Acephate Appendices

Appendix A   Ecological Effects Data

Table A.1 Avian Acute Oral Toxicity for Acephate					
Species	% ai	LD_{50} (mg ai/kg)	Toxicity Category	MRID No. Author/Year	Study Classification
Mallard duck (*Anas platyrhynchos*)	89	350	moderately toxic	00014700 Mastalski, 1970	acceptable
Mallard duck (*Anas platyrhynchos*)	93.2	234	moderately toxic	00160000 Hudson, 1984	acceptable
Mallard duck (*Anas platyrhynchos*)	89	350	moderately toxic	00015962 Hudson, 1972	acceptable
Bobwhite quail *(Colinus virginianus)*	15 (1)	109	moderately toxic	43939301 Campbell, 1992	acceptable
Pheasant (*Phasianus colchicus*)	89	140	moderately toxic	00014701 Mastalski, 1970	acceptable
Dark eyed junko (*Junco hyemalis*)	75	106 (2)	moderately toxic	00093911 Zinkl, 1981	supplemental

(1) This is a granular formulation. Slope = 5.4; Formulation LD50 = 734 mg/kg (86-139 mg/kg formulation)
(2) The birds initially refused to ingest larvae that contained 16 µg acephate/larvae; however, the birds were willing to consume larvae containing five µg acephate. The study found that acephate given by gavage without larvae produced more inhibition than the larvae-fed birds. The study also concludes that the higher the dose, the more ChE inhibition is found in the birds. Increased time of exposure may prolong the time for recovery from ChE inhibition. Feeding the birds larvae containing acephate may decrease the activity of the acephate when compared to the gavage. The birds fed for five days recovered in 12 to 22 days.

These avian studies with technical grade acephate indicate that it is moderately toxic to birds on an acute oral basis (LD_{50} = 51-500 mg/kg).

Table A.2 Avian Subacute Dietary Toxicity for Acephate					
Species	% ai	5-Day LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Northern bobwhite quail *(Colinus virginianus)*	95.3	1280 ppm	slightly toxic	00015956 Fletcher, 1976	acceptable
Mallard duck (*Anas platyrhynchos*)	95.3	>5000	practically non-toxic	00015957 Fletcher, 1976	acceptable
Dark eyed junko (*Junco hyemalis*)	75	1485	slightly toxic	00093911 Zinkl, 1981	supplemental
Japanese Quail *(Coturnix japonica)*	15.6	718	moderately toxic	(1)	supplemental
Japanese Quail *(Coturnix japonica)*	98	3275	slightly toxic	(1)	supplemental
Northern bobwhite quail *(Colinus virginianus)*	formulation	3/6 dead within 100 minutes (2)	inhalation study	(3)	ancillary

(1) Smith, G.J., 1987. Pesticide Use and Toxicology in Relation to Wildlife: Organophorous and Carbamate Compounds. U.S. Dept. Of Interior, FWS Resource Publication 170. pg. 71.

(2) In this inhalation study, bobwhites were exposed to 2.2 mg/L of acephate for 100 minutes.
(3) Bertem, P.E., R.E. Chiles. Studies on the Inhalation Toxicity of Two Phosphoramidothioate Insecticides to Rodents and Quail. University of California, School of Public Health, Naval Biosciences Laboratory, Naval Supply Center, Oakland, California

These avian studies with technical and formulated grade acephate indicate that the toxicity ranges from practically non-toxic to moderately toxic to birds on a subacute dietary basis (LC_{50} = 501 - 1000 ppm).

Studies using the degradate methamidophos.

Table A.3 Avian Acute Oral Toxicity

Species	% ai	LD_{50} (mg/kg) (confidence interval)	Toxicity Category (slope)	MRID No. Author/Year	Study Classification (1)
Northern bobwhite quail *(Colinus virginianus)*	75	8 (6.2 – 10.3)	very highly toxic (7.36)	00014094, 00109717 Fletcher, 1971	Supplemental (2)
Northern bobwhite quail *(Colinus virginianus)*	75	10.1 (male) (7.9 – 13.1) 11.0 (female) (8.5 – 14.1)	highly toxic	00041313 Nelson et al, 1979	acceptable
Mallard duck *(Anas platyrhynchos)*	75	8.48 (6.73 – 10.7)	very highly toxic	0016000 Hudson et al 1984	acceptable
Mallard duck *(Anas platyrhynchos)*	75	29.5 (27.3 – 31.9)	highly toxic	00014095, 00109718 Fletcher, 1971	Supplemental (3)
Dark eyed junco (*Junco hyemalis)*	73	8	very highly toxic	ECOTOX # 39519 00093914 Zinkl et al, 1979	Supplemental (4)
Common grackle (*Quiscalur quiscula*)	55	6.7 a.i.(4.1 – 10.9)	very highly toxic	00144428 Lamb, 1972	Supplemental (7)
Starling	75	10 (5.6 – 17.8) (5)	very highly toxic	00146286 Schafer, 1984	Supplemental (6)
Redwing blackbird	75	1.78 (5)	very highly toxic	00146286 Schafer, 1984	Supplemental (6)

(1) Acceptable (study satisfies guideline). Supplemental (study is scientifically sound, but does not satisfy guideline)
(2) Due to age of birds (older), insufficient number of hours birds fasted, insufficient description of study design. Death occurred 8 – 22 hrs after dosing.
(3) Due to poor dose response that precludes development of the best estimate of LD50. Death occurred 1 hr after dose.
(4) Due to post dose observations were only 6 hrs instead of 14 days.
(5) Dermal LD_{50} = 17.8 mg/kg for starling and 31.6 mg/kg for redwing blackbird.
(6) This test is an “up/down” test by FWS. Only two doses were used (3.16 and 1.0 mg/kg) with resulting mortality being 2 out of 2 birds tested and 0 out of 2 birds tested, respectively.
(7) Due to five birds dosed per treatment level and insufficient environmental information. EPA guidelines call for ten birds per treatment level. All mortalities occurred within 24 hrs.

Since the LD_{50} falls in the range of 1 to 50 mg ai/kg, methamidophos is categorized as very highly to highly toxic to avian species on an acute oral basis.

Two subacute dietary studies using the TGAI are required to establish the toxicity of methamidophos to birds. The preferred test species are mallard duck and bobwhite quail. Results of these tests are tabulated below.

Table A.4 Avian Subacute Dietary Toxicity

Species	% ai	5-Day LC_{50} (ppm) (confidence interval)	Toxicity Category (slope)	MRID No. Author/Year	Study Classification
Northern bobwhite quail *(Colinus virginianus)*	74	42 (34 – 52) (1)	very highly toxic (3.4)	00093904 Beavers & Fink,1979	acceptable
Northern bobwhite quail *(Colinus virginianus)*	75	57.5 (40 – 82) (3)	Highly toxic	00014064 Jackson, 1968	Supplemental (2)
Northern bobwhite quail *(Colinus virginianus)*	75	59 (48-72)	highly toxic 6.445	44484404 Thompson-Cowley, 1981	Supplemental
Mallard duck *(Anas platyrhynchos)*	75	1302 (906 – 1872) (1)	slightly toxic	00041658, Nelson et al 1979	acceptable
Mallard duck *(Anas platyrhynchos)*	75	847.7 (600 – 1198) (4)	Moderately toxic Slope = 4.27	00130823, 00014304 00145655, Lamb & Bunke 1977	Supplemental (5)
Mallard duck *(Anas platyrhynchos)*	70	1650 (1138 – 2392)	slightly toxic	44484403 Shapiro, 1981	Supplemental
Japanese Quail	73	92	highly toxic	(6)	Supplemental

(1) Note that birds were too sick to eat.
(2) Due to birds being 12 weeks of age instead of 10 to 17 days old.
(3) Observed repellency at 826 ppm. Death occurred at 2 to 7 days after exposure.
(4) Death occurred 1 to 6 days after exposure. There is 60% mortality at 1000 ppm. Birds recover 5 to 8 days post treatment.
(5) Due to 60 gm average weight difference of birds in control to birds in treatment groups at day 0, 4 concentrations used instead of 6 concentrations, and incomplete design.
(6) Smith, G.J., 1987. *Pesticide Use and Toxicology in Relation to Wildlife: Organophorous and Carbamate Compounds*. U.S. Dept. Of Interior, FWS Resource Publication 170. pg. 71.

Since the LC_{50} falls in the range of <50 to 5000 ppm, methamidophos is categorized as slightly toxic to very highly toxic to avian species on a subacute dietary basis.

ii. Birds, Chronic

Avian reproduction studies using the TGAI are required for acephate and for its degradate methamidophos because the birds may be subject to repeated or continuous exposure to the pesticide, especially preceding or during the breeding season. The preferred test species are mallard duck and bobwhite quail.

Results of these tests are tabulated below.

Studies using the parent chemical, acephate.

Table A.5 Avian Reproduction for acephate

Species/ Study Duration	% ai	NOAEC/LOAEC (ppm)	LOAEC Endpoints	MRID No. Author/Year	Study Classification
Northern bobwhite quail *(Colinus virginianus)*	tech	20/80	(1)	00029692 Beavers, 1979	acceptable

Table A.5 Avian Reproduction for acephate					
Species/ Study Duration	% ai	NOAEC/LOAEC (ppm)	LOAEC Endpoints	MRID No. Author/Year	Study Classification
Mallard duck *(Anas platyrhynchos)*	tech	5/20	(2)	00029691 Beavers, 1979	acceptable

(1) reduced body weight, number of eggs laid, eggs set, viable embryos, live 3-week embryos, normal hatchlings, and 14-day old survivors.
(2) reduced number viable embryos, live 3-week embryos.

These avian reproduction studies with technical grade acephate indicate that when parents are fed between 5 and 20 ppm acephate, the survival of embryos and chicks are adversely affected.

Studies using the degradate methamidophos.

Table A.6 Avian Reproduction

Species/ Study Duration	% ai	NOAEC/LOAEC (ppm)	LOAEC Endpoints	MRID No. Author/Year	Study Classification
Northern bobwhite quail *(Colinus virginianus)*	73	3/5	Eggshell thickness, embryo viability, embryo development, hatchability, survivability of hatchlings.	00014114 Beavers & Fink, 1978	acceptable
Mallard duck *(Anas platyrhynchos)*	73	>15	no effect	00014113 Fink, 1977	supplemental
Northern bobwhite quail *(Colinus virginianus)*	73	5/7.8	Egg production	ECOTOX # 40022 Stromberg, et. al., 1986	Open literature study

Although the mallard study is supplemental, since the quail is a more sensitive species than the mallard, the study need not be repeated.

iii. Mammals, Acute and Chronic

Wild mammal testing is required on a case-by-case basis, depending on the results of lower tier laboratory mammalian studies, intended use patterns, and pertinent environmental fate characteristics. In most cases, rat or mouse toxicity values obtained from the Agency's Health Effects Division (HED) substitute for wild mammal testing. However, for acephate and it degradate methamidophos, there are several sources of data in literature on wild mammals. These may also be used for risk assessment purposes. These toxicity values are reported below.

Studies using the parent chemical, acephate.

Table A.7 Mammalian Toxicity for Acephate					
Species	% ai	Test Type	Toxicity Value	Affected Endpoints	MRID No.
rat	23.7	oral acute	LD_{50}= 970 mg/kg (f)	mortality	237487
rat	85	oral acute	LD_{50}= 1490 mg/kg (m) 739 mg/kg (f)	mortality	236863, 236864
rat	98	oral acute	LD_{50}= 945 mg/kg (m) 866 mg/kg (f)	mortality	00014675
white-footed mouse	98	oral acute	LD_{50}= 380 mg/kg	mortality	(1)
meadow vole	98	oral acute	LD_{50}= 321 mg/kg	mortality	(1)
mouse	70%	oral acute	LD_{50}= 720 mg ai/kg	mortality	(2)
mouse	98	oral acute	LD_{50}= 351 mg/kg	mortality	(1)
brown bat	70%	oral acute	LD_{50}>1500 mg ai/kg ED_{50}= 687 mg ai/kg (3)	mortality	(2)
Charles River rat	98.7	3-generation reproductive	NOAEL = 50 ppm LOAEL = 500 ppm	parental and pup weight, food consumption, litter size, mating performance and viability	40323401 40605701

(1) Rattner, B.A., D.J. Hoffman. 1984. Comparative toxicity of acephate in laboratory mice, white-footed mice, and meadow voles. Arch. Environ. Contam. Toxicol. 13:483-491.
(2) Clarke Jr., D.R., B.A. Rattner. 1987. Orthene[R] Toxicity to Little Brown Bats (*Myotis lucifugus*): Acetylchlorinesterase Inhibition, Coordination Loss, and Mortality. Environ. Toxicol. and Chem. Vol 6 pp. 705-708.

An analysis of the results indicates that acephate is categorized as moderately toxic to small mammals on an acute oral basis. There does not appear to be a palatability problem in the above studies (personal communication Nancy McCarroll, HED, 2/10/98).

Studies using the degradate methamidophos

Table A.8 Mammalian Toxicity

Species/ Study Duration	% ai	Test Type	Toxicity Value	Affected Endpoints	MRID No. Year
laboratory rat *(Rattus norvegicus)*	95	acute oral	LD_{50}= 15.6 mg/kg (m) LD_{50}= 13.0 mg/kg (f)	mortality	00014044 1968
laboratory mouse *(Mus musculus)*	95	acute oral	LD_{50}= 16.2 mg/kg (f)	mortality	00014047 1968
laboratory mouse *(Mus musculus)*	75	acute oral	LD_{50}= 18 mg/kg (f)	mortality	00014048 1968
laboratory rat *(Rattus norvegicus)*	70.5	2-generation reproductive	NOAEL=10 ppm (1) LOAEL= 33 ppm (1)	Decrease in number of births, pup viability and body weight	00148455 41234301 1984

(1) The study indicates that 10 ppm = 0.5 mg/kg/day and 33 ppm = 1.65 mg/kg/day. 33 ppm was the highest dose tested.

An analysis of the results indicates that methamidophos is categorized as highly toxic to small mammals on an acute oral and dermal basis. There does not appear to be a palatability problem in the above studies (personal communication Nancy McCarroll, HED, 2/10/98). The 10 ppm NOAEL of the 2-generation reproductive study is acceptable for ecological risk assessment.

iv. Insects

A honey bee acute contact study using the TGAI is required for acephate and its degradate methamidophos because its use on vegetables, cotton, peanut, and soybean will result in honey bee exposure. Results of this test are tabulated below.

Studies using the parent chemical, acephate

Table A.9 Nontarget Insect Acute Contact Toxicity (141-1) for Acephate

Species	product	LD_{50} (µg/bee)	Toxicity Category	MRID No. Author/Year	Study Classification
Honey bee *(Apis mellifera)*	orthene	1.20 µg/bee	highly toxic	00014714, 44038201 Atkins, 1971	acceptable
Honey bee *(Apis mellifera)*	orthene	<0.25 ppm (1)	highly toxic	(2)	supplemental
Honey bee *(Apis mellifera)*	orthene	(3)	highly toxic	(4)	supplemental
Green lacewing (5) *Chrysopa carnea*	orthene	5.57 µg/vial	highly toxic	05004012 Plapp, 1978	supplemental

(1) 74.5% mortality at 0.25 ppm acephate in sugar syrup after 14 days.
(2) Fielder, L. 1986. Assessment of Chronic Toxicity of Selected Insecticides to Honeybees. Journal of Apicultural Research 26(2):115-122.
(3) Acephate fed to worker bees via sugar syrup showed up in the royal jelly for the queen, indicating that acephate is systemic to bees. These concentrations of 1 ppm or less were harmless to the worker bees but levels at 0.1 ppm showed significant reduction of the surviving brood.
(4) Stoner, A., W. Wilson, J. Harvey. 1985 Acephate (Orthene®): Effects on Honey Bee Queen, Brood, and Worker Survival. American Bee Journal, June 1985, p. 448-450.
(5) Predator of tobacco budworm

An analysis of the results indicates that acephate is categorized as highly toxic to bees and beneficial insects on an acute contact basis.

A study (MRID 05004012) attempted to determine a toxicity ratio of selectivity of acephate by comparing the sensitivity of beneficial predator insects to that of the pest tobacco budworm. The ratio is calculated using the LC_{50} values for the pest divided by the LC_{50} values for the beneficial insect; a ratio greater than 1 represents that acephate is more toxic to the predator than to the pest. Green lacewing had a calculated ratio of 6.4 and the ratio for the parasitic wasp was 10.0. Acephate is more toxic to the beneficial predator than the pest.

A study of honey bee toxicity to residues on foliage using the typical end-use product is not required for acephate because the acute contact honey bee LD_{50} is not less than 0.1 *ug*/bee. However, the studies were provided and are tabulated below:

Table A.10 Nontarget insect acute residue toxicity (§141-2) for acephate formulations

Species	% ai	lb ai applied	No. hrs. after initial exposure[(a)] and % dead after contact	MRID No. Author/Year	Study Classification
honey bee *(Apis mellifera)*	75	1.0	0 hr. = 100 2 hr. = 79 8 hr. = 17	00014715 Sakamoto, 1971	acceptable
alkali bee (*Nomia melanderi*)	75	1.0	2 hr. = 83 8 hr. = 30	00014715 Sakamoto, 1971	acceptable
alfalfa leaf cutter bee (*Megachile rotundata*)	75	1.0	2 hr. = 69 8 hr. = 21	00014715 Sakamoto, 1971	acceptable
bumble bee	75	1.0	2hr. = 43	00014715 Sakamoto, 1971	acceptable
honey bee *(Apis mellifera)*	75	1.0	2 hr. = 79 8 hr. = 16	05000837 Johansen, 1972	acceptable
alkali bee (*Nomia melanderi*)	75	1.0	2 hr. = 81 8 hr. = 23	05000837 Johansen, 1972	acceptable
honey bee *(Apis mellifera)*	orthene	0.48	1 hr. = 4.5 24 hr. = 98.5 96 hr. = 5.0	00014714 Atkins, 1971	acceptable
honey bee *(Apis mellifera)*	orthene	0.97	1 hr. = 3.2 24 hr. = 100 96 hr. = 41.7	00014714 Atkins, 1971	acceptable
spiders	acephate	560 gm/ha (0.5 lb ai/A)	spiders were found to have high mortality (74% dead) at 20 days post spray.	05020212 Hydron, 1979	supplemental

[(a)] foliage was sprayed, collected after varying times, and then put with bees

Table A.11 Non-target insect acute contact toxicity for methamidophos formulation

Species	% ai	LD_{50} (μg ai/bee)	Toxicity Category	MRID No. Author/Year	Study Classification
Honey bee *(Apis mellifera)*	63	1.37 Slope = 10.32	Highly toxic	00036935 Atkins et al, 1975	acceptable

Table A.12 Freshwater Fish Acute Toxicity for Acephate TGAI

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Rainbow trout 1.1 g (static) *(Oncorhynchus mykiss)* 17 ^oC, pH 7.4, 40 mg/L $CaCO_3$	97	110 (95% CI 63-190)	practically non-toxic	40098001 Mayer, 1986	supplemental
Rainbow trout (static) *(Oncorhynchus mykiss)*	technical	>1000	practically non-toxic	00014705 Hutchinson, 1970	core
Rainbow trout 0.2 g (static) (*O. mykiss*), 12 ^oC, pH 7.4, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Rainbow trout 0.2 g (static) (*O. mykiss*), 12 ^oC, pH 7.4, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Rainbow trout 0.9 g (static) (*O. mykiss*), 12 ^oC, pH 7.4, 40 mg/L $CaCO_3$	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Rainbow trout 0.9 g (static) (*O. mykiss*), 12 ^oC, pH 7.4, 320 mg/L $CaCO_3$	94	>1000	practically non-toxic	40098001 Mayer, 1986	supplemental
Rainbow trout 1.0 g (static) (*O. mykiss*), 12 ^oC, pH 6.5, 40 mg/L $CaCO_3$	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Rainbow trout 1.0 g (static) (*O. mykiss*), 12 ^oC, pH 8.5, 40 mg/L $CaCO_3$	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Rainbow trout 1.5 g (static) *(Oncorhynchus mykiss)*, 10 ^oC, pH 7.4, 40 mg/L $CaCO_3$	94	1100 (95% CI 775 – 1561)	practically non-toxic	40094602 Johnson, 1980 40098001 Mayer, 1986	supplemental
Bluegill sunfish (static) *(Lepomis macrochirus)*	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Bluegill sunfish (static) *(Lepomis macrochirus)*	94	>1000	practically non-toxic	40098001 Mayer, 1986	supplemental
Atlantic salmon yolk-sac fry (static) (*Salmo salar*), 7 ^oC, pH 7.5, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Atlantic salmon 0.2 g (static) (*Salmo salar*), 7 ^oC, pH 7.5, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Atlantic salmon 0.2 g (static) (*S. salar*), 17 ^oC, pH 7.5, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Atlantic salmon 0.2 g (static) (*S. salar*), 12 ^oC, pH 7.5, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Atlantic salmon 0.2 g (static) (*S. salar*), 12 °C, pH 7.5, 12 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Atlantic salmon 0.2 g (static) (*S. salar*), 12 °C, pH 7.5, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Atlantic salmon 0.2 g (static) (*S. salar*), 12 °C, pH 6.5, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Atlantic salmon 0.2 g (static) (*S. salar*), 12 °C, pH 8.5, 40 mg/L $CaCO_3$	97	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Brook trout 0.2 g (static) (*Salvelinus fontinalis*), 12 °C	94	>100	practically non-toxic	40094602 Johnson, 1980	supplemental
Brook trout 1.5 g (static) (*S. fontinalis*), 12 °C, pH 7.5, 42 mg/L $CaCO_3$	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Cutthroat trout, 0.7 g (static) (*Salmo clarki*), 12 °C, pH 7.5, 42 mg/L $CaCO_3$	94	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Cutthroat trout, 0.8 g (static) (*Salmo clarki*), 12 °C, pH 7.8 42 mg/L $CaCO_3$	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Cutthroat trout, 0.9 g (static) (*S. clarki*), 7 °C, pH 7.5, 42 mg/L $CaCO_3$	94	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Cutthroat trout, 0.9 g (static) (*S. clarki*), 12 °C, pH 8.5, 42 mg/L $CaCO_3$	94	>60	at most slightly toxic	40098001 Mayer, 1986	supplemental
Cutthroat trout, 1.0 g (static) (*S. clarki*), 12 °C, pH 6.5, 42 mg/L $CaCO_3$	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Cutthroat trout, 1.0 g (static) (*S. clarki*), 12 °C, pH 7.8, 330 mg/L $CaCO_3$	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Cutthroat trout (static) (*Salmo clarki*)	94	>100	practically non-toxic	00120401 Woodward, 1980	supplemental
Yellow perch (static) (*Perca flavescens*)	94	>50	at most slightly toxic	40098001 Mayer, 1986	supplemental
Channel Catfish 2.0 g (static) *(Ictalurus punctatus*), 22 °C, pH 7.4, 40 mg/L $CaCO_3$	94	>1000	practically non-toxic	40094602 Johnson and Finley, 1980 40098001 Mayer, 1986	supplemental
Fathead Minnow (static) *(Pimephales promelas)*	94	>1000	practically non-toxic	40094602 Johnson, 1980	supplemental

Table A.13 Freshwater fish acute toxicity for formulation of acephate

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Rainbow trout 1.2 g (static) *(Oncorhynchus mykiss*), 10 °C, pH 7.4, 40 mg/L $CaCO_3$	75 WP(1)	730 (580 – 920)	practically non-toxic	40094602 Johnson and Finley, 1980 40098001 Mayer, 1986	supplemental
Rainbow trout (static) *(Oncorhynchus mykiss)*	75	2740	practically non-toxic	Geen et al. (2)	supplemental

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Bluegill sunfish (static) *(Lepomis macrochirus)*	75	2000 (3)	practically non-toxic	00014706 Thompson, 1971	core
Bluegill sunfish (static) *(Lepomis macrochirus)*	75 WP	>200	practically non-toxic	40098001 Mayer, 1986	supplemental
Bluegill sunfish (static) *(Lepomis macrochirus)*	75 WP	>1000	practically non-toxic	40094602 Johnson, 1980	supplemental
Brook trout 0.2 g (static) (*Salvelinus fontinalis*), 12 ^oC, pH 6.5, 42 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 0.2 g (static) (*S. fontinalis*), 12 ^oC, pH 7.5, 42 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 0.2 g (static) (*S. fontinalis*), 12 ^oC, pH 8, 12 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 0.2 g (static) (*S. fontinalis*), 12 ^oC, pH 8, 44 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 0.2 g (static) (*S. fontinalis*), 12 ^oC, pH 8, 300 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 0.2 g (static) (*S. fontinalis*), 12 ^oC, pH 9, 42 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 0.7 g (static) (*Salvelinus fontinalis*), 7 ^oC, pH 7.5, 42 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 0.7 g (static) (*S. fontinalis*), 17 ^oC, pH 7.5, 42 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 1.0 g (static) (*S. fontinalis*), 7 ^oC, pH 7.5, 40 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Brook trout 1.0 g (static) (*S. fontinalis*), 17 ^oC, pH 7.5, 42 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Largemouth bass (static) (*Micropterus salmoides*)	75	3000 (4)	practically non-toxic	00014707 Thompson, 1971	supplemental
Cutthroat trout 0.9 g (static) (Salmo clarki), 12 ^oC, pH 7.5, 42 mg/L $CaCO_3$	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Cutthroat trout (static) (*Salmo clarki*)	75	>100	practically non-toxic	00120401 Woodward, 1980	supplemental
Gold fish (static) (*Carassius auratus)*	75	>4000 (5)	practically non-toxic	00014710 Thompson, 1971	supplemental
Yellow perch (static) (*Perca flavescens*)	75 WP	>100	practically non-toxic	40098001 Mayer, 1986	supplemental
Channel Catfish, 0.5 g (static) *(Ictiobus cyrinallus)*	75 WP	(95% CI 560-1000)	practically non-toxic	40094602 Johnson and Finley, 1980 40098001 Mayer, 1986	supplemental
Channel Catfish (static) *(Ictiobus cyrinallus)*	75	1500 (6)	practically non-toxic	00014708 Thompson, 1971	core
Fathead Minnow 1.0 g (static) *(Pimephales promelas*), 20 ^oC, pH 7.4, 40 mg/L $CaCO_3$	75 WP	>1000	practically non-toxic	40098001 Mayer, 1986	supplemental
Fathead Minnow 1.0 g (static) *(P. promelas*), 20 ^oC, pH 7.4, 40 mg/L $CaCO_3$	75 WP	>1000	practically non-toxic	40098001 Mayer, 1986	supplemental

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Mosquito fish (static) (*Gambusia affinis*)	75	6000 (7)	practically non-toxic	00014709 Thompson, 1971	supplemental

1 WP = wettable powder
2 Geen, G.H., B.A. McKeown, P.C. Oloffs, 1984. Acephate in Rainbow Trout (*Salmo gairdneri*), Acute Toxicity, Uptake, and Elimination. J. Environ. Science and Health B19(2) p. 131-155.
3 There was 100% mortality at 8,000 ppm. No mortality at 500 ppm
4 There was 100% mortality at 4,000 ppm. No mortality at 500 ppm
5 No mortality at 1000 and 2000 ppm
6 No mortality at 1000 ppm
7 No mortality at 4000 ppm

Table A.14 Freshwater fish acute toxicity for methamidophos (TGAI)

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Carp (static) *(Cyprinpus carpio)*	90	68 (a)	slightly toxic	05008361 Chin, 1979	supplemental

(a) Sublethal doses affect growth rate of carp. Brain and liver acetylcholinesterase activities are depressed at 20 ppm concentrations for 48 hours.

