of exposure is also via the respiratory surface (gills) and integument for other freshwater vertebrate and invertebrate prey species. Terrestrial adult CRLFs could be exposed to methamidophos via ingestion of these vertebrate and invertebrate species, as well as, spray drift.

California red-legged frogs could be exposed to methamidophos through the inadvertent ingestion of sediment, soil and sand while foraging in surface water or on land. The incidental ingestion of a considerable amount of sand was observed by a CRLF that consumed a mouse (Hayes and Tennant, 1985). Thus, incidental soil and sediment ingestion is a plausible route of exposure to CRLFs, although it is likely to be less important than food ingestion, given that food ingestion rate far exceeds soil and sediment ingestion rates. Inhalation is not considered a route of exposure given the low potential for methamidophos to volatilize.

Dermal contact is a potential route of exposure for CRLFs and their prey that come in contact with methamidophos via spray drift. California red-legged frogs are unlikely to frequent agricultural fields where methamidophos is applied further decreasing the likelihood that dermal contact will be an important route of exposure. However, the contact potential via spray drift must me considered.

4.2.2.1 Direct Effects

Birds

The acute RQ value for birds was determined to be 0.69 which is above the LOC (0.1) for endangered species (Table 14).

The chronic RQ value was determined to be 9.67 which is also above the LOC (1.0) for endangered species (Table 14).

Based on this information, there is a possibility that methamidophos will have a direct effect on the terrestrial phase of the CRLF. The effect potential will be considered further in a geospatial analysis presented later in this assessment. This geospatial analysis considers the proximity of the CRLF to actual use of methamidophos in the state of California. This geospatial analysis will be considered in making the effects determination.

4.2.2.2 Indirect Effects

Similar to the aquatic phase, the diet of terrestrial adult CRLFs is highly diverse, and includes a wide variety of invertebrates as well as small vertebrates (other frogs and mice). Thus, even if some terrestrial invertebrates were affected by pesticide use near riparian areas inhabited by CRLF, this would not be expected to impair the CRLF's ability to find suitable food because a variety of other food sources would still be available. Only if a significant fraction of invertebrate species were eliminated over a wide area, in conjunction with a significant reduction in vertebrate prey, would the ability of terrestrial CRLF to find sufficient amounts of food be affected. Widespread elimination of invertebrate species in the CRLF's terrestrial habitat is highly unlikely.

Bayer CropScience

Terrestrial Plants

Indirect effects on plants as habitat is not considered significant based on the mode of action of methamidophos and the fact that the available studies have reported very low toxicity for methamidophos to plants.

Adequate information on the properties and toxicity of methamidophos exist to make an indirect effects determination of methamidophos to the terrestrial phase of the CRLF.

Table 14. Refined risk characterization for the terrestrial CRLF

Endpoint	EEC (ppb)	Toxicity (ppb)	Species	RQ	LOC
Direct Effects					
Bird acute LC50	29 ppm[a]	42 ppm[b]	Northern bobwhite	0.69	0.1
Bird chronic NOEC	29 ppm[a]	3 ppm[b]	Northern bobwhite	9.67	1
Indirect Effects					
Terrestrial Plants	4 lb a.i. acre	No effect at limit dose	All standard species tested	n.c.	1

[a]EEC is in mg ai/kg food item (terrestrial invertebrates) calculated for the maximum application rate for Cotton (Barber, et.al. 2005) using the 95th percentile 14.3 ppm/lb ai/acre applied for ground-dwelling invertebrate residues multiplied by the maximum use rate of 4 lbs ai/acre and a foliar half-life of 8.2 days

[b]Values taken from EPA's IRED for Methamidophos (EPA 2002).

n.c. = not calculated

4.3 Measures of Exposure and Effects Removed From Further Consideration

Based on the results presented above for methamidophos, the following assessment endpoints and measures of effects were removed from further consideration in the effects determination:

4.3.1 Aquatic-phase California red-legged frog

- Acute and chronic effects to the primary productivity of the algal community in aquatic environments that potentially contain early life stages of the California red-legged frog.
- Acute and chronic effects to the structure of the plant community in aquatic environments that potentially contain early life stages of the California red-legged frog.
- Acute and chronic effects to the structure and function of the aquatic breeding and aquatic non-breeding primary constituent elements (PCE) of critical habitat for the California red-legged frog.

4.3.2 Terrestrial-phase California red-legged frog

- Acute and chronic effects to the structure of the plant community in terrestrial environments that potentially contain adult California red-legged frogs.
- Acute and chronic effects to the structure and function of the upland and dispersal primary constituent elements (PCE) of critical habitat for the California red-legged frog.
- Indirect effects to vegetative habitat from acute and chronic exposure to methamidophos.

4.4 Geospatial Analysis

4.4.1 Methamidophos Use in Proximity to the California Red-legged Frog

Overlap of methamidophos use and habitat and/or observations was determined for the Santa Barbara county (Table 4). The next level of analysis was to consider what sections within these counties, if any, contain both CRLF observations (CNDDB, 2006) and methamidophos use. This spatial analysis revealed that only three sections in Santa Barbara, and thus the state of California, have both methamidophos use and CRLF observations (Table 15). It can be seen that the average proportion of acres treated during each treatment within these sections are relatively low ranging from 3.1% to 3.75%. This spatial analysis clearly indicates that the probability of actual use of methamidophos in the proximity of CRLF is very low.

Table 15. CRLF sections (based on observations from April 1996 to May 2006 recorded in CNDDB) that had Methamidophos use during 2001-2005.

Section	Use Data Year	Total Applied (lb a.i.)[1]	Total area treated (Acres)[1]	Total number of treatments	% of section treated per treatment on an average[2]	Application Methods
42S10N33W21	2001	0.00	--	--	--	--
	2002	106.44	134.5	6	3.5	Aerial
	2003	135.35	171	8	3.3	Aerial
	2004	75.21	95	4	3.7	Aerial
	2005	0.00	--	--	--	--
42S10N33W27	2001	64.89	82	4	3.2	Aerial
	2002	0.00	--	--	--	--
	2003	64.89	82	4	3.2	Aerial
	2004	63.31	80	4	3.1	Ground
	2005	0.00	--	--	--	--
42S09N33W01	2001	131.84	96	4	3.75	Aerial
	2002	0.00	--	--	--	--
	2003	0.00	--	--	--	--
	2004	0.00	--	--	--	--
	2005	0.00	--	--	--	--

[1] Data taken from the PUR database. Total pounds of a.i. from all applications in a particular year and total area treated is the sum of treated area from all applications

[2] Average area treated for each treatment is the total area treated divided by the number of applications; Percent of section treated assumes that the area of section is 640 acres.

4.5 Final Conclusions on Risks of Methamidophos to the California Red-Legged Frog

The information presented in this section summarizes the risk conclusions and effects determination for the CRLF. The information used to derive the effects determination conclusions were based on "best scientific and commercial data available".

The effects determination concluded either "no effect", "may affect, but unlikely to adversely affect" or "likely to adversely affect" for each assessment endpoint (i.e., direct and indirect effects). In general, the exposure scenario(s) assigned the risk category of greatest concern ("no effect" < "may affect, but unlikely to adversely affect" < "likely to adversely affect") for a particular assessment endpoint drove the overall risk conclusion for methamidophos. A determination of "no effect" implies that all exposure scenarios have a RQ<LOC. If one or more of the RQs had been greater than the corresponding LOC those scenarios and geospatial analysis would have proceeded to a refined effects determination where a risk conclusion of "may affect, but unlikely to adversely affect" or "likely to adversely affect" would have been made depending on whether the exposure scenarios of greatest concern were categorized as low, intermediate or high risk.

The risk quotients derived in the effects determination using scenarios appropriate for California indicate that aquatic-phase California red-legged frogs and their prey items are not likely at risk from exposure to methamidophos from the application of Monitor® 4 according to the label-permitted uses (potato, cotton & tomato) for California. The risk quotients derived from a refined effects determination indicate that terrestrial phase California red-legged frogs and their prey items may be at risk from exposure to methamidophos from the application of Monitor ® 4. However, after considering the geospatial analysis for the use of a methamidophos in California in relation to the observations of the CRLF in the state the likelihood of effects is low.

Thus, an effect determination of "may effect, but unlikely to adversely effect" the aquatic California red-legged frogs, terrestrial-phase California red-legged frogs and their prey is made.

5.0 REFERENCES

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Appendix 1 CNDDB-CRLF Location Watershed Characteristics

CNDDB-CRLF Location Watershed Characteristics					
CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
618	1164	0.0	0.4	77.3	22.3
577	1131	0.0	0.0	55.6	44.4
780	1917	3.7	0.3	41.5	54.4
437	1917	3.7	0.3	41.5	54.4
23	10463	0.6	0.1	38.9	60.3
314	10463	0.6	0.1	38.9	60.3
822	7658	0.8	0.1	35.1	64.0
714	17121	0.0	0.0	31.1	68.8
616	17121	0.0	0.0	31.1	68.8
583	17121	0.0	0.0	31.1	68.8
415	361	0.0	0.0	22.2	77.8
130	4535	0.3	0.0	18.5	81.1
393	2008	0.0	0.0	18.0	82.0
514	6372	0.4	0.0	16.8	82.8
512	6372	0.4	0.0	16.8	82.8
559	1501	0.1	0.0	15.9	84.0
820	2666	2.1	0.2	15.6	82.2
755	13108	0.7	0.3	10.4	88.6
344	977	0.0	0.0	9.4	90.6
637	25559	4.9	0.2	8.9	86.1
71	25559	4.9	0.2	8.9	86.1
630	25559	4.9	0.2	8.9	86.1
808	25559	4.9	0.2	8.9	86.1
809	25559	4.9	0.2	8.9	86.1
101	25559	4.9	0.2	8.9	86.1
220	25559	4.9	0.2	8.9	86.1
368	25559	4.9	0.2	8.9	86.1
253	541	1.9	0.0	8.3	89.9
127	1409	0.0	0.0	7.7	92.3
311	3421	0.0	0.0	7.6	92.4
347	3638	0.9	0.7	7.6	90.7
509	3638	0.9	0.7	7.6	90.7
434	7040	0.4	0.2	7.1	92.3
134	1425	0.0	0.1	6.8	93.1
107	1377	0.0	0.0	6.6	93.4
395	15096	0.0	0.4	6.1	93.4
830	76516	0.0	0.0	6.1	93.9
241	1856	0.0	0.0	6.1	93.9
459	4878	0.0	0.0	6.0	94.0
456	4878	0.0	0.0	6.0	94.0
453	4878	0.0	0.0	6.0	94.0
842	951	0.0	0.0	5.9	94.1

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
840	951	0.0	0.0	5.9	94.1
676	951	0.0	0.0	5.9	94.1
677	951	0.0	0.0	5.9	94.1
413	42923	0.1	0.0	5.7	94.2
99	39797	3.1	0.1	5.7	91.0
843	1201	0.1	0.0	5.5	94.4
362	257617	0.1	0.0	5.4	94.5
521	3848	0.2	0.0	5.0	94.7
605	3848	0.2	0.0	5.0	94.7
167	3848	0.2	0.0	5.0	94.7
357	313679	0.1	0.0	4.9	95.0
841	1595	0.0	0.0	4.7	95.3
92	1677	0.0	0.0	4.7	95.3
91	1677	0.0	0.0	4.7	95.3
90	1677	0.0	0.0	4.7	95.3
161	30102	0.2	0.0	4.6	95.1
410	30102	0.2	0.0	4.6	95.1
405	30102	0.2	0.0	4.6	95.1
404	30102	0.2	0.0	4.6	95.1
846	30102	0.2	0.0	4.6	95.1
845	30102	0.2	0.0	4.6	95.1
584	33979	0.3	0.2	4.5	95.0
561	33979	0.3	0.2	4.5	95.0
111	2055	0.0	0.0	4.4	95.6
844	13417	0.0	0.0	4.3	95.7
440	765	0.0	0.0	4.2	95.8
116	97707	0.0	0.1	4.1	95.7
52	2924	0.6	0.0	4.1	95.3
109	101607	0.7	0.0	4.0	95.2
401	30382	0.0	0.0	3.8	96.2
372	3250	0.4	0.0	3.7	95.9
210	3250	0.4	0.0	3.7	95.9
392	11808	0.1	0.0	3.7	96.3
639	22646	0.0	0.0	3.7	96.3
467	257	2.9	0.0	3.4	93.7
370	257	2.9	0.0	3.4	93.7
211	29853	0.0	0.0	3.4	96.6
346	29853	0.0	0.0	3.4	96.6
661	558201	0.4	0.0	3.3	96.2
781	415	2.0	0.0	3.3	94.7
319	46484	0.2	0.1	3.2	96.5
409	2952	0.0	0.0	3.0	97.0
408	2952	0.0	0.0	3.0	97.0
852	12695	0.0	0.2	3.0	96.8
582	751865	0.1	0.0	2.9	97.0

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
554	751865	0.1	0.0	2.9	97.0
290	751865	0.1	0.0	2.9	97.0
581	751865	0.1	0.0	2.9	97.0
398	532082	0.5	0.0	2.9	96.6
352	422	0.0	0.0	2.8	97.2
861	422	0.0	0.0	2.8	97.2
291	11232	0.0	0.0	2.8	97.2
425	5795	0.0	0.0	2.7	97.2
10	55240	0.2	0.1	2.7	97.0
280	29285	0.0	0.2	2.7	97.1
519	31543	0.0	0.2	2.5	97.2
202	210963	0.1	0.0	2.4	97.5
264	28059	0.0	0.0	2.4	97.6
244	5443	0.0	0.0	2.2	97.8
304	1066206	0.0	0.0	2.1	97.8
158	65330	1.0	0.0	2.1	96.8
102	29190	0.0	0.0	1.9	98.0
156	449867	0.0	0.0	1.9	98.0
57	2753	0.0	0.0	1.9	98.1
481	544	3.6	0.0	1.9	94.5
331	544	3.6	0.0	1.9	94.5
866	544	3.6	0.0	1.9	94.5
37	9295	0.0	0.0	1.8	98.2
50	12497	0.0	0.0	1.8	98.2
260	20409	0.0	0.2	1.8	98.0
406	12350	0.0	0.0	1.7	98.3
553	634	0.0	0.0	1.7	98.3
743	5330	0.0	0.0	1.7	98.3
662	2547	0.0	0.0	1.7	98.3
599	1053316	0.0	0.0	1.7	98.3
848	1050746	0.0	0.0	1.6	98.4
546	555	0.0	0.0	1.6	98.4
529	3097	0.1	0.4	1.5	97.9
403	1048354	0.0	0.0	1.5	98.4
847	1048354	0.0	0.0	1.5	98.4
162	1126	0.0	0.0	1.5	98.5
725	49746	0.0	0.1	1.5	98.4
335	27191	0.4	2.4	1.4	95.8
407	11154	0.0	0.0	1.4	98.6
325	51453	1.3	0.0	1.4	97.3
155	8364	0.1	0.0	1.3	98.6
289	2048	0.0	0.0	1.2	98.8
9	1009147	0.0	0.0	1.2	98.8
113	30378	0.0	0.0	1.1	98.8
396	30378	0.0	0.0	1.1	98.8

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
73	27733	0.4	0.0	1.1	98.4
544	126921	0.0	0.0	1.1	98.9
225	2524	0.0	0.0	1.1	98.9
735	387829	0.0	0.0	1.0	99.0
191	111815	0.3	0.1	1.0	98.6
742	111815	0.3	0.1	1.0	98.6
214	50106	1.3	0.0	1.0	97.7
424	32686	0.4	0.2	1.0	98.4
507	22249	0.0	0.3	0.9	98.7
232	22249	0.0	0.3	0.9	98.7
522	22249	0.0	0.3	0.9	98.7
518	22249	0.0	0.3	0.9	98.7
515	22249	0.0	0.3	0.9	98.7
526	22249	0.0	0.3	0.9	98.7
160	22249	0.0	0.3	0.9	98.7
722	22249	0.0	0.3	0.9	98.7
520	380296	0.0	0.0	0.9	99.0
278	12873	0.1	0.1	0.9	98.9
619	12873	0.1	0.1	0.9	98.9
274	15791	0.0	0.0	0.9	99.1
816	7463	0.0	0.0	0.9	99.1
814	7463	0.0	0.0	0.9	99.1
45	41054	0.0	0.2	0.9	98.9
8	40875	0.0	0.2	0.8	99.0
487	451	4.0	0.0	0.7	95.3
489	451	4.0	0.0	0.7	95.3
38	129637	0.4	0.0	0.7	98.9
131	6927	0.0	0.0	0.7	99.3
33	33585	0.0	0.2	0.6	99.1
243	9684	0.0	0.0	0.6	99.3
26	8198	0.1	0.2	0.6	99.1
527	1616	0.0	0.1	0.6	99.4
593	1616	0.0	0.1	0.6	99.4
265	97657	0.0	0.0	0.6	99.4
308	97657	0.0	0.0	0.6	99.4
234	2811	0.9	0.0	0.6	98.5
183	180920	0.0	0.0	0.6	99.4
614	25648	0.0	0.0	0.6	99.4
500	1772	0.0	0.0	0.5	99.5
205	132483	0.0	0.0	0.5	99.5
305	1503	0.0	0.0	0.5	99.5
511	130595	0.0	0.0	0.5	99.5
660	10228	0.0	0.0	0.5	99.5
772	268149	0.4	0.1	0.5	99.0
208	4864	0.1	0.0	0.5	99.4

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
207	4864	0.1	0.0	0.5	99.4
836	4864	0.1	0.0	0.5	99.4
182	4864	0.1	0.0	0.5	99.4
585	4864	0.1	0.0	0.5	99.4
451	399561	0.7	0.1	0.5	98.7
733	399561	0.7	0.1	0.5	98.7
736	399561	0.7	0.1	0.5	98.7
237	11842	0.0	0.1	0.4	99.5
140	11842	0.0	0.1	0.4	99.5
428	162349	0.0	0.0	0.4	99.5
287	162349	0.0	0.0	0.4	99.5
609	1409	0.0	0.0	0.4	99.6
383	68518	0.0	0.0	0.4	99.6
222	3662	0.0	0.0	0.4	99.6
187	5565	0.1	0.0	0.4	99.5
206	5565	0.1	0.0	0.4	99.5
394	2950	0.0	0.0	0.4	99.6
249	2950	0.0	0.0	0.4	99.6
690	3813	0.0	0.0	0.4	99.6
691	3813	0.0	0.0	0.4	99.6
680	3813	0.0	0.0	0.4	99.6
384	45145	1.4	0.0	0.4	98.2
478	45145	1.4	0.0	0.4	98.2
382	1438	0.0	0.1	0.4	99.6
381	1438	0.0	0.1	0.4	99.6
64	1521	0.3	0.0	0.4	99.4
80	1521	0.3	0.0	0.4	99.4
590	126800	1.3	0.1	0.3	98.2
61	299486	0.0	0.0	0.3	99.6
2	231456	0.7	0.1	0.3	98.8
79	153412	0.0	0.0	0.3	99.6
364	2025	5.0	0.3	0.3	94.5
729	2025	5.0	0.3	0.3	94.5
181	2025	5.0	0.3	0.3	94.5
198	2025	5.0	0.3	0.3	94.5
115	1809	0.2	0.0	0.3	99.5
16	12269	0.0	0.0	0.3	99.7
628	4890	0.0	0.0	0.3	99.7
197	2971	0.0	0.0	0.3	99.7
293	1834	0.0	0.0	0.3	99.7
658	47327	0.0	0.0	0.3	99.7
439	47995	0.0	0.0	0.3	99.7
589	529	0.0	0.0	0.3	99.7
556	9604	0.0	0.0	0.2	99.8
865	8684	0.0	0.0	0.2	99.8

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
678	8684	0.0	0.0	0.2	99.8
681	8684	0.0	0.0	0.2	99.8
349	1129	0.0	0.0	0.2	99.8
351	1129	0.0	0.0	0.2	99.8
215	1321	0.0	0.0	0.2	99.8
1	22323	0.6	0.1	0.2	99.1
307	283282	0.0	0.0	0.2	99.7
655	754	0.0	0.0	0.2	99.8
288	754	0.0	0.0	0.2	99.8
641	24208	1.2	0.1	0.2	98.5
868	1011	0.0	0.0	0.2	99.8
485	1011	0.0	0.0	0.2	99.8
373	95430	0.9	0.2	0.2	98.8
65	284358	0.0	0.0	0.2	99.8
773	1015	0.0	0.1	0.2	99.7
284	8103	0.0	0.0	0.2	99.8
43	8103	0.0	0.0	0.2	99.8
366	1727	0.3	0.0	0.2	99.5
740	1727	0.3	0.0	0.2	99.5
273	1727	0.3	0.0	0.2	99.5
812	5365	0.0	0.0	0.2	99.8
59	261862	0.0	0.0	0.2	99.8
477	1489	0.0	0.0	0.1	99.9
663	6136	0.0	0.0	0.1	99.9
106	6136	0.0	0.0	0.1	99.9
380	4396	0.0	0.0	0.1	99.9
28	20590	0.0	0.0	0.1	99.9
6	125534	1.2	0.1	0.1	98.5
250	1089	0.0	0.0	0.1	99.9
56	3882	0.0	0.0	0.1	99.9
627	749	0.0	0.0	0.1	99.9
217	12902	0.0	0.0	0.1	99.9
135	12902	0.0	0.0	0.1	99.9
316	5568	0.0	0.0	0.1	99.9
385	670	0.0	0.0	0.1	99.9
343	3292	3.3	0.0	0.1	96.6
567	114759	0.0	0.0	0.1	99.9
390	7538	2.2	0.1	0.1	97.7
566	1264	0.0	0.0	0.1	99.9
54	2799	0.0	0.0	0.1	99.9
194	89282	0.9	0.2	0.1	98.8
693	285	0.0	0.0	0.1	99.9
850	12344	0.0	0.0	0.1	99.9
63	32417	0.0	0.0	0.1	99.9
698	34597	0.0	0.0	0.1	99.9

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
849	32685	0.0	0.0	0.1	99.9
611	999	0.0	0.0	0.1	99.9
355	3040	0.0	0.0	0.1	99.9
257	7326	0.0	0.0	0.1	99.9
471	7326	0.0	0.0	0.1	99.9
195	1762	0.0	0.0	0.1	99.9
568	38197	0.0	0.0	0.1	99.8
148	28458	1.7	2.8	0.1	95.4
730	28458	1.7	2.8	0.1	95.4
872	3082	0.0	0.0	0.1	99.9
359	29166	1.7	3.1	0.1	95.1
200	135711	0.1	0.0	0.1	99.9
14	19032	0.0	0.0	0.1	99.9
285	7633	0.2	0.0	0.1	99.7
42	60186	0.1	0.0	0.0	99.9
259	124124	0.1	0.0	0.0	99.9
513	2296	0.0	0.0	0.0	100.0
613	7911	0.0	0.0	0.0	99.9
266	9074	0.0	0.1	0.0	99.9
48	78840	0.1	0.0	0.0	99.9
612	6912	0.0	0.0	0.0	100.0
490	1084	2.9	0.0	0.0	97.0
483	1084	2.9	0.0	0.0	97.0
462	1084	2.9	0.0	0.0	97.0
666	572	0.0	0.0	0.0	100.0
689	572	0.0	0.0	0.0	100.0
180	1723	0.0	0.0	0.0	99.9
60	244337	0.0	0.0	0.0	99.9
569	2408	0.0	0.0	0.0	99.9
41	38051	0.0	0.0	0.0	100.0
560	8229	0.0	0.0	0.0	100.0
421	21262	0.1	0.0	0.0	99.9
213	15086	0.0	0.0	0.0	100.0
855	17879	0.8	0.1	0.0	99.1
716	17879	0.8	0.1	0.0	99.1
686	1596	0.2	0.0	0.0	99.8
498	7278	0.6	0.1	0.0	99.3
423	5092	0.0	0.0	0.0	100.0
839	6852	0.0	0.0	0.0	100.0
669	1777	0.0	0.0	0.0	100.0
683	1787	0.0	0.0	0.0	100.0
419	939	0.0	0.0	0.0	100.0
51	8565	0.0	0.0	0.0	100.0
399	2860	0.0	0.1	0.0	99.9
216	11482	0.0	0.0	0.0	100.0