Table A.15 Freshwater fish acute toxicity for methamidophos formulations

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Rainbow trout (static) *(Oncorhynchus mykiss)*	74	25 (21-29)	slightly toxic	00041312 Nelson & Roney, 1979	acceptable
Rainbow trout (static) *(Oncorhynchus mykiss)*	71	40 (35-46)	slightly toxic	00144429 Hermann, 1980	not reviewed
Rainbow trout (static) *(Oncorhynchus mykiss)*	40 (a)	37 (28-49)	slightly toxic	00144432 Lamb, 1972	not reviewed
Rainbow trout (static) *(Oncorhynchus mykiss)*	75	51 (36-72)	slightly toxic	00014063 Schoenig, 1968	Supplemental (b)
Bluegill sunfish *(static)* *(Lepomis macrochirus)*	74	34 (30-38)	slightly toxic	00041312 Nelson & Roney, 1979	acceptable
Bluegill sunfish *(static)* *(Lepomis macrochirus)*	40 (1)	31 (21-46)	slightly toxic	00144432 Lamb & Roney, 1972	not reviewed
Bluegill sunfish (static) *(Lepomis macrochirus)*	75.4	45 (35-58)	slightly toxic	44484402 McCann, 1977	Supplemental (c)
Bluegill sunfish (static) *(Lepomis macrochirus)*	75	46 (34-62)	slightly toxic	00014063 Schoenig, 1968	Supplemental (b)

(a) Formulation of 40% is in propylene glycol. Author concludes that propylene glycol contributes to bluegill toxicity in the formulation. There was 10% mortality in the negative control and 30% mortality in the solvent control. There was no mortality in the trout controls.
(b) Due to polyethylene liners used in test.
(c) Due to being a static jar study and insufficient environmental information.

Table A.16 Amphibian Acute Toxicity for Acephate TGAI

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Green Frog larvae/tadpole (*Rani clamitans*)	90	6433 (24 hr)	practically non-toxic	00093943, 05019255 Lyons, 1976	Supplemental (3)
frog larvae (*Rani catesbelana*)	98	>5	(1)	44042901 Hall, 1980	Supplemental (3)
Salamander larvae (*Ambystoma gracile)*	97	8816 (96 hr)	practically non-toxic	Geen et al. 1984(2)	Supplemental (3)

(1) This study tested for bio-concentrations to amphibians. No bio-accumulation nor toxicity was noted.
(2) Geen, G.H., B.A. McKeown, T.A. Watson, D.B. Parker. 1984. Effects of Acephate (Orthene) on Development and Survival of the Salamander,*Ambystoma gracile*, (Baird). Environ. Sci. Health, B19 (2), 157-170 (1984).

(3) Supplemental study due to no available FIFRA test guideline and no raw data for statistical analysis.

Table A.17 Freshwater Invertebrate Acute Toxicity for Acephate TGAI

Species	% ai	96-hour LC_{50} (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Mayfly larvae, age not reported Ephemerida	98	24-h LC_{50} 3.2[(3)]	N/A	Hussain et al. 1985[(1)]	supplemental
Stonefly 1st year class (*Pteronarcella badia*), 12 °C, pH 6.5, 40 mg/L $CaCO_3$, static	94	6.4 (95% CI 5.3-7.8)	Moderately toxic	40098001 Mayer, 1986	supplemental
Stonefly, 1st year class (*Pteronarcella badia*)	94	9.5	Moderately toxic	00120401 Woodward, 1980	supplemental
Stonefly, 1st year class (*Pteronarcella badia*), 12 °C, 7.5 pH, 38 mg/L $CaCO_3$	94	9.5 (95% CI 7.3-12.3)	Moderately toxic	40098001 Mayer, 1986, 40094602 Johnson, and Finley 1980	supplemental
Stonefly, 1st year class, 12 °C, pH 8.5, 38 mg/L $CaCO_3$, static	94	21.2 (95% CI 15.6-28.2)	Slightly toxic	40098001 Mayer 1986	supplemental
Stonefly, 1st year class *(Isogenus* sp.), 7 °C, pH 7, 35 mg/L $CaCO_3$, static	94	11.7 (95% CI 8.7-15.8)	Slightly toxic	40098001 Mayer, 1986	supplemental
Stonefly, naiad (*Skwala* sp.), 7 °C, 40 mg/L $CaCO_3$, static	95	12 (95% CI 8.7-16)	Slightly toxic	40094602 Johnson and Finley, 1980	supplemental
Stonefly larvae, age not reported Plecoptera	98	24-h LC_{50} 37[(3)]	N/A	Hussain et al. 1985[(1)]	supplemental
Water-boatman, adults Corixidae	98	24-h LC_{50} 8.2	Moderately toxic	Hussain et al. 1984[(2)]	supplemental
Backswimmer, adults Notonectidae	98	24-h LC_{50} 10.4	Slightly toxic	Hussain et al. 1984[(2)]	supplemental
Waterflea *(Daphnia magna)*	98	48-h EC_{50} 71.8 (95% CI 62.9 – 81.7) Slope = 6.3 (effect is immobility as a surrogate for mortality)	Slightly toxic	00014565 Wheeler, 1978	acceptable
Scud, mature (*Gammarus pseudolimneaus*), 12 °C 40 mg/L $CaCO_3$, static	94	48-h LC_{50} >50	At most slightly toxic	40094602 Johnson and Finley, 1980 40098001 Mayer, 1986	supplemental
Scud, mature (*Gammarus pseudolimneaus*), 12 °C, static, 320 mg/L $CaCO_3$	94	48-h LC_{50} >50	At most slightly toxic	40098001 Mayer, 1986	supplemental
Scud *(Gammarus pseudolimneaus)*	94	>100	Practically non-toxic	00014861, 05018314 Schoettger, 1970	acceptable
Midge, 4th instar (*Chironomus plumosus*), 20 °C, static	94	>1000	practically non-toxic	40094602 Johnson and Finley, 1980	supplemental
Midge, 3rd instar (*Chironomus plumosus*), 17 °C, pH 7.4, 40 mg/L $CaCO_3$, static	94	48-h EC_{50} >50	At most slightly toxic	40098001 Mayer, 1986	supplemental
Midge, 3rd instar (Chironomus plumosus), 17 °C, pH 7.4, 320 mg/L $CaCO_3$, static	94	48-h EC50 >50	At most slightly toxic	40098001 Mayer, 1986	supplemental

Damselfly larvae, age not reported Zygoptera	98	24-h LC_{50} 140[(3)]	N/A	Hussain et al. 1985[(1)]	supplemental
Mosquito, 3rd instar (*Aedes aegypti*)	98	24-h LC_{50} 650[(3)]	N/A	Hussain et al. 1985[(1)]	supplemental

(1) Hussain, M.A., R.B. Mohamad, P.C. Oloffs. 1985. *Studies on the Toxicity, Metabolism, and Anticholinesterase Properties of Acephate and Methamidophos*. J. Environ. Sci. Health, B20 (1), p. 129-147. (1985). These aquatic insects were tested in water samples. The aquatic insect, backswimmer, have ChE inhibition for 4 hours before recovery begins. The authors suggest that aquatic insects and possibly fish that are exposed to acephate/methamidophos may not recover by spontaneous reactivation of AchE and may therefore be stressed for some time because of physiological effects caused by inhibition of AchE.
(2) Hussain, M.A., R.B. Mohamad, Oloffs, P.C. 1984. *Toxicity and Metabolism of Acephate in Adult and Larval Insects*. J. Environ. Sci. Health, B19(3), 355-377.
(3) Mean of two tests (Note: author does not report if the mean is a geometric or arithmetic mean).

Table A.18 Freshwater invertebrates acute toxicity to acephate formulations.

Species	% ai	96-hour LC_{50}/ (ppm ai)	Toxicity Category	MRID No. Author/Year	Study Classification
Waterflea *(Daphnia magna)*	75	48-h EC_{50} 1.11 (0.65-1.88) Slope = 1.62 (effect immobility as surrogate for mortality)	Moderately toxic	Test No. 397-6 McCann, 1978	acceptable
Stonefly, 1st year class *(Isogenus* sp.), 7 °C, pH 7.5, 42 mg/L $CaCO_3$, static	75 WP	12 (95% CI 8.0-17.9)	Slightly toxic	40098001 Mayer, 1986	supplemental
Stonefly, naiad (Skwala sp.), 7 °C, static, 40 mg/L $CaCO_3$, static	75 WP	12 (95% CI 8.0 – 18)	Slightly toxic	40094602 Johnson and Finley, 1980	supplemental
Midge, 3rd instar (*Chironomus plumosus*), 20 °C, pH 7.2, 40 mg/L $CaCO_3$, static	75 WP	48-h EC_{50} >1000[(a)]	Practically non-toxic	40098001 Mayer, 1986	supplemental
Crayfish *(Procamborus clarki)*	75	120-h LC_{50} >750 No mortality	Practically non-toxic	00014712 Sleight, 1972	supplemental

[(a)] Additionally three tests, with the same environmental conditions, were conducted using solutions aged 1, 3, and 7 days prior to test initiation. The resultant 48-h EC_{50} values were >1000 ppm ai (initial concentration) for each test.

Table A.19 Freshwater invertebrates acute toxicity to methamidophos formulations

Freshwater Invertebrate Acute Toxicity					
Species	**% ai**	**48-hour LC_{50}/ EC_{50} (ppm)**	**Toxicity Category**	**MRID No. Author/Year**	**Study Classification**
Waterflea *(Daphnia magna)*	74	0.026 (0.20–0.034)	Very highly toxic	00041311 Nelson & Roney 1979	acceptable
waterflea *(Daphnia magna)*	72	0.050 (0.040-0.070)	Very highly toxic	00014110 Wheeler 1978	acceptable
waterflea *(Daphnia magna)*	74	0.027 (0.014-0.053)	Very highly toxic	00014305 Nelson & Roney 1977	Supplemental (1)

(1) Due to temperature of 24°C instead of 18 °C.

Previous methamidophos RED (1998) has a reference for freshwater prawn (*Macrobrachium rosenbergii*) study[1] as being supplemental. This study is not cited in the above study because the study is considered to be an invalid study that does

[1] Juarez, L.M., J. Sanchez, 1989. Toxicity of the Organophosphorous Insecticide Methamidophos (O,S-Dimethyl Phosphoramidothioate) to Larvae of the Freshwater Prawn, *Macrobachium rosenbergii* (DeMan) and the Blue Shrimp, *Penaeus stylirostris* Stimpson. Bull. Environ. Contam. Toxicol. (1989) 43:302-309.

not meet EPA's criteria for acceptability. The study was a static renewal study in which the organisms were handled every 24 hours. During the handling process, mortality occurred. The mortality in the controls ranged from 60% to 80%. EPA's criteria only allows up to 10% mortality in the controls. Furthermore, EPA recognizes that in the FWS Recovery Plan for The California Red-Legged Frog[2], this study is cited as evidence that methamidophos is very highly toxic to aquatic invertebrates.

Since the EC_{50} falls in the range of <1 ppm, methamidophos is categorized as very highly toxic to aquatic invertebrates on an acute basis.

v. Freshwater Invertebrate, Chronic

A freshwater aquatic invertebrate life-cycle test using the TGAI is required for acephate since the end-use product may be applied directly to water (former forestry use) or is expected to be transported to water from the intended use site, the pesticide is intended for use such that its presence in water is likely to be recurrent (multiple applications). Regardless of toxicity, the EEC in water is equal to or greater than 0.01 of any acute EC_{50} or LC_{50} value, or the pesticide is persistent in water (*i.e.*, half-life greater than 4 days). The preferred test species is *Daphnia magna*. Results of this test are tabulated below.

Studies for Acephate

Freshwater Aquatic Invertebrate Life-Cycle Toxicity

Species	% ai	21-day NOEC/LOEC(ppm)	Endpoints Affected	MRID No. Author/Year	Study Classification
Waterflea *(Daphnia magna)*	unknown	0.150/0.375	caused reduction in numbers of young at 375 ppb and higher	44466601 McCann, 1978	supplemental

This study was acceptable in 1982 review. The study has been downgraded to supplemental because the control had 35% mortality of the adults and the treatments range from 10% to 35% mortality with the highest concentration level having 10% mortality. Since this is a 21 day static test, it is assumed that the mortalities come from handling the organisms. There is a dose response trend of offspring per adult per day. With the dose response trend and because methamidophos daphnia life study has a more sensitive NOEC of 4.5 ppb, it was decided to make this study supplemental and not invalid since there is some useful information in this study.

Studies for the degradate methamidophos.

Freshwater Invertebrate Life Cycle Toxicity

[2] U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-Legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, OR. viii + 173 pp.

Species/Static or Flow-through	% ai	NOEC	Remarks	MRID No. Author/Year	Study Classification
Waterflea *(Daphnia magna)*	78.5	4.49 ppb (0.0045 ppm)	21-day dry weight NOAEC: 4.49 µg ai/L LOAEC: 5.32 µg ai/L 21-day immobility NOAEC: 4.49 µg ai/L LOAEC: 5.32 µg ai/L 21-day reproduction endpoint NOAEC: 4.49 µg ai/L LOAEC: 5.32 µg ai/L	46554501 Kern et. al., 2005	supplemental

The Daphnid life cycle study has some uncertainty in that the measured concentrations in the study kept increasing every 7 days that the concentrations were measured. Normally in a flow-thru system, the concentrations should remain similar over the time period of the test. However, this raises questions as to what concentration was the daphnids exposed to over to course of the test. Although, there were some questions regarding the concentration levels of study, the reviewer believes that the results can be of use for risk assessment.

c. Toxicity to Estuarine and Marine Animals

i. Estuarine and Marine Fish, Acute

Acute toxicity testing with estuarine/marine fish using the TGAI is required for acephate and its degradate methamidophos because the end-use product is expected to reach estuarine/marine environments because of its use in coastal counties. The preferred test species is sheepshead minnow (*Cyprinodon variegatus*). Results of these tests are tabulated below.

Studies for Acephate

Estuarine/Marine Fish Acute Toxicity for Acephate					
Species/Static or Flow-through	% ai	96-hour LC_{50} (ppm)	Toxicity Category	MRID No. Author/Year	Study Classification
Sheepshead minnow (flow-thru) *(Cyprinodon variegatus)*	94	910	practically non-toxic	40098001 Mayer, 1986	supplemental
Sheepshead minnow (static) *(Cyprinodon variegatus)*	94	>3200 (28days)	practically non-toxic	40098001 Mayer, 1986	supplemental
Mummichog (static) *(Fundulus heteroclitus)*	75	2872 (m) 3299 (f)	practically non-toxic	(1)	ancillary
Pin Fish (flow-thru) (*Lagodon rhomboides*)	94	85	slightly toxic	40098001 Mayer, 1986	supplemental
Spot (static) (*Leinstomus xanthurns*)	94	>100	practically non-toxic	40098001 Mayer, 1986	supplemental

(1) Fulton, M.H. and G.I. Scott. 1991. The Effects of Certain Intrinsic Variables on the Acute Toxicity of Selected Organophosphorous Insecticides to the Mummichog, *Fundulus heteroclitus.* J. Environ. Sci. Health B26 (5&6), 459-478.

Since the LC_{50} falls in the range of 10 to >100 ppm, acephate is categorized as slightly toxic to practically non-toxic to estuarine/marine fish on an acute basis.

Studies for the degradate methamidophos

Estuarine/Marine Fish Acute Toxicity

Species/Static or Flow-through	% ai	96-hour LC_{50} (ppm)	Toxicity Category	MRID No. Author/Year	Study Classification
Sheepshead minnow *(Cyprinodon variegatus)*	70.1	5.63 (4.13-6.89)	Moderately toxic	00144431 Larkin, 1983	acceptable

Since the LC_{50} falls in the range of 1-10 ppm, methamidophos is categorized as moderately toxic to estuarine/marine fish on an acute basis.

ii. Estuarine and Marine Fish, Chronic

An estuarine/marine fish early life-stage toxicity test using the TGAI is required for acephate because the end-use product is expected to be transported to the estuarine/marine environment from the intended use site and the pesticide is intended for use such that its presence in water is likely to be continuous or recurrent regardless of toxicity. The preferred test species is sheepshead minnow. However since the estuarine invertebrate is more sensitive, the estuarine invertebrate life cycle would be evaluated to determine a need for the estuarine fish early life-cycle. The estuarine invertebrate life-cycle study shows that NOAEC value is much higher than the peak EEC. Therefore, the estuarine early-life cycle study may not be needed at this time.

iii. Estuarine and Marine Invertebrates, Acute

Acute toxicity testing with estuarine/marine invertebrates using the TGAI is required for acephate and its degradate methamidophos because they are expected to reach estuarine/marine environment because of the use in coastal counties. The preferred test species are mysid shrimp and eastern oyster. Results of these tests are tabulated below.

Studies for Acephate

Estuarine/Marine Invertebrate Acute Toxicity for Acephate					
Species/Static or Flow-through	% ai.	96-hour LC_{50} (ppm)	Toxicity Category	MRID No. Author/Year	Study Classification
Eastern oyster (embryo-larvae) *(Crassostrea virginica)*	89	5.41 (48 hr) (3.3 – 8.9)	moderately toxic	00014713 Sleight, 1970	acceptable
Eastern oyster (embryo-larvae) static *(Crassostrea virginica)*	94	150	practically non-toxic	40228401 Mayer, 1986	supplemental
Mysid *(Americamysis bahia)* flow-thru	94	7.3	Slightly toxic	40228401 Mayer, 1986	supplemental
Brown shrimp (*Penaeus aztecus*)	89	22.9 (48 hr) (9.5 – 54.9)	slightly toxic	00014711 Sleight, 1970	supplemental
Pink Shrimp (flow-thru) (*Penaeus onorarum*)	94	3.8	Moderately toxic	40228401 Mayer, 1986	supplemental
Pink Shrimp (static) (*Penaeus onorarum*)	94	>10	Slightly toxic	40228401 Mayer, 1986	supplemental

Since the LC_{50}/EC_{50} falls in the range of 1.0 to >100 ppm, acephate is categorized as moderately toxic to practically non-toxic to estuarine/marine invertebrates on an acute basis.

Studies for the degradate methamidophos.

Estuarine/Marine Invertebrate Acute Toxicity

Species	% ai.	96-hour LC_{50}/EC_{50} (ppm)	Toxicity Category	MRID No. Author/Year	Study Classification
Oyster – shell deposition (*Crassostrea virginica*)	72.9	36 (30-47)	slightly toxic	40088601, 40074701 Surprenant, 1987	Supplemental (1)
Mysid shrimp *(Americamysis bahia)*	technical	1.054 (0.756 – infinity) (2)	Moderately toxic	00144430 Larkin, 1983	acceptable

(1) Due to no raw data.
(2) Of the 5 test concentrations, only the highest concentration showed any mortality and the mortality is 70 percent. Therefore, the confidence level is not very good due to only one concentration having mortality and that it is 70%.

Previous methamidophos RED (1998) has a reference for blue shrimp (*Penaeus stylirostris*) study[3] as being supplemental. This study is not cited in the above study because the study is considered to be an invalid study as it does not meet EPA's criteria for acceptability. The study was a static renewal study in which the organisms were handled every 24 hours. During the handling process, mortality occurred. The mortality in the controls ranged from 60% to 80%. EPA's criteria only allows up to

[3] Juarez, L.M., J. Sanchez, 1989. Toxicity of the Organophosphorous Insecticide Methamidophos (O,S-Dimethyl Phosphoramidothioate) to Larvae of the Freshwater Prawn, *Macrobachium rosenbergii* (DeMan) and the Blue Shrimp, *Penaeus stylirostris* Stimpson. Bull. Environ. Contam. Toxicol. (1989) 43:302-309.

10% mortality in the controls. Furthermore, EPA recognizes that in the FWS Recovery Plan for The California Red-Legged Frog [4], this study is cited as evidence that methamidophos is very highly toxic to aquatic invertebrates.

Since the LC_{50}/EC_{50} falls in the range of <1 to 100 ppm, methamidophos is categorized as highly toxic to slightly toxic to estuarine/marine invertebrates on an acute basis.

iv. Estuarine and Marine Invertebrate, Chronic

An estuarine/marine invertebrate life-cycle toxicity test using the TGAI is required for acephate because the chemical is expected to be transported to estuarine/marine environment from the intended use site (vegetables, cotton, soybean), the pesticide is intended for use such that its presence in water is likely to be continuous or recurrent regardless of toxicity, the EEC in water is equal to or greater than 0.01 of any acute LC_{50} or EC_{50} value or pesticide is persistent in water (*e.g.*, half-life greater than 4 days). The preferred test species is mysid shrimp. Results of this test are tabulated below.

Studies for Acephate

Estuarine/Marine Invertebrate Life-Cycle Toxicity for Acephate

Species/(Static Renewal or Flow-through)	% ai	21-day NOEC/LOEC (ppm)	Endpoints Affected	MRID No. Author/Year	Study Classification
Mysid shrimp *(Americamysis bahia)*	tech	0.58/1.4	Mortality[1]	00066341, 40228401 Mayer, 1986	supplemental

[1] Survival of the progeny of the acephate-exposed mysids were not affected.

Studies for the degradate methamidophos

Estuarine/Marine Invertebrate Life Cycle Toxicity

Species/Static or Flow-through	% ai	NOEC	Remarks	MRID No. Author/Year	Study Classification
Mysid shrimp *(Americamysis bahia)*	78.5	0.174 ppm	Young/Repro. Day: 0.360 mg ai/L Larvae Survival: 0.669 mg ai/L Growth 1) length: 0.360 mg ai/L 2) dry weight: 0.174 mg ai/L	466460-01 Blankinship et. al., 2005	acceptable

The endpoints measured were not gender specific.

[4] U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-Legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, OR. viii + 173 pp.

d. Toxicity to Plants

i. Terrestrial

Currently, terrestrial plant testing is not required for pesticides other than herbicides except on a case-by-case basis (*e.g.*, labeling bears phytotoxicity warnings, incident data or literature that demonstrate phytotoxicity). However, information has come to EFED's attention that acephate may exhibit phytotoxicity on non-target plants.

Studies for Acephate

Reference	Author, Year	Phytotoxicity Information
00014623	Davis, 1977	Orthene Insect Spray formulation (15.6% a.i.) tested on poinsettia at 0.75 lb / 100 gal. applied up to 3X. Phytoxicity symptoms observed on plants (tomato, watermelon, fuchsia, begonia, *Hedra helix*, and philodendron, angelwings, coleus, poinsettia, *Chrysanthemum* spp., *Diffenbachia picta*, *Gynura aurantiaca*,and *Dracaena marginata*) are slight tip burn and foliar distortion, marginal leaf necrosis, slight leaf chlorosis caused by formulation. The technical active acephate, whenever it is tested, did not cause any leaf damage. The formulation with methyl cellosolve caused some tip burn and foliar distortion on new growth.
00014928	Shaefer, 1975	Marginal necrosis and slight stunting on18 inch tall *Viburnum suspensum* from 2 applications of 1 lb /100 gal water of Orthene formulation. Fourteen other different species of nursery plants tested with no symptoms of effects.
00014929	Clark, 1975	Slight to mild phytotoxicity symptoms on leaves for Lombardy cottonwood from 2 applications of 0.5 lb and 1.0 lb ai/A. Sixty different species of nursery plants tested with no symptoms of effects. No information provided as to what the formulation of acephate that is used.

All of the above efficacy studies did not measure any growth parameters and the phytotoxicity rating system was not adequately described. An EC_{25} can not be determined with the data provided. All of the symptoms described in the studies do not appear to be significant growth effects but horticultural marketing leaf injury that may recover without adverse consequences. Thus, the NOEC could possibly be at or near the maximum rate of application used in the studies.

The following describe the phytotoxic characteristics of acephate:

Vegetative Vigor Tier II : Porch, J.R., *et al.*, 2003; MRID 46173204

Crop	Plant height*		Dry weight*		Most sensitive parameter
	NOEC	EC_{25}	NOEC	EC_{25}	
Onion	4.50	>4.50	4.50	>4.50	None
Ryegrass	4.50	>4.50	4.50	>4.50	None
Wheat	4.50	>4.50	4.50	>4.50	None
Corn	4.50	>4.50	4.50	>4.50	None
Buckwheat	4.50	>4.50	4.50	>4.50	None

Crop	Plant height*		Dry weight*		Most sensitive parameter
	NOEC	EC_{25}	NOEC	EC_{25}	
Soybean	4.50	>4.50	4.50	>4.50	None
Lettuce	4.50	>4.50	4.50	>4.50	None
Flax	4.50	>4.50	4.50	>4.50	None
Tomato	4.50	>4.50	4.50	>4.50	None
Radish	4.50	>4.50	4.50	>4.50	None

Units are kg a.i./ha

Seedling Emergence Tier II: Porch, J.R., *et al.*, 2003; MRID 46173203

Crop	Emergence*		Survival*		Plant height*		Dry weight*		Most sensitive parameter
	NOEC	EC_{25}	NOEC	EC_{25}	NOEC	EC_{25}	NOEC	EC_{25}	
Onion	4.50	>4.50	4.50	>4.50	4.50	<4.50	4.50	<4.50	Dry weight**
Ryegrass	4.50	>4.50	4.50	>4.50	4.50	>4.50	4.50	>4.50	None
Wheat	4.50	>4.50	4.50	>4.50	4.50	>4.50	4.50	>4.50	None
Corn	4.50	>4.50	4.50	>4.50	4.50	>4.50	4.50	>4.50	None
Buckwheat	4.50	>4.50	4.50	>4.50	<4.50	>4.50	<4.50	>4.50	None
Soybean	4.50	>4.50	4.50	>4.50	4.50	>4.50	4.50	>4.50	None
Lettuce	4.50	>4.50	4.50	>4.50	4.50	>4.50	4.50	>4.50	None
Flax	4.50	>4.50	4.50	>4.50	4.50	>4.50	4.50	>4.50	None
Tomato	4.50	>4.50	4.50	>4.50	4.50	>4.50	4.50	>4.50	None
Radish	4.50	>4.50	4.50	>4.50	4.50	>4.50	4.50	>4.50	None

* Units are kg ai/ha and 4.50 kg ai/ha is equivalent to 3.96 lb a.i./A
**The study author discounted the >25% inhibition exhibited by onion height and biomass because these responses did not follow a clear dose-dependent pattern.

The NOEC for acephate seedling emergence and vegetative vigor studies is 4.5 lb ai/A.

Studies for the degradate methamidophos

Toxicity of Methamidophos to Terrestrial Plants - Tier I   Seedling Emergence

Species	*% ai*	*% inhibition length*	*% inhibition weight*	*Maximum Dose*	*MRID No. Author, Year*	*Study Classification*
Cabbage	42.6	3	0	4 lb ai/A	46655802 Christ and Lam, 2005	Not Reviewed
Corn		0	0			
Cucumber		2	0			
Lettuce		0	3			
Oat		0	0			
Onion		3	0			
Radish		0	6			
Ryegrass		0	0			
Soybean		2	0			
Tomato		15	0			

Toxicity of Methamidophos to Terrestrial Plants - Tier I   Vegetative Vigor

Species	*% ai*	*% inhibition length*	*% inhibition weight*	*Maximum Dose*	*MRID No. Author, Year*	*Study Classification*
Cabbage	42.6	0	6	4 lb ai/A	46655802 Christ and Lam, 2005	Not Reviewed
Corn		3	1			
Cucumber		0	1			
Lettuce		5	4			
Oat		4	8			
Onion		1	4			
Radish		6	5			
Ryegrass		0	0			
Soybean		1	4			
Tomato		0	6			

The NOEC for methamidophos seedling emergence and vegetative vigor studies is 4 lb ai/A.

ii. Aquatic Plants

Currently, aquatic plant testing is not required for pesticides other than herbicides and fungicides except on a case-by-case basis (*e.g.*, labeling bears phytotoxicity warnings incident data or literature that demonstrate phytotoxicity). The only on acephate information EFED has is below:

Skeletonema costatum EC_{50} >50 ppm (Mayer, 1986; MRID 40228401)

Therefore, EFED does not have any information to warrant further phytotoxicity testing on aquatic plants.

e. Field Testing and Literature Findings

i. Terrestrial Organisms

The tables below describe field studies and incidents concerning the use of acephate and its impact on the environment.