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
431	2945	0.0	0.0	0.0	100.0
122	4031	0.0	0.0	0.0	100.0
315	2107	0.0	0.0	0.0	100.0
449	32190	0.0	0.1	0.0	99.9
153	18720	0.0	0.0	0.0	100.0
13	20537	0.0	0.0	0.0	100.0
104	11561	0.0	0.0	0.0	99.9
303	1302	0.0	0.3	0.0	99.7
587	2757	0.2	0.0	0.0	99.8
586	2757	0.2	0.0	0.0	99.8
192	12750	0.0	0.0	0.0	99.9
379	2958	0.0	0.0	0.0	100.0
321	28870	0.0	0.0	0.0	100.0
757	24997	0.0	0.1	0.0	99.9
766	3598	1.4	0.0	0.0	98.6
333	3598	1.4	0.0	0.0	98.6
493	3598	1.4	0.0	0.0	98.6
491	3598	1.4	0.0	0.0	98.6
851	3598	1.4	0.0	0.0	98.6
178	2005	0.1	0.0	0.0	99.9
549	4099	0.0	0.0	0.0	100.0
427	4116	0.2	0.0	0.0	99.8
635	4178	0.0	0.0	0.0	100.0
221	5267	0.0	0.0	0.0	100.0
450	5370	0.0	0.0	0.0	100.0
400	2723	0.0	0.0	0.0	100.0
152	2785	0.0	0.2	0.0	99.8
833	2854	0.0	0.0	0.0	100.0
7	82258	0.0	0.0	0.0	100.0
687	6912	0.1	0.0	0.0	99.9
36	27847	0.0	0.0	0.0	100.0
664	8062	0.1	0.0	0.0	99.9
374	8474	0.1	0.0	0.0	99.9
753	5291	0.2	0.0	0.0	99.8
461	74438	0.2	0.0	0.0	99.8
463	74438	0.2	0.0	0.0	99.8
558	87225	0.0	0.0	0.0	100.0
254	69903	0.0	0.0	0.0	100.0
12	69903	0.0	0.0	0.0	100.0
323	6074	0.0	0.0	0.0	100.0
124	12496	0.0	0.0	0.0	100.0
517	12496	0.0	0.0	0.0	100.0
117	14351	0.0	0.0	0.0	100.0
147	14351	0.0	0.0	0.0	100.0
236	22440	0.1	0.1	0.0	99.8

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
376	22440	0.1	0.1	0.0	99.8
324	47699	0.0	0.0	0.0	100.0
326	47699	0.0	0.0	0.0	100.0
328	47699	0.0	0.0	0.0	100.0
834	8059	0.0	0.0	0.0	100.0
39	17361	0.0	0.0	0.0	100.0
332	11325	0.0	0.0	0.0	100.0
25	12373	0.8	0.0	0.0	99.2
108	30807	0.0	0.0	0.0	100.0
247	63939	0.1	0.0	0.0	99.9
313	2016	0.0	0.0	0.0	100.0
300	2424	0.1	0.0	0.0	99.9
301	14109	0.0	0.0	0.0	100.0
270	896	6.4	0.0	0.0	93.6
62	6305	0.0	0.0	0.0	100.0
302	1679	0.0	0.0	0.0	100.0
272	1734	0.0	0.0	0.0	100.0
276	921	0.0	0.0	0.0	100.0
5	63993	0.0	0.0	0.0	100.0
275	2469	0.0	0.2	0.0	99.8
312	568	0.0	0.0	0.0	100.0
310	88589	0.2	0.0	0.0	99.8
309	556	0.0	0.0	0.0	100.0
271	7011	0.0	0.0	0.0	100.0
306	1851	0.0	0.0	0.0	100.0
327	618	0.0	0.0	0.0	100.0
68	1724	1.4	0.1	0.0	98.6
295	2282	0.0	0.0	0.0	100.0
70	3218	0.0	0.0	0.0	99.9
320	2083	0.0	0.0	0.0	100.0
286	504	0.0	0.0	0.0	100.0
76	2427	0.3	0.3	0.0	99.4
66	26561	0.0	0.0	0.0	100.0
74	213	16.8	0.0	0.0	83.2
283	1908	0.0	0.0	0.0	100.0
317	1792	0.0	0.0	0.0	100.0
294	14109	0.0	0.0	0.0	100.0
292	2327	0.0	0.1	0.0	99.9
4	6981	4.3	0.1	0.0	95.5
318	747	0.0	0.0	0.0	100.0
3	87557	3.2	0.0	0.0	96.8
72	923	1.7	0.3	0.0	98.0
77	12338	1.6	0.2	0.0	98.2
298	2088	0.0	0.1	0.0	99.9
277	1594	0.9	0.0	0.0	99.1

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
297	1247	0.0	0.0	0.0	100.0
279	6313	0.0	0.0	0.0	100.0
15	4294	0.1	0.0	0.0	99.9
58	1602	0.0	0.0	0.0	100.0
322	1817	0.0	0.0	0.0	100.0
67	14530	0.0	0.0	0.0	100.0
69	2552	0.0	0.0	0.0	100.0
281	1681	0.0	0.1	0.0	99.9
11	1350	0.0	0.0	0.0	100.0
269	4294	0.1	0.0	0.0	99.9
282	9688	10.5	0.5	0.0	89.0
296	1705	0.9	0.2	0.0	98.9
299	3924	0.0	0.0	0.0	100.0
75	2362	0.2	0.0	0.0	99.8
151	493	0.0	0.0	0.0	100.0
142	23776	0.0	0.0	0.0	100.0
55	5578	0.2	0.0	0.0	99.8
159	2631	0.0	0.0	0.0	100.0
157	4838	0.0	0.0	0.0	100.0
53	3777	0.0	0.0	0.0	100.0
164	3444	0.0	0.0	0.0	100.0
40	7256	0.5	0.1	0.0	99.5
165	6540	1.1	0.2	0.0	98.8
150	6861	0.0	0.0	0.0	100.0
149	6540	1.1	0.2	0.0	98.8
146	1990	0.0	0.2	0.0	99.8
145	35124	0.0	0.0	0.0	100.0
144	2632	0.0	0.0	0.0	100.0
184	9163	0.7	0.0	0.0	99.3
154	2552	0.0	0.0	0.0	100.0
171	6861	0.0	0.0	0.0	100.0
228	5357	0.0	0.1	0.0	99.9
177	2429	0.0	0.0	0.0	100.0
176	8657	7.1	1.1	0.0	91.8
175	25165	0.0	0.0	0.0	100.0
174	896	5.4	0.7	0.0	93.9
163	1225	0.0	0.0	0.0	100.0
172	2469	0.0	0.2	0.0	99.8
141	2469	0.0	0.2	0.0	99.8
170	3033	0.0	0.0	0.0	100.0
169	1267	0.0	0.0	0.0	100.0
168	1330	0.3	0.0	0.0	99.7
34	14834	0.2	0.4	0.0	99.5
35	15287	0.0	0.0	0.0	100.0
166	13670	0.0	0.0	0.0	100.0

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
173	825	0.0	0.0	0.0	100.0
49	1710	0.0	0.0	0.0	100.0
143	4638	0.0	0.0	0.0	100.0
93	2016	0.0	0.0	0.0	100.0
112	509	0.6	0.0	0.0	99.4
46	4777	0.0	0.0	0.0	100.0
110	429	0.0	0.0	0.0	100.0
118	39187	0.0	0.0	0.0	99.9
105	8162	0.0	0.0	0.0	100.0
119	437	0.0	0.0	0.0	100.0
103	23453	0.0	0.0	0.0	100.0
94	2016	0.0	0.0	0.0	100.0
95	3591	0.0	0.0	0.0	100.0
100	569	0.0	0.0	0.0	100.0
98	2347	0.0	0.1	0.0	99.9
97	4910	0.0	0.1	0.0	99.9
47	477	0.0	0.0	0.0	100.0
128	5511	0.0	0.0	0.0	100.0
139	5357	0.0	0.1	0.0	99.9
138	5927	0.0	0.2	0.0	99.8
137	13670	0.0	0.0	0.0	100.0
136	9183	0.0	0.0	0.0	100.0
133	487	0.0	0.0	0.0	100.0
114	11339	0.2	0.0	0.0	99.8
129	4095	0.0	0.0	0.0	100.0
32	5369	0.0	0.0	0.0	100.0
44	7412	0.0	0.0	0.0	100.0
126	2724	0.0	0.0	0.0	100.0
125	6565	0.1	0.0	0.0	99.9
123	526	2.2	0.0	0.0	97.8
121	5704	0.0	0.0	0.0	100.0
120	1459	0.0	0.0	0.0	100.0
132	2352	0.2	0.0	0.0	99.8
21	2479	0.0	0.0	0.0	100.0
84	4838	0.0	0.0	0.0	100.0
240	2469	0.0	0.2	0.0	99.8
239	13670	0.0	0.0	0.0	100.0
238	2469	0.0	0.2	0.0	99.8
19	1721	0.1	0.0	0.0	99.9
81	14530	0.0	0.0	0.0	100.0
20	3684	0.0	0.0	0.0	100.0
245	3488	0.0	0.0	0.0	100.0
82	17206	0.0	0.0	0.0	100.0
22	15258	0.0	0.0	0.0	100.0
233	842	0.0	0.0	0.0	100.0

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
231	577	0.0	0.3	0.0	99.7
83	3361	0.0	0.0	0.0	100.0
179	12009	0.3	0.0	0.0	99.7
235	6861	0.0	0.0	0.0	100.0
258	1260	0.0	0.0	0.0	100.0
268	1006	0.0	0.0	0.0	100.0
267	2023	0.0	0.0	0.0	100.0
78	9163	0.7	0.0	0.0	99.3
263	1493	0.0	0.0	0.0	100.0
18	1421	0.0	0.0	0.0	100.0
242	6198	0.0	0.0	0.0	100.0
261	1578	0.0	0.0	0.0	100.0
229	4209	7.6	0.5	0.0	91.9
256	2808	1.5	0.3	0.0	98.1
255	1710	0.0	0.0	0.0	100.0
252	6383	0.0	0.0	0.0	100.0
251	1714	0.0	0.0	0.0	100.0
248	1315	0.0	0.0	0.0	100.0
246	1247	0.0	0.0	0.0	100.0
262	1851	0.0	0.0	0.0	100.0
193	401	0.0	0.0	0.0	100.0
230	3218	0.0	0.0	0.0	99.9
88	1107	0.0	0.0	0.0	100.0
29	3717	0.4	0.0	0.0	99.6
199	6924	0.0	0.0	0.0	100.0
30	8209	0.0	0.0	0.0	100.0
87	1427	0.0	0.0	0.0	100.0
196	6861	0.0	0.0	0.0	100.0
203	1120	0.0	0.0	0.0	100.0
89	7193	0.0	0.0	0.0	100.0
190	1138	0.0	0.0	0.0	100.0
189	2007	3.2	0.0	0.0	96.7
188	3650	0.0	0.0	0.0	100.0
186	265	17.7	1.3	0.0	81.1
185	418	2.8	0.0	0.0	97.2
31	22319	0.0	0.0	0.0	100.0
219	295	0.0	0.0	0.0	100.0
24	52302	0.0	0.0	0.0	100.0
96	6151	0.0	0.0	0.0	100.0
227	39187	0.0	0.0	0.0	99.9
226	3130	0.4	0.0	0.0	99.6
85	3361	0.0	0.0	0.0	100.0
201	522	0.0	0.0	0.0	100.0
223	103	0.0	0.0	0.0	100.0
17	7906	0.1	0.0	0.0	99.9