Terrestrial Vertebrates	Summary	Reference
Sparrows	Migratory white-throated sparrows (*Zonotrichia albicollis*) were exposed to acephate to determine its effects on migratory orientation and behavior. Birds were exposed to polarizer sheets to determine the mechanism by which acephate may affect migratory orientation. Adult birds exposed to 256 ppm acephate a.i. were not able to establish a preferred migratory orientation and exhibited random activity. All juvenile treatment groups displayed a seasonally correct southward migratory orientation. The author hypothesized that acephate may have produced aberrant migratory behavior by affecting the memory of the adult's migratory route and wintering ground. The "experiment reveals that an environmentally relevant concentration" (similar to 0.5 lb ai/A application) of an OP such as acephate "can alter migratory orientation, but its effect is markedly different between adult and juvenile sparrows. Results suggest that the survival of free-flying adult passerine migrants may be compromised following organophosphorus pesticide exposure."	Vyas et. al., 1995 ECOTOX 40313
Birds	Acephate was sprayed in a forest at 0.5 lb ai/A. Eleven species of birds had ChE inhibition that ranged on average from 20 to 40%. The maximum depression of ChE found in chipping sparrows was 57% at day six. Western tanager species was found to have significant inhibition up to 26 days after application. Brain residue analysis of a western tanager collected on day three contained 0.318 ppm of acephate and 0.055 ppm of methamidophos. The authors concluded that brain ChE inhibition that occurred from forest application of 0.5 lb. ai/A is sufficient to be life threatening to the birds.	Zinkl, J. G., C.J. Henny, and P.J. Shea. 1979. Brain cholinesterase activities of passerine birds in forests sprayed with cholinesterase inhibitors. Pages 356-365. In: Animals as Monitors of Environmental Pollutants, National Academy of Science, Washington, DC.
Sparrows	The effects of a 14-day dietary exposure of acephate on cholinesterase activity in three regions; basal ganglia, hippocampus, and hypothamulus were examined in the brain of the white-throated sparrow, *Zonotrichia albicollis*. All three regions experienced depressed cholinesterase activity between 0.5-2 ppm ai acephate. The regions exhibited cholinesterase recovery at 2-16 ppm ai acephate; however, cholinerase activity dropped and showed no recovery at higher dietary levels (> 16 ppm acephate) which suggests that each region maintains its own ChE activity level integrity until the brain is saturated so that the differences of the regions is nil. Each region of the brain is responsible for different survival areas such as a foraging and escaping predators, memory and spatial orientation, food and water intake, reproduction and several others. Evidence indicated that the recovery is initiated by the magnitude of depression, not the duration. In general, as acephate concentration increased, depression in ChE activity among brain regions increased and differences of ChE activity among the three brain regions decreased. The pattern of ChE depression in different regions of the brain following low level exposure may prove to be a critical factor in the survival of the bird. The authors hypothesized that adverse effects to birds in the field may occur at pesticide exposure levels customarily considered negligible.	Vyas et. al., 1996 ECOTOX 40343

Terrestrial Vertebrates	Summary	Reference
Passerine birds	Several large acreages of forest were sprayed with 0.5, 1.0 or 2.0 lb. ai/A application rates. There was no brain ChE inhibition on day zero after application. Birds collected from the 2 lb ai/A plots from day one thru six post spray showed ChE inhibition. Brain ChE inhibition was shown in birds 33 days after treatment but not 89 days after treatment. Birds seemed to have more inhibition of ChE in summer application when compared to the fall application in the 1 lb. ai/A plots (30-50% and 25-40% depression, respectively). The greatest ChE inhibition occurred in dark-eyed juncos (65%) collected 15 days after treatment. In the 2 lb. ai/A plots, dark-eyed juncos and golden-crowned kinglets had 54% ChE inhibition. Of the 14 species collected, only pine siskins *(Siinus pinus)* did not show any ChE inhibition. Symptoms of organophosate poisoning were observed such as a warbling vireo salivating profusely, an American robin having difficulty maintaining a perching position, and a mountain chickadee having visible tremors. All of these observations were made in the 1 lb. ai/A plots. The authors concluded that since marked ChE inhibition did not occur on day zero, but was evident up to 33 days after application, there was either an accumulative effect that was detected later or acephate was converted to a more potent ChE inhibitor such as methamidophos. Spraying the forest with 0.5, 1.0 or 2.0 lb. ai/A caused marked and widespread, and prolonged ChE depression in passerine birds.	Zinkl, 1977
Red-eye Vireos	Site: Acephate was applied in this study on June 13 at 0.55 kg/ha (0.5 lb ai/A) on two 200 hectare plots. Significant ($P<0.05$) decline in number of red-eyed vireos was observed. The decline was concentrated in the interior of the treated plots rather than spread throughout. The authors concluded that this was directly attributed to acephate.	05014922, 00163173 (Bart, 1979)
American Kestrels	The kestrels were dosed with 50 mg/kg of 75% acephate formulation. Serum ChE was 37% inhibited and returned to predosed levels eight days later. Then the birds were dosed again and the serum ChE activity was inhibited at 42%; brain ChE was at 26% inhibition. The kestrel prey-catching activity was not altered from the acephate at 50 mg/kg dose level.	00141694 (Rudolph, 1984)
Forest birds	Site: Wallowa-Whitman National Forest. Applications of 1.12 (1.0 lb ai/A) and 2.24 (2.0 lb ai/A) kg/ha were made on forest plots in Oregon. Extensive inhibition of brain ChE activity (commonly at 30-50%) for up to 33 days for 11 of the 12 species of birds that were collected was observed. The highest frequency of ChE inhibition was observed on day two post spray. Two species of birds had observable population decreases. Some birds on the plots treated with 1.12 kg/ha had 65% ChE inhibition which is considered to be fatal amounts. At both plots, birds were found with coordination problems, salivating profusely, and inability to fly. These behaviors were observed up to 20 days after application in the 2.24 kg/ha plot. It was also observed that breeding pairs for the warbling vireo and yellow-rumpled warbler were decreased. The authors concluded that application of acephate at rates of 1.12 and 2.24 kg/ha can cause sickness and death to forest birds.	40644802 (Richmond, 1979)
Birds	Site: Seven western states. USDA applied 1.05 oz ai/A ULV aerially for grasshopper control in 38,000 to 51,000 acre plots in May 1980. Most birds collected showed reduced brain ChE activity. The greatest inhibitions were found in the last birds collected. Horned larks showed more than 20% inhibition at the end of the 24-day post spray period. Some of these birds were showing 40% inhibition of brain ChE.	00032188 (Mazuravich, 1972)
Birds and Deer Mice	Site: WY, UT and AZ rangeland. In 1979 and 1980, the birds and small mammals collected up to 24 days after application had reduced ChE activity. Reduction of 20% or more is indicative of exposure to brain ChE inhibitor. Of the birds collected in AZ, 24.5% had reduced ChE activity >20%. The birds with the most ChE inhibition were the last ones collected (21-24 days post treatment). In 1981, horned larks and lark buntings were collected in WY on a 12,000 acre plot that was treated with acephate at the rate of 0.105 kg/ha. More than 20% ChE inhibition was found in 19% of the horned larks and 25% of the lark buntings. Deer mice were also collected in WY. They were found to have ChE inhibition that ranged from 12.7% to 14.6%.	00093909 (McEwen, 1981)
Squirrel	There is a marked inhibition of brain ChE activity in squirrels after aerial treatment of forests at rates of 0.57 kg/ha (0.51 lb/A) of Orthene.	40329701 (Zinkl, 1980)
Insectivorous mammals	Increased ingestion of arthropods by insectivorous mammals has been reported following acephate application. This signifies a direct pathway for substantial exposure to acephate due to consumption of dead and dying insects.	Stehn, et. al., 1976

terrestrial invertebrates	summary	Reference
queen bees	Acephate appears to be systemic in nurse bees, causing glandular secretions fed to queens to be toxic. All colonies fed the 10 ppm rate lost queens early in the study and the affected colonies were unable to rear new queens. The study implied infrequent encounters by honey bee foragers with acephate on crops at levels of 1 ppm (1 ppm is NOAEC level) or less should be harmless. However, foragers may be expected to encounter levels greater than 1 ppm in the field because of 6-9 day residue persistence and residual systemic activity of acephate in plants for up to 15 days. Consequently, the study concluded that acephate is a hazard to honey bees because of its high contact toxicity, and because of its systemic nature.	Stoner et. al., 1984
honey bees	Orthene was found to be more detrimental to honey bee populations than carbaryl. Brood cycles of some colonies were found to be permanently broken, so the colonies were technically dead. Depression in the numbers of wild foraging bees was apparent. Measured seed and fruit production of various plants were reduced from lack of pollination.	00099762 (Johansen, 1977)
yellow jacket wasps and ants	Severe impacts on yellow jacket wasps and ants at rates of application of 1 and 2 lb ai/A sprayed on forest. Temperature seems to affect the exposure of wasps in that cooler temperature (39^{o}F) causes wasps not to forage out of nests and therefore not be exposed as much, whereas warmer temperatures (59^{o}F) increases the activity of wasps and the exposure to acephate.	00099763 (Johansen, 1977)

ii. Aquatic Organisms

The tables below describe field studies and incidents concerning the use of acephate and its impact on the environment.

aquatic organisms	summary	reference
fishes	Site: Moosehead Lake, ME. A 75% acephate formulation was applied at 0.5 lb. ai/A on forest. Brook trout and landlocked salmonoid did not show any decreases in ChE activity but suckers, a bottom feeder, showed 28% drop in ChE activity. There was a gradual return to pre spray ChE activity by eight days after treatment. The brook trout changed their diet a few days after spraying in response to the killed arthropods entering the stream. Macro invertebrates increased drift into the stream moderately and temporarily from the spraying. The invertebrate standing crop was not affected. Salmonoid growth was unaffected and newly hatched smelt grew normally.	00014547, 05012201 (Rabeni, 1979)
fishes	Site: Two forest ponds and a stream in PA. 0.5 lb. ai/A was applied to two forest ponds and a stream in PA, where 65 caged fish (bluegills, perch, and bullheads) were held. The fish and the sampled benthic invertebrates showed no effect up to eight days post treatment. The authors concluded that the "aquatic ecosystem under study was not significantly affected."	00014637 Bocsor, 1975
fishes and invertebrates	Author compared Orthene with Sumithion, Carbaryl, Dylox, Matacil, and Dimilin regarding brook trout, Atlantic salmon, scud and stoneflies. Author concluded that "Orthene should not pose any significant toxicity hazard to fish or (aquatic) invertebrates" when compared to the other chemicals.	00014861 (Schoettger, 1976)
fishes and invertebrates	Direct application to stream for 5 hour at concentration of 1000 ppb from 8 a.m. to 1 p.m. Measurements of acephate remained constantly at 1100 to 1200 ppb during this time. No mortality was noted in trout and benthic insects in the stream.	Geen et. al., 1981
rainbow trout	"Brain ChE activity was depressed (38.2%) in trout exposed for 24 hours to 400 mg acephate per liter. After 24 hours of being in uncontaminated water, brain ChE was still depressed (42.5%)." There was no significant difference in the 100 mg/L for ChE depression when compared to control. Brain ChE activity remains depressed 8 days after a 24-hour exposure to 25 mg/L of methamidophos and 15 days after exposure to 400 mg/L of acephate. Because of low toxicity of acephate to rainbow trout, the study failed to determine at what % ChE inhibition would cause death. The level of depression that suggests poisoning by acephate or methamidophos is greater than 70% since brain ChE inhibition is at least this much in some trout that did not die. There is persistent ChE depression (8 days for methamidophos and 15 days for acephate) which suggests sublethal effects such as inability to sustain physical activity in search of food, eluding predators, and maintaining position in flowing water would occur. The author suggested that trout could die as a indirect result of sublethal toxicity.	Zinkl et. al., 1987
mussel and clam	Reports of mussel die-off occurring in North Carolina prompted this study (See Fleming et. al. 1995). *Elliptio complanata* (freshwater mussel) and *Corbicula fluminea* (asiatic clam) were both tested. *E. Complanata* ChE depression was significant at 1.3 mg/L at the adductor muscle at 21EC at 96 hour exposure (no mortality was observed). When the temperature was raised to 30EC, there was significant mortality at observed at 5 mg/L. Cholinesterase activities of the adductor muscle (which was depressed 94-96%), began to recover 12 days after exposure, but was not fully recovered until more than 24 days after exposure. Acephate reduced the shell closure responsiveness at 5 mg/L with more pronounced affect at 27EC. This appears to confirm a die-off of mussels in North Carolina in August at a time of low water flow and seasonally peaked temperatures. When compared to carbamates, recovery is less rapid due to the accepted generalization (O'Brien, 1976) that OP chemicals irreversibly bind (phosphorylation) to ChE sites whereas carbamates reversibly bind (carbamylation) to ChE sites.	Moulton et. al., 1996

aquatic organisms	summary	reference
mussels	"In 1990, we investigated a die-off of freshwater mussels in north-central North Carolina. An estimated 1,000 mussels of several species were found dead or moribund, including about 111 Tar spinymussels (Elliptio steinstansana), a federally listed endangered species. The die-off occurred during a period of low flow and high water temperature in a stream reach dominated by forestry and agriculture. Pathological examinations did not show any abnormalities and indicated that the die-off was an acute event. Chemical analyses of mussels, sediments, and water revealed no organophosphorus or carbamate pesticides. Cholinesterase activity in adductor muscle from Eastern elliptios (Elliptio complanata) collected at the kill site and downstream was depressed 73 and 65%, respectively, compared with upstream reference samples. The depression is consistent with a diagnosis of anticholinesterase poisoning. This is the first documented case in which cholinesterase-inhibiting compounds have been implicated in a die-off of freshwater mussels."	Fleming et. al., 1995

Appendix B: PRZM-EXAMS Aquatic Exposures Estimates

1. Non-bearing Citrus by Ground Application: 1 lb/A, 2 times at 7 days

stored as CitrusGround.out
Chemical: acephate
PRZM environment: CAcitrus_NirrigC.txt modified Thuday, 17 June 2004 at 08:14:54
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23155.dvf modified Wedday, 3 July 2002 at 09:04:20
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.904	0.7894	0.5331	0.2553	0.1712	0.04223
1962	1.036	0.9141	0.6564	0.4026	0.2769	0.06836
1963	1.934	1.67	1.085	0.6866	0.4699	0.116
1964	0.9075	0.7946	0.5385	0.2614	0.1756	0.0432
1965	0.8963	0.7874	0.5353	0.2654	0.1786	0.04415
1966	0.891	0.7697	0.5126	0.2376	0.1591	0.04872
1967	0.9052	0.7901	0.5337	0.3184	0.221	0.05765
1968	0.8755	0.7469	0.4895	0.2223	0.1488	0.03659
1969	0.8991	0.7818	0.5251	0.2956	0.2002	0.04939
1970	0.8952	0.7676	0.5102	0.2435	0.1692	0.05186
1971	0.8881	0.7652	0.508	0.2376	0.1648	0.04453
1972	0.882	0.7145	0.4575	0.2012	0.1346	0.04732
1973	0.9134	0.803	0.5505	0.2736	0.1839	0.04605
1974	2.353	2.014	1.139	0.5262	0.3528	0.09082
1975	0.8938	0.774	0.5171	0.2475	0.1664	0.04118
1976	0.8924	0.772	0.515	0.2436	0.1634	0.04018
1977	1.112	0.9751	0.6248	0.4103	0.2764	0.06929
1978	0.8658	0.7301	0.4729	0.2124	0.1453	0.03709
1979	0.8879	0.7653	0.5082	0.237	0.1587	0.03919
1980	0.9187	0.8034	0.5428	0.2623	0.1761	0.04346
1981	0.8941	0.7746	0.5177	0.2435	0.1631	0.04021
1982	0.8888	0.7667	0.5177	0.2458	0.1646	0.04069
1983	1.027	0.8956	0.637	0.3092	0.2082	0.05175
1984	0.8936	0.7739	0.517	0.247	0.166	0.04087
1985	0.9145	0.8051	0.5495	0.266	0.1782	0.0442
1986	0.8836	0.7589	0.5017	0.2337	0.1568	0.03869
1987	0.8985	0.7801	0.5233	0.2447	0.1674	0.04658
1988	0.8841	0.7597	0.5024	0.2326	0.156	0.03848
1989	0.8772	0.7495	0.4921	0.2223	0.1486	0.03665
1990	0.8849	0.7609	0.5036	0.2316	0.155	0.03823
0.1	1.1044	0.969	0.65446	0.40953	0.27685	0.069197

Average of yearly averages: 0.0491203333333333

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:

Output File: CitrusGround
Metfile: w23155.dvf
PRZM scenario: CAcitrus_NirrigC.txt
EXAMS environment file: pond298.exv
Chemical Name: acephate
Description Variable Name Value Units Comments
Molecular weight mwt 183.16 g/mol
Henry's Law Const. henry 5.1E-13 atm-m^3/mol
Vapor Pressure vapr 1.7E-6 torr
Solubility sol 801000 mg/L
Kd Kd 0.09 mg/L
Koc Koc mg/L
Photolysis half-life kdp 0 days Half-life
Aerobic Aquatic Metabolism kbacw 4.6 days Halfife
Anaerobic Aquatic Metabolism kbacs 4.6 days Halfife
Aerobic Soil Metabolism asm 2.3 days Halfife
Hydrolysis: pH 7 163 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 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 01-03 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.
Record 17: FILTRA
IPSCND
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)

2. Cotton by Aerial, 1 lb/A, 6 times at 3 day intervals

stored as AirSix.out
Chemical: acephate
PRZM environment: Cacotton_NirrigC.txt modified Thuday, 17 June 2004 at 08:14:24
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w93193.dvf modified Wedday, 3 July 2002 at 09:04:24
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	10.93	9.633	7.659	4.025	2.718	0.6705
1962	11.17	9.918	7.936	4.161	2.802	0.6912
1963	16.05	14.19	9.834	5.441	3.707	0.9148
1964	11.18	9.927	7.912	4.249	2.878	0.7081
1965	20.66	18.73	13.01	6.513	4.398	1.085
1966	10.45	9.081	7.17	3.628	2.434	0.6003
1967	12.67	11.26	8.755	4.758	3.247	0.8011
1968	14.64	12.99	9.434	4.865	3.281	0.8071
1969	11.44	10.12	8.097	4.301	2.905	0.7166

```
1970  19.32 17.57 15.43 7.863 5.301 1.307
1971  10.91 9.601 7.615 4.045 2.741 0.6764
1972  9.845 8.381 6.605 3.312 2.228 0.5479
1973  11.37 10.14 8.536 4.669 3.151 0.777
1974  10.69 9.318 7.402 3.891 2.626 0.6477
1975  12.38 11.01 8.62  4.761 3.243 0.8
1976  11.13 9.863 7.86  4.253 2.881 0.7088
1977  11.99 10.62 8.173 4.242 2.853 0.7038
1978  17.04 15.22 12.54 5.896 3.969 0.9789
1979  10.74 9.308 7.467 3.855 2.592 0.6392
1980  11.64 10.24 8.367 4.349 2.931 0.721
1981  10.79 9.817 7.974 4.205 2.83  0.698
1982  20.66 18.41 12.79 6.821 4.628 1.142
1983  16.37 14.96 12.61 6.777 4.574 1.128
1984  10.11 8.684 6.828 3.479 2.338 0.575
1985  11.04 9.735 7.732 3.948 2.648 0.6529
1986  18.58 17.09 12.2  5.831 3.918 0.9663
1987  12.4  10.94 9.169 4.565 3.06  0.7545
1988  10.36 8.974 7.078 3.635 2.449 0.6024
1989  11.22 9.805 8.169 4.163 2.791 0.6882
1990  10.35 8.964 7.067 3.564 2.392 0.59


0.1   19.246      17.522      12.772      6.7506      4.5564
      1.1237
                              Average of yearly averages:
      0.776656666666666

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: AirSix
Metfile:    w93193.dvf
PRZM scenario:    Cacotton_NirrigC.txt
EXAMS environment file: pond298.exv
Chemical Name:    acephate
Description Variable Name     Value Units Comments
Molecular weight  mwt   183.16      g/mol
Henry's Law Const.      henry 5.1E-13     atm-m^3/mol
Vapor Pressure    vapr  1.7E-6      torr
Solubility  sol   801000      mg/L
Kd    Kd    0.09  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 4.6   days  Halfife
Anaerobic Aquatic Metabolism  kbacs 4.6   days  Halfife
Aerobic Soil Metabolism asm   2.3   days  Halfife
Hydrolysis: pH 7  163   days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  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  01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1  interval    3     days  Set to 0 or delete line for single
app.
```

Interval 2 interval 3 days Set to 0 or delete line for single app.
Interval 3 interval 3 days Set to 0 or delete line for single app.
Interval 4 interval 3 days Set to 0 or delete line for single app.
Interval 5 interval 3 days Set to 0 or delete line for single app.
Record 17: FILTRA
IPSCND
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)

3. Cotton by Ground, 6 times at 3 day intervals

stored as GrdSix.out
Chemical: acephate
PRZM environment: Cacotton_NirrigC.txt modified Thuday, 17 June 2004 at 08:14:24
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w93193.dvf modified Wedday, 3 July 2002 at 09:04:24
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	2.185	1.927	1.537	0.8112	0.5479	0.1352
1962	2.234	1.984	1.614	0.8565	0.577	0.1423
1963	7.444	6.581	4.13	2.125	1.454	0.3589
1964	2.235	1.985	1.582	0.8498	0.5756	0.1416
1965	13.76	12.41	7.822	3.552	2.401	0.5924
1966	2.091	1.816	1.434	0.7257	0.4869	0.1201
1967	4.289	3.907	2.815	1.467	1.002	0.2473
1968	6.461	5.903	3.92	1.883	1.271	0.3127
1969	2.621	2.336	1.892	0.9888	0.6679	0.1648
1970	15.86	14	10.4	4.898	3.295	0.8127
1971	2.233	1.964	1.554	0.8244	0.5587	0.1379
1972	1.969	1.676	1.321	0.6623	0.4455	0.1096
1973	3.277	2.925	2.162	1.217	0.8232	0.203
1974	2.235	1.949	1.59	0.848	0.5725	0.1412
1975	3.438	3.195	2.299	1.249	0.8514	0.2101
1976	2.243	1.988	1.589	0.8613	0.5834	0.1435
1977	3.18	2.815	1.966	1.028	0.6919	0.1707
1978	13.55	11.7	7.442	3.281	2.206	0.5439
1979	2.457	2.185	1.843	0.9611	0.6457	0.1592
1980	3.005	2.756	2.382	1.205	0.8114	0.1996
1981	3.262	2.863	2.043	1.11	0.7485	0.1846
1982	12.1	10.81	7.317	3.505	2.384	0.5881
1983	10.43	9.218	7.525	3.846	2.593	0.6395
1984	2.022	1.737	1.366	0.6957	0.4676	0.115
1985	2.298	2.027	1.608	0.8182	0.5488	0.1353
1986	11.63	10.76	7.518	3.308	2.223	0.5483
1987	4.357	4.047	3.433	1.639	1.098	0.2708

```
1988  2.078 1.799 1.421       0.7308      0.4923      0.1211
1989  3.606 3.319 2.836       1.418       0.9503      0.2343
1990  2.07  1.793 1.413       0.7128      0.4784      0.118


0.1   13.405      11.611      7.5243      3.5473      2.3993
      0.59197
                              Average of yearly averages:
      0.266723333333333
```

Inputs generated by pe4.pl - 8-August-2003

```
Data used for this run:
Output File: GrdSix
Metfile:    w93193.dvf
PRZM scenario:    Cacotton_NirrigC.txt
EXAMS environment file: pond298.exv
Chemical Name:    acephate
Description Variable Name     Value Units Comments
Molecular weight  mwt   183.16      g/mol
Henry's Law Const.      henry 5.1E-13     atm-m^3/mol
Vapor Pressure    vapr  1.7E-6      torr
Solubility  sol   801000      mg/L
Kd    Kd    0.09  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 4.6   days  Halfife
Anaerobic Aquatic Metabolism  kbacs 4.6   days  Halfife
Aerobic Soil Metabolism asm   2.3   days  Halfife
Hydrolysis: pH 7  163   days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  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  01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1  interval    3     days  Set to 0 or delete line for single
app.
Interval 2  interval    3     days  Set to 0 or delete line for single
app.
Interval 3  interval    3     days  Set to 0 or delete line for single
app.
Interval 4  interval    3     days  Set to 0 or delete line for single
app.
Interval 5  interval    3     days  Set to 0 or delete line for single
app.
Record 17:  FILTRA
      IPSCND
      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)
```

4. Lettuce, Aerial

stored as Lettuce Aerial.out
Chemical: acephate
PRZM environment: CAlettuceC.txt modified Monday, 11 October 2004 at 15:23:40
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23273.dvf modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	4.605	4.075	2.812	1.442	0.9815	0.386
1962	4.975	4.446	3.097	1.627	1.109	0.3019
1963	12.09	10.75	7.047	4.014	2.849	0.7309
1964	4.706	4.226	3.392	2.249	1.572	0.4051
1965	4.637	4.084	2.797	1.62	1.126	0.2802
1966	4.564	4.013	2.735	1.366	0.9254	0.4126
1967	6.037	5.362	3.749	2.073	1.426	0.364
1968	7.932	6.936	4.678	2.485	1.694	0.4452
1969	4.579	4.035	2.758	1.821	1.285	0.3245
1970	16.84	15.12	10.86	5.001	3.381	1.077
1971	4.607	4.07	2.794	1.489	1.062	0.3232
1972	4.533	3.967	2.686	1.332	0.9037	0.3845
1973	7.243	6.628	5.051	2.721	1.863	0.4705
1974	33.65	29.81	20.04	9.696	6.592	1.649
1975	7.082	6.278	4.114	2.15	1.469	0.3664
1976	6.959	6.128	4.629	2.402	1.661	0.4781
1977	8.946	7.92	5.18	2.951	2.18	0.5497
1978	12.79	11.12	7.935	3.88	2.636	0.654
1979	4.569	4.02	2.783	1.673	1.148	0.285
1980	5.61	4.969	3.447	1.772	1.214	0.3375
1981	28.85	25.58	18.23	8.93	6.063	1.519
1982	4.69	4.158	3.403	1.979	1.357	0.336
1983	12.83	11.37	8.525	4.123	2.797	0.691
1984	4.571	4.023	2.876	1.489	1.013	0.2853
1985	4.806	4.272	2.939	1.513	1.026	0.3064
1986	15.87	14.43	9.285	4.46	3.042	0.7552
1987	15.49	14.2	10.09	4.898	3.328	0.8519
1988	4.524	3.952	2.671	1.844	1.527	0.39
1989	4.593	4.035	2.754	1.364	0.9228	0.2469
1990	4.638	4.108	2.834	1.442	0.9984	0.2733

0.1 16.743 15.051 10.783 4.9907 3.3757 1.05449
Average of yearly averages: 0.529343333333333

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: Lettuce Aerial
Metfile: w23273.dvf
PRZM scenario: CAlettuceC.txt
EXAMS environment file: pond298.exv
Chemical Name: acephate
Description Variable Name Value Units Comments

```
Molecular weight  mwt   183.16      g/mol
Henry's Law Const.      henry 5.1E-13     atm-m^3/mol
Vapor Pressure    vapr  1.7E-6      torr
Solubility  sol   801000      mg/L
Kd    Kd    0.09  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 4.6   days  Halfife
Anaerobic Aquatic Metabolism  kbacs 4.6   days  Halfife
Aerobic Soil Metabolism asm   2.3   days  Halfife
Hydrolysis: pH 7  163   days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  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  01-03 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.
Record 17:  FILTRA
      IPSCND
      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)
```

5. Lettuce, ground

stored as LettuceGround.out
Chemical: acephate
PRZM environment: CAlettuceC.txt   modified Monday, 11 October 2004 at 15:23:40
EXAMS environment: pond298.exv   modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23273.dvf   modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	3.014	2.659	1.917	0.9089	0.6059	0.1995
1962	1.25	1.117	0.7783	0.4089	0.2994	0.09778
1963	10.17	9.05	5.964	2.922	2.125	0.5488
1964	2.575	2.397	1.735	0.9929	0.711	0.193
1965	1.004	0.9119	0.6176	0.5179	0.3775	0.09529
1966	4.104	3.576	2.173	1.166	0.7773	0.2374
1967	3.098	2.769	1.799	0.9554	0.6629	0.1756
1968	5.564	4.865	2.953	1.476	1.011	0.2781
1969	2.307	2.021	1.23	0.7218	0.5393	0.1405
1970	15.19	13.7	9.087	4.116	2.78	0.9394
1971	0.9987	0.88	0.5671	0.3457	0.2968	0.1328
1972	2.229	2.056	1.459	0.9305	0.6784	0.2132
1973	3.966	3.536	3.079	1.611	1.108	0.2843
1974	32.7	28.55	18.22	8.75	5.949	1.49
1975	3.51	3.159	2.087	1.035	0.7085	0.1784
1976	4.198	3.697	2.544	1.327	0.9302	0.3008

```
1977  6.966 6.167 3.878       1.884       1.448       0.3692
1978  9.814 8.523 6.175       2.97        2.019       0.5018
1979  1.378 1.25  0.8497      0.5804      0.4059      0.1017
1980  1.961 1.737  1.236      0.6338      0.4399      0.1482
1981  27.7  24.99  16.94      8.25        5.599       1.405
1982  2.309 2.113  1.457      0.8409      0.5826      0.1447
1983  11.16 9.799  6.599      3.152       2.138       0.5281
1984  1.08  0.9505 0.696      0.3807      0.2597      0.1013
1985  1.104 0.9816 0.662      0.343       0.2327      0.1126
1986  12.71 11.68  7.63       3.511       2.398       0.596
1987  14    12.59  8.241      3.875       2.633       0.6814
1988  3.817 3.449  2.319      1.044       0.8388      0.2209
1989  0.9473 0.8322 0.5733    0.2832      0.1916      0.0671
1990  0.9493 0.8408 0.5855    0.3029      0.2716      0.08277


0.1   15.071      13.589      9.0024      4.0919      2.7653
      0.9136
                              Average of yearly averages:   0.352188

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: LettuceGround
Metfile:    w23273.dvf
PRZM scenario:    CAlettuceC.txt
EXAMS environment file: pond298.exv
Chemical Name:    acephate
Description Variable Name     Value Units Comments
Molecular weight  mwt   183.16      g/mol
Henry's Law Const.      henry 5.1E-13     atm-m^3/mol
Vapor Pressure    vapr  1.7E-6      torr
Solubility  sol   801000      mg/L
Kd    Kd    0.09  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 4.6   days  Halfife
Anaerobic Aquatic Metabolism  kbacs 4.6   days  Halfife
Aerobic Soil Metabolism asm   2.3   days  Halfife
Hydrolysis: pH 7  163   days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  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  01-03 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.
Record 17:  FILTRA
      IPSCND
      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)
```

6. Row Crops (beans, celery, peppers) Aerial

stored as Air3day.out
Chemical: acephate
PRZM environment: CARowCrop.txt modified Tueday, 20 February 2007 at 13:04:11
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w93193.dvf modified Wedday, 3 July 2002 at 09:04:24
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	7.066	6.253	4.352	2.119	1.426	0.3517
1962	5.133	4.557	3.682	1.938	1.303	0.3214
1963	7.298	6.452	4.546	2.286	1.546	0.3814
1964	7.647	6.791	4.549	2.237	1.508	0.371
1965	6.544	5.72	4.38	2.225	1.498	0.3695
1966	9.831	8.541	5.314	2.441	1.634	0.4031
1967	8.046	7.075	4.597	2.247	1.522	0.3753
1968	6.596	5.755	3.725	1.763	1.184	0.2913
1969	5.119	4.529	2.995	1.626	1.098	0.2708
1970	8.953	7.83	5.591	2.666	1.794	0.4425
1971	6.887	6.059	4.636	2.268	1.53	0.3774
1972	6.304	5.366	3.752	1.724	1.156	0.2844
1973	5.151	4.597	3.139	1.601	1.077	0.2657
1974	5.087	4.436	3.057	1.576	1.061	0.2619
1975	5.14	4.573	3.066	1.532	1.037	0.2558
1976	5.126	4.543	3.791	2.063	1.395	0.3432
1977	7.694	6.811	4.691	2.251	1.509	0.3723
1978	9.962	8.505	4.843	2.177	1.462	0.3605
1979	5.118	4.435	3.544	1.7	1.14	0.2813
1980	5.862	5.154	3.708	1.8	1.21	0.2976
1981	5.09	4.467	2.945	1.433	0.9619	0.2372
1982	5.135	4.563	3.345	1.717	1.158	0.2858
1983	7.175	6.251	4.175	1.905	1.281	0.3159
1984	7.318	6.301	4.096	1.877	1.258	0.3095
1985	5.107	4.504	3.058	1.542	1.033	0.2548
1986	7.56	6.435	4.55	2.002	1.34	0.3306
1987	9.993	9.178	5.615	2.562	1.714	0.4227
1988	5.285	4.577	3.634	1.785	1.199	0.295
1989	5.858	5.052	3.751	1.796	1.202	0.2965
1990	7.75	6.711	4.696	2.197	1.472	0.363

0.1 9.7432 8.4375 5.2669 2.4255 1.6252 0.40093
Average of yearly averages: 0.326303333333333

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: Air3day
Metfile: w93193.dvf
PRZM scenario: CARowCrop.txt
EXAMS environment file: pond298.exv

```
Chemical Name:    acephate
Description Variable Name     Value Units Comments
Molecular weight  mwt   183.16      g/mol
Henry's Law Const.      henry 5.1E-13     atm-m^3/mol
Vapor Pressure    vapr  1.7E-6      torr
Solubility  sol   801000      mg/L
Kd    Kd    0.09  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 4.6   days  Halfife
Anaerobic Aquatic Metabolism  kbacs 4.6   days  Halfife
Aerobic Soil Metabolism asm   2.3   days  Halfife
Hydrolysis: pH 7  163   days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  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  01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1  interval    3     days  Set to 0 or delete line for single
app.
Record 17:  FILTRA
      IPSCND
      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)
```

7. Row Crops (beans, celery, peppers), Ground

stored as Ground3day.out
Chemical: acephate
PRZM environment: CARowCrop.txt   modified Tueday, 20 February 2007 at 13:04:11
EXAMS environment: pond298.exv   modified Thuday, 29 August 2002 at 16:33:30
Metfile: w93193.dvf   modified Wedday, 3 July 2002 at 09:04:24
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	3.819	3.367	2.193	1.048	0.7062	0.1742
1962	2.556	2.27	1.542	0.8147	0.5496	0.1356
1963	4.04	3.571	2.387	1.178	0.7982	0.197
1964	3.901	3.464	2.297	1.105	0.7453	0.1834
1965	4.36	3.811	2.352	1.217	0.8217	0.2027
1966	5.988	5.203	3.333	1.498	1.004	0.2475
1967	4.367	3.84	2.444	1.168	0.7914	0.1952
1968	2.605	2.293	1.509	0.7516	0.5057	0.1245
1969	1.164	1.03	0.6704	0.4997	0.3408	0.08408
1970	5.243	4.776	3.419	1.663	1.12	0.2761
1971	3.363	2.958	2.367	1.21	0.8168	0.2015
1972	3.56	3.031	1.842	0.8595	0.5773	0.142
1973	1.03	0.9194	0.676	0.4089	0.2767	0.06824
1974	1.628	1.419	0.8948	0.5544	0.3754	0.09268

```
1975  1.028 0.91460.6131      0.3326      0.2266      0.05594
1976  2.881 2.553 1.734       0.9315      0.6329      0.1558
1977  4.211 3.728 2.502       1.17        0.7852      0.1937
1978  6.179 5.275 2.977       1.31        0.8801      0.2171
1979  2.796 2.423 1.46        0.7329      0.4927      0.1215
1980  2.347 2.064 1.48        0.7369      0.496       0.122
1981  1.018 0.8934 0.6356     0.3719      0.2509      0.06189
1982  1.535 1.391 0.9735      0.5555      0.3761      0.09285
1983  3.28  2.993 1.98        0.898       0.6041      0.149
1984  4.016 3.45  2.12        0.9679      0.6493      0.1597
1985  1.212 1.069 0.7551      0.4654      0.3129      0.07718
1986  4.008 3.546 2.577       1.153       0.7722      0.1904
1987  6.431 5.837 3.593       1.597       1.069       0.2636
1988  2.976 2.578 1.642       0.8228      0.5544      0.1364
1989  2.778 2.395 1.674       0.8741      0.586       0.1445
1990  4.083 3.671 2.58        1.265       0.8478      0.2091


0.1   5.9135      5.1603      3.2974      1.4792      0.99161
      0.24446
                              Average of yearly averages:
      0.155845333333333

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: Ground3day
Metfile:    w93193.dvf
PRZM scenario:    CARowCrop.txt
EXAMS environment file: pond298.exv
Chemical Name:    acephate
Description Variable Name     Value Units Comments
Molecular weight  mwt   183.16      g/mol
Henry's Law Const.      henry 5.1E-13     atm-m^3/mol
Vapor Pressure    vapr  1.7E-6      torr
Solubility  sol   801000      mg/L
Kd    Kd    0.09  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 4.6   days  Halfife
Anaerobic Aquatic Metabolism  kbacs 4.6   days  Halfife
Aerobic Soil Metabolism asm   2.3   days  Halfife
Hydrolysis: pH 7  163   days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  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  01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1  interval    3     days  Set to 0 or delete line for single
app.
Record 17:  FILTRA
      IPSCND
      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)

8. Turf, Aerial

stored as TurfAir.out
Chemical: acephate
PRZM environment: CATurf.txt modified Tueday, 20 February 2007 at 13:03:48
EXAMS environment: pond298.exv   modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23234.dvf   modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	2.8	2.47	1.82	0.9273	0.6298	0.1556
1962	3.847	3.435	2.517	1.257	0.8548	0.2113
1963	4.529	4.022	2.653	1.282	0.8722	0.2156
1964	2.8	2.487	1.947	0.9545	0.6498	0.1602
1965	2.8	2.484	2.06	1.082	0.7394	0.183
1966	2.975	2.645	2.106	1.084	0.7366	0.1821
1967	3.467	3.075	2.36	1.196	0.817	0.202
1968	3.032	2.765	1.852	0.8779	0.5959	0.1469
1969	2.859	2.556	2.1	1.068	0.7278	0.1799
1970	4.414	3.847	2.657	1.26	0.8547	0.2111
1971	4.333	3.844	2.642	1.268	0.8629	0.2133
1972	3.941	3.461	2.411	1.137	0.771	0.19
1973	2.8	2.492	1.693	0.8228	0.5577	0.1378
1974	6.132	5.421	3.434	1.603	1.087	0.2686
1975	2.8	2.49	1.737	0.9057	0.6204	0.1534
1976	4.57	4.078	2.898	1.422	0.968	0.2386
1977	4	3.564	2.578	1.272	0.8649	0.2138
1978	3.452	2.994	2.223	1.052	0.7119	0.1758
1979	3.101	2.73	1.847	0.8713	0.5898	0.1457
1980	3.868	3.473	2.418	1.156	0.7844	0.1933
1981	2.8	2.471	1.923	0.9626	0.6535	0.1614
1982	3.447	3.07	1.975	0.9452	0.6416	0.1586
1983	3.78	3.37	2.181	1.011	0.6845	0.1691
1984	3.539	3.097	2.028	0.9116	0.6153	0.1515
1985	2.8	2.498	1.691	0.818	0.5539	0.1368
1986	3.38	2.95	2.153	0.9944	0.6727	0.1661
1987	3.425	3.002	2.171	1.037	0.7005	0.1729
1988	2.8	2.445	1.945	0.9132	0.6169	0.1519
1989	2.8	2.58	1.682	0.7704	0.5189	0.1281
1990	3.146	2.796	1.959	0.9288	0.6278	0.155

0.1   4.5175   4.0045   2.6566   1.281 0.87147   0.21542
Average of yearly averages: 0.177646666666667

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: TurfAir
Metfile: w23234.dvf

PRZM scenario: CATurf.txt
EXAMS environment file: pond298.exv
Chemical Name: acephate
Description Variable Name Value Units Comments
Molecular weight mwt 183.16 g/mol
Henry's Law Const. henry 5.1E-13 atm-m^3/mol
Vapor Pressure vapr 1.7E-6 torr
Solubility sol 801000 mg/L
Kd Kd 0.09 mg/L
Koc Koc mg/L
Photolysis half-life kdp 0 days Half-life
Aerobic Aquatic Metabolism kbacw 4.6 days Halfife
Anaerobic Aquatic Metabolism kbacs 4.6 days Halfife
Aerobic Soil Metabolism asm 2.3 days Halfife
Hydrolysis: pH 7 163 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 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 01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17: FILTRA
IPSCND
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)

9. Turf, Ground

stored as TurfGrd.out
Chemical: acephate
PRZM environment: CATurf.txt modified Tueday, 20 February 2007 at 13:03:48
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23234.dvf modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	1.16	1.023	0.6521	0.3716	0.2542	0.06285
1962	2.14	1.91	1.318	0.6622	0.4513	0.1116
1963	2.362	2.098	1.432	0.7075	0.482	0.1192
1964	1.177	1.045	0.6951	0.3666	0.2505	0.06181
1965	1.542	1.368	0.9322	0.5057	0.3481	0.08623
1966	1.354	1.204	0.9127	0.5025	0.3432	0.08489
1967	2.081	1.847	1.216	0.6219	0.4266	0.1055
1968	0.9516	0.8371	0.6504	0.3282	0.2235	0.0551
1969	1.538	1.385	0.9183	0.4924	0.3371	0.08336
1970	2.693	2.347	1.593	0.7616	0.5175	0.1278
1971	2.297	2.038	1.426	0.6963	0.4744	0.1173
1972	1.749	1.536	1.241	0.606	0.4114	0.1014
1973	0.56	0.4983	0.4202	0.226	0.1538	0.03802
1974	4.032	3.564	2.272	1.064	0.722	0.1784

1975	0.672	0.5976	0.4694	0.3038	0.2103	0.05208
1976	2.538	2.265	1.679	0.8307	0.5662	0.1396
1977	2.194	1.954	1.365	0.6858	0.4672	0.1155
1978	2.187	1.896	1.143	0.5642	0.3828	0.09457
1979	0.9031	0.7951	0.6409	0.3201	0.2172	0.05365
1980	2.084	1.899	1.245	0.605	0.4111	0.1013
1981	1.275	1.125	0.7451	0.4055	0.2768	0.06841
1982	1.234	1.099	0.7102	0.348	0.2365	0.05846
1983	1.732	1.523	0.9947	0.4682	0.3173	0.07838
1984	1.495	1.299	0.9013	0.4125	0.2786	0.06859
1985	0.5735	0.5117	0.4019	0.2116	0.1438	0.03553
1986	1.756	1.539	1.037	0.4971	0.3369	0.08323
1987	1.889	1.655	1.038	0.5143	0.3482	0.08598
1988	1.205	1.052	0.7878	0.398	0.2696	0.06639
1989	0.7692	0.6743	0.4928	0.2384	0.1609	0.03971
1990	1.197	1.06	0.7259	0.3607	0.2443	0.06032

0.1 2.5204 2.2483 1.5769 0.75619 0.51395
0.12694
Average of yearly averages:
0.0845053333333333

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: TurfGrd
Metfile: w23234.dvf
PRZM scenario: CATurf.txt
EXAMS environment file: pond298.exv
Chemical Name: acephate
Description Variable Name Value Units Comments
Molecular weight mwt 183.16 g/mol
Henry's Law Const. henry 5.1E-13 atm-m^3/mol
Vapor Pressure vapr 1.7E-6 torr
Solubility sol 801000 mg/L
Kd Kd 0.09 mg/L
Koc Koc mg/L
Photolysis half-life kdp 0 days Half-life
Aerobic Aquatic Metabolism kbacw 4.6 days Halfife
Anaerobic Aquatic Metabolism kbacs 4.6 days Halfife
Aerobic Soil Metabolism asm 2.3 days Halfife
Hydrolysis: pH 7 163 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 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 01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17: FILTRA
IPSCND
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)

10. Nut Trees (Almond scenario) Aerial

stored as AlmondAir.out
Chemical: acephate
PRZM environment: CAalmond_NirrigC.txt modified Thuday, 17 June 2004 at 08:13:20
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23232.dvf modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	14.9	13.45	9.727	5.226	3.551	0.8814
1962	11.96	10.68	8.689	4.657	3.155	0.9987
1963	16.91	15.07	10.87	6.465	4.472	1.108
1964	11.17	9.924	7.909	4.276	2.907	0.7257
1965	11.07	9.799	7.799	4.277	2.915	0.7204
1966	10.91	9.614	7.636	4.002	2.701	0.7298
1967	17.39	15.51	10.93	6.351	4.399	1.091
1968	13.75	12.43	9.667	4.987	3.378	0.8344
1969	11.11	9.849	7.843	4.899	3.385	0.8373
1970	11.12	9.731	7.845	4.203	2.852	0.7234
1971	13.34	11.92	9.244	5.014	3.424	0.8476
1972	10.27	8.866	6.983	3.633	2.46	0.607
1973	11.32	10.43	8.584	4.704	3.182	0.7862
1974	11.66	10.27	8.366	4.556	3.098	0.7658
1975	17.6	16.38	13.25	7.541	5.192	1.282
1976	10.89	9.591	7.616	4.255	2.902	0.7141
1977	14.49	12.91	9.349	5.071	3.446	0.8563
1978	14.02	12.79	11.29	5.679	3.854	0.9523
1979	16.37	14.65	10.19	5.595	3.81	0.9419
1980	11.56	10.26	8.469	4.764	3.238	0.7986
1981	20.71	18.43	13.67	7.576	5.168	1.277
1982	13.8	12.77	10.95	6.379	4.35	1.074
1983	25.1	22.85	15.78	8.278	5.663	1.398
1984	11.07	9.626	7.418	3.864	2.61	0.6423
1985	11.46	10.23	8.22	4.476	3.032	0.7633
1986	14.64	12.9	10.19	5.092	3.448	0.8532
1987	18.12	16.68	14.4	7.022	4.726	1.168
1988	10.31	8.92	7.029	4.23	3.086	0.7639
1989	14.08	12.8	10.12	5.144	3.468	0.8568
1990	10.76	9.437	7.481	3.908	2.724	0.7185

0.1 18.068 16.65 13.628 7.4891 5.1238 1.2661
Average of yearly averages:
0.890563333333333

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: AlmondAir
Metfile: w23232.dvf

PRZM scenario: CAalmond_NirrigC.txt
EXAMS environment file: pond298.exv
Chemical Name: acephate
Description Variable Name Value Units Comments
Molecular weight mwt 183.16 g/mol
Henry's Law Const. henry 5.1E-13 atm-m^3/mol
Vapor Pressure vapr 1.7E-6 torr
Solubility sol 801000 mg/L
Kd Kd 0.09 mg/L
Koc Koc mg/L
Photolysis half-life kdp 0 days Half-life
Aerobic Aquatic Metabolism kbacw 4.6 days Halfife
Anaerobic Aquatic Metabolism kbacs 4.6 days Halfife
Aerobic Soil Metabolism asm 2.3 days Halfife
Hydrolysis: pH 7 163 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 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 01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1 interval 3 days Set to 0 or delete line for single app.
Interval 2 interval 3 days Set to 0 or delete line for single app.
Interval 3 interval 3 days Set to 0 or delete line for single app.
Interval 4 interval 3 days Set to 0 or delete line for single app.
Interval 5 interval 3 days Set to 0 or delete line for single app.
Record 17: FILTRA
IPSCND
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)

11. Nut Trees (ground) Almond scenario

stored as AlmondGrd.out
Chemical: acephate
PRZM environment: CAalmond_NirrigC.txt modified Thuday, 17 June 2004 at 08:13:20
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23232.dvf modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	6.397	5.926	3.859	1.93	1.315	0.3296
1962	6.195	5.541	3.103	1.361	0.9242	0.4279
1963	8.102	7.221	5.462	2.966	2.068	0.5136
1964	2.235	1.985	1.582	0.8552	0.5813	0.1536

1965	2.214	1.96	1.56	0.8992	0.618	0.1533
1966	2.182	1.923	1.527	0.8004	0.5402	0.1994
1967	8.585	7.656	5.018	2.761	1.921	0.4788
1968	5.747	5.247	3.763	1.865	1.264	0.3142
1969	4.002	3.481	2.08	1.521	1.087	0.2702
1970	2.598	2.325	2.02	1.05	0.7119	0.1961
1971	4.813	4.4	3.165	1.635	1.119	0.2785
1972	2.053	1.773	1.397	0.7279	0.4939	0.1232
1973	3.412	3.134	2.284	1.286	0.8728	0.2165
1974	2.964	2.709	2.375	1.29	0.8755	0.2172
1975	10.16	9.085	7.519	3.982	2.743	0.6774
1976	2.18	1.92	1.525	1.001	0.6984	0.172
1977	5.589	4.98	3.214	1.667	1.139	0.287
1978	8.632	7.62	5.816	2.758	1.872	0.4633
1979	7.927	7.301	4.776	2.414	1.652	0.4093
1980	3.003	2.667	2.215	1.392	0.9513	0.2359
1981	13.19	11.73	8.213	4.256	2.91	0.7199
1982	6.565	6.149	5.164	2.909	1.983	0.4895
1983	17.83	15.9	10.53	5.105	3.499	0.864
1984	2.904	2.644	1.84	0.9675	0.6547	0.1612
1985	2.39	2.133	1.78	1.015	0.6891	0.1859
1986	7.32	6.429	4.849	2.321	1.573	0.3908
1987	14.18	12.74	8.688	3.981	2.677	0.663
1988	5.332	4.546	2.521	1.448	1.152	0.2881
1989	7.085	6.33	4.51	2.149	1.45	0.3591
1990	2.802	2.325	1.496	0.799	0.6867	0.2042

0.1	12.887	11.4655	8.1436	3.9819	2.7364	0.67596

Average of yearly averages: 0.34809

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: AlmondGrd
Metfile: w23232.dvf
PRZM scenario: CAalmond_NirrigC.txt
EXAMS environment file: pond298.exv
Chemical Name: acephate
Description Variable Name Value Units Comments
Molecular weight mwt 183.16 g/mol
Henry's Law Const. henry 5.1E-13 atm-m^3/mol
Vapor Pressure vapr 1.7E-6 torr
Solubility sol 801000 mg/L
Kd Kd 0.09 mg/L
Koc Koc mg/L
Photolysis half-life kdp 0 days Half-life
Aerobic Aquatic Metabolism kbacw 4.6 days Halfife
Anaerobic Aquatic Metabolism kbacs 4.6 days Halfife
Aerobic Soil Metabolism asm 2.3 days Halfife
Hydrolysis: pH 7 163 days Half-life
Method: CAM 2 integer See PRZM manual
Incorporation Depth: DEPI 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 01-03 dd/mm or dd/mmm or dd-mm or dd-mmm

Interval 1 interval 3 days Set to 0 or delete line for single app.
Interval 2 interval 3 days Set to 0 or delete line for single app.
Interval 3 interval 3 days Set to 0 or delete line for single app.
Interval 4 interval 3 days Set to 0 or delete line for single app.
Interval 5 interval 3 days Set to 0 or delete line for single app.
Record 17: FILTRA
IPSCND
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)

12. Fruit Trees, Aerial

stored as FruitAir.out
Chemical: acephate
PRZM environment: CAfruit_NirrigC.txt modified Thuday, 17 June 2004 at 08:14:02
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w93193.dvf modified Wedday, 3 July 2002 at 09:04:24
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	10.93	9.633	7.653	4.018	2.713	0.6759
1962	11.17	9.919	7.905	4.133	2.783	0.6882
1963	11.18	9.888	7.826	4.281	2.916	0.7298
1964	11.18	9.927	7.912	4.249	2.878	0.7204
1965	14.12	12.85	9.48	4.884	3.297	0.8143
1966	10.45	9.081	7.17	3.628	2.434	0.6294
1967	11.49	10.11	7.964	4.497	3.077	0.7694
1968	10.59	9.238	7.306	3.785	2.551	0.6363
1969	11.04	9.77	7.773	4.449	3.024	0.7465
1970	13.34	12.01	10.65	5.67	3.826	0.9941
1971	10.86	9.553	7.583	4.04	2.741	0.6898
1972	9.845	8.381	6.605	3.312	2.228	0.5817
1973	11.35	10.13	8.218	4.431	2.988	0.7404
1974	10.57	9.217	7.288	3.808	2.57	0.6371
1975	11.24	10	7.979	4.411	3.003	0.7411
1976	11.11	9.851	7.846	4.245	2.876	0.7256
1977	11.07	9.796	7.796	4.029	2.709	0.6743
1978	12.43	11.17	9.861	4.977	3.362	0.8337
1979	10.37	8.991	7.091	3.63	2.441	0.602
1980	11.38	10	8.09	4.2	2.831	0.6972
1981	10.79	9.612	7.702	4.024	2.727	0.6797
1982	14.87	13.22	9.747	5.313	3.601	0.8891
1983	12.09	10.69	9.127	4.914	3.321	0.8193

```
1984  10.11 8.684 6.828 3.479 2.338 0.5831
1985  10.93 9.641 7.659 3.914 2.625 0.6499
1986  14.64 12.91 9.649 4.686 3.148 0.7947
1987  10.61 9.258 7.325 3.707 2.489 0.6344
1988  10.36 8.969 7.072 3.714 2.529 0.6226
1989  10.24 8.833 7.04  3.592 2.409 0.5956
1990  10.35 8.964 7.068 3.565 2.41  0.6091


0.1   14.042      12.766      9.7372      4.9707      3.3579
      0.83226
                              Average of yearly averages:
      0.706823333333334

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: FruitAir
Metfile:    w93193.dvf
PRZM scenario:    CAfruit_NirrigC.txt
EXAMS environment file: pond298.exv
Chemical Name:    acephate
Description Variable Name     Value Units Comments
Molecular weight  mwt   183.16      g/mol
Henry's Law Const.      henry 5.1E-13     atm-m^3/mol
Vapor Pressure    vapr  1.7E-6      torr
Solubility  sol   801000      mg/L
Kd    Kd    0.09  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 4.6   days  Halfife
Anaerobic Aquatic Metabolism  kbacs 4.6   days  Halfife
Aerobic Soil Metabolism asm   2.3   days  Halfife
Hydrolysis: pH 7  163   days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  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  01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1  interval    3     days  Set to 0 or delete line for single
app.
Interval 2  interval    3     days  Set to 0 or delete line for single
app.
Interval 3  interval    3     days  Set to 0 or delete line for single
app.
Interval 4  interval    3     days  Set to 0 or delete line for single
app.
Interval 5  interval    3     days  Set to 0 or delete line for single
app.
Record 17:  FILTRA
      IPSCND
      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)