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
218	2483	3.8	0.0	0.0	96.2
86	1765	0.0	0.0	0.0	100.0
212	9980	3.8	0.5	0.0	95.7
27	9887	0.2	0.0	0.0	99.8
209	531	0.0	0.0	0.0	100.0
204	1433	0.0	0.0	0.0	100.0
224	1594	0.9	0.0	0.0	99.1
703	242	0.0	0.2	0.0	99.8
712	691	0.0	0.0	0.0	100.0
711	356	0.0	0.0	0.0	100.0
710	6284	0.0	0.0	0.0	100.0
709	1714	0.0	0.0	0.0	100.0
708	5326	0.0	0.0	0.0	100.0
707	4671	0.3	0.0	0.0	99.7
706	1736	0.0	0.0	0.0	100.0
692	569	0.0	0.0	0.0	100.0
704	282	0.0	0.0	0.0	100.0
717	800	0.0	0.0	0.0	100.0
702	1256	0.0	0.0	0.0	100.0
701	672	1.3	0.0	0.0	98.7
700	298	0.0	0.0	0.0	100.0
699	10613	0.0	0.0	0.0	100.0
697	2259	0.0	0.0	0.0	100.0
696	5079	0.0	0.0	0.0	100.0
695	848	0.0	0.0	0.0	100.0
746	732	0.0	0.0	0.0	100.0
705	1736	0.0	0.0	0.0	100.0
727	2374	0.7	0.0	0.0	99.3
621	1100	0.0	0.0	0.0	100.0
744	487	0.0	0.0	0.0	100.0
741	522	0.0	0.0	0.0	100.0
739	2007	3.2	0.0	0.0	96.7
738	667	0.0	0.0	0.0	100.0
737	838	0.0	0.0	0.0	100.0
734	2007	3.2	0.0	0.0	96.7
732	2007	3.2	0.0	0.0	96.7
713	10271	0.2	0.0	0.0	99.8
728	669	0.0	0.0	0.0	100.0
715	4051	0.0	0.0	0.0	100.0
726	2347	0.0	0.1	0.0	99.9
724	3514	0.0	0.0	0.0	100.0
723	4340	2.3	2.4	0.0	95.3
721	496	0.0	0.0	0.0	100.0
720	3034	0.0	0.2	0.0	99.8
719	582	0.0	0.2	0.0	99.8

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
718	818	0.0	0.0	0.0	100.0
688	608	0.0	0.0	0.0	100.0
731	994	0.0	0.0	0.0	100.0
633	2469	0.0	0.2	0.0	99.8
646	2503	0.0	0.0	0.0	100.0
645	146	0.0	0.0	0.0	100.0
644	466	0.0	0.0	0.0	100.0
643	3142	0.0	0.0	0.0	100.0
642	11199	0.0	0.0	0.0	100.0
640	1660	0.0	0.0	0.0	100.0
638	1649	0.0	0.2	0.0	99.8
694	268	0.0	0.0	0.0	100.0
634	904	0.0	0.0	0.0	100.0
649	99870	0.6	0.0	0.0	99.3
632	2469	0.0	0.2	0.0	99.8
631	2469	0.0	0.2	0.0	99.8
629	348	0.0	0.0	0.0	100.0
626	585	0.0	0.0	0.0	100.0
625	422	0.0	0.2	0.0	99.8
624	498	0.0	0.0	0.0	100.0
623	1664	0.0	0.0	0.0	100.0
435	1144	0.0	0.0	0.0	100.0
636	1274	0.0	0.0	0.0	100.0
659	800	0.0	0.0	0.0	100.0
685	879	0.1	0.0	0.0	99.9
675	11252	0.0	0.0	0.0	100.0
674	2383	0.0	0.0	0.0	100.0
673	675	0.0	0.0	0.0	100.0
672	1050	0.0	0.0	0.0	100.0
671	11252	0.0	0.0	0.0	100.0
670	930	0.0	0.0	0.0	100.0
668	1205	0.0	0.0	0.0	100.0
647	862	0.0	0.0	0.0	100.0
665	232	0.0	0.0	0.0	100.0
648	348	0.0	0.0	0.0	100.0
657	1607	0.1	0.1	0.0	99.9
656	2058	0.0	0.0	0.0	100.0
654	1113	0.0	0.0	0.0	100.0
653	1113	0.0	0.0	0.0	100.0
652	6006	7.1	0.9	0.0	92.0
651	900	0.0	0.0	0.0	100.0
650	507	0.0	0.0	0.0	100.0
747	356	0.0	0.0	0.0	100.0
667	4986	0.0	0.0	0.0	100.0
815	766	0.0	0.0	0.0	100.0

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
827	3085	0.0	0.0	0.0	100.0
826	3249	0.0	0.0	0.0	100.0
825	1617	0.0	0.0	0.0	100.0
824	2697	0.0	0.0	0.0	100.0
823	196	0.0	0.0	0.0	100.0
821	961	0.4	0.0	0.0	99.6
819	2332	0.0	0.0	0.0	100.0
802	669	0.0	0.0	0.0	100.0
817	1160	0.0	0.0	0.0	100.0
831	1613	0.0	0.0	0.0	100.0
813	1962	0.0	0.0	0.0	100.0
811	1664	0.0	0.0	0.0	100.0
810	485	0.0	0.0	0.0	100.0
807	6861	0.0	0.0	0.0	100.0
806	6861	0.0	0.0	0.0	100.0
805	1814	0.0	0.0	0.0	100.0
804	1476	0.0	0.0	0.0	100.0
745	1885	0.0	0.1	0.0	99.9
818	2007	3.2	0.0	0.0	96.7
857	5640	0.0	1.6	0.0	98.4
871	14530	0.0	0.0	0.0	100.0
870	3732	0.7	0.1	0.0	99.2
869	5688	0.0	0.0	0.0	100.0
867	689	0.0	0.0	0.0	100.0
864	1001	3.2	0.2	0.0	96.6
863	2808	1.5	0.3	0.0	98.1
862	400	0.0	0.1	0.0	99.9
860	602	4.7	0.0	0.0	95.3
828	775	0.0	0.0	0.0	100.0
858	345	0.0	0.0	0.0	100.0
829	3085	0.0	0.0	0.0	100.0
856	61	0.0	0.0	0.0	100.0
854	1027	5.6	0.0	0.0	94.4
853	4180	3.2	7.1	0.0	89.7
838	702	0.0	0.0	0.0	100.0
837	702	0.0	0.0	0.0	100.0
835	7624	0.0	0.0	0.0	100.0
832	4327	0.2	0.0	0.0	99.8
801	2347	0.0	0.1	0.0	99.9
859	5690	1.5	0.3	0.0	98.3
759	265	17.7	1.3	0.0	81.1
777	7662	1.3	0.1	0.0	98.6
776	266	0.0	0.0	0.0	100.0
775	626	0.0	0.0	0.0	100.0
765	828	0.0	0.0	0.0	100.0

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
764	3390	0.0	0.0	0.0	100.0
763	706	0.0	0.1	0.0	99.8
762	2602	0.7	0.0	0.0	99.3
803	316	0.0	0.0	0.0	100.0
760	2052	0.0	0.6	0.0	99.4
782	1107	0.0	0.0	0.0	100.0
758	76	24.1	25.6	0.0	50.3
756	5424	0.2	0.1	0.0	99.7
754	4360	0.1	0.0	0.0	99.9
752	1001	3.2	0.2	0.0	96.6
751	524	2.3	0.0	0.0	97.7
750	356	0.0	0.0	0.0	100.0
749	732	0.0	0.0	0.0	100.0
748	732	0.0	0.0	0.0	100.0
761	7454	0.0	0.0	0.0	100.0
790	22650	0.0	0.0	0.0	100.0
800	1310	0.0	0.0	0.0	100.0
799	366	0.1	0.0	0.0	99.9
798	366	0.1	0.0	0.0	99.9
797	1631	0.0	0.2	0.0	99.8
796	2734	0.0	0.0	0.0	100.0
795	1004	0.0	0.0	0.0	100.0
794	4081	0.0	0.0	0.0	100.0
793	1845	0.0	0.0	0.0	100.0
778	997	0.0	0.0	0.0	100.0
791	95092	0.7	0.0	0.0	99.3
779	320	0.0	0.0	0.0	100.0
789	24495	0.0	0.0	0.0	100.0
788	22280	0.0	0.0	0.0	100.0
787	22280	0.0	0.0	0.0	100.0
786	22280	0.0	0.0	0.0	100.0
785	232	0.0	0.0	0.0	100.0
784	858	0.0	0.0	0.0	100.0
783	25642	0.0	0.0	0.0	100.0
620	348	0.0	0.0	0.0	100.0
792	1845	0.0	0.0	0.0	100.0
442	618	0.0	0.0	0.0	100.0
455	428	0.0	0.0	0.0	100.0
454	20809	1.1	0.5	0.0	98.4
452	1851	0.0	0.0	0.0	100.0
448	4368	1.0	0.0	0.0	99.0
447	1970	0.0	0.0	0.0	100.0
446	21701	0.0	0.0	0.0	100.0
445	5613	0.0	0.0	0.0	100.0
422	70934	1.7	0.0	0.0	98.3

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
443	1824	0.0	0.0	0.0	100.0
460	6748	0.0	0.0	0.0	100.0
441	711	1.6	0.0	0.0	98.4
438	2716	0.0	0.0	0.0	100.0
436	3488	0.0	0.0	0.0	100.0
433	851	1.6	0.0	0.0	98.4
432	7981	0.0	0.0	0.0	100.0
430	822	1.4	0.0	0.0	98.5
429	822	1.4	0.0	0.0	98.5
494	1341	0.0	0.0	0.0	100.0
444	1676	0.0	0.0	0.0	100.0
473	17742	0.0	0.0	0.0	100.0
622	196	0.0	0.0	0.0	100.0
488	8835	0.0	0.0	0.0	100.0
486	2343	0.0	0.0	0.0	100.0
484	8835	0.0	0.0	0.0	100.0
482	16120	0.0	0.0	0.0	100.0
480	16120	0.0	0.0	0.0	100.0
479	1145	1.8	0.0	0.0	98.2
476	2189	0.0	0.0	0.0	100.0
457	4756	0.0	0.0	0.0	100.0
474	17742	0.0	0.0	0.0	100.0
458	1738	0.0	0.0	0.0	100.0
472	1260	0.0	0.0	0.0	100.0
470	2189	0.0	0.0	0.0	100.0
469	1937	0.0	0.0	0.0	100.0
468	1738	0.0	0.0	0.0	100.0
466	1553	0.0	0.0	0.0	100.0
465	2243	0.0	0.0	0.0	100.0
464	53280	0.0	0.0	0.0	100.0
420	2794	0.0	0.0	0.0	100.0
475	949	0.0	0.0	0.0	100.0
342	16986	0.0	0.0	0.0	100.0
361	506	0.0	0.0	0.0	100.0
360	2671	2.8	0.8	0.0	96.5
358	2552	0.0	0.0	0.0	100.0
356	4940	0.0	0.0	0.0	99.9
354	6006	7.1	0.9	0.0	92.0
353	6006	7.1	0.9	0.0	92.0
350	1098	0.0	0.0	0.0	100.0
426	2374	0.0	0.0	0.0	100.0
345	6576	9.9	0.7	0.0	89.3
367	6861	0.0	0.0	0.0	100.0
341	896	6.4	0.0	0.0	93.6
340	1607	0.1	0.1	0.0	99.9

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
339	5499	0.0	0.0	0.0	100.0
338	1288	0.0	0.0	0.0	100.0
337	4180	3.2	7.1	0.0	89.7
336	875	0.5	1.7	0.0	97.8
334	5590	0.1	0.0	0.0	99.9
330	1145	1.8	0.0	0.0	98.2
348	1459	0.0	0.0	0.0	100.0
388	421	0.2	0.0	0.0	99.8
418	390	0.2	0.0	0.0	99.8
417	1710	0.0	0.0	0.0	100.0
416	7435	0.0	0.1	0.0	99.9
414	562	0.0	0.0	0.0	100.0
412	608	0.0	0.0	0.0	100.0
411	18354	0.5	0.2	0.0	99.4
402	702	0.0	0.0	0.0	100.0
397	770	0.0	0.1	0.0	99.9
363	2552	0.0	0.0	0.0	100.0
389	1127	0.0	0.0	0.0	100.0
365	1602	0.0	0.0	0.0	100.0
387	1127	0.0	0.0	0.0	100.0
386	421	0.2	0.0	0.0	99.8
378	450	0.3	0.0	0.0	99.7
377	2041	0.0	0.0	0.0	100.0
375	421	0.2	0.0	0.0	99.8
371	903	0.3	0.0	0.0	99.7
369	2552	0.0	0.0	0.0	100.0
495	295	0.0	0.0	0.0	100.0
391	490	0.1	0.0	0.0	99.9
564	1080	0.0	0.0	0.0	100.0
578	338	0.0	0.0	0.0	100.0
576	627	0.0	0.0	0.0	100.0
575	1489	0.0	0.0	0.0	100.0
574	3085	0.0	0.0	0.0	100.0
573	552	0.0	0.0	0.0	100.0
572	106	0.0	0.0	0.0	100.0
571	629	0.6	0.0	0.0	99.4
539	1759	0.0	0.0	0.0	100.0
565	534	0.0	0.0	0.0	100.0
588	6540	1.1	0.2	0.0	98.8
563	3085	0.0	0.0	0.0	100.0
562	3085	0.0	0.0	0.0	100.0
557	4126	0.0	0.0	0.0	100.0
555	2327	0.0	0.1	0.0	99.9
552	2572	5.8	13.9	0.0	80.3
551	2552	0.0	0.0	0.0	100.0

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
550	2552	0.0	0.0	0.0	100.0
492	9966	10.2	0.5	0.0	89.3
570	1331	0.0	0.0	0.0	100.0
600	538202	1.5	0.0	0.0	98.5
617	2086	1.8	0.0	0.0	98.2
615	7011	0.0	0.0	0.0	100.0
610	7273	0.0	0.0	0.0	100.0
608	1003	0.0	0.0	0.0	100.0
607	4679	0.4	0.1	0.0	99.5
606	2542	0.1	0.0	0.0	99.9
604	462	0.0	0.0	0.0	100.0
603	462	0.0	0.0	0.0	100.0
579	373	0.0	0.0	0.0	100.0
601	1075	0.0	0.0	0.0	100.0
580	585	0.0	0.0	0.0	100.0
598	439	0.0	0.0	0.0	100.0
597	3514	0.0	0.0	0.0	100.0
596	2507	0.1	0.0	0.0	99.9
595	2440	0.1	0.0	0.0	99.9
594	22120	0.0	0.0	0.0	100.0
592	299	2.5	0.0	0.0	97.5
591	1724	0.0	0.0	0.0	100.0
538	2697	0.0	0.0	0.0	100.0
602	1075	0.0	0.0	0.0	100.0
506	1738	0.0	0.0	0.0	100.0
548	405	0.0	0.0	0.0	100.0
547	2049	5.4	0.0	0.0	94.6
545	20328	0.0	0.0	0.0	100.0
543	46189	0.0	0.0	0.0	100.0
542	888	0.0	0.0	0.0	100.0
541	2697	0.0	0.0	0.0	100.0
516	1113	0.0	0.0	0.0	100.0
540	2946	0.0	0.0	0.0	100.0
508	32016	0.0	0.0	0.0	100.0
684	43688	0.0	0.0	0.0	100.0
505	6321	0.0	0.0	0.0	100.0
504	549	0.0	0.0	0.0	100.0
503	639	0.0	0.0	0.0	100.0
502	2634	0.0	0.0	0.0	100.0
501	549	0.0	0.0	0.0	100.0
499	3565	0.0	0.0	0.0	100.0
497	46189	0.0	0.0	0.0	100.0
496	3158	0.0	0.0	0.0	100.0
510	344	0.0	0.0	0.0	100.0
524	3647	0.0	0.0	0.0	100.0

CNDDB-CRLF Location Watershed Characteristics

CNDDB_CRLF Location ID	Watershed Area (Ac)	Water	Wetland	AgLand	Other
537	15654	0.0	0.0	0.0	100.0
536	1174	0.0	0.0	0.0	100.0
535	1174	0.0	0.0	0.0	100.0
534	469	0.0	0.0	0.0	100.0
533	585	0.0	0.0	0.0	100.0
532	1642	0.0	0.0	0.0	100.0
531	1029	1.0	0.2	0.0	98.9
530	1029	1.0	0.2	0.0	98.9
679	702	0.0	0.0	0.0	100.0
525	16570	4.3	0.3	0.0	95.4
682	435	0.0	0.0	0.0	100.0
523	7662	1.3	0.1	0.0	98.6
774	522	0.0	0.0	0.0	100.0
771	732	0.0	0.0	0.0	100.0
770	842	0.0	0.0	0.0	100.0
769	2365	0.0	0.0	0.0	100.0
768	1610	0.0	0.0	0.0	100.0
767	1610	0.0	0.0	0.0	100.0
329	1034	0.0	0.0	0.0	100.0
528	585	0.0	0.0	0.0	100.0

Appendix 2: PE4 Output files

Cotton – Aerial application

stored as CACot_LabA.out

Chemical: Methamidophos
PRZM environment: CAcottonC.txt modified Satday, 12 October 2002 at 17:34:02
EXAMS environment: pond298.exv modified Wedday, 21 April 2004 at 12:48:09
Metfile: w93193.dvf modified Sunday, 19 May 2002 at 06:54:08
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	4.888	3.931	3.124	1.652	1.112	0.2746
1962	5.024	4.085	3.249	1.745	1.176	0.2905
1963	5.286	4.379	3.486	1.9	1.282	0.3166
1964	5.007	4.065	3.233	1.734	1.169	0.2881
1965	5.16	4.237	3.372	1.817	1.227	0.3033
1966	5.223	4.308	3.429	1.824	1.226	0.3029
1967	4.742	3.766	2.989	1.55	1.039	0.2565
1968	4.891	3.935	3.127	1.696	1.146	0.2824
1969	5.013	4.072	3.239	1.735	1.168	0.2886
1970	4.788	3.817	3.031	1.605	1.08	0.2669
1971	4.901	3.945	3.136	1.658	1.115	0.2754
1972	4.967	4.02	3.197	1.7	1.144	0.2819
1973	5.047	4.11	3.27	1.759	1.186	0.2932
1974	4.989	4.045	3.217	1.72	1.157	0.2857
1975	5.251	4.34	3.454	1.903	1.286	0.3179
1976	5.155	4.232	3.368	1.896	1.292	0.3189
1977	4.886	3.928	3.122	1.649	1.109	0.2738
1978	4.845	3.882	3.084	1.622	1.09	0.269
1979	4.898	3.942	3.134	1.663	1.117	0.2756
1980	4.751	3.776	2.997	1.579	1.061	0.2611
1981	4.671	3.685	2.922	1.517	1.017	0.2511
1982	5.022	4.082	3.247	1.73	1.165	0.2877
1983	5.202	4.284	3.41	1.802	1.209	0.2984
1984	4.453	3.437	2.715	1.395	0.9338	0.2297
1985	4.552	3.55	2.81	1.468	0.9866	0.2436
1986	4.893	3.936	3.128	1.618	1.084	0.2677
1987	5.41	4.518	3.596	1.938	1.304	0.322
1988	4.564	3.564	2.821	1.471	0.9877	0.2431
1989	4.823	3.857	3.064	1.628	1.095	0.2705
1990	4.711	3.731	2.96	1.555	1.044	0.2578

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	5.41	4.518	3.596	1.938	1.304	0.322
0.0645161290322581	5.286	4.379	3.486	1.903	1.292	0.3189
0.0967741935483871	5.251	4.34	3.454	1.9	1.286	0.3179
0.129032258064516	5.223	4.308	3.429	1.896	1.282	0.3166
0.161290322580645	5.202	4.284	3.41	1.824	1.227	0.3033
0.193548387096774	5.16	4.237	3.372	1.817	1.226	0.3029
0.225806451612903	5.155	4.232	3.368	1.802	1.209	0.2984
0.258064516129032	5.047	4.11	3.27	1.759	1.186	0.2932
0.290322580645161	5.024	4.085	3.249	1.745	1.176	0.2905
0.32258064516129	5.022	4.082	3.247	1.735	1.169	0.2886

0.354838709677419	5.013	4.072	3.239	1.734	1.168	0.2881
0.387096774193548	5.007	4.065	3.233	1.73	1.165	0.2877
0.419354838709677	4.989	4.045	3.217	1.72	1.157	0.2857
0.451612903225806	4.967	4.02	3.197	1.7	1.146	0.2824
0.483870967741936	4.901	3.945	3.136	1.696	1.144	0.2819
0.516129032258065	4.898	3.942	3.134	1.663	1.117	0.2756
0.548387096774194	4.893	3.936	3.128	1.658	1.115	0.2754
0.580645161290323	4.891	3.935	3.127	1.652	1.112	0.2746
0.612903225806452	4.888	3.931	3.124	1.649	1.109	0.2738
0.645161290322581	4.886	3.928	3.122	1.628	1.095	0.2705
0.67741935483871	4.845	3.882	3.084	1.622	1.09	0.269
0.709677419354839	4.823	3.857	3.064	1.618	1.084	0.2677
0.741935483870968	4.788	3.817	3.031	1.605	1.08	0.2669
0.774193548387097	4.751	3.776	2.997	1.579	1.061	0.2611
0.806451612903226	4.742	3.766	2.989	1.555	1.044	0.2578
0.838709677419355	4.711	3.731	2.96	1.55	1.039	0.2565
0.870967741935484	4.671	3.685	2.922	1.517	1.017	0.2511
0.903225806451613	4.564	3.564	2.821	1.471	0.9877	0.2436
0.935483870967742	4.552	3.55	2.81	1.468	0.9866	0.2431
0.967741935483871	4.453	3.437	2.715	1.395	0.9338	0.2297

0.1 5.2482 4.3368 3.4515 1.8996 1.2856 0.31777

Average of yearly averages: 0.279816666666667

Inputs generated by pe4.pl - update revision 19 - August 2005

Data used for this run:
Output File: CACot_LabA
Metfile: w93193.dvf
PRZM scenario: CAcottonC.txt
EXAMS environment file: pond298.exv
Chemical Name: Methamidophos

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	141.14	g/mol	
Henry's Law Const.	henry	1.6e-11		atm-m^3/mol
Vapor Pressure	vapr	1.725e-5		torr
Solubility	sol	200000	mg/L	
Kd	Kd	0.029	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	7.56	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	20.4	days	Halfife
Aerobic Soil Metabolism	asm	1.75	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	1	integer	See PRZM manual
Incorporation Depth:	DEPI	4.0	cm	
Application Rate:	TAPP	1.12	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	03-07	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	7	days	Set to 0 or delete line for single app.
app. rate 1	apprate	1.12	kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate	1.12	kg/ha	
Interval 3	interval	7	days	Set to 0 or delete line for single app.
app. rate 3	apprate	1.12	kg/ha	
Record 17:	FILTRA			
	IPSCND 1			

```
      UPTKF
Record 18:    PLVKRT
      PLDKRT
      FEXTRC 0.5
Flag for Index Res. Run    IR     Pond
Flag for runoff calc.      RUNOFF none    none, monthly or total(average of entire run)
```