13. Fruit Trees, Ground

stored as FruitGrd.out
Chemical: acephate
PRZM environment: CAfruit_NirrigC.txt   modified Thuday, 17 June 2004 at 08:14:02
EXAMS environment: pond298.exv   modified Thuday, 29 August 2002 at 16:33:30
Metfile: w93193.dvf   modified Wedday, 3 July 2002 at 09:04:24
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	2.185	1.927	1.531	0.8035	0.5426	0.1407
1962	2.235	1.985	1.582	0.8273	0.557	0.1392
1963	2.374	2.099	1.629	0.9164	0.6599	0.166
1964	2.235	1.985	1.582	0.8498	0.5756	0.1545
1965	6.393	5.842	3.855	1.854	1.253	0.3101
1966	2.091	1.816	1.434	0.7257	0.4869	0.1504
1967	2.849	2.589	1.932	1.195	0.8256	0.2143
1968	2.117	1.848	1.461	0.7571	0.5101	0.1347
1969	2.332	1.996	1.555	1.144	0.7915	0.1959
1970	7.802	7.073	5.414	2.612	1.759	0.4862
1971	2.176	1.914	1.521	0.8195	0.5595	0.1519
1972	1.969	1.676	1.321	0.6624	0.4456	0.1448
1973	2.271	2.026	1.751	0.9687	0.6539	0.1648
1974	2.114	1.843	1.458	0.7617	0.514	0.1302
1975	2.253	2.004	1.598	0.8834	0.6013	0.1487
1976	2.228	1.975	1.574	0.8525	0.582	0.161
1977	2.213	1.959	1.559	0.8059	0.5419	0.1399
1978	7.926	6.901	4.653	2.324	1.573	0.3927
1979	2.075	1.798	1.418	0.726	0.4882	0.1205
1980	2.729	2.46	2.093	1.05	0.7073	0.1748
1981	2.388	2.096	1.714	0.9217	0.6632	0.1655
1982	6.065	5.405	3.776	1.934	1.314	0.3249
1983	5.236	4.697	3.792	1.905	1.287	0.3175
1984	2.022	1.737	1.366	0.6957	0.4676	0.1234
1985	2.187	1.929	1.532	0.7831	0.5252	0.1322
1986	7.401	6.509	4.685	2.113	1.42	0.3694
1987	2.126	1.856	1.47	0.7445	0.5283	0.1456
1988	2.071	1.794	1.414	0.8124	0.5751	0.1422
1989	2.065	1.781	1.492	0.8233	0.5531	0.1379
1990	2.071	1.794	1.414	0.7135	0.5006	0.1379

0.1   7.3002   6.4423   4.5732   2.0951   1.4094   0.36495
Average of yearly averages: 0.193926666666667

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: FruitGrd
Metfile: w93193.dvf

PRZM scenario: CAfruit_NirrigC.txt
EXAMS environment file: pond298.exv
Chemical Name: acephate
Description Variable Name   Value Units Comments
Molecular weight mwt   183.16   g/mol
Henry's Law Const.   henry 5.1E-13   atm-m^3/mol
Vapor Pressure   vapr 1.7E-6   torr
Solubility sol   801000   mg/L
Kd   Kd   0.09 mg/L
Koc   Koc   mg/L
Photolysis half-life   kdp   0   days Half-life
Aerobic Aquatic Metabolism   kbacw 4.6   days Halfife
Anaerobic Aquatic Metabolism kbacs 4.6   days Halfife
Aerobic Soil Metabolism asm   2.3   days Halfife
Hydrolysis: pH 7 163   days Half-life
Method: CAM   2   integer   See PRZM manual
Incorporation Depth: DEPI 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 01-03 dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1 interval   3   days Set to 0 or delete line for single app.
Interval 2 interval   3   days Set to 0 or delete line for single app.
Interval 3 interval   3   days Set to 0 or delete line for single app.
Interval 4 interval   3   days Set to 0 or delete line for single app.
Interval 5 interval   3   days Set to 0 or delete line for single app.
Record 17: FILTRA
      IPSCND
      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)

14. Cole Crops, Aerial

stored as air2apps.out
Chemical: acephate
PRZM environment: CAColeCrop no_irrig.txt modified Monday, 16 April 2007 at 08:58:22
EXAMS environment: pond298.exv   modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23234.dvf   modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	4.796	4.231	3.164	1.699	1.156	0.2857
1962	5.404	4.824	3.352	1.767	1.204	0.2978
1963	4.63	4.112	3.04	1.693	1.16	0.287
1964	4.631	4.245	3.049	1.621	1.108	0.2733

1965	4.622	4.1	2.828	1.465	1.001	0.2476
1966	4.668	4.33	2.983	1.55	1.053	0.2604
1967	5.122	4.734	3.402	1.864	1.278	0.3162
1968	8.561	7.531	5.04	2.662	1.823	0.4498
1969	5.129	4.549	3.364	1.852	1.265	0.3128
1970	7.094	6.182	4.31	2.109	1.432	0.3539
1971	9.205	8.167	5.414	2.914	2.006	0.4967
1972	4.557	4.003	2.724	1.368	0.9297	0.2291
1973	6.456	5.745	4.166	2.146	1.458	0.3602
1974	20.55	18.39	12.8	6.076	4.124	1.019
1975	4.83	4.364	3.135	1.706	1.171	0.2898
1976	9.311	8.309	6.665	3.346	2.282	0.5626
1977	4.652	4.144	3.051	1.668	1.14	0.2819
1978	41.06	35.6	20.96	9.544	6.487	1.603
1979	4.573	4.026	2.749	1.387	0.9418	0.2326
1980	7.006	6.186	4.573	2.272	1.544	0.3805
1981	4.763	4.204	2.99	1.546	1.051	0.2598
1982	8.587	7.748	6.332	3.152	2.143	0.5298
1983	13.02	11.7	9.131	4.44	3.014	0.7446
1984	4.486	3.897	2.73	1.357	0.9196	0.2265
1985	6.408	5.717	3.98	2.125	1.445	0.357
1986	13.51	12.63	7.863	3.748	2.55	0.63
1987	5.098	4.467	3.098	1.544	1.045	0.2579
1988	4.52	3.946	2.665	1.307	0.884	0.2177
1989	7.239	6.345	4.278	2.19	1.481	0.3656
1990	4.702	4.163	2.881	1.461	0.9901	0.2445

0.1 13.461 12.537 9.0042 4.3708 2.9676
0.73314
Average of yearly averages:
0.412443333333333

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: air2apps
Metfile: w23234.dvf
PRZM scenario: CAColeCrop no_irrig.txt
EXAMS environment file: pond298.exv
Chemical Name: acephate

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	183.16	g/mol	
Henry's Law Const.	henry	5.1E-13	atm-m^3/mol	
Vapor Pressure	vapr	1.7E-6	torr	
Solubility	sol	801000	mg/L	
Kd	Kd	0.09	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	4.6	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	4.6	days	Halfife
Aerobic Soil Metabolism	asm	2.3	days	Halfife
Hydrolysis:	pH 7	163	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	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  01-03 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.
Record 17:  FILTRA
      IPSCND
      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)
```

15. Cole Crops, Ground

```
stored as grd2apps.out
Chemical: acephate
PRZM environment: CAColeCrop no_irrig.txt modified Monday, 16 April
2007 at 08:58:22
EXAMS environment: pond298.exv      modified Thuday, 29 August 2002 at
16:33:30
Metfile: w23234.dvf     modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)
```

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	1.827	1.613	1.109	0.5907	0.4038	0.09985
1962	1.702	1.52	1.088	0.5606	0.3822	0.09452
1963	1.438	1.277	0.896	0.5179	0.3575	0.08855
1964	1.336	1.186	0.8202	0.4437	0.3041	0.07506
1965	0.9245	0.82	0.5655	0.2931	0.2002	0.04954
1966	1.186	1.055	0.7051	0.3753	0.2554	0.06312
1967	2.157	1.99	1.334	0.7009	0.4828	0.1195
1968	5.964	5.246	3.265	1.608	1.106	0.2729
1969	2.303	2.042	1.313	0.6973	0.4787	0.1184
1970	4.031	3.512	2.365	1.097	0.7448	0.184
1971	6.544	5.806	3.684	1.796	1.242	0.3078
1972	0.9114	0.8005	0.5447	0.2735	0.1859	0.04583
1973	2.818	2.527	1.99	0.9875	0.6709	0.1658
1974	19.06	17.09	11	5.13	3.479	0.8598
1975	1.332	1.202	0.9215	0.5063	0.3489	0.08636
1976	7.399	6.602	4.539	2.199	1.498	0.3691
1977	1.286	1.146	0.8376	0.4728	0.3248	0.08039
1978	39.02	33.83	19.92	8.89	6.041	1.493
1979	0.9145	0.8051	0.5501	0.2783	0.1889	0.04667
1980	3.637	3.257	2.461	1.177	0.799	0.1969
1981	1.099	0.9702	0.7928	0.426	0.2903	0.07173
1982	6.521	5.974	4.182	2.024	1.374	0.3396
1983	11.36	10.12	7.211	3.464	2.35	0.5805
1984	1.006	0.8764	0.6451	0.3425	0.2327	0.05732
1985	3.185	2.842	1.866	0.9492	0.6469	0.1599
1986	10.81	9.879	6.25	2.832	1.929	0.4767
1987	1.487	1.303	0.9747	0.4853	0.3285	0.08111
1988	0.9039	0.7893	0.5329	0.2613	0.1768	0.04354
1989	4.2	3.681	2.29	1.164	0.7881	0.1946
1990	1.018	0.9016	0.6378	0.3213	0.2177	0.05376

```
0.1   11.305      10.0959     7.1149      3.4008      2.3079
      0.57012
                              Average of yearly averages:   0.229195