Cotton – Ground application

stored as CACot_LabG.out

```
Chemical: Methamidophos
PRZM environment: CAcottonC.txt   modified Satday, 12 October 2002 at 17:34:02
EXAMS environment: pond298.exv    modified Wedday, 21 April 2004 at 12:48:09
Metfile: w93193.dvf modified Sunday, 19 May 2002 at 06:54:08
Water segment concentrations (ppb)
```

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.9776	0.7862	0.6248	0.3305	0.2223	0.05491
1962	1.005	0.8169	0.6498	0.349	0.2352	0.0581
1963	1.057	0.8759	0.6971	0.3801	0.2564	0.06333
1964	1.001	0.8129	0.6466	0.3468	0.2338	0.05762
1965	1.032	0.8474	0.6744	0.3635	0.2454	0.06067
1966	1.045	0.8616	0.6858	0.3647	0.2452	0.06057
1967	0.9484	0.7532	0.5977	0.3101	0.2078	0.05129
1968	0.9783	0.787	0.6255	0.3391	0.2291	0.05648
1969	1.003	0.8144	0.6477	0.347	0.2337	0.05773
1970	0.9575	0.7635	0.6062	0.3211	0.2161	0.05338
1971	0.9801	0.789	0.6271	0.3316	0.223	0.05509
1972	0.9934	0.804	0.6393	0.3399	0.2288	0.05639
1973	1.009	0.822	0.6539	0.3518	0.2373	0.05864
1974	0.9979	0.809	0.6434	0.344	0.2314	0.05714
1975	1.05	0.8679	0.6908	0.3805	0.2573	0.06358
1976	1.031	0.8463	0.6735	0.3792	0.2583	0.06378
1977	0.9772	0.7857	0.6244	0.3299	0.2217	0.05475
1978	0.969	0.7764	0.6169	0.3243	0.2179	0.0538
1979	0.9797	0.7885	0.6267	0.3326	0.2234	0.05513
1980	0.9502	0.7553	0.5995	0.3157	0.2122	0.05223
1981	0.9341	0.737	0.5844	0.3035	0.2035	0.05022
1982	1.004	0.8164	0.6494	0.346	0.233	0.05754
1983	1.04	0.8568	0.682	0.3605	0.2419	0.05968
1984	0.8905	0.6875	0.543	0.279	0.1868	0.04595
1985	0.9104	0.71	0.562	0.2936	0.1973	0.04872
1986	0.9785	0.7872	0.6257	0.3235	0.2169	0.05354
1987	1.082	0.9036	0.7192	0.3876	0.2609	0.0644
1988	0.9128	0.7128	0.5643	0.2943	0.1975	0.04862
1989	0.9645	0.7714	0.6127	0.3255	0.2191	0.0541
1990	0.9422	0.7461	0.5919	0.311	0.2089	0.05156

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	1.082	0.9036	0.7192	0.3876	0.2609	0.0644
0.0645161290322581	1.057	0.8759	0.6971	0.3805	0.2583	0.06378
0.0967741935483871	1.05	0.8679	0.6908	0.3801	0.2573	0.06358
0.129032258064516	1.045	0.8616	0.6858	0.3792	0.2564	0.06333
0.161290322580645	1.04	0.8568	0.682	0.3647	0.2454	0.06067
0.193548387096774	1.032	0.8474	0.6744	0.3635	0.2452	0.06057
0.225806451612903	1.031	0.8463	0.6735	0.3605	0.2419	0.05968
0.258064516129032	1.009	0.822	0.6539	0.3518	0.2373	0.05864

0.290322580645161	1.005	0.8169	0.6498	0.349	0.2352	0.0581
0.32258064516129	1.004	0.8164	0.6494	0.347	0.2338	0.05773
0.354838709677419	1.003	0.8144	0.6477	0.3468	0.2337	0.05762
0.387096774193548	1.001	0.8129	0.6466	0.346	0.233	0.05754
0.419354838709677	0.9979	0.809	0.6434	0.344	0.2314	0.05714
0.451612903225806	0.9934	0.804	0.6393	0.3399	0.2291	0.05648
0.483870967741936	0.9801	0.789	0.6271	0.3391	0.2288	0.05639
0.516129032258065	0.9797	0.7885	0.6267	0.3326	0.2234	0.05513
0.548387096774194	0.9785	0.7872	0.6257	0.3316	0.223	0.05509
0.580645161290323	0.9783	0.787	0.6255	0.3305	0.2223	0.05491
0.612903225806452	0.9776	0.7862	0.6248	0.3299	0.2217	0.05475
0.645161290322581	0.9772	0.7857	0.6244	0.3255	0.2191	0.0541
0.67741935483871	0.969	0.7764	0.6169	0.3243	0.2179	0.0538
0.709677419354839	0.9645	0.7714	0.6127	0.3235	0.2169	0.05354
0.741935483870968	0.9575	0.7635	0.6062	0.3211	0.2161	0.05338
0.774193548387097	0.9502	0.7553	0.5995	0.3157	0.2122	0.05223
0.806451612903226	0.9484	0.7532	0.5977	0.311	0.2089	0.05156
0.838709677419355	0.9422	0.7461	0.5919	0.3101	0.2078	0.05129
0.870967741935484	0.9341	0.737	0.5844	0.3035	0.2035	0.05022
0.903225806451613	0.9128	0.7128	0.5643	0.2943	0.1975	0.04872
0.935483870967742	0.9104	0.71	0.562	0.2936	0.1973	0.04862
0.967741935483871	0.8905	0.6875	0.543	0.279	0.1868	0.04595

```
0.1    1.0495 0.86727      0.6903 0.38001      0.25721      0.063555
                           Average of yearly averages:      0.0559646666666667

Inputs generated by pe4.pl - update revision 19 - August 2005


Data used for this run:
Output File: CACot_LabG
Metfile:      w93193.dvf
PRZM scenario:       CAcottonC.txt
EXAMS environment file:    pond298.exv
Chemical Name:       Methamidophos
Description   Variable Name Value  Units  Comments
Molecular weight     mwt    141.14 g/mol
Henry's Law Const.   henry  1.6e-11       atm-m^3/mol
Vapor Pressure       vapr   1.725e-5      torr
Solubility    sol    200000 mg/L
Kd     Kd     0.029  mg/L
Koc    Koc           mg/L
Photolysis half-life        kdp    0      days   Half-life
Aerobic Aquatic Metabolism kbacw  7.56   days   Halfife
Anaerobic Aquatic Metabolism      kbacs  20.4   days   Halfife
Aerobic Soil Metabolism    asm    1.75   days   Halfife
Hydrolysis:   pH 7   0      days   Half-life
Method:       CAM    1      integer       See PRZM manual
Incorporation Depth:        DEPI   4.0    cm
Application Rate:    TAPP   1.12   kg/ha
Application Efficiency:     APPEFF 0.99   fraction
Spray Drift   DRFT   0.01   fraction of application rate applied to pond
Application Date     Date   03-07  dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1    interval      7      days   Set to 0 or delete line for single app.
app. rate 1   apprate       1.12   kg/ha
Interval 2    interval      7      days   Set to 0 or delete line for single app.
app. rate 2   apprate       1.12   kg/ha
Interval 3    interval      7      days   Set to 0 or delete line for single app.
```

```
app. rate 3   apprate       1.12    kg/ha
Record 17:    FILTRA
       IPSCND 1
       UPTKF
Record 18:    PLVKRT
       PLDKRT

       FEXTRC 0.5
Flag for Index Res. Run     IR      Pond
Flag for runoff calc.       RUNOFF none    none, monthly or total(average of entire run)
```

Potato – Aerial application

```
stored as CAPot_LabA.out

Chemical: Methamidophos
PRZM environment: CAsugarbeetC.txt       modified Thuday, 29 May 2003 at 16:17:54
EXAMS environment: pond298.exv   modified Wedday, 21 April 2004 at 12:48:09
Metfile: w93193.dvf modified Sunday, 19 May 2002 at 06:54:08
Water segment concentrations (ppb)
```

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	4.971	3.997	3.256	1.699	1.14	0.2813
1962	5.142	4.18	3.43	1.81	1.217	0.3003
1963	5.426	4.495	3.689	1.991	1.342	0.3312
1964	5.174	4.201	3.493	1.836	1.234	0.3037
1965	5.356	4.398	3.665	1.949	1.311	0.3238
1966	5.279	4.355	3.512	1.885	1.266	0.3125
1967	4.994	3.966	3.329	1.703	1.14	0.2812
1968	4.988	4.012	3.282	1.718	1.156	0.2845
1969	5.211	4.233	3.545	1.861	1.25	0.3086
1970	4.934	3.934	3.272	1.689	1.133	0.2796
1971	5.066	4.078	3.399	1.768	1.186	0.2927
1972	5.056	4.092	3.337	1.752	1.177	0.2896
1973	5.097	4.151	3.347	1.776	1.194	0.2948
1974	5.075	4.115	3.351	1.765	1.186	0.2926
1975	5.342	4.415	3.588	1.939	1.308	0.323
1976	5.308	4.357	3.597	1.93	1.306	0.322
1977	4.941	3.973	3.21	1.677	1.125	0.2775
1978	4.977	3.988	3.298	1.71	1.146	0.2828
1979	4.986	4.013	3.274	1.71	1.147	0.2831
1980	5.014	3.985	3.347	1.716	1.15	0.283
1981	4.707	3.714	2.984	1.531	1.025	0.2529
1982	5.212	4.236	3.54	1.859	1.248	0.3081
1983	5.27	4.341	3.512	1.878	1.261	0.311
1984	4.725	3.648	3.022	1.515	1.013	0.2492
1985	4.622	3.605	2.934	1.491	0.9988	0.2464
1986	4.949	3.982	3.219	1.676	1.122	0.2769
1987	5.37	4.485	3.539	1.942	1.307	0.3225
1988	4.856	3.792	3.16	1.597	1.07	0.2631
1989	4.95	3.959	3.272	1.696	1.138	0.2808
1990	4.859	3.848	3.209	1.645	1.102	0.272

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	5.426	4.495	3.689	1.991	1.342	0.3312
0.0645161290322581	5.37	4.485	3.665	1.949	1.311	0.3238
0.0967741935483871	5.356	4.415	3.597	1.942	1.308	0.323

0.129032258064516	5.342	4.398	3.588	1.939	1.307	0.3225
0.161290322580645	5.308	4.357	3.545	1.93	1.306	0.322
0.193548387096774	5.279	4.355	3.54	1.885	1.266	0.3125
0.225806451612903	5.27	4.341	3.539	1.878	1.261	0.311
0.258064516129032	5.212	4.236	3.512	1.861	1.25	0.3086
0.290322580645161	5.211	4.233	3.512	1.859	1.248	0.3081
0.32258064516129	5.174	4.201	3.493	1.836	1.234	0.3037
0.354838709677419	5.142	4.18	3.43	1.81	1.217	0.3003
0.387096774193548	5.097	4.151	3.399	1.776	1.194	0.2948
0.419354838709677	5.075	4.115	3.351	1.768	1.186	0.2927
0.451612903225806	5.066	4.092	3.347	1.765	1.186	0.2926
0.483870967741936	5.056	4.078	3.347	1.752	1.177	0.2896
0.516129032258065	5.014	4.013	3.337	1.718	1.156	0.2845
0.548387096774194	4.994	4.012	3.329	1.716	1.15	0.2831
0.580645161290323	4.988	3.997	3.298	1.71	1.147	0.283
0.612903225806452	4.986	3.988	3.282	1.71	1.146	0.2828
0.645161290322581	4.977	3.985	3.274	1.703	1.14	0.2813
0.67741935483871	4.971	3.982	3.272	1.699	1.14	0.2812
0.709677419354839	4.95	3.973	3.272	1.696	1.138	0.2808
0.741935483870968	4.949	3.966	3.256	1.689	1.133	0.2796
0.774193548387097	4.941	3.959	3.219	1.677	1.125	0.2775
0.806451612903226	4.934	3.934	3.21	1.676	1.122	0.2769
0.838709677419355	4.859	3.848	3.209	1.645	1.102	0.272
0.870967741935484	4.856	3.792	3.16	1.597	1.07	0.2631
0.903225806451613	4.725	3.714	3.022	1.531	1.025	0.2529
0.935483870967742	4.707	3.648	2.984	1.515	1.013	0.2492
0.967741935483871	4.622	3.605	2.934	1.491	0.9988	0.2464