Inputs generated by pe4.pl - 8-August-2003

Data used for this run:
Output File: grd2apps
Metfile:    w23234.dvf
PRZM scenario:    CAColeCrop no_irrig.txt
EXAMS environment file: pond298.exv
Chemical Name:    acephate
Description Variable Name     Value Units Comments
Molecular weight  mwt   183.16      g/mol
Henry's Law Const.      henry 5.1E-13     atm-m^3/mol
Vapor Pressure    vapr  1.7E-6      torr
Solubility  sol   801000      mg/L
Kd    Kd    0.09  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 4.6   days  Halfife
Anaerobic Aquatic Metabolism  kbacs 4.6   days  Halfife
Aerobic Soil Metabolism asm   2.3   days  Halfife
Hydrolysis: pH 7  163   days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  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  01-03 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.
Record 17:  FILTRA
      IPSCND
      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)
```

Appendix C. Reported Incidents Associated with Acephate and/or Methamidophos Use

I000468-001 (06/06/92). Allegheny County, Penn. A fish kill occurred in a backyard pond as a result of a tank mix of acephate, diazinon, and chlorpyrifos treatment for residential trees. Application was used in accordance with the label. Application rate, fish species and number of dead fish were not available. No water or fish tissues were analyzed. Acephate is less toxic to fish than the other two chemicals.

I005800-004 (6/18/97) Alleged animal death from acephate exposure in pond. This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. No data or information was provided as to the identity of the animal, the use of the acephate, where the alleged incident occurred or any pertinent information.

I007109-001 (3/25/98) On Edisto Beach State Park, SC, several boat-tailed grackles were observed to be in distress and falling out of trees. On the ground, birds were found to be paralyzed for a short period prior to death. Park officials reported that diazinon and acephate granules were applied in the Park for fire ant control. The grackles were found near the sites of application. At least 24 dead boat-tailed grackles were collected and frozen to be examined later. Complete necropsy was done on eight of them. Lab tests found trace amounts of methamidophos was detected in the all of the eight birds examined. Brain ChE activity was depressed by 65% in four of the birds examined. Although acephate was not detected, the degradate methamidophos was detected. No diazinon was detected. Methamidophos is not registered for fire ant control, whereas acephate is registered for that use.

I016176-001. (3/11/05) In residential area of Georgetown, GA, about 45 – 50 boat-tailed grackles were found dead of which 26 were collected for examination. Necropsies were performed on 5 of the birds. All 5 of the birds had reduced ChE levels in brain. Pooled GI content had 55 ppm acephate and pooled liver contents had 40 ppm acephate. The majority of the acephate sold in the area is for ant control. Boat-tailed grackles inhabit open areas and are ground feeders. This would make them potential victims where fire ants are a problem.

I001777-02 (12/05/94) In PA, an Orthenex Rose and Flower Spray (aerosol) is alleged to have cause damage to ornamentals and/or flowers. There are no data or information available to ascertain the extent of the damage or the type of damage. Thus it is not known whether acephate caused the damage. This report was sent to EPA under 6(a)(2) of FIFRA by the registrant.

I000799-009 (06/23/91) In NC, farmer applied Mocap (ethoprop) and Orthene (acephate) to tobacco field. There is drainage ditch from the field to pond of approximately 1000 feet. Heavy rains came and 300 – 400 fish died in half-acre pond. Water samples were analyzed and found to contain 1.2 ppb endosulfan, 0.06 ppb dieldrin, 0.32 ppb disulfoton sulfoxide, 0.04 ppb diazinon, 0.48 ppb alachlor, and 0.14 ppb ethoprop. Acephate was not found in the water samples. Soil samples were taken residues ranging up to 0.04 ppm for acephate and 0.06 ppm for ethoprop. The dissolved oxygen content was considered to be acceptable. It is not certain if acephate is the main culprit for the fish kills.

Information submitted during the 60-day comment period for the Acephate RED (Johansen, 1999) indicated that acephate is hazardous to honey bees, alkali bees and alfalfa leaf-cutting bees for 3 days when applied to blooming crops or weeds. Washington State Department of Agriculture investigated approximately 135 bee kills from 1992 to 1998. In several cases, acephate was responsible for killing honey bees when it was applied to blooming mint. There were 7 incidents in Washington State in which bee colonies were adversely impacted from the use of acephate on nearby mint and carrot fields. Acephate residues on bees were detected in all of these incidents in concentrations up to 2.63 ppm. Apiary losses ranged up to 60 hives per incident.

I007340-619. (4/22/98) This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. There was an allegation of plant damage from the use of Ortho Systemic Rose and Floral Spray on ornamentals in FL. This spray has acephate, resmethrin, and triforine in the product. There are no data or information available to ascertain the extent of the damage or the type of damage. Thus it is not known whether acephate caused the damage.

I007340-704. (5/27/98) This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. There was an allegation of plant damage from the use of Ortho Orthenex™ Insect and Disease Control Formula III on ornamentals in PA. This spray has acephate, fenbutatin-oxide, and triforine in the product. There are no data or information available to ascertain the extent of the damage or the type of damage or the kind of plant. It is not known whether acephate caused the damage or the other chemicals or the combination.

I009262-105. (8/26/99) This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. There was an allegation of plant damage from the use of Isotox Insect Killer Formula IV which has acephate and fenbutatin-oxide. Location of incident is Washington, DC. Product was sprayed on a dwarf Alberta pine with the results that the pine is dying. It is not known whether acephate caused the damage or the other chemicals or the combination.

I009262-116. (8/02/99) This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. There was an allegation of plant damage from the use of Ortho Orthenex™ Insect and Disease Control Formula III on ornamentals in IN. This spray has acephate, fenbutatin-oxide, and triforine in the product. The report indicated that the flowering almond and hibiscus were dying. It is not known whether acephate caused the damage or the other chemicals or the combination.

I009262-117. (8/03/99) This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. There was an allegation of plant damage from the use of Ortho Orthenex™ Insect and Disease Control Formula III on ornamentals in TX. This spray has acephate, fenbutatin-oxide, and triforine in the product. The report indicated that the homeowner applied this product on 40 – 50 bushes used as hedge per recommendation of county extension agent. About 95% of the bushes died. It is not known whether acephate caused the damage or the other chemicals or the combination.

I008693-042. (4/23/99) This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. There was an allegation of plant damage from the use of Ant-Stop Orthene™ Fire Ant Kill in TX. This product has 75% acephate. The report indicated that the homeowner applied this product on the sod. The sod died. There are no data or information available to ascertain the description of the damage. Location of incident is not known.

I009262-091. (8/02/99) This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. There was an allegation of plant damage from the use of Ant-Stop Orthene™ Fire Ant Kill in GA. This product has 75% acephate. Product was applied on spots of the lawn resulting in "burnt spots".

I014409-070. (about 8/92). WA State Dept. of Agriculture sent in report. Acephate was applied to blooming mint with a result of a bee kill.

I014409-068. (about 8/92). WA State Dept. of Agriculture sent in report. Lab analysis found acephate and methamidophos in dead bees. About 40 colonies were affected. Application site is unknown.

I014409-067. (about 8/92). WA State Dept. of Agriculture sent in report. Lab analysis found acephate and methamidophos in dead bees. About 48 colonies were affected. Application site is unknown.

I014409-060. (about 7/92). WA State Dept. of Agriculture sent in report. Acephate was applied to blooming mint with a result of a bee kill.

I014409-071. (about 8/92). WA State Dept. of Agriculture sent in report. Acephate was applied to blooming mint with a result of a bee kill.

I014409-065. (about 8/92). WA State Dept. of Agriculture sent in report. Lab analysis report positive for acephate. About 60 colonies were affected in this bee kill. Application site is unknown.

I014409-064. (about 8/92). WA State Dept. of Agriculture sent in report. Lab analysis report positive for acephate. About 48 colonies were affected in this bee kill. Application site is unknown.

I013135-001. (6/30/02). Orthene Fire Ant Killer applied in TX. Bird and rabbit died application. No other information was given.

I007776-004. (on or before 9/15/98). This report was sent to EPA under 6(a)(2) of FIFRA by the registrant. In AL, there is a lawsuit against the registrant pertaining to alleged injury on pine trees from spraying with Orthene 75S. No other information is available.

Appendix D

ACEPHATE
Papers that Were Accepted for ECOTOX

Acceptable for ECOTOX and OPP

Allen, R. L. and Snipes, C. E. (1995). Interactions of Foliar Insecticides Applied with Pyrithiobac. *Weed Technol.* 9: 512-517. EcoReference No.: 64055
Rejection Code: LITE EVAL CODED(EFV),OK(MLN,PTB),NO MIXTURE(ACP,AZ,BFT,CPY,DCTP,MOM,OML,TDC). NOT USED: no useful data for risk assessment

Baheti, B. L. and Yadav, S. M. (1993). Seed Soaking of Blackgram (Vigna mungo L.) in Pesticides for Control of Root-Knot Nematode, Meloidogyne incognita. *Indian J.Mycol.Plant Pathol.* 23: 173-174. EcoReference No.: 87467
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: nematode control Not Relevant to RLF Assessment

Bart, J. (1979). Effects of Acephate and Sevin on Forest Birds. *J.Wildl.Manag.* 43: 544-549.
Endpoint Not More Sensitive than Submitted Data; study is used in literature reviews. EcoReference No.: 35750
Rejection Code: LITE EVAL CODED(ACP,CBL).

Baur, M. E., Ellis, J., Hutchinson, K., and Boethel, D. J. (2003). Contact Toxicity of Selective Insecticides for Non-target Predaceous Hemipterans in Soybeans. *J.Entomol.Sci.* 38: 269-277. EcoReference No.: 82481
Rejection Code: LITE EVAL CODED(ACP,MFZ,TDC,PMR,MOM,SS,LCYT,ACE),OK(ALL CHEMS) NOT USED: Endpoint Not More Sensitive Than Submitted Data

Behera, B. C. and Bhunya, S. P. (1989). Studies on the Genotoxicity of Asataf (Acephate), an Organophosphate Insecticide, in a Mammalian In Vivo System. *Mutat.Res.* 223: 287-293. EcoReference No.: 87460
Rejection Code: LITE EVAL CODED(ACP). Not used: Genotoxicity Not Relevant to RLF Assessment

Bocsor, J. G. and O'Connor, T. F. (1975). Environmental Impact Study of Aerially Applied Orthene (O,S-Dimethylacetylphosphoramidothioate) on a Forest and Aquatic Ecosystem. *LOTEL Rep.No.174, Lake Ontario Environ.Lab., State Univ.of New York, Oswego, NY* 231 p. EcoReference No.: 16571
Rejection Code: LITE EVAL CODED(ACP). Endpoint Not More Sensitive Than Submitted Data

Brehmer, P. M. and Anderson, R. K. (1992). Effects of Urban Pesticide Applications on Nesting Success of Songbirds. *Bull.Environ.Contam.Toxicol.* 48: 352-359. EcoReference No.: 68895
Rejection Code: LITE EVAL CODED(DZ),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Broadbent, A. B. and Pree, D. J. (1997). Resistance to Insecticides in Populations of Frankliniella occidentalis (Pergande) (Thysanoptera: Thripidae) from Greenhouses in the Niagara Region of Ontario. *Can.Entomol.* 129: 907-913. EcoReference No.: 63606 Rejection Code: OK(MOM,MLN),NO MIXTURE(PPB). NOT USED: Endpoint Not More Sensitive Than

Submitted Data

Chalfant, R. B. (1997). Laboratory Bioassays of Insecticides Against the Cabbage Looper. *In: C.R.Saxena, Arthropod Management Tests, Entomol.Soc.of Am., Lanham, MD* 22: 413. EcoReference No.: 82480
Rejection Code: LITE EVAL CODED(ACP,DKGNa,CYH,MOM,CPY,DKGNa,MTM,EFV,ES,PMR),OK(ALL CHEMS)//PHASE II COMPLETE. NOT USED: Efficacy data not useful for assessment.

Clark, D. R. Jr. and Rattner, B. A. (1987). Orthene Toxicity to Little Brown Bats (Myotis lucifugus): Acetylcholinesterase Inhibition, Coordination Loss, and Mortality. *Environ.Toxicol.Chem.* 6: 705-708. EcoReference No.: 39704
Rejection Code: LITE EVAL CODED (ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Davies, P. E., Cook, L. S. J., and Goenarso, D. (1994). Sublethal Responses to Pesticides of Several Species of Australian Freshwater Fish and Crustaceans and Rainbow Trout. *Environ.Toxicol.Chem.* 13: 1341-1354 (OECDG Data File). EcoReference No.: 4442
Rejection Code: LITE EVAL CODED(ACP,ATZ,CYP),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

De Nardo, E. A. B. and Grewal, P. S. (2003). Compatibility of Steinernema feltiae (Nematoda: Steinernematidae) with Pesticides and Plant Growth Regulators Used in Glasshouse Plant Production. *Biocontrol Sci.Technol.* 13: 441-448. EcoReference No.: 71382
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Not Relevant for RLF Assessment

Decarie, R., DesGranges, J. L., Lepine, C., and Morneau, F. (1993). Impact of Insecticides on the American Robin (Turdus migratorius) in a Suburban Environment. *Environ.Pollut.* 80: 231-238. EcoReference No.: 40041
Rejection Code: LITE EVAL CODED(ACP,DZ). NOT USED: Endpoint Not More Sensitive Than Submitted Data

DeKergommeaux, D. J., Grant, W. F., and Sandhu, S. S. (1983). Clastogenic and Physiological Response of Chromosomes to Nine Pesticides in the Vicia faba In Vivo Root Tip Assay System. *Mutat.Res.* 124: 69-84 EcoReference No.: 69987
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Duangsawasdi, M. (1977). Organophosphate Insecticide Toxicity in Rainbow Trout (Salmo gairdneri). Effects of Temperature and Investigations on the Sites of Action. *Ph.D.Thesis, University of Manitoba, Manitoba, Canada:138 p.; Diss.Abstr.Int.B Sci.Eng.38(11):5228 (1978).* EcoReference No.: 7317
Rejection Code: LITE EVAL CODED(ACP),OK(FNT). NOT USED: Endpoint Not More Sensitive Than Submitted Data,

Duangsawasdi, M. and Klaverkamp, J. F. (1979). Acephate and Fenitrothion Toxicity in Rainbow Trout: Effects of Temperature Stress and Investigations on the Sites of Action. *In: L.L.Marking and R.A.Kimerle (Eds.), Aquatic Toxicology and Hazard Assessment, 2nd Symposium, ASTM STP 667, Philadelphia, PA* 35-51. EcoReference No.: 404
Rejection Code: LITE EVAL CODED(ACP),OK(FNP). NOT USED: Endpoint Not More Sensitive Than Submitted Data, and One Day Test

Duso, C., Camporese, P., and Van der Geest, L. P. S. (1992). Toxicity of a Number of Pesticides to Strains of Typhlodromus pyri and Amblyseius andersoni (Acari: Phytoseiidae). *Entomophaga* 37: 363-

372. EcoReference No.: 73088
User Define 2: NEW CSC,WASHT,CALFT
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Eulitz, E. G. (1986). Initial Experiments in the Control of False Wireworm (Tenebrionidae) on Tobacco Transplants. *Phytophylactica* 18: 115-119. EcoReference No.: 74106
User Define 2: WASHT
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Farag, A. T., Eweidah, M. H., and El-Okazy, A. M. (2000). Reproductive Toxicology of Acephate in Male Mice. *Reprod.Toxicol.* 14: 457-462. EcoReference No.: 87471
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Farag, A. T., Eweidah, M. H., Tayel, S. M., and El-Sebae, A. H. (2000). Developmental Toxicity of Acephate by Gavage in Mice. *Reprod.Toxicol.* 14: 241-245. EcoReference No.: 87472
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Fulton, M. H. and Scott, G. I. (1991). The Effect of Certain Intrinsic and Extrinsic Variables on the Acute Toxicity of Selected Organophosphorus Insecticides to the Mummichog, Fundulus heteroclitus. *J.Environ.Sci.Health* B26(5/6): 459-478. EcoReference No.: 6924
Rejection Code: LITE EVAL CODED(ACP,ES,FNV,AZ). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Funderburk, J. E., Gorbet, D. W., Teare, I. D., and Stavisky, J. (1998). Thrips Injury can Reduce Peanut Yield and Quality Under Conditions of Multiple Stress. *Agron.J.* 90: 563-566. EcoReference No.: 87131
Rejection Code: LITE EVAL CODED(ACP, ADC),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Geen, G. H., Hussain, M. A., Oloffs, P. C., and McKeown, B. A. (1981). Fate and Toxicity of Acephate (Orthene) Added to a Coastal B. C. Stream. *J.Environ.Sci.Health* B16: 253-271. EcoReference No.: 15677
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data. Study is used in field study impacts.

Geen, G. H., McKeown, B. A., and Oloffs, P. C. (1984). Acephate in Rainbow Trout (Salmo gairdneri): Acute Toxicity, Uptake, Elimination. *J.Environ.Sci.Health Part B* 19: 131-155. EcoReference No.: 11133
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Geen, G. H., McKeown, B. A., Watson, T. A., and Parker, D. B. (1984). Effects of Acephate (Orthene) on Development and Survival of the Salamander, Ambystoma gracile (Baird). *J.Environ.Sci.Health* B19: 157-170. EcoReference No.: 11134
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Hall, R. J. and Kolbe, E. (1980). Bioconcentration of Organophosphorus Pesticides to Hazardous Levels by Amphibians. *J.Toxicol.Environ.Health* 6: 853-860. EcoReference No.: 6495
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Endpoint Not

More Sensitive Than Submitted Data. No serios bioconcentration shown for acephate.

Harris, C. R., Turnbull, S. A., and McLeod, D. G. R. (1985). Contact Toxicity of Twenty-One Insecticides to Adults of the Carrot Rust Fly (Diptera: Psilidae). *Can.Entomol.* 117: 1025-1027. EcoReference No.: 72206
Rejection Code: LITE EVAL CODED(CBF),OK(MOM),TARGET(CYP,MLN). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Helson, B. V., De Groot, P., Turgeon, J. J., and Kettela, E. G. (1989). Toxicity of Insecticides to First-Instar Larvae of the Spruce Budmoth, Zeiraphera canadensis Mut. and Free. (Lepidoptera: Tortricidae): Laboratory and Field Studies. *Can.Entomol.* 121: 81-91. EcoReference No.: 73595
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Helson, B. V., Lyons, D. B., Wanner, K. W., and Scarr, T. A. (2001). Control of Conifer Defoliators with Neem-Based Systemic Bioinsecticides Using a Novel Injection Device. *Can.Entomol.* 133: 729-744. EcoReference No.: 75422
Rejection Code: LITE EVAL CODED(AZD),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Herbert, D. A. Jr. (1992). Corn Earworm Control in Peanut in Virginia, 1991. *In: A.K.Burditt,Jr.(Ed.), Insecticide and Acaricide Tests, Volume 17, Entomol.Soc.of Am., Lanham, MD* 249-250. EcoReference No.: 79285
Rejection Code: LITE EVAL CODED(BFT,EFV),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data; Efficacy data not useful for assessment

Herbert, D. A. Jr. (1997). Effects of Selected Seed, Foliar and In-Furrow Applied Insecticides and Planting Date on Thrips Injury, Plant Stand and Yield, 1996. *In: C.R.Saxena, Arthropod Management Tests, Volume 22, Entomol.Soc.of Am., Lanham, MD* 22: 282-283 EcoReference No.: 78956
Rejection Code: LITE EVAL CODED(ACP,ADC,PRT)..NOT USED: Exposure route is not available to CRLF; Efficacy data not useful for assessment

Herbert, D. A. Jr. (1997). Effects of Selected Seed, Foliar and In-Furrow Applied Insecticides on Thrips Injury, Plant Stand and Yield, 1996. *In: C.R.Saxena, Arthropod Management Tests, Volume 22, Entomol.Soc.of Am., Lanham, MD* 22: 281. EcoReference No.: 79448
Rejection Code: LITE EVAL CODED(ADC,ACP,PRT),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Herzog, G. A., McPherson, R. M., Jones, D. C., and Ottens, R. J. (2002). Baseline Susceptibility of Tobacco Hornworms (Lepidoptera: Sphingidae) to Acephate, Methomyl and Spinosad in Georgia. *J.Entomol.Sci.* 37: 94-100. EcoReference No.: 69718
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Hoffman, D. J. and Albers, P. H. (1984). Evaluation of Potential Embryotoxicity and Teratogenicity of 42 Herbicides, Insecticides, and Petroleum Contaminants to Mallard Eggs. *Arch.Environ.Contam.Toxicol.* 13 : 15-27. EcoReference No.: 35249
Rejection Code: LITE EVAL CODED(MOM,DMT,DMB,ALSV),OK (ALL CHEMS except BMN,MCPA-MIXTURE). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Hoffman, D. J. and Albers, P. H. (1984). Evaluation of Potential Embryotoxicity and Teratogenicity of 42 Herbicides, Insecticides, and Petroleum Contaminants to Mallard Eggs. *Arch.Environ.Contam.Toxicol.* 13 : 15-27. EcoReference No.: 35249
Rejection Code: LITE EVAL CODED(ACP,PRO,DZ,ATZ,MOM,DMT,DMB,ALSV),OK(ALL CHEMS except BMN,MCPA-MIXTURE). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Horowitz, A. R., Toscano, N. C., Youngman, R. R., and Miller, T. A. (1987). Synergistic Activity of

Binary Mixtures of Insecticides on Tobacco Budworm (Lepidoptera: Noctuidae) Eggs. *J.Econ.Entomol.* 80: 333-337. EcoReference No.: 73691
Rejection Code: OK NOT USED: Endpoint Not More Sensitive Than Submitted Data and acephate not shown synergistic affects in this study
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Hussain, M. A., Mohamad, R. B., and Oloffs, P. C. (1985). Studies on the Toxicity, Metabolism, and Anticholinesterase Properties of Acephate and Methamidophos. *J.Environ.Sci.Health* 20B: 129-147. EcoReference No.: 37219
Rejection Code: LITE EVAL CODED(ACP,ADC),OK(MTM). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Hussain, M. A., Mohamad, R. B., and Oloffs, P. C. (1984). Toxicity and Metabolism of Acephate in Adult and Larval Insects. *J.Environ.Sci.Health* B19: 355-377. EcoReference No.: 11371
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Jackson, D. M. and Lam, J. J. Jr. (1989). Jalysus wickhami (Hemiptera: Berytidae): Toxicity of Pesticides Applied to the Soil or in the Transplant Water of Flue-Cured Tobacco. *J.Econ.Entomol.* 82: 913-918. EcoReference No.: 68596
User Define 2: NEW CBFADC
Rejection Code: LITE EVAL CODED(CBF,ADC). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Jacobson, R. M. and Thriugnanam, M. (1990). New Selective Systemic Aphicides. *In: D.R.Baker, J.G.Fenyes, and W.K.Moberg (Eds.), ACS (Am.Chem.Soc) Symp.Ser.No.443, Chapter 26, Synthesis and Chemistry of Agrichemicals, Washington, D.C.* 322-339. EcoReference No.: 74350
Rejection Code: OK TARGET(DMT,MLN). NOT USED: Endpoint Not More Sensitive Than Submitted Data and Efficacy data not useful for assessment

Jagdale, G. B. and Grewal, P. S. (2002). Identification of Alternatives for the Management of Foliar Nematodes in Floriculture. *Pest Manag.Sci.* 58: 451-458. EcoReference No.: 75893
Rejection Code: LITE EVAL CODED(ACP,DZ),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Jordan, D. L., Frans, R. E., and McClelland, M. R. (1993). DPX-PE350 does not Interact with Early-Season Insecticides in Cotton (Gossypium hirsutum). *Weed Technol.* 7: 92-96. EcoReference No.: 74702
Rejection Code: LITE EVAL CODED(ACP,ADC,CBL),NO MIXTURE(DS,PRT,PTBNa),OK(DMT). NOT USED: Not Relevant for RLF Assessment, Data Not Useable

Klaverkamp, J. F., Hobden, B. R., and Harrison, S. E. (1975). Acute Lethality and In Vitro Brain Cholinesterase Inhibition of Acephate and Fenitrothion in Rainbow Trout. *Proc.West.Pharmacol.Soc.* 18: 358-361. EcoReference No.: 5516
Rejection Code: LITE EVAL CODED(ACP),OK(FNT). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Klingeman, W. E., Buntin, G. D., Van Iersel, M. W., and Braman, S. K. (2000). Whole-Plant Gas Exchange, not Individual-Leaf Measurements, Accurately Assesses Azalea Response to Insecticides. *Crop Prot.* 19: 407-415.
EcoReference No.: 64755
Rejection Code: LITE EVAL CODED(ACP),OK TARGET(CBL). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Kumar, S. (2003). Acetylcholinesterease Activity in Rat Brain Regions Following Acephate Exposure for

4, 14 and 60 Days. *Toxicol.Environ.Chem.* 84: 69-77. EcoReference No.: 86930
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data and data not useful for risk assessment

Kumar, S. (2004). Changes in Rat Brain Regions Serotoninergic System Following Acephate Poisoning. *Pestic.Biochem.Physiol.* 78 : 140-150. EcoReference No.: 73655
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Not Relevant for RLF Assessment

Lemke, L. A. and Kissam, J. B. (1987). Evaluation of Various Insecticides and Home Remedies for Control of Individual Red Imported Fire Ant Colonies. *J.Entomol.Sci.* 22: 275-281. EcoReference No.: 78182
Rejection Code: LITE EVAL CODED(ALSV),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Leonard, B. R., Boethel, D. J., Sparks, A. N. Jr., Layton, M. B., Mink, J. S., Pavloff, A. M., Burris, E., and Graves, J. B. (1990). Variations in Response of Soybean Looper (Lepidoptera: Noctuidae) to Selected Insecticides in Louisiana. *J.Econ.Entomol.* 83: 27-34. EcoReference No.: 74115
User Define 2: WASHT
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Liong, P. C., Hamzah, W. P., and Murugan, V. (1988). Toxicity of Some Pesticides Towards Freshwater Fishes. *Fish.Bull.Dep.Fish.(Malays.)* 57: 13 p. EcoReference No.: 3296
Rejection Code: LITE EVAL CODED(ACP,CBF),OK(ALL CHEMS), NO COC(EFV). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Mahajna, M., Quistad, G. B., and Casida, J. E. (1997). Acephate Insecticide Toxicity: Safety Conferred by Inhibition of the Bioactivating Carboxyamidase by the Metabolite Methamidophos. *Chem.Res.Toxicol.* 10: 64-69. EcoReference No.: 74946
Rejection Code: LITE EVAL CODED(ACP),NO ENDPOINT(DMT),NO MIXTURE(TARGET-MTM). NOT USED: Endpoint Not More Sensitive Than Submitted Data, Not Relevant to RLF Assessment

Maklakov, A., Ishaaya, I., Freidberg, A., Yawetz, A., Horowitz, A. R., and Yarom, I. (2001). Toxicological Studies of Organophosphate and Pyrethroid Insecticides for Controlling the Fruit Fly Dacus ciliatus (Diptera: Tephritidae). *J.Econ.Entomol.* 94: 1059-1066. EcoReference No.: 63712
Rejection Code: LITE EVAL CODED(PPB,DMT),OK(ALL CHEMS),OK TARGET(CYP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Mallik, M. A. B. and Tesfai, K. (1985). Pesticidal Effect on Soybean-Rhizobia Symbiosis. *Plant Soil* 85: 33-41. EcoReference No.: 70794
Rejection Code: LITE EVAL CODED(DZ,CBL,ACP),OK(ALL CHEMS),NO MIXTURE(CAPTAN),TARGET(CBL). NOT USED: Endpoint Not More Sensitive Than Submitted Data and data not useful for risk assessment

Mani, M. (1994). Relative Toxicity of Different Pesticides to Campoletis chlorideae Uchida (Hym., Ichneumonidae). *J.Biol.Control* 8: 18-22. EcoReference No.: 62600
Rejection Code: OK TARGET(DMT,MLN,FVL,CYP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Marletto, F., Patetta, A., and Manino, A. (2003). Laboratory Assessment of Pesticide Toxicity to Bumblebees. *Bull.Insectol.* 56: 155-158. EcoReference No.: 73698

Rejection Code: OK TARGET(DMT). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Mayer, F. L. J. and Ellersieck, M. R. (1986). Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. *Resour.Publ.No.160, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC* 505 p. (USGS Data File). EcoReference No.: 6797
Rejection Code: LITE EVAL CODED(MTL,MLT,CBF,ADC,MOM,PPB,SZ,DMT,WFN),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Mayer, F. L. Jr. and Ellersieck, M. R. (1986). Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. *Resour.Publ.No.160, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC* 505 p. (USGS Data File). EcoReference No.: 6797
Rejection Code: LITE EVAL CODED(ATZ,MTL,MLT,CBF,ADC,MOM,PPB,SZ,DMT,WFN,RTN,CuS,DOD,NaN3,DMB,RSM,CaPS,MCPB, NaPCP,PCP,AMSV,ALSV,PRT,ATM,CQTC,ATN,DBAC),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Mayer, F. L. Jr. and Ellersieck, M. R. (1986). Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. *Resour.Publ.No.160, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC* 505 p. (USGS Data File). EcoReference No.: 6797
Rejection Code: LITE EVAL CODED(MTL,MLT,CBF,ADC,MOM,PPB,SZ,DMT,WFN,RTN,CuS,DOD,NaN3,DMB,RSM,CaPS,MCPB, NaPCP. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Mayer, F. L. Jr. and Ellersieck, M. R. (1986). Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. *Resour.Publ.No.160, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC* 505 p. (USGS Data File). EcoReference No.: 6797
Rejection Code: LITE EVAL CODED(IGS,ATZ,MTL,MLT,CBF,ADC,MOM,PPB,SZ,DMT,WFN,RTN,CuS,DOD,NaN3,DMB,RSM,CaPS,MCPB, NaPCP,PCP,AMSV,ALSV,PRT,ATM,CQTC,ATN,DBAC),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Mayer, F. L. Jr. and Ellersieck, M. R. (1986). Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. *Resour.Publ.No.160, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC* 505 p. (USGS Data File). EcoReference No.: 6797
Rejection Code: LITE EVAL CODED(ACP,AZ,MTPN,DCB,DZ,IGS,ATZ,MTL,MLT,CBF,ADC,MOM,PPB,SZ,DMT,WFN,RTN,CuS, DOD,NaN3,DMB,RSM,CaPS,MCPB, NaPCP,PCP,AMSV,ALSV,PRT,ATM,CQTC,ATN,DBAC),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

McLeese, D. W. (1976). `Toxicity Studies with Lobster Larvae and Adults and a Freshwater Crayfish in 1975. *Fish.Res.Board of Can.,Environ.Can., St.Andrews, New Brunswick, Can., Manusc.Rep.Ser.No.1384*. EcoReference No.: 82412
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

McPherson, R. M., Seagraves, M. P., Ottens, R. J., and Bundy, C. S. (2003). Leaf Dip Bioassay to Determine Susceptibility of Tobacco Hornworm (Lepidoptera: Sphingidae) to Acephate, Methomyl and Spinosad. *J.Entomol.Sci.* 38: 262-268. EcoReference No.: 72750
User Define 2: WASHT,CORE,SENT,CSC
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Micinski, S., Fitzpatrick, B. J., and Graves, J. B. (1992). Control of the Bollworm-Tobacco Budworm Complex, 1991. *In: A.K.Burditt,Jr.(Ed.), Insecticide & Acaricide Tests, Entomol.Soc.of Am., Lanham, MD* 17: 237-238. EcoReference No.: 82242
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Mohan, S. and Mishra, S. D. (1993). Management of Meloidogyne incognita Infecting Frenchbean Through Seed Coating with Chemicals. *Indian J.Nematol.* 23: 92-94. EcoReference No.: 87468