0.1 5.3546 4.4133 3.5961 1.9417 1.3079 0.32295
Average of yearly averages: 0.291023333333333

Inputs generated by pe4.pl - update revision 19 - August 2005

Data used for this run:
Output File: CAPot_LabA
Metfile: w93193.dvf
PRZM scenario: CAsugarbeetC.txt
EXAMS environment file: pond298.exv
Chemical Name: Methamidophos

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	141.14	g/mol	
Henry's Law Const.	henry	1.6e-11	atm-m^3/mol	
Vapor Pressure	vapr	1.725e-5	torr	
Solubility	sol	200000	mg/L	
Kd	Kd	0.029	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	7.56	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	20.4	days	Halfife
Aerobic Soil Metabolism	asm	1.75	days	Halfife
Hydrolysis: pH 7		0	days	Half-life
Method:	CAM	1	integer	See PRZM manual
Incorporation Depth:	DEPI	4.0	cm	
Application Rate:	TAPP	1.12	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.05	fraction of application rate applied to pond	
Application Date	Date	20-06	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	7	days	Set to 0 or delete line for single app.

app. rate 1	apprate	1.12	kg/ha	
Interval 2	interval	7	days	Set to 0 or delete line for single app.
app. rate 2	apprate	1.12	kg/ha	
Interval 3	interval	7	days	Set to 0 or delete line for single app.
app. rate 3	apprate	1.12	kg/ha	
Record 17:	FILTRA			
IPSCND 1				
UPTKF				
Record 18:	PLVKRT			
PLDKRT				
FEXTRC 0.5				
Flag for Index Res. Run		IR	Pond	
Flag for runoff calc.		RUNOFF	none	none, monthly or total(average of entire run)

Potato – Ground application

stored as CAPot_LabG.out

Chemical: Methamidophos
PRZM environment: CAsugarbeetC.txt modified Thuday, 29 May 2003 at 16:17:54
EXAMS environment: pond298.exv modified Wedday, 21 April 2004 at 12:48:09
Metfile: w93193.dvf modified Sunday, 19 May 2002 at 06:54:08
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.9941	0.7995	0.6513	0.3398	0.228	0.05626
1962	1.028	0.836	0.686	0.362	0.2433	0.06006
1963	1.085	0.899	0.7379	0.3983	0.2683	0.06624
1964	1.035	0.8401	0.6986	0.3672	0.2468	0.06074
1965	1.071	0.8796	0.733	0.3898	0.2622	0.06475
1966	1.056	0.8709	0.7025	0.377	0.2533	0.0625
1967	0.9989	0.7933	0.6658	0.3406	0.228	0.05623
1968	0.9976	0.8025	0.6563	0.3436	0.2312	0.05691
1969	1.042	0.8465	0.709	0.3722	0.2501	0.06172
1970	0.9867	0.7868	0.6544	0.3378	0.2266	0.05592
1971	1.013	0.8156	0.6799	0.3536	0.2372	0.05854
1972	1.011	0.8184	0.6673	0.3505	0.2353	0.05792
1973	1.019	0.8302	0.6693	0.3551	0.2388	0.05896
1974	1.015	0.823	0.6703	0.353	0.2371	0.05851
1975	1.068	0.883	0.7175	0.3878	0.2616	0.0646
1976	1.062	0.8715	0.7194	0.3859	0.2613	0.0644
1977	0.9881	0.7945	0.6421	0.3353	0.2249	0.05551
1978	0.9954	0.7976	0.6597	0.3419	0.2292	0.05656
1979	0.9972	0.8027	0.6548	0.342	0.2295	0.05661
1980	1.003	0.7971	0.6693	0.3432	0.2301	0.05661
1981	0.9414	0.7428	0.5969	0.3062	0.205	0.05058
1982	1.042	0.8473	0.708	0.3718	0.2497	0.06162
1983	1.054	0.8681	0.7023	0.3757	0.2521	0.06219
1984	0.945	0.7295	0.6045	0.303	0.2026	0.04983
1985	0.9243	0.7209	0.5869	0.2983	0.1998	0.04929
1986	0.9898	0.7963	0.6438	0.3352	0.2245	0.05537
1987	1.074	0.897	0.7079	0.3884	0.2614	0.0645
1988	0.9713	0.7585	0.632	0.3195	0.2139	0.05262
1989	0.99	0.7918	0.6543	0.3391	0.2276	0.05616
1990	0.9718	0.7696	0.6419	0.329	0.2205	0.0544

Sorted results

Prob. Peak 96 hr 21 Day 60 Day 90 Day Yearly

0.032258064516129	1.085	0.899	0.7379	0.3983	0.2683	0.06624
0.0645161290322581	1.074	0.897	0.733	0.3898	0.2622	0.06475
0.0967741935483871	1.071	0.883	0.7194	0.3884	0.2616	0.0646
0.129032258064516	1.068	0.8796	0.7175	0.3878	0.2614	0.0645
0.161290322580645	1.062	0.8715	0.709	0.3859	0.2613	0.0644
0.193548387096774	1.056	0.8709	0.708	0.377	0.2533	0.0625
0.225806451612903	1.054	0.8681	0.7079	0.3757	0.2521	0.06219
0.258064516129032	1.042	0.8473	0.7025	0.3722	0.2501	0.06172
0.290322580645161	1.042	0.8465	0.7023	0.3718	0.2497	0.06162
0.32258064516129	1.035	0.8401	0.6986	0.3672	0.2468	0.06074
0.354838709677419	1.028	0.836	0.686	0.362	0.2433	0.06006
0.387096774193548	1.019	0.8302	0.6799	0.3551	0.2388	0.05896
0.419354838709677	1.015	0.823	0.6703	0.3536	0.2372	0.05854
0.451612903225806	1.013	0.8184	0.6693	0.353	0.2371	0.05851
0.483870967741936	1.011	0.8156	0.6693	0.3505	0.2353	0.05792
0.516129032258065	1.003	0.8027	0.6673	0.3436	0.2312	0.05691
0.548387096774194	0.9989	0.8025	0.6658	0.3432	0.2301	0.05661
0.580645161290323	0.9976	0.7995	0.6597	0.342	0.2295	0.05661
0.612903225806452	0.9972	0.7976	0.6563	0.3419	0.2292	0.05656
0.645161290322581	0.9954	0.7971	0.6548	0.3406	0.228	0.05626
0.67741935483871	0.9941	0.7963	0.6544	0.3398	0.228	0.05623
0.709677419354839	0.99	0.7945	0.6543	0.3391	0.2276	0.05616
0.741935483870968	0.9898	0.7933	0.6513	0.3378	0.2266	0.05592
0.774193548387097	0.9881	0.7918	0.6438	0.3353	0.2249	0.05551
0.806451612903226	0.9867	0.7868	0.6421	0.3352	0.2245	0.05537
0.838709677419355	0.9718	0.7696	0.6419	0.329	0.2205	0.0544
0.870967741935484	0.9713	0.7585	0.632	0.3195	0.2139	0.05262
0.903225806451613	0.945	0.7428	0.6045	0.3062	0.205	0.05058
0.935483870967742	0.9414	0.7295	0.5969	0.303	0.2026	0.04983
0.967741935483871	0.9243	0.7209	0.5869	0.2983	0.1998	0.04929

0.1 1.0707 0.88266 0.71921 0.38834 0.26158 0.06459
Average of yearly averages: 0.0582036666666667

Inputs generated by pe4.pl - update revision 19 - August 2005

Data used for this run:
Output File: CAPot_LabG
Metfile: w93193.dvf
PRZM scenario: CAsugarbeetC.txt
EXAMS environment file: pond298.exv
Chemical Name: Methamidophos
Description Variable Name Value Units Comments
Molecular weight mwt 141.14 g/mol
Henry's Law Const. henry 1.6e-11 atm-m^3/mol
Vapor Pressure vapr 1.725e-5 torr
Solubility sol 200000 mg/L
Kd Kd 0.029 mg/L
Koc Koc mg/L
Photolysis half-life kdp 0 days Half-life
Aerobic Aquatic Metabolism kbacw 7.56 days Halfife
Anaerobic Aquatic Metabolism kbacs 20.4 days Halfife
Aerobic Soil Metabolism asm 1.75 days Halfife
Hydrolysis: pH 7 0 days Half-life
Method: CAM 1 integer See PRZM manual
Incorporation Depth: DEPI 4.0 cm
Application Rate: TAPP 1.12 kg/ha
Application Efficiency: APPEFF 0.959 fraction

```
Spray Drift   DRFT   0.01    fraction of application rate applied to pond
Application Date     Date    20-06  dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1    interval       7      days   Set to 0 or delete line for single app.
app. rate 1   apprate        1.12   kg/ha
Interval 2    interval       7      days   Set to 0 or delete line for single app.
app. rate 2   apprate        1.12   kg/ha
Interval 3    interval       7      days   Set to 0 or delete line for single app.
app. rate 3   apprate        1.12   kg/ha
Record 17:    FILTRA
       IPSCND 1
       UPTKF
Record 18:    PLVKRT
       PLDKRT
       FEXTRC 0.5
Flag for Index Res. Run      IR     Pond
Flag for runoff calc.        RUNOFF none   none, monthly or total(average of entire run)
```

Tomato – Aerial application

```
stored as CATom_LabA.out

Chemical: Methamidophos
PRZM environment: CAtomatoC.txt   modified Satday, 12 October 2002 at 17:38:04
EXAMS environment: pond298.exv    modified Wedday, 21 April 2004 at 12:48:09
Metfile: w93193.dvf modified Sunday, 19 May 2002 at 06:54:08
Water segment concentrations (ppb)
```

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	4.971	3.997	3.256	1.699	1.14	0.2813
1962	5.142	4.18	3.43	1.81	1.217	0.3003
1963	5.426	4.495	3.689	1.991	1.342	0.3312
1964	5.174	4.201	3.493	1.836	1.234	0.3037
1965	5.356	4.398	3.665	1.949	1.311	0.3238
1966	5.279	4.355	3.512	1.885	1.266	0.3125
1967	4.994	3.966	3.329	1.703	1.14	0.2812
1968	4.988	4.012	3.282	1.718	1.156	0.2845
1969	5.211	4.233	3.545	1.861	1.25	0.3086
1970	4.934	3.934	3.272	1.689	1.133	0.2796
1971	5.066	4.078	3.399	1.768	1.186	0.2927
1972	5.056	4.092	3.337	1.752	1.177	0.2896
1973	5.097	4.151	3.347	1.776	1.194	0.2948
1974	5.075	4.115	3.351	1.765	1.186	0.2926
1975	5.342	4.415	3.588	1.939	1.308	0.323
1976	5.308	4.357	3.597	1.93	1.306	0.322
1977	4.941	3.973	3.21	1.677	1.125	0.2775
1978	4.977	3.988	3.298	1.71	1.146	0.2828
1979	4.986	4.013	3.274	1.71	1.147	0.2831
1980	5.014	3.985	3.347	1.716	1.15	0.283
1981	4.707	3.714	2.984	1.531	1.025	0.2529
1982	5.212	4.236	3.54	1.859	1.248	0.3081
1983	5.27	4.341	3.512	1.878	1.261	0.311
1984	4.725	3.648	3.022	1.515	1.013	0.2492
1985	4.622	3.605	2.934	1.491	0.9988	0.2464
1986	4.949	3.982	3.219	1.676	1.122	0.2769
1987	5.37	4.485	3.539	1.942	1.307	0.3225
1988	4.856	3.792	3.16	1.597	1.07	0.2631
1989	4.95	3.959	3.272	1.696	1.138	0.2808
1990	4.859	3.848	3.209	1.645	1.102	0.272