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Not Relevant for RLF Assessment

Morimoto, M., Matsuda, K., Ohta, Y., Ihara, T., and Komai, K. (2004). Evaluation of Calcium-Alginate Gel as an Artificial Diet Medium for Bioassays on Common Cutworms. *J.Agric.Food Chem.* 52: 4737-4739. EcoReference No.: 76263
Rejection Code: LITE EVAL CODED(RTN),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Moser, V. C., Casey, M., Hamm, A., Carter, W. H. Jr., Simmons, J. E., and Gennings, C. (2005). Neurotoxicological and Statistical Analyses of a Mixture of Five Organophosphorus Pesticides Using a Ray Design. *Toxicol.Sci.* 86: 101-115. EcoReference No.: 80609
Rejection Code: LITE EVAL CODED(ACP,DZ),OK(ALL CHEMS). NOT USED: Not Relevant for RLF Assessment

Moulton, C. A., Fleming, W. J., and Purnell, C. E. (1996). Effects of Two Cholinesterase-Inhibiting Pesticides on Freshwater Mussels. *Environ.Toxicol.Chem.* 15: 131-137. EcoReference No.: 52429
Rejection Code: LITE EVAL CODED(ADC,ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data but study is mentioned in field study review

Mueller, J. D. and Lewis, S. A. (1993). Evaluation of Nematicides for Controlling Meloidogyne incognita and Hoplolaimus columbus on Kenaf (Hibiscus cannabinus). *Nematropica* 23: 91-97. EcoReference No.: 87050
Rejection Code: LITE EVAL CODED(ACP,ADC),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Mulder, P. G. Jr. (1997). Effects of Insecticides on Thrips Populations Peanut Injury Growth and Yield, 1995. *In: C.R.Saxena, Arthropod Management Tests, Volume 22, Entomol.Soc.of Am., Lanham, MD* 22: 284-285. EcoReference No.: 78959
Rejection Code: LITE EVAL CODED(PRT,FPN),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Mulder, P. G. Jr. (1997). Effects of Insecticides on Thrips Populations, Peanut Injury, Growth, and Yield, 1996. *In: C.R.Saxena, Arthropod Management Tests, Volume 22, Entomol.Soc.of Am., Lanham, MD* 22: 284-285. EcoReference No.: 78959
Rejection Code: LITE EVAL CODED(ACP,ADC,PRT,FPN),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Mulder, P. G. Jr. (1998). Effects of Insecticides on Thrips Populations, Peanut Injury, Growth, and Yield, 1996. *In: K.N.Saxena (Ed.), Arthropod Management Tests, Volume 23, Entomol.Soc.of Am., Lanham, MD* 23: 254-255. EcoReference No.: 79337
Rejection Code: LITE EVAL CODED(ADC,ACP,PRT),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Mulder, P. G. Jr. (1999). Effects of Insecticides on Thrips Populations, Peanut Injury, Growth and Yield, 1998. *In: K.N.Saxena (Ed.), Arthropod Management Tests, Volume 24, Entomol.Soc.of Am., Lanham, MD* 24: 267-268. EcoReference No.: 78960
Rejection Code: LITE EVAL CODED(ADC,ACP,PRT),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Mulder, P. G. Jr. (1998). Effects of Insecticies on Thrips Populations, Peanut Injury, Growth, and Yield, Chickasha, Oklahoma, 1996. *In: K.N.Saxena (Ed.), Arthropod Management Tests, Volume 23, Entomol.Soc.of Am., Lanham, MD* 23: 255-256.
EcoReference No.: 78961
Rejection Code: LITE EVAL CODED(ADC,ACP,PRT),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Noetzel, D., Ricard, M., and Heuser, L. (1992). Grasshopper Control in Conservation Reserve Program Land, 1991. *In: A.K.Burditt,Jr.(Ed.), Insecticide and Acaricide Tests, Volume 17, Entomol.Soc.of Am., Lanham, MD* 185-186. EcoReference No.: 79759
Rejection Code: LITE EVAL CODED(EFV),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Olofinboba, M. O. and Kozlowski, T. T. (1982). Effects of 3 Systemic Insecticides on Seed Germination and Growth of Pinus Halepensis Seedlings. *Plant Soil* 64: 255-258. EcoReference No.: 41343
Rejection Code: LITE EVAL CODED(ACP),OK TARGET(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Omer, A. D., Johnson, M. W., Tabashnik, B. E., Costa, H. S., and Ullman, D. E. (1993). Sweetpotato Whitefly Resistance to Insecticides in Hawaii: Intra-island Variation is Related to Insecticide Use. *Entomol.Exp.Appl.* 67: 173-182. EcoReference No.: 74148
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Ottens, R. J., Todd, J. W., Herzog, G. A., and Bass, M. H. (1984). Toxicity of Selected Insecticides to Laboratory and Field Colonies of the Soybean Looper. *J.Agric.Entomol.* 1: 367-370.
EcoReference No.: 73702
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Patel, M. G., Patel, J. R., and Borad, P. K. (1995). Comparative Efficacy and Economics of Various Insecticides Against Aphid, Lipaphis erysimi (Kalt) on Mustard in Gujarat. *Indian J.Plant Prot.* 23: 217-218. EcoReference No.: 75046
Rejection Code: LITE EVAL CODED(ACP,DMT),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Prasad, R. T., Reddy, G. P. V., Murthy, M. M. K., and Prasad, V. D. (1993). Efficacy and Residues of Certain Newer Insecticides on Okra. *Indian J.Plant Prot.* 21: 47-50. EcoReference No.: 87464
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Efficacy data not useful for assessment

Rabeni, C. F. (1978). The Impact of Orthene, a Spruce Budworm Insecticide, on Stream Fishes. A Report to the United States Fish and Wildlife Service. *In: K.G.Stratton (Ed.), Environ.Monit.of Cooperative Spruce Budworm Control Project, Maine 1976 and 1977, Maine Forest Serv., Dep.of Conservation, Augusta, ME* 82-123.
EcoReference No.: 16306
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data but study is used for aquatic field study section

Rabeni, C. F. and Stanley, J. G. (1979). Operational Spraying of Acephate to Suppress Spruce Budworm Has Minor Effects on Stream Fishes and Invertebrates. *Bull.Environ.Contam.Toxicol.* 23: 327-334. EcoReference No.: 7164
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data but study is in aquatic field study section

Rahman, M. F., Mahboob, M., Danadevi, K., Banu, B. S., and Grover, P. (2002). Assessment of Genotoxic Effects of Chloropyriphos and Acephate by the Comet Assay in Mice Leucocytes. *Mutat.Res.* 516: 139-147. EcoReference No.: 87473
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Genotoxic effects not Relevant for RLF Assessment

Rathore, B. S. and Yadav, B. S. (1996). Effect of Chemical Seed Soaking on Plant Growth and Reproduction of Rotylenchulus reniformis in Cowpea. *Indian J.Mycol.Plant Pathol.* 26: 281-283. EcoReference No.: 87463
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Not Relevant for RLF Assessment

Rattner, B. A. and Hoffman, D. J. (1984). Comparative Toxicity of Acephate in Laboratory Mice, White-Footed Mice, and Meadow Voles. *Arch.Environ.Contam.Toxicol.* 13: 483-491. EcoReference No.: 38448
Rejection Code: LITE EVAL CODED(ACP). Endpoint is used in risk assessment

Rattner, B. A. and Michael, S. D. (1985). Organophosphorus Insecticide Induced Decrease in Plasma Luteinizing Hormone Concentration in White-Footed Mice. *Toxicol.Lett.* 24: 65-69. EcoReference No.: 87455
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Roberts, B. L. and Dorough, H. W. (1984). Relative Toxicities of Chemicals to the Earthworm Eisenia foetida. *Environ.Toxicol.Chem.* 3: 67-78. EcoReference No.: 40531
Rejection Code: LITE EVAL CODED(ACP,AZ,ADC,NCTN,CBF,MOM,PPB,CuS,CYP)OK(ALL CHEMS). NOT USED: earthworm toxicity Not Relevant for RLF Assessment

Rose, R. L., Sparks, T. C., and Smith, C. M. (1988). Insecticide Toxicity to the Soybean Looper and the Velvetbean Caterpillar (Lepidoptera: Noctuidae) as Influenced by Feeding on Resistant Soybean (PI 227687) Leaves and Coumestrol. *J.Econ.Entomol.* 81: 1288-1294. EcoReference No.: 74118
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Rudolph, S. G., Zinkl, J. G., Anderson, D. W., and Shea, P. J. (1984). Prey-Capturing Ability of American Kestrels fed DDE and Acephate or Acephate Alone. *Arch.Environ.Contam.Toxicol.* 13: 367-372. EcoReference No.: 38591
Rejection Code: LITE EVAL CODED(ACP),NO CONTROL(DDT). NOT USED: no adverse effects to kestrel hunting ability

Samsoe-Petersen, L. (1987). Laboratory Method for Testing Side-Effects of Pesticides on the Rove Beetle Aleochara bilineata - Adults. *Entomophaga* 32: 73-81. EcoReference No.: 70278
Rejection Code: LITE EVAL CODED(SZ). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Sapone, A., Pozzetti, L., Canistro, D., Broccoli, M., Bronzetti, G., Potenza, G., Affatato, A., Biagi, G. L., Cantelli-Forti, G., and Paolini, M. (2005). CYP Superfamily Perturbation by Diflubenzuron or Acephate in Different Tissues of CD1 Mice. *Food Chem.Toxicol.* 43: 173-183. EcoReference No.: 80247
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Not Relevant to RLF Assessment

Shaikh, N. P. (2004). Herbicide and Insecticide Interactions in Peanut (Arachis hypogaea L.). *Ph.D.Thesis, Univ.of Florida, Gainesville,FL* 122 p. EcoReference No.: 82752
Rejection Code: LITE EVAL CODED(ACP,ADC,SCA),OK(ALL CHEMS),OK TARGET(MTL). NOT USED: Endpoint Not relevant to risk assessment

Singh, A. K. and Drewes, L. R. (1987). Neurotoxic Effects of Low-Level Chronic Acephate Exposure in Rats. *Environ.Res.* 43 : 342-349. EcoReference No.: 87465
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data, Not Relevant to RLF Assessment

Singh, R. and Sandhu, H. S. (1999). Acute Toxicity of Acephate and Its Effects on Biochemical Parameters in Buffalo Calves. *Indian J.Anim.Sci.* 69: 935-937. EcoReference No.: 87465
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Not Relevant to RLF Assessment

Spassova, D., White, T., and Singh, A. K. (2000). Acute Effects of Acephate and Methamidophos on Acetylcholinesterase Activity, Endocrine System and Amino Acid Concentrations in Rats. *Comp.Biochem.Physiol.C* 126: 79-89. EcoReference No.: 54406
Rejection Code: LITE EVAL CODED(ACP), OK(MTM). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Srivastava, K. P. and Bhatnagar, R. K. (1986). Bird Damage in High Yielding Genotypes of Pigeon Pea and Relative Efficacy of Insecticides in Controlling the Pod Damage. *Pesticides* 20: 50-51. EcoReference No.: 87469
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Stanosz, G. R. (1994). Benomyl and Acephate Applications Increase Survival of Sugar Maple Seedlings During Their First Growing Season in Northern Pennsylvania. *Can.J.For.Res.* 24: 1107-1111. EcoReference No.: 87475
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Stapel, J. O., Cortesero, A. M., and Lewis, W. J. (2000). Disruptive Sublethal Effects of Insecticides on Biological Control: Altered Foraging Ability and Life Span of a Parasitoid After Feeding on Extrafloral Nectar of Cotton Treated with Systemic Insecticides. *Biol.Control* 17: 243-249. EcoReference No.: 64854
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Stoner, A., Wilson, W. T., and Harvey, J. (1985). Acephate (Orthene): Effects on Honey Bee Queen, Brood and Worker Survival. *Am.Bee J.* 125: 448-450. EcoReference No.: 35475
Rejection Code: LITE EVAL CODED(ACP). USED: this study was used in field studies of insects

Takada, Y., Kawamura, S., and Tanaka, T. (2001). Effects of Various Insecticides on the Development of the Egg Parasitoid Trichogramma dendrolimi (Hymenoptera: Trichogrammatidae).

J.Econ.Entomol. 94: 1340-1343. EcoReference No.: 63722
Rejection Code: OK. NOT USED: Endpoint Not More Sensitive Than Submitted Data

Tanigoshi, L. K. and Babcock, J. M. (1989). Insecticide Efficacy for Control of Lygus Bugs (Heteroptera: Miridae) on White Lupin, Lupinus albus L. *J.Econ.Entomol.* 82: 281-284. EcoReference No.: 74116
Rejection Code: OK TARGET(DMT). NOT USED: Efficacy data not useful for assessment

Tillman, P. G. and Scott, W. (1997). Susceptibility of Cotesia marginiventris (Cresson) (Hymenoptera: Braconidae) to Field Rates of Selected Cotton Insecticides. *J.Entomol.Sci.* 32: 303-310. EcoReference No.: 64166
Rejection Code: OK(MOM),TARGET(CYP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Tipping, P. W. and Center, T. D. (2002). Evaluating Acephate for Insecticide Exclusion of Oxyops vitiosa (Coleoptera: Curculionidae) from Melaleuca quinquenervia. *Fla.Entomol.* 85: 458-463. EcoReference No.: 71555
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Not Relevant for RLF Assessment

Trial, J. G. and Gibbs, K. E. (1978). Effects of Orthene, Sevin-4-Oil and Dylox on Aquatic Insects Incidental to Attempts to Control Spruce Budworm in Maine, 1976. *In: K.G.Stratton (Ed.), Environ.Monit.of Cooperative Spruce Budworm Control Project, Maine 1976 and 1977, Maine Forest Serv., Dep.of Conservation, Augusta, ME* 207-216. EcoReference No.: 16309
Rejection Code: LITE EVAL CODED(ACP),OK(CBL). NOT USED: Endpoint Not More Sensitive Than Submitted Data

U.S.Environmental Protection Agency (1981). Acephate, Aldicarb, Carbophenothion, DEF, EPN, Ethoprop, Methyl Parathion, and Phorate: Their Acute and Chronic Toxicity, Bioconcentration Potential, and Persistence as Related to Marine Environments. *EPA 600/4-81-041, U.S.EPA, Gulf Breeze, FL* 255 p. (U.S.NTIS PB81-244477). EcoReference No.: 56755
Rejection Code: LITE EVAL CODED(ADC,PRT,ACP),OK(ALL CHEMS). NOT USED: not relevant due to estuarine environment not part of CRLF exposure route

Verma, S. R., Kumar, V., and Dalela, R. C. (1981). Acute Toxicity of Three Newly Formulated Pesticides to Fish Mystus vittatus. *Indian J.Environ.Health* 23: 215-221. EcoReference No.: 16590
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Vyas, N. B., Kuenzel, W. J., Hill, E. F., Romo, G. A., and Komaragiri, M. V. S. (1996). Regional Cholinesterase Activity in White-Throated Sparrow Brain is Differentially Affected by Acephate (Orthene). *Comp.Biochem.Physiol.C* 113: 381-386. EcoReference No.: 40343
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint not used but study is used in terrestrial field study

Vyas, N. B., Kuenzel, W. J., Hill, E. F., and Sauer, J. R. (1995). Acephate Affects Migratory Orientation of the White-Throated Sparrow (Zonotrichia albicollis). *Environ.Toxicol.Chem.* 14: 1961-1965. EcoReference No.: 40313
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint not used but study is used in terrestrial field study

Wier, A. T., Boethel, D. J., Leonard, B. R., and Burris, E. (1994). Laboratory Toxicity and Field Efficacy of AC 303,630 (Pirate) Against Beet Armyworm, Spodoptera exigua (Hubner), Larvae.

J.Agric.Entomol. 11: 311-320. EcoReference No.: 73704
User Define 2: WASHT,CORE
Rejection Code: OK . NOT USED: Endpoint Not More Sensitive Than Submitted Data

Wilson, B. W., Henderson, J. D., Kellner, T. P., McEuen, S. F., Griffis, L. C., and J.C.Lai (1990). Acetylcholinesterase and Neuropathy Target Esterase in Chickens Treated with Acephate. *Neurotoxicology* 11: 483-492. EcoReference No.: 81003
Rejection Code: LITE EVAL CODED(ACP),OK(ALL CHEMS). NOT USED: Endpoint Not More Sensitive Than Submitted Data, Not Relevant to RLF Assessment

Zehnder, G. W. and Speese III, J. (1992). Foliar Sprays for Worm Control on Peppers 1991. *In: A.K.Burditt,Jr.(Ed.), Insecticide & Acaricide Tests, Entomol.Soc.of Am., Lanham, MD* 17: 121-122. EcoReference No.: 82246
Rejection Code: LITE EVAL CODED(ACP,DKGNa,MOM,EFV). NOT USED: Efficacy data not useful for assessment

Zhang, L., Shono, T., Yamanaka, S., and Tanabe, H. (1994). Effects of Insecticides on the Entomopathogenic nematode Steinernema carpocapsae Weiser. *Appl.Entomol.Zool.* 29: 539-547 EcoReference No.: 84164
Rejection Code: LITE EVAL CODED(ACP,DZ),OK(ALL CHEMS)..NOT USED: Endpoint Not More Sensitive Than Submitted Data and exposure route not available for CRLF

Zinkl, J. G., Mack, P. D., Mount, M. E., and Shea, P. J. (1984). Brain Cholinesterase Activity and Brain and Liver Residues in Wild Birds of A Forest Sprayed with Acephate. *Environ.Toxicol.Chem.* 3: 79-88. EcoReference No.: 39516
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data, but study is used in terrestrial field study section

Zinkl, J. G., Roberts, R. B., Shea, P. J., and Lasmanis, J. (1981). Toxicity of Acephate and Methamidophos to Dark-Eyed Juncos. *Arch.Environ.Contam.Toxicol.* 10: 185-192. EcoReference No.: 39519
Rejection Code: LITE EVAL CODED (ACP),OK(ALL CHEMS). NOT USED: Endpoint is compared in section 4 but not used due to exposure to birds not from technical grade but larvae.

Zinkl, J. G., Shea, P. J., Nakamoto, R. J., and Callman, J. (1987). Effects of Cholinesterases of Rainbow Trout Exposed to Acephate and Methamidophos. *Bull.Environ.Contam.Toxicol.* 38: 22-28. EcoReference No.: 12398
Rejection Code: LITE EVAL CODED(ACP). NOT USED: Endpoint Not More Sensitive Than Submitted Data

Appendix D1

ACEPHATE
Papers that Were Excluded from ECOTOX

ADACHI, T. (1998). CHANGE IN CONTROL OF THE DIAMONDBACK MOTH PLUTELLA XYLOSTELLA LINNE IN JAPAN. *AGROCHEMICALS JAPAN; 0* 2-7.
Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

ADACHI, T. and FUTAI, K. (1992). CHANGES IN INSECTICIDE SUSCEPTIBILITY OF THE DIAMONDBACK MOTH IN HYOGO JAPAN. *JARQ (JPN AGRIC RES Q); 26* 144-151.
Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

Ageda, Saori, Fuke, Chiaki, Ihama, Yoko, and Miyazaki, Tetsuji (2006). The stability of organophosphorus insecticides in fresh blood. *Legal Medicine* 8: 144-149.
Chem Codes: Chemical of Concern: ACP Rejection Code: IN VITRO.

AKESSON NB, BAYER DE, and YATES WE (1989). APPLICATION EFFECTS OF VEGETABLE OIL ADDITIVES AND CARRIERS ON AGRICULTURAL SPRAYS. *CHOW, P. N. P. (ED.). ADJUVANTS AND AGROCHEMICALS, VOL. II. RECENT DEVELOPMENT, APPLICATION, AND BIBLIOGRAPHY OF AGRO-ADJUVANTS; FIRST INTERNATIONAL SYMPOSIUM, BRANDON, MANITOBA, CANADA, AUGUST 5-7, 1986. XIII+222P. CRC PRESS, INC.: BOCA RATON, FLORIDA, USA. ILLUS. ISBN 0-8493-6532-5; ISBN 0-8493-6533-3.; 0 (0). 1989. 121-138.*
Chem Codes: Chemical of Concern: ACP Rejection Code: NO TOX DATA.

Albright, L. J., Gasith, A., Geen, G. H., Mozel, Y., and Perry, A. S. (1983). The Influence of the Organophosphorous Insecticides Acephate and Parathion upon the Heterotrophic Bacteria of Two Freshwater Ecosystems. *In: Rep.No.IAEA-TECDOC-283, Agrochem.-Biota Interact.in Soil and Water Using Nucl.Tech., Joint FAO/IAEA Div.of Isotope and Radiat.Applic.of Atomic Energy for Food and Agric.Dev., June 7-12, 1982, Rome, Italy, INIS Clearinghouse, Viennna, Austria* 33-44.
Chem Codes: Chemical of Concern: ACP Rejection Code: BACTERIA.

ANDO, M. and WAKAMATSU, K. (1986). INHIBITION OF INSECTICIDE ACEPHATE O S DIMETHYL-N-ACETYLPHOSPHORAMIDOTHIOATE ON THE ACTIVITY OF CYTOCHROME C OXIDASE IN MITOCHONDRIA. *FOURTH INTERNATIONAL CONGRESS OF TOXICOLOGY, TOKYO, JAPAN, JULY 21-25, 1986. TOXICOL LETT (AMST); 31 (SUPPL.). 1986. 37.*
Chem Codes: Chemical of Concern: ACP Rejection Code: IN VITRO.

Ando, Mitsuru and Wakamatsu, Kunimitsu (1983). Difference absorption spectrum of cytochrome c oxidase in the presence of acephate (N-acetvl O,S-dimethyl thiophosphoramide). *Toxicology Letters* 17: 85-88.
Chem Codes: Chemical of Concern: ACP Rejection Code: METHODS.

ANON (1985). REPORT OF THE WORKING GROUP OF THE PLANNING COMMISSION ON PESTICIDES INDUSTRY FOR THE SEVENTH FIVE YEAR PLAN. *PESTICIDES (BOMBAY); 19 (9). 1985 (RECD. 1986). 11-20.*
Chem Codes: Chemical of Concern: ACP Rejection Code: NO TOX DATA.

Arienzo M., Sanchez-Camazano M., Crisanto Herrero T., and Sanchez-Martin M. J. (1993). Effect of organic cosolvents on adsorption of organophosphorus pesticides by soils. *Chemosphere* 27: 1409-1417.
Chem Codes: Chemical of Concern: ACP Rejection Code: FATE..

BAKER EA, HAYES AL, and BUTLER RC (1992). Physicochemical properties of agrochemicals: Their effects on foliar penetration. *PESTIC SCI; 34* 167-182.
Chem Codes: Chemical of Concern: ACP Rejection Code: METABOLISM.

BAKER FC, BAUTISTA AV, ROSE JE, and ROSE AF (1997). DETECTION OF ACEPHATE METABOLITES IN A COMPLEX MATRIX. *213TH NATIONAL MEETING OF THE AMERICAN CHEMICAL SOCIETY, SAN FRANCISCO, CALIFORNIA, USA, APRIL 13-17, 1997. ABSTRACTS OF PAPERS AMERICAN CHEMICAL SOCIETY; 213* AGRO 83.
Chem Codes: Chemical of Concern: ACP Rejection Code: METHODS.

Baltruschat, H. and Bellut, H. (1982). Rst 20024 H, a Herbicide from the Chloracetamide Group for Control of Grass and Dicotyledonous Weeds in Field Crops. *Med Rijk Lg* 47: 85-94.
Chem Codes: Chemical of Concern: ACP Rejection Code: NON-ENGLISH/NOT PURSUING.

Beal, D. D. (1990). Use of Mouse Liver Tumor Data in Risk Assessments Performed by the U.S.A. EPA. *In: D.E.Stevenson, et al.(Eds.), Prog.in Clin.and Biol.Res., Volume 331, Mouse Liver Carcinogenesis: Mechanisms and Species Comparisons, Symp., Nov.30-Dec.3, 1988, Austin, TX, Wiley-Liss, New York, NY* 5-18.
Chem Codes: Chemical of Concern: CF,CHD,CTD,Captan,DDT,BE,AN,AND,FML,CST,Cd,ACY,Ni,Cr,BZD,AS,HE,ETO,CPH,BNZ,DPDP,DDVP,DLD,Folpet,HPT,Pb,NSA,PCB,TXP,3CE,ACP,ACL,DCE,TFN,MTL,OYZ,PAQT,PRN Rejection Code: REFS CHECKED/REVIEW.

BENNETT DA, CHUNG AC, and LEE SM (1997). Multiresidue method for analysis of pesticides in liquid whole milk. *JOURNAL OF AOAC INTERNATIONAL; 80* 1065-1077.
Chem Codes: Chemical of Concern: ACP Rejection Code: METHODS.

BERLINGER MJ, LEBIUSH-MORDECHI, S., DAHAN, R., and TAYLOR, R. AJ (1996). A rapid method for screening insecticides in the laboratory. *PESTICIDE SCIENCE; 46* 345-353.
Chem Codes: Chemical of Concern: ACP Rejection Code: METHODS.

Bhagwat, B. and Lane, W. D. (2003). Eliminating thrips from in vitro shoot cultures of apple with insecticides. *HortScience, 38 (1) pp. 97-100, 2003*.
Chem Codes: Chemical of Concern: ACP Rejection Code: IN VITRO.

Bhushan, B. and Hoondal, G. S. (1999). Effect of Fungicides, Insecticides and Allosamidin on a Thermostable Chitinase from Bacillus sp. BG-11. *World J.Microbiol.Biotechnol.* 15: 403-404.
Chem Codes: Chemical of Concern: MZB,CuS,BMY,MLN,MOM,Captan,CTN,DINO,MLX,TDF,ACP,CYP,DMT,HPT Rejection

Code: BACTERIA.

Bhushan, B. and Hoondal, G. S. (1999). Effect of Fungicides, Insecticides and Allosamidin on a Thermostable Chitinase from Bacillus sp. BG-11. *World J.Microbiol.Biotechnol.* 15: 403-404.
Chem Codes: Chemical of Concern: MZB,CuS,BMY,MLN,MOM,Captan,CTN,DINO,MLX,TDF,ACP,CYP,DMT,HPT Rejection Code: BACTERIA.

BLAIR BW (1989). LABORATORY SCREENING OF ACARICIDES AGAINST TETRANYCHUS-EVANSI BAKER AND PRITCHARD. *CROP PROT; 8* 212-216.
Chem Codes: Chemical of Concern: ACP Rejection Code: METHODS.

BRAMAN SK, OETTING RD, and FLORKOWSKI, W. (1997). Assessment of pesticide use by commercial landscape maintenance and lawn care firms in Georgia. *JOURNAL OF ENTOMOLOGICAL SCIENCE; 32* 403-411.
Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

Brattsten, L. B., Holyoke, C. W. Jr., Leeper, J. R., and Raffa, K. F. (1986). Insecticide Resistance: Challenge to Pest Management and Basic Research. *Science* 231: 1255-1260.
Chem Codes: EcoReference No.: 72033
Chemical of Concern: CBL,DDT,AND,PYN,DZ,PPB,PRN,MP,ACP Rejection Code: REVIEW.

Brattsten, L. B., Holyoke, C. W. Jr., Leeper, J. R., and Raffa, K. F. (1986). Insecticide Resistance: Challenge to Pest Management and Basic Research. *Science* 231: 1255-1260.
Chem Codes: Chemical of Concern: CBL,DDT,AND,PYN,DZ,PPB,PRN,MP,ACP Rejection Code: REVIEW.

BRIGANTI, F. and WILD JR (1997). PROTEIN ENGINEERING FOR IMPROVED BIODEGRADATION OF RECALCITRANT POLLUTANTS AU - MASON JR. *WILD, J. R., S. D. VARFOLOMEYEV AND A. SCOZZAFAVA (ED.). NATO ASI SERIES 3 HIGH TECHNOLOGY, VOL. 19. PERSPECTIVES IN BIOREMEDIATION: TECHNOLOGIES FOR ENVIRONMENTAL IMPROVEMENT; 1995 NATO ADVANCED RESEARCH WORKSHOP ON BIOTECHNOLOGICAL REMEDIATION OF CONTAMINATED SITES, LVIV, UKRAINE, MARCH 5-9, 1995. XVI+123P. KLUWER ACADEMIC PUBLISHERS: DORDRECHT, NETHERLANDS; NORWELL, MASSACHUSETTS, USA. ISBN 0-7923-4339-5.; 19 (0). 1997. 107-118.*
Chem Codes: Chemical of Concern: ACP Rejection Code: NO TOX DATA.

BURRIS, E., PAVLOFF AM, LEONARD BR, GRAVES JB, and CHURCH, G. (1990). Evaluation of two procedures for monitoring populations of early season insect pests (Thysanoptera: Thripidae and Homoptera: Aphididae) in cotton under selected management strategies.
Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

BUXTORF UP, RAMSEIER, C., and WENK, P. (1995). Salad vegetables in winter: A survey of the nitrate content and the residues of pesticides and bromide. *MITTEILUNGEN AUS DEM GEBIETE DER LEBENSMITTELUNTERSUCHUNG UND HYGIENE; 86* 497-511.
Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

CAIRNS, T., SIEGMUND EG, DOOSE GM, and OKEN AC (1985). SNOW PEAS AND ACEPHATE. *ANAL CHEM; 57* 572A-574A, 576A.

Chem Codes: Chemical of Concern: ACP Rejection Code: HUMAN HEALTH.

CANTELO WW (1985). CONTROL OF MEGASELIA-HALTERATA A PHORID FLY PEST OF COMMERCIAL MUSHROOM PRODUCTION BY INSECTICIDAL TREATMENT OF THE COMPOST OR CASING MATERIAL. *J ENTOMOL SCI; 20* 50-54.
Chem Codes: Chemical of Concern: ACP Rejection Code: EFFLUENT.

CHAE MY, POSTULA JF, and RAUSHEL FM (1994). Stereospecific enzymatic hydrolysis of phosphorus-sulfur bonds in chiral organophosphate triesters. *BIOORGANIC & MEDICINAL CHEMISTRY LETTERS; 4* 1473-1478.
Chem Codes: Chemical of Concern: ACP Rejection Code: NO TOX DATA.

Chae, Myeong Yun, Postula, Joseph F., and Raushel, Frank M. (1994). Stereospcific enzymatic hydrolysis of phosphorus-sulfur bonds in chiral organophosphate triesters. *Bioorganic & Medicinal Chemistry Letters* 4: 1473-1478.
Chem Codes: Chemical of Concern: ACP Rejection Code: NO TOX DATA.

CHENG HH (1990). SSSA SOIL SCIENCE SOCIETY OF AMERICA BOOK SERIES NO. 2. PESTICIDES IN THE SOIL ENVIRONMENT PROCESSES IMPACTS AND MODELING. *CHENG, H. H. (ED.). SSSA (SOIL SCIENCE SOCIETY OF AMERICA) BOOK SERIES, NO. 2. PESTICIDES IN THE SOIL ENVIRONMENT: PROCESSES, IMPACTS, AND MODELING. XXIII+530P. SOIL SCIENCE SOCIETY OF AMERICA, INC.: MADISON, WISCONSIN, USA. ILLUS. ISBN 0-89118-791-X.; 0 (0). 1990. XXIII+530P.*
Chem Codes: Chemical of Concern: ACP Rejection Code: MODELING.

COCHRAN DG (1989). MONITORING FOR INSECTICIDE RESISTANCE IN FIELD-COLLECTED STRAINS OF THE GERMAN COCKROACH DICTYOPTERA BLATTELLIDAE. *J ECON ENTOMOL; 82* 336-341.
Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

COHEN, S., SVRJCEK, A., DURBOROW, T., and BARNES NL (1999). Water quality impacts by golf courses. *JOURNAL OF ENVIRONMENTAL QUALITY; 28* 798-809.
Chem Codes: Chemical of Concern: ACP Rejection Code: HUMAN HEALTH, NO TOX DATA, SURVEY.

CORDLE MK (1988). USDA REGULATION OF RESIDUES IN MEAT AND POULTRY PRODUCTS. *J ANIM SCI; 66* 413-433.
Chem Codes: Chemical of Concern: ACP Rejection Code: HUMAN HEALTH.

Corson, M. S., Mora, M. A., and Grant, W. E. (1998). Simulating Cholinesterase Inhibition in Birds Caused by Dietary Insecticide Exposure. *Ecol.Model.* 105: 299-323.
Chem Codes: Chemical of Concern: TBO,MP,MLN,DS,ACP,AZ,CBL,CBF,CPY,DCTP,DMT,OML,TBC Rejection Code: MODELING.

Corson, M. S., Mora, M. A., and Grant, W. E. (1998). Simulating Cholinesterase Inhibition in Birds Caused by Dietary Insecticide Exposure. *Ecol.Model.* 105: 299-323.

Chem Codes: Chemical of Concern: TBO,MP,MLN,DS,ACP,AZ,CBL,CBF,CPY,DCTP,DMT,OML,TBC Rejection Code: MODELING.

CORSON MS, MORA MA, and GRANT WE (1998). Simulating cholinesterase inhibition in birds caused by dietary insecticide exposure. *ECOLOGICAL MODELLING; 105* 299-323.
Chem Codes: Chemical of Concern: ACP Rejection Code: MODELING.

Crocomo, W. B., Guassu, C. M. D. O., and Nakagawa, J. (1989). Physiological Quality of Cotton, Peanut and Bean Seeds Treated with Systemic Insecticides. *Cientifica* 17: 157-167 (POR) (ENG ABS).
Chem Codes: Chemical of Concern: CBF,ACP,DS,TDC Rejection Code: NON-ENGLISH.

CROSBY DG and MINYARD, J. P. JR (1991). THE PERSISTENT SEVENTIES. *MARCO, G. J., R. M. HOLLINGWORTH AND J. R. PLIMMER (ED.). REGULATION OF AGROCHEMICALS: A DRIVING FORCE IN THEIR EVOLUTION. XVI+189P. AMERICAN CHEMICAL SOCIETY: WASHINGTON, D.C., USA. ILLUS. ISBN 0-8412-2085-9(PAPER); ISBN 0-8412-2089-1(CLOTH).; 0 (0). 1991. 9-18.*
Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY, FATE.
DAHLSTEN DL and DREISTADT SH (1991). FOREST PEST MANAGEMENT SOCIOPOLITICS. *XVIII INTERNATIONAL CONGRESS OF ENTOMOLOGY, VANCOUVER, BRITISH COLUMBIA, CANADA, 1988. FOR ECOL MANAGE; 39* 289-298.
Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

Davies, P. E., Cook, L. S. J., and Goenarso, D. (1994). Sublethal Responses to Pesticides of Several Species of Australian Freshwater Fish and Crustaceans and Rainbow Trout. *Environ.Toxicol.Chem.* 13: 1341-1354 (OECDG Data File).
Chem Codes: EcoReference No.: 4442
Chemical of Concern: ACP,ATZ,CTN,CYP,FNT

Davies, P. E. and White, R. W. G. (1985). The Toxicology and Metabolism of Chlorothalonil in Fish. I. Lethal Levels for Salmo gairdneri, Galaxias maculatus, G. truttaceus and G. auratus and the Fate of 14C-TCIN in S. gairdneri. *Aquat.Toxicol.* 7: 93-105.
Chem Codes: Chemical of Concern: ACP,CTN

Di Sioudi, Barbara D., Miller, Charles E., Lai, Kaihua, Grimsley, Janet K., and Wild, James R. (1999). Rational design of organophosphorus hydrolase for altered substrate specificities. *Chemico-Biological Interactions* 119-120: 211-223.
Chem Codes: Chemical of Concern: ACP Rejection Code: IN VITRO.

Drescher, Wilhelm and Fiedler, Lothar (1983). Methode zum nachweis von ruckstanden der insektizide acephat, dimethoat, methamidophos und omethoat in kleinen nektarmengen. *Chemosphere* 12: 1605-1610.
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Chem Codes: Chemical of Concern:
ADC,TBC,CBL,MOM,ABT,PRN,ACP,PRT,PPHD,FNF,DZ,ETN,FNTH,TCF,AZ,PHSL,MLN,MP,Naled,DMT,DS,CPY Rejection Code: IN VITRO/METABOLISM.

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Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

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Chem Codes: Chemical of Concern: DDT,TCF,HCCH,DZ,ACP,MLN,DDVP,PPHD,PRN,FNT,FNTH,DEM,DMT,MTM,DS,MLT Rejection Code: REFS CHECKED/REVIEW.

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Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

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Chem Codes: Chemical of Concern: ACP Rejection Code: SURVEY.

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Chem Codes: Chemical of Concern: AZ,ACP,EFV Rejection Code: NO EFFECT.

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Chem Codes: Chemical of Concern: ACP Rejection Code: HUMAN HEALTH.

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Chem Codes: Chemical of Concern: ACP Rejection Code: BACTERIA.

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Chem Codes: Chemical of Concern: ACP Rejection Code: EFFLUENT.