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	5.426	4.495	3.689	1.991	1.342	0.3312
0.0645161290322581	5.37	4.485	3.665	1.949	1.311	0.3238
0.0967741935483871	5.356	4.415	3.597	1.942	1.308	0.323
0.129032258064516	5.342	4.398	3.588	1.939	1.307	0.3225
0.161290322580645	5.308	4.357	3.545	1.93	1.306	0.322
0.193548387096774	5.279	4.355	3.54	1.885	1.266	0.3125
0.225806451612903	5.27	4.341	3.539	1.878	1.261	0.311
0.258064516129032	5.212	4.236	3.512	1.861	1.25	0.3086
0.290322580645161	5.211	4.233	3.512	1.859	1.248	0.3081
0.32258064516129	5.174	4.201	3.493	1.836	1.234	0.3037
0.354838709677419	5.142	4.18	3.43	1.81	1.217	0.3003
0.387096774193548	5.097	4.151	3.399	1.776	1.194	0.2948
0.419354838709677	5.075	4.115	3.351	1.768	1.186	0.2927
0.451612903225806	5.066	4.092	3.347	1.765	1.186	0.2926
0.483870967741936	5.056	4.078	3.347	1.752	1.177	0.2896
0.516129032258065	5.014	4.013	3.337	1.718	1.156	0.2845
0.548387096774194	4.994	4.012	3.329	1.716	1.15	0.2831
0.580645161290323	4.988	3.997	3.298	1.71	1.147	0.283
0.612903225806452	4.986	3.988	3.282	1.71	1.146	0.2828
0.645161290322581	4.977	3.985	3.274	1.703	1.14	0.2813
0.67741935483871	4.971	3.982	3.272	1.699	1.14	0.2812
0.709677419354839	4.95	3.973	3.272	1.696	1.138	0.2808
0.741935483870968	4.949	3.966	3.256	1.689	1.133	0.2796
0.774193548387097	4.941	3.959	3.219	1.677	1.125	0.2775
0.806451612903226	4.934	3.934	3.21	1.676	1.122	0.2769
0.838709677419355	4.859	3.848	3.209	1.645	1.102	0.272
0.870967741935484	4.856	3.792	3.16	1.597	1.07	0.2631
0.903225806451613	4.725	3.714	3.022	1.531	1.025	0.2529
0.935483870967742	4.707	3.648	2.984	1.515	1.013	0.2492
0.967741935483871	4.622	3.605	2.934	1.491	0.9988	0.2464

0.1 5.3546 4.4133 3.5961 1.9417 1.3079 0.32295

Average of yearly averages: 0.291023333333333

Inputs generated by pe4.pl - update revision 19 - August 2005

Data used for this run:
Output File: CATom_LabA
Metfile: w93193.dvf
PRZM scenario: CAtomatoC.txt
EXAMS environment file: pond298.exv
Chemical Name: Methamidophos

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	141.14	g/mol	
Henry's Law Const.	henry	1.6e-11		atm-m^3/mol
Vapor Pressure	vapr	1.725e-5		torr
Solubility	sol	200000	mg/L	
Kd	Kd	0.029	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	7.56	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	20.4	days	Halfife
Aerobic Soil Metabolism	asm	1.75	days	Halfife
Hydrolysis: pH 7		0	days	Half-life
Method:	CAM	1	integer	See PRZM manual
Incorporation Depth:	DEPI	4.0	cm	
Application Rate:	TAPP	1.12	kg/ha	

```
Application Efficiency:    APPEFF 0.95   fraction
Spray Drift   DRFT   0.05  fraction of application rate applied to pond
Application Date    Date   20-06  dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1    interval     7      days   Set to 0 or delete line for single app.
app. rate 1   apprate             kg/ha
Interval 2    interval     7      days   Set to 0 or delete line for single app.
app. rate 2   apprate             kg/ha
Interval 3    interval     7      days   Set to 0 or delete line for single app.
app. rate 3   apprate             kg/ha
Record 17:    FILTRA
       IPSCND 1
       UPTKF
Record 18:    PLVKRT
       PLDKRT
       FEXTRC 0.5
Flag for Index Res. Run    IR     EPA Pond
Flag for runoff calc.      RUNOFF none   none, monthly or total(average of entire run)
```

Tomato – Ground application

stored as CATom_LabG.out

Chemical: Methamidophos
PRZM environment: CAtomatoC.txt   modified Satday, 12 October 2002 at 17:38:04
EXAMS environment: pond298.exv   modified Wedday, 21 April 2004 at 12:48:09
Metfile: w93193.dvf modified Sunday, 19 May 2002 at 06:54:08
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.9941	0.7995	0.6513	0.3398	0.228	0.05626
1962	1.028	0.836	0.686	0.362	0.2433	0.06006
1963	1.085	0.899	0.7379	0.3983	0.2683	0.06624
1964	1.035	0.8401	0.6986	0.3672	0.2468	0.06074
1965	1.071	0.8796	0.733	0.3898	0.2622	0.06475
1966	1.056	0.8709	0.7025	0.377	0.2533	0.0625
1967	0.9989	0.7933	0.6658	0.3406	0.228	0.05623
1968	0.9976	0.8025	0.6563	0.3436	0.2312	0.05691
1969	1.042	0.8465	0.709	0.3722	0.2501	0.06172
1970	0.9867	0.7868	0.6544	0.3378	0.2266	0.05592
1971	1.013	0.8156	0.6799	0.3536	0.2372	0.05854
1972	1.011	0.8184	0.6673	0.3505	0.2353	0.05792
1973	1.019	0.8302	0.6693	0.3551	0.2388	0.05896
1974	1.015	0.823	0.6703	0.353	0.2371	0.05851
1975	1.068	0.883	0.7175	0.3878	0.2616	0.0646
1976	1.062	0.8715	0.7194	0.3859	0.2613	0.0644
1977	0.9881	0.7945	0.6421	0.3353	0.2249	0.05551
1978	0.9954	0.7976	0.6597	0.3419	0.2292	0.05656
1979	0.9972	0.8027	0.6548	0.342	0.2295	0.05661
1980	1.003	0.7971	0.6693	0.3432	0.2301	0.05661
1981	0.9414	0.7428	0.5969	0.3062	0.205	0.05058
1982	1.042	0.8473	0.708	0.3718	0.2497	0.06162
1983	1.054	0.8681	0.7023	0.3757	0.2521	0.06219
1984	0.945	0.7295	0.6045	0.303	0.2026	0.04983
1985	0.9243	0.7209	0.5869	0.2983	0.1998	0.04929
1986	0.9898	0.7963	0.6438	0.3352	0.2245	0.05537
1987	1.074	0.897	0.7079	0.3884	0.2614	0.0645
1988	0.9713	0.7585	0.632	0.3195	0.2139	0.05262
1989	0.99	0.7918	0.6543	0.3391	0.2276	0.05616
1990	0.9718	0.7696	0.6419	0.329	0.2205	0.0544

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	1.085	0.899	0.7379	0.3983	0.2683	0.06624
0.0645161290322581	1.074	0.897	0.733	0.3898	0.2622	0.06475
0.0967741935483871	1.071	0.883	0.7194	0.3884	0.2616	0.0646
0.129032258064516	1.068	0.8796	0.7175	0.3878	0.2614	0.0645
0.161290322580645	1.062	0.8715	0.709	0.3859	0.2613	0.0644
0.193548387096774	1.056	0.8709	0.708	0.377	0.2533	0.0625
0.225806451612903	1.054	0.8681	0.7079	0.3757	0.2521	0.06219
0.258064516129032	1.042	0.8473	0.7025	0.3722	0.2501	0.06172
0.290322580645161	1.042	0.8465	0.7023	0.3718	0.2497	0.06162
0.32258064516129	1.035	0.8401	0.6986	0.3672	0.2468	0.06074
0.354838709677419	1.028	0.836	0.686	0.362	0.2433	0.06006
0.387096774193548	1.019	0.8302	0.6799	0.3551	0.2388	0.05896
0.419354838709677	1.015	0.823	0.6703	0.3536	0.2372	0.05854
0.451612903225806	1.013	0.8184	0.6693	0.353	0.2371	0.05851
0.483870967741936	1.011	0.8156	0.6693	0.3505	0.2353	0.05792
0.516129032258065	1.003	0.8027	0.6673	0.3436	0.2312	0.05691
0.548387096774194	0.9989	0.8025	0.6658	0.3432	0.2301	0.05661
0.580645161290323	0.9976	0.7995	0.6597	0.342	0.2295	0.05661
0.612903225806452	0.9972	0.7976	0.6563	0.3419	0.2292	0.05656
0.645161290322581	0.9954	0.7971	0.6548	0.3406	0.228	0.05626
0.67741935483871	0.9941	0.7963	0.6544	0.3398	0.228	0.05623
0.709677419354839	0.99	0.7945	0.6543	0.3391	0.2276	0.05616
0.741935483870968	0.9898	0.7933	0.6513	0.3378	0.2266	0.05592
0.774193548387097	0.9881	0.7918	0.6438	0.3353	0.2249	0.05551
0.806451612903226	0.9867	0.7868	0.6421	0.3352	0.2245	0.05537
0.838709677419355	0.9718	0.7696	0.6419	0.329	0.2205	0.0544
0.870967741935484	0.9713	0.7585	0.632	0.3195	0.2139	0.05262
0.903225806451613	0.945	0.7428	0.6045	0.3062	0.205	0.05058
0.935483870967742	0.9414	0.7295	0.5969	0.303	0.2026	0.04983
0.967741935483871	0.9243	0.7209	0.5869	0.2983	0.1998	0.04929
0.1	1.0707	0.88266	0.71921	0.38834	0.26158	0.06459

Average of yearly averages: 0.0582036666666667

Inputs generated by pe4.pl - update revision 19 - August 2005

Data used for this run:
Output File: CATom_LabG
Metfile: w93193.dvf
PRZM scenario: CAtomatoC.txt
EXAMS environment file: pond298.exv
Chemical Name: Methamidophos

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	141.14	g/mol	
Henry's Law Const.	henry	1.6e-11		atm-m^3/mol
Vapor Pressure	vapr	1.725e-5		torr
Solubility	sol	200000	mg/L	
Kd	Kd	0.029	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	7.56	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	20.4	days	Halfife
Aerobic Soil Metabolism	asm	1.75	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM	1	integer	See PRZM manual

```
Incorporation Depth:        DEPI   4.0    cm
Application Rate:    TAPP   1.12   kg/ha
Application Efficiency:     APPEFF 0.99   fraction

Spray Drift   DRFT    0.01  fraction of application rate applied to pond
Application Date     Date   20-06  dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1    interval      7      days   Set to 0 or delete line for single app.
app. rate 1   apprate              kg/ha
Interval 2    interval      7      days   Set to 0 or delete line for single app.
app. rate 2   apprate              kg/ha
Interval 3    interval      7      days   Set to 0 or delete line for single app.
app. rate 3   apprate              kg/ha
Record 17:    FILTRA
       IPSCND 1
       UPTKF
Record 18:    PLVKRT
       PLDKRT
       FEXTRC 0.5
Flag for Index Res. Run     IR     EPA Pond
Flag for runoff calc.       RUNOFF none   none, monthly or total(average of entire run)
```