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Chem Codes: EcoReference No.: 72129
Chemical of Concern: EDT,DZ,ACP,PAQT,SFL,NACl0

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Chem Codes: Chemical of Concern: MOM Rejection Code: HUMAN HEALTH.

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Chem Codes: Chemical of Concern: ACP Rejection Code: BIOLOGICAL TOXICANT.

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Chem Codes: Chemical of Concern: ACP Rejection Code: NO TOX DATA.

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Chem Codes: Chemical of Concern: ACP Rejection Code: FATE, SURVEY.

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Chem Codes: Chemical of Concern: ACP Rejection Code: IN VITRO.

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Chem Codes: Chemical of Concern: DZ Rejection Code: SURVEY.

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Chem Codes: Chemical of Concern: ACP Rejection Code: FATE.

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Chem Codes: EcoReference No.: 8570
Chemical of Concern: ACP,Captan,CBL,CTN,DMT,DS,DZ,FO,HXZ,MDT,MLN,MOM,PPG,PSM,TET,CYP,FVL,PMR,TFR,Cu,CuS,PCP,IZP,MCPP1 Rejection Code: NON-ENGLISH.

Yokoyama, T., Saka, H., Fujita, S., and Nishiuchi, Y. (1988). Sensitivity of Japanese Eel, Anguilla japonica, to 68 Kinds of Agricultural Chemicals. *Bull.Agric.Chem.Insp.Stn.* 28: 26-33 (JPN) (ENG ABS).
Chem Codes: Chemical of Concern: ACP,Captan,CBL,CTN,DMT,DS,DZ,FO,HXZ,MDT,MLN,MOM,PPG,PSM,TET,CYP,FVL,PMR,TFR,Cu,CuS,PCP,IZP,MCPP1 Rejection Code: NON-ENGLISH.

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Chem Codes: Chemical of Concern: ACP Rejection Code: METHODS.

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18.
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Chem Codes: Chemical of Concern: ACP Rejection Code: EFFLUENT.

Yu, S. J. (1982). Induction of microsomal oxidases by host plants in the fall armyworm, Spodoptera frugiperda (J. E. Smith). *Pesticide Biochemistry and Physiology* 17: 59-67.
Chem Codes: Chemical of Concern: ACP Rejection Code: NO TOX DATA.

Appendix D2

ECOTOX Database literature with mixtures

Acephate – Screen of Ecotox Records for Possible Mixture Data

SEARCH_TERMS
ORTHO SYSTEMIC ROSE & FLORAL SPRAY
ORTHENEX INSECT & DISEASE CONTROL FORMULA III
ISOTOX INSECT KILLER FORMULA IV
WHITMIRE TC 136
J & P SYSTEMIC ROSE & FLORAL SPRAY
Fenbutatin-oxide
Fenpropathrin
Resmethrin
Triforine

1. FIELD RP and HOY MA. EVALUATION OF GENETICALLY IMPROVED STRAINS OF METASEIULUS-OCCIDENTALIS ACARINA PHYTOSEIIDAE FOR INTEGRATED CONTROL OF SPIDER MITES ON ROSES IN GREENHOUSES. 1986(2): 1-32.
   Notes: Chemical of Concern: ACP
   Abstract: BIOSIS COPYRIGHT: BIOL ABS. RRM TETRANYCHUS-URTICAE ACEPHATE CARBARYL PIRIMICARB ENDOSULFAN HEXAKIS DIENOCHLOR BENOMYL TRIFORINE PARINOL PIPERALIN OXYCARBOXIN TOXICITY
   Biochemistry/ Poisoning/ Animals, Laboratory/ Plants/Growth & Development/ Herbicides/ Pest Control/ Pesticides/ Arachnida/ Entomology/Economics/ Pest Control, Biological/ Arachnida/ Entomology/Economics/ Insecticides/ Pest Control/ Pesticides/ Anatomy, Comparative/ Animal/ Arthropods/Physiology/ Physiology, Comparative/ Pathology/ Plants, Medicinal/ Arthropods

2. Morin, S.; Williamson, M. S.; Goodson, S. J.; Brown, J. K.; Tabashnik, B. E., and Dennehy, T. J. Mutations in the Bemisia tabaci para sodium channel gene associated with resistance to a pyrethroid plus organophosphate mixture. 2002 Dec; 32, (12): 1781-1791.
   Notes: Chemical of Concern: ACP
   Abstract: The voltage-gated sodium channel is the primary target site of pyrethroid insecticides. In some insects, super knockdown resistance (super-kdr) to pyrethroids is caused by point mutations in the linker fragment between transmembrane segments 4 and 5 of the para-type sodium channel protein domain II (IIS4-5). Here, we identify two mutations in the IIS4-5 linker of the para-type sodium channel of the whitefly, Bemisia tabaci: methionine to valine at position 918 (M918V) and leucine to isoleucine at position 925 (L925I). Although each mutation was isolated independently from strains >100-fold resistant to a pyrethroid (fenpropathrin) plus organophosphate (acephate) mixture, only L925I was associated with resistance in strains derived from the field in 2000 and 2001. The L925I mutation occurred in all individuals from nine different field collections that survived exposure to a discriminating concentration of fenpropathrin plus acephate. Linkage analysis of hemizygous male progeny of unmated heterozygous F1 females (L925Ixwild-type) shows that the observed resistance is tightly linked to the voltage-gated sodium channel locus. The results provide a molecular tool for better understanding, monitoring and managing pyrethroid resistance in B. tabaci.
   Insecticide/ Resistance/ Pyrethroid/ Voltage-gated sodium channel/ Bemisia tabaci

3. SIVASUPRAMANIAM, S.; JOHNSON, S.; WATSON TF; OSMAN AA , and JASSIM, R. A glass-vial technique for monitoring tolerance of Bemisia argentifolii (Homoptera: Aleyrodidae) to selected insecticides in Arizona. 1997(1): 66-74.

Notes: Chemical of Concern: ACP
Abstract: BIOSIS COPYRIGHT: BIOL ABS. A glass-vial bioassay technique was used to assess the toxicity of bifenthrin, endosulfan, fenpropathrin, and fenpropathrin+acephate (1:1) to adult Bemisia argentifolii Bellows & Perring. Initial surveys of B. argentifolii susceptibility to the test insecticides established a basis for monitoring possible changes in population sensitivity to these products. Data on tolerance of B. argentifolii adult populations were obtained in 1992 (20 populations) and 1993 (22 populations) with treated glass vials. Surveys on populations from different host crops (cotton, cole crops, and melons) were done in different geographical areas in Arizona. Probit analysis of the results indicated that the LC50s from many of the test sites were significantly different, exhibiting various levels of tolerance to the insecticides tested. Host plants, crop phenology, and the geographical region seemed to affect responses of B. argentifolii populations. Plants/Growth & Development/ Soil/ Textiles/ Vegetables/ Herbicides/ Pest Control/ Pesticides/ Arachnida/ Entomology/Economics/ Plants/ Arachnida/ Entomology/Economics/ Insecticides/ Pest Control/ Pesticides/ Plants/ Plants/ Plants/ Insects

4. Sivasupramaniam, S. and Watson, T. F. Selection for Fenpropathrin and Fenpropathrin + Acephate Resistance in the Silverleaf Whitefly (Homoptera: Aleyrodidae).
MORSOIL,ENV,MIXTURE; 2000; 93, (3): 949-954.
Notes: EcoReference No.: 58567
Chemical of Concern: ACP,FPP

Appendix E. Toxicity Categories and LOCs

Table 4.1.3 Categories of Toxicity for Aquatic Organisms

LC_{50} (ppm)	**Toxicity Category**
< 0.1	Very highly toxic
> 0.1 - 1	Highly toxic
> 1 - 10	Moderately toxic
> 10 - 100	Slightly toxic
> 100	Practically nontoxic

Table 4.1.4 Categories of Toxicity for Terrestrial Organisms

Oral dose LD_{50} (mg/kg-bw)	**Toxicity Category**
< 10	Very highly toxic
10 - 50	Highly toxic
51 - 500	Moderately toxic
501 - 2000	Slightly toxic
> 2000	Practically nontoxic
Dietary LC_{50} (ppm)	**Toxicity Category**
< 50	Very highly toxic
50 - 500	Highly toxic
501 - 1000	Moderately toxic
1001 - 5000	Slightly toxic
> 5000	Practically nontoxic

Table 4.1.5 Categories of Toxicity for Bee

Bee Acute Contact **LD_{50} (µg/bee)**	**Toxicity Category**
<2	Highly toxic
2 – 10.99	Moderately toxic
≥ 11	Practically nontoxic

Table 4.1.6 Levels of Concern for Terrestrial and Aquatic Organisms

Taxa	**Acute LOC**	**Chronic LOC**
Avian[1] (terrestrial phase amphibians)	0.1	1
Mammalian[2]	0.1	1
Terrestrial plants[3]	1	
Aquatic Animals[4] (aquatic phase amphibians)	0.05	1
Insects [5]	0.05	1

Used in RQ calculations:
[1] LD_{50} and estimated NOEL
[2] LD_{50} and NOEC
[3] EC25
[4] LC/EC_{50} and estimated and reproductive NOEC
[5] LD_{50} per EFED's CRLF Steering Committee

Appendix F   T-REX model outputs

Table A1. Inputs used for TREX Analysis

Uper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Acephate	
Use	Cotton	
Formulation	Orthene 75	
Application Rate	1	lbs a.i./acre
Half-life	8.2	days
Application Interval	3	days
Maximum # Apps./Year	6	
Length of Simulation	1	year

Endpoints

Avian	Bobwhite quail	LD50 (mg/kg-bw)	109.00
	Japanese Quail	LC50 (mg/kg-diet)	718.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	5.00
Mammals		LD50 (mg/kg-bw)	180.5
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	2.50
		NOAEC (mg/kg-diet)	50.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	837.49
Tall Grass	383.85
Broadleaf plants/sm Insects	471.09
Fruits/pods/seeds/lg insects	52.34

Table A2. **Summary of Risk Quotient Calculations Based on Upper Bound Kenaga EECs,** TREX terrestrial model output, Cotton

Table X. Upper Bound Kenaga, Acute Avian Dose-Based Risk Quotients									
		EECs and RQs							
Size Class (grams)	**Adjusted LD50**	**Short Grass**		**Tall Grass**		**Broadleaf Plants/ Small Insects**		**Fruits/Pods/ Seeds/ Large Insects**	
		EEC	**RQ**	**EEC**	**RQ**	**EEC**	**RQ**	**EEC**	**RQ**
20	78.53	953.82	**12.15**	437.17	**5.57**	536.52	**6.83**	59.61	**0.76**
100	99.97	543.91	**5.44**	249.29	**2.49**	305.95	**3.06**	33.99	**0.34**
1000	141.21	243.51	**1.72**	111.61	**0.79**	136.98	**0.97**	15.22	**0.11**

Table X. Upper Bound Kenaga, Subacute Avian Dietary Based Risk Quotients								
	EECs and RQs							
	Short Grass		**Tall Grass**		**Broadleaf Plants/ Small Insects**		**Fruits/Pods/ Seeds/ Large Insects**	
LC50	**EEC**	**RQ**	**EEC**	**RQ**	**EEC**	**RQ**	**EEC**	**RQ**
718	837.49	**1.17**	383.85	**0.53**	471.09	**0.66**	52.34	0.07

Size class not used for dietary risk quotients

Table X. Upper Bound Kenaga, Chronic Avian Dietary Based Risk Quotients								
	EECs and RQs							
	Short Grass		**Tall Grass**		**Broadleaf Plants/ Small Insects**		**Fruits/Pods/ Seeds/ Large Insects**	
NOAEC (ppm)	**EEC**	**RQ**	**EEC**	**RQ**	**EEC**	**RQ**	**EEC**	**RQ**
5	837.49	167.50	383.85	76.77	471.09	94.22	52.34	10.47

Table X. Upper Bound Kenaga, Acute Mammalian Dose-Based Risk Quotients		
Size	**Adjust**	**EECs and RQs**

Class (grams)	ed LD50	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	396.71	798.48	2.01	365.97	0.92	449.15	1.13	49.91	0.13	11.09	0.03
35	320.98	551.86	1.72	252.94	0.79	310.42	0.97	34.49	0.11	7.66	0.02
1000	138.83	127.95	0.92	58.64	0.42	71.97	0.52	8.00	0.06	1.78	0.01

Table X. Upper Bound Kenaga, Acute Mammalian Dietary Based Risk Quotients

LC50 (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
0	837.49	#####	383.85	#####	471.09	#####	52.34	#####

Size class not used for dietary risk quotients

Table X. Upper Bound Kenaga, Chronic Mammalian Dietary Based Risk Quotients

NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
50	837.49	16.75	383.85	7.68	471.09	9.42	52.34	1.05

Size class not used for dietary risk quotients

Table X. Upper Bound Kenaga, Chronic Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	5.49	798.48	145.32	365.97	66.61	449.15	81.74	49.91	9.08	11.09	2.02

35	4.45	551.86	124.13	252.94	56.89	310.42	69.82	34.49	7.76	7.66	1.72
1000	1.92	127.95	66.54	58.64	30.50	71.97	37.43	8.00	4.16	1.78	0.92

Summary of Risk Quotient Calculations Based on Mean Kenaga EECs

Table X. Mean Kenaga, Acute Avian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	78.53	338.14	4.306	143.21	1.824	179.01	2.280	27.85	0.355
100	99.97	192.80	1.929	81.66	0.817	102.07	1.021	15.88	0.159
1000	141.21	86.02	0.609	36.43	0.258	45.54	0.322	7.08	0.050

Table X. Mean Kenaga, Subacute Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
LC50	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
718	296.61	0.413	125.62	0.175	157.03	0.219	24.43	0.034

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Chronic Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
NOAEC (ppm)	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
5	296.61	59.322	125.62	25.125	157.03	31.406	24.43	4.885

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Acute Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	396.71	281.78	0.710	119.34	0.301	149.18	0.376	23.21	0.058	5.13	0.01
35	320.98	195.76	0.610	82.91	0.258	103.64	0.323	16.12	0.050	3.66	0.01
1000	138.83	44.49	0.320	18.84	0.136	23.55	0.170	3.66	0.026	0.73	0.01

Table X. Mean Kenaga, Acute Mammalian Dietary Based Risk Quotients

LC50 (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
0	296.61	#####	125.62	#####	157.03	#####	24.43	#####

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Chronic Mammalian Dietary Based Risk Quotients

NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
50	296.61	5.932	125.62	2.512	157.03	3.141	24.43	0.489

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Chronic Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	5.49	281.78	51.283	119.34	21.720	149.18	27.150	23.21	4.223	5.13	0.93
35	4.45	195.76	44.034	82.91	18.650	103.64	23.312	16.12	3.626	3.66	0.82
1000	1.92	44.49	23.138	18.84	9.800	23.55	12.249	3.66	1.905	0.73	0.38

Table A3. Inputs used for TREX Analysis, Sewage Disposal Areas

Chemical Name:	Acephate	
Use	sewage disposal areas	
Formulation	Orthene	
Application Rate	0.13	lbs a.i./acre
Half-life	8.2	days
Application Interval	0	days
Maximum # Apps./Year	1	
Length of Simulation	1	year

Endpoints			
Avian	Bobwhite quail	LD50 (mg/kg-bw)	109.00
	Japanese Quail	LC50 (mg/kg-diet)	718.00
	Mallard duck	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	5.00
Mammals		LD50 (mg/kg-bw)	180.50
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	2.50
		NOAEC (mg/kg-diet)	50.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	31.20
Tall Grass	14.30
Broadleaf plants/sm Insects	17.55
Fruits/pods/seeds/lg insects	1.95

Summary of Risk Quotient Calculations Based on Upper Bound Kenaga EECs

Table X. Upper Bound Kenaga, Acute Avian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs			
		Short Grass	Tall Grass	Broadleaf Plants/ Small Insects	Fruits/Pods/ Seeds/ Large Insects

		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	78.53	35.53	0.45	16.29	0.21	19.99	0.25	2.22	0.03
100	99.97	20.26	0.20	9.29	0.09	11.40	0.11	1.27	0.01
1000	141.21	9.07	0.06	4.16	0.03	5.10	0.04	0.57	0.00

Table X. Upper Bound Kenaga, Subacute Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
LC50	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
718	31.20	0.04	14.30	0.02	17.55	0.02	1.95	0.00

Size class not used for dietary risk quotients

Table X. Upper Bound Kenaga, Chronic Avian Dietary Based Risk Quotients

	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
NOAEC (ppm)	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
5	31.20	6.24	14.30	2.86	17.55	3.51	1.95	0.39

Size class not used for dietary risk quotients

Table X. Upper Bound Kenaga, Acute Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	396.71	29.75	0.07	13.63	0.03	16.73	0.04	1.86	0.00	0.41	0.00
35	320.98	20.56	0.06	9.42	0.03	11.56	0.04	1.28	0.00	0.29	0.00
1000	138.83	4.77	0.03	2.18	0.02	2.68	0.02	0.30	0.00	0.07	0.00

Table X. Upper Bound Kenaga, Acute Mammalian Dietary Based Risk Quotients

LC50 (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
0	31.20	#####	14.30	#####	17.55	#####	1.95	#####

Size class not used for dietary risk quotients

Table X. Upper Bound Kenaga, Chronic Mammalian Dietary Based Risk Quotients								
NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
50	31.20	0.62	14.30	0.29	17.55	0.35	1.95	0.04

Size class not used for dietary risk quotients

Table X. Upper Bound Kenaga, Chronic Mammalian Dose-Based Risk Quotients											
Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	5.49	29.75	5.41	13.63	2.48	16.73	3.05	1.86	0.34	0.41	0.08
35	4.45	20.56	4.62	9.42	2.12	11.56	2.60	1.28	0.29	0.29	0.06
1000	1.92	4.77	2.48	2.18	1.14	2.68	1.39	0.30	0.15	0.07	0.03

Summary of Risk Quotient Calculations Based on Mean Kenaga EECs

Table X. Mean Kenaga, Acute Avian Dose-Based Risk Quotients					
Size Class (grams)	Adjusted LD50	EECs and RQs			
		Short Grass	Tall Grass	Broadleaf Plants/ Small Insects	Fruits/Pods/ Seeds/ Large Insects

		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	78.53	12.60	0.160	5.34	0.068	6.67	0.085	1.04	0.013
100	99.97	7.18	0.072	3.04	0.030	3.80	0.038	0.59	0.006
1000	141.21	3.20	0.023	1.36	0.010	1.70	0.012	0.26	0.002

Table X. Mean Kenaga, Subacute Avian Dietary Based Risk Quotients

LC50	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
718	11.05	0.015	4.68	0.007	5.85	0.008	0.91	0.001

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Chronic Avian Dietary Based Risk Quotients

NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
5	11.05	2.210	4.68	0.936	5.85	1.170	0.91	0.182

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Acute Mammalian Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	396.71	10.50	0.026	4.45	0.011	5.56	0.014	0.86	0.002	0.19	0.00
35	320.98	7.29	0.023	3.09	0.010	3.86	0.012	0.60	0.002	0.14	0.00
1000	138.83	1.66	0.012	0.70	0.005	0.88	0.006	0.14	0.001	0.03	0.00

Table X. Mean Kenaga, Acute Mammalian Dietary Based Risk Quotients								
LC50 (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
0	11.05	#####	4.68	#####	5.85	#####	0.91	#####

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Chronic Mammalian Dietary Based Risk Quotients								
NOAEC (ppm)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
50	11.05	0.221	4.68	0.094	5.85	0.117	0.91	0.018

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Chronic Mammalian Dose-Based Risk Quotients											
Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivore	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	5.49	10.50	1.911	4.45	0.809	5.56	1.011	0.86	0.157	0.19	0.03
35	4.45	7.29	1.640	3.09	0.695	3.86	0.868	0.60	0.135	0.14	0.03
1000	1.92	1.66	0.862	0.70	0.365	0.88	0.456	0.14	0.071	0.03	0.01

Appendix F1: T-HERPS

Cotton scenario

Upper Bound Kenaga Residues For RQ Calculation	
Chemical Name:	Acephate
Use	Cotton
Formulation	Orthene
Application Rate	1 lbs a.i./acre
Half-life	8.2 days
Application Interval	3 days
Maximum # Apps./Year	6
Length of Simulation	1 year

Acute and Chronic RQs are based on the Upper Bound Kenaga Residues.

The maximum single day residue estimation is used for both the acute and reproduction RQs.

RQs reported as "0.00" in the RQ tables below should be noted as <0.01 in your assessment. This is due to rounding and significant figure issues in Excel.

Endpoints			
Avian	Bobwhite quail	LD50 (mg/kg-bw)	109.00
	Japanese Quail	LC50 (mg/kg-diet)	718.00
	Bobwhite quail	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	5.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	837.49
Tall Grass	383.85
Broadleaf plants/sm Insects	471.09
Fruits/pods/seeds/lg insects	52.34
Small herbivore mammals	551.86
Small insectivore mammals	34.49
Small terrestrial phase amphibians	16.35

Terrestrial Herpetofauna Results

Weight Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	1.4	0.017	0.1	3.9	5.44E-05
Mid	37	0.212	1.4	3.8	1.41E-03
Large	238	0.893	6.0	2.5	5.96E-03

Body Weight (g)	Adjusted LD50 (mg/kg-bw)
1.4	109.00
37	109.00
238	109.00

Dose-based EECs (mg/kg-bw)	Herpetofaunal Size Classes and Body Weights		
	small (g)	mid (g)	large (g)
	1.4	37	238
Short Grass	32.54	31.98	20.96
Tall Grass	14.91	14.66	9.61
Broadleaf plants/sm Insects	18.30	17.99	11.79
Fruits/pods/seeds/lg insects	2.03	2.00	1.31
Small herbivore mammals	N/A	522.03	81.16
Small insectivore mammals	N/A	32.63	5.07
Small terrestrial phase amphibian	N/A	0.62	0.41

Dose-based RQs (Dose-based EEC/adjusted LD50)	Amphibian/Reptile Acute RQs for Small, Medium, and Large Species (grams)		
	1.4	37	238
Short Grass	0.30	0.29	0.19
Tall Grass	0.14	0.13	0.09
Broadleaf plants/sm insects	0.17	0.17	0.11
Fruits/pods/seeds/lg insects	0.02	0.02	0.01
Small herbivore mammals	N/A	4.79	0.74
Small insectivore mammals	N/A	0.30	0.05
Small terrestrial phase amphibian	N/A	0.01	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or	RQs	
	Acute	Chronic
Short Grass	1.17	167.50
Tall Grass	0.53	76.77
Broadleaf plants/sm Insects	0.66	94.22
Fruits/pods/seeds/lg insects	0.07	10.47
Small herbivore mammals	0.77	110.37
Small insectivore mammals	0.05	6.90
Small terrestrial phase amphibian	0.02	3.27

Note: To provide risk management with the maximum possible information,
it is recommended that both the dose-based and concentration-based
RQs be calculated when data are available

Rights-of Way scenario (lowest exposure)

Upper Bound Kenaga Residues For RQ Calculation

Chemical Name:	Acephate
Use	Rights of Way
Formulation	Orthene
Application Rate	0.25 lbs a.i./acre
Half-life	8.2 days
Application Interval	7 days
Maximum # Apps./Year	3
Length of Simulation	1 year

Endpoints

Avian	Bobwhite quail	LD50 (mg/kg-bw)	109.00
	Japanese Quail	LC50 (mg/kg-diet)	718.00
	Bobwhite quail	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	5.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	111.58
Tall Grass	51.14
Broadleaf plants/sm Insects	62.76
Fruits/pods/seeds/lg insects	6.97
Small herbivore mammals	73.52
Small insectivore mammals	4.60
Small terrestrial phase amphibians	2.18

Terrestrial Herpetofauna Results

Weight Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	1.4	0.017	0.1	3.9	5.44E-05
Mid	37	0.212	1.4	3.8	1.41E-03
Large	238	0.893	6.0	2.5	5.96E-03

Body Weight (g)	Adjusted LD50 (mg/kg-bw)
1.4	109.00
37	109.00
238	109.00

Dose-based EECs (mg/kg-bw)	Herpetofaunal Size Classes and Body Weights		
	small (g)	mid (g)	large (g)
	1.4	37	238
Short Grass	4.33	4.26	2.79
Tall Grass	1.99	1.95	1.28
Broadleaf plants/sm Insects	2.44	2.40	1.57
Fruits/pods/seeds/lg insects	0.27	0.27	0.17
Small herbivore mammals	N/A	69.55	10.81
Small insectivore mammals	N/A	4.35	0.68
Small terrestrial phase amphibian	N/A	0.08	0.05

Dose-based RQs (Dose-based EEC/adjusted LD50)	Amphibian/Reptile Acute RQs for Small, Medium, and Large Species (grams)		
	1.4	37	238
Short Grass	0.04	0.04	0.03
Tall Grass	0.02	0.02	0.01
Broadleaf plants/sm insects	0.02	0.02	0.01
Fruits/pods/seeds/lg insects	0.00	0.00	0.00
Small herbivore mammals	N/A	0.64	0.10
Small insectivore mammals	N/A	0.04	0.01
Small terrestrial phase amphibian	N/A	0.00	0.00

Dietary-based RQs (Dietary-based EEC/LC50 or	RQs	
	Acute	Chronic
Short Grass	0.16	22.32
Tall Grass	0.07	10.23
Broadleaf plants/sm Insects	0.09	12.55
Fruits/pods/seeds/lg insects	0.01	1.39
Small herbivore mammals	0.10	14.70
Small insectivore mammals	0.01	0.92
Small terrestrial phase amphibian	0.00	0.44

Note: To provide risk management with the maximum possible information, it is recommended that both the dose-based and concentration-based RQs be calculated when data are available

Chemical Name:	**Acephate**
Use	**seagwe diposal**
Formulation	**Orthene**

Application Rate	0.13	lbs a.i./acre
Half-life	8.2	days
Application Interval	0	days
Maximum # Apps./Year	1	
Length of Simulation	1	year

Endpoints			
Avian	Bobwhite quail	LD50 (mg/kg-bw)	109.00
	Japanese Quail	LC50 (mg/kg-diet)	718.00
	Bobwhite quail	NOAEL(mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	5.00

Dietary-based EECs (ppm)	Kenaga Values
Short Grass	31.20
Tall Grass	14.30
Broadleaf plants/sm Insects	17.55
Fruits/pods/seeds/lg insects	1.95
Small herbivore mammals	20.56
Small insectivore mammals	1.28

Small terrestrial phase amphibians	**0.61**

Summary of Risk Quotient Calculations Based on Upper Bound Kenaga EECs

Table X. Upper Bound Kenaga, Acute Terrestrial Herpetofauna Dose-Based Risk Quotients

Size Class (grams)	Adjusted LD50	EECs and RQs									
		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Small Herbivore Mammals		Small Insectivore Mammal		Small Amphibians	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
1.4	109.00	0.68	0.01	0.08	0.00	N/A	N/A	N/A	N/A	N/A	N/A
37	109.00	0.67	0.01	0.07	0.00	19.45	0.18	1.22	0.01	0.02	0.00
238	109.00	0.44	0.00	0.05	0.00	3.02	0.03	0.19	0.00	0.02	0.00

Table X. Upper Bound Kenaga, Subacute Terrestrial Herpetofauna Dietary Based Risk Quotients

LC50 (ppm)	EECs and RQs									
	Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Small Herbivore Mammals		Small Insectivore Mammals		Small Amphibians	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
718	17.55	0.02	1.95	0.00	20.56	0.03	1.28	0.00	0.61	0.00

Size class not used for dietary risk quotients

Table X. Upper Bound Kenaga, Chronic Terrestrial Herpetofauna Dietary Based Risk Quotients										
NOAEC (ppm)	EECs and RQs									
	Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Small Herbivore Mammals		Small Insectivore Mammals		Small Amphibians	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
5	17.55	3.51	1.95	0.39	20.56	4.11	1.28	0.26	0.61	0.12

Size class not used for dietary risk quotients

Summary of Risk Quotient Calculations Based on Mean Kenaga EECs

Table X. Mean Kenaga, Acute Terrestrial Herpetofauna Dose-Based Risk Quotients											
Size Class (grams)	Adjusted LD50	EECs and RQs									
		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Small Herbivore Mammals		Small Insectivore Mammals		Small Amphibians	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
1.4	109.00	0.23	0.00	0.04	0.000	N/A	N/A	N/A	N/A	N/A	N/A
37	109.00	0.22	0.00	0.03	0.000	6.89	0.063	0.57	0.01	0.01	0.00
238	109.00	0.15	0.00	0.02	0.000	1.07	0.010	0.09	0.00	0.01	0.00

Table X. Mean Kenaga, Subacute Terrestrial Herpetofauna Dietary Based Risk Quotients

LC50 (ppm)	EECs and RQs									
	Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Small Herbivore Mammals		Small Insectivore Mammals		Small Amphibians	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
718	5.85	0.008	0.91	0.001	7.28	0.0101	0.60	0.001	0.20	0.000

Size class not used for dietary risk quotients

Table X. Mean Kenaga, Chronic Terrestrial Herpetofauna Dietary Based Risk Quotients

NOAEC (ppm)	EECs and RQs									
	Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Small Herbivore Mammals		Small Insectivore Mammals		Small Amphibians	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
5	5.85	1.170	0.91	0.182	7.28	1.4563	0.60	0.120	0.20	0.041

Size class not used for dietary risk quotients

Appendix G. Label Information

Table XX. Product Names, Registration Numbers and % A.I. of each product.

%AI	Reg.No	Product Name
0.25	000239-02476	Ortho systemic rose & floral spray
1	000499-00373	Whitmire pt 289 orthene
1.5	000239-02453	Orthene systemic rose & flower care 8-8-8
	000239-02472	Orthene granules
4	000239-02594	Orthenex insect & disease control formula iii
8	000239-02595	Isotox insect killer formula iv
9.4	000239-02461	Orthene systemic insect control
12	000499-00421	Whitmire micro-gen pt 1320 tr
15	059639-00075	Payload 15 granular
	059639-00087	Pinpoint 15 granular
50	000239-02632	Ortho orthene fire ant killer formula ii
75	019713-00400	Drexel acephate 75 wsp
	019713-00497	Drexel acephate 75sp homeowner
	034704-00863	Lpi 008 acephate 75
	051036-00236	Acephate 75sp
	051036-00252	Acephate 75sp homeowner
	053883-00133	Acephate 75 sp agricultural & fire ant insecticide
	059639-00026	Orthene 75 s soluble powder
	059639-00027	Orthene tobacco insect spray
	059639-00028	Orthene tree and ornamental spray
	059639-00089	Orthene 75 wsp (insecticide in a water soluble bag)
	070506-00001	Lancer 75 sp
	081964-00002	Acephate 75% sp
	CA79013800	Orthene 75 s soluble powder
	CA87007100	Orthene 75 s soluble powder
80	019713-00408	Drexel acephate 80 seed protectant
	034704-00694	Clean crop acephate 80 df seed protectant
	051036-00262	Acephate 80s seed treater
90	019713-00544	Drexel acephate 90s
	034704-00862	Drexel acephate 90s
	034704-00880	Acephate 90sp insecticide
	051036-00238	Acephate 90sp
	059639-00033	Orthene 90 s
	059639-00086	Orthene 90 wsp
	070506-00002	Lancer 90 sp
	081964-00003	Acephate 75% sp
96	001677-00192	Eco2000-fb
	051036-00237	Acephate pco sp insecticide
97	037979-00001	Acecap systemic insecticide implants
	051036-00337	Acephate 97 eg
	064014-00001	Arbor thene

	070506-00008	Lancer 97df insecticide
97.4	019713-00495	Drexel acephate pco sp insecticide
	034704-00903	Acephate 97 eg
	059639-00031	Orthene pco spray concentrate
	059639-00091	Orthene 97 pellets

Table 2.4.4.B. Uses not allowed in California (LUIS Report) (move to appendix?—note, this does not mean that citrus, cotton, etc are completely disallowed in CA, just these specific reg numbers).

Crop/Site	**Reg.No**	**Equipment**	**Max App Rate Qty**	**Max App Rate Unit/Area**	**Timing**
Citrus	019713-00400	Ground	0.75	lb A	Nonbearing
					Seedling stage
		Sprinkler can	0.0012	gal mound	When needed
Cotton (Unspecified)	051036-00236	Hopper box	0.1875	lb A	At planting
	051036-00238	Hopper box	0.1828	lb A	At planting
	053883-00133	Hopper box	0.1875	lb cwt	Seed
	059639-00026	Hopper box	0.1875	lb A	At planting
	059639-00033	Hopper box	0.225	lb A	At planting
	070506-00001	Hopper box	0.1875	lb A	Seed
	070506-00002	Hopper box	0.1828	lb A	Seed
	081964-00002	Aircraft	0.9975	lb A	Foliar
	081964-00003	Aircraft	0.9	lb A	Foliar
Fencerows/Hedgerows	081964-00002	Aircraft	0.2475	lb A	Foliar
	081964-00003	Aircraft	0.225	lb A	Foliar
Soybeans (Unspecified)	034704-00862	Aircraft	0.99	lb A	Foliar
		Ground	0.99	lb A	Foliar
Tobacco					
Uncultivated Land	081964-00002	Aircraft	0.1253	lb A	Foliar
	081964-00003	Aircraft	0.1238	lb A	Foliar

Table 2.4.4.B. Uses not allowed in California (LUIS Report) (move to appendix?—note, this does not mean that citrus, cotton, etc are completely disallowed in CA, just these specific reg numbers).

Crop/Site	**Reg.No**	**Equipment**	**Max App Rate Qty**	**Max App Rate Unit/Area**	**Timing**
Citrus	019713-00400	Ground	0.75	lb A	Nonbearing
					Seedling stage
		Sprinkler can	0.0012	gal mound	When needed
Cotton (Unspecified)	051036-00236	Hopper box	0.1875	lb A	At planting
	051036-00238	Hopper box	0.1828	lb A	At planting
	053883-00133	Hopper box	0.1875	lb cwt	Seed
	059639-00026	Hopper box	0.1875	lb A	At planting
	059639-00033	Hopper box	0.225	lb A	At planting
	070506-00001	Hopper box	0.1875	lb A	Seed
	070506-00002	Hopper box	0.1828	lb A	Seed
	081964-00002	Aircraft	0.9975	lb A	Foliar
	081964-00003	Aircraft	0.9	lb A	Foliar
Fencerows/Hedgerows	081964-00002	Aircraft	0.2475	lb A	Foliar
	081964-00003	Aircraft	0.225	lb A	Foliar
Soybeans (Unspecified)	034704-00862	Aircraft	0.99	lb A	Foliar
		Ground	0.99	lb A	Foliar
Tobacco					
Uncultivated Land	081964-00002	Aircraft	0.1253	lb A	Foliar
	081964-00003	Aircraft	0.1238	lb A	Foliar

APPENDIX H

Pesticide Products Formulated with Acephate and Other Pesticide Active Ingredients

The Agency does not routinely include, in its risk assessments, an evaluation of mixtures of active ingredients, either those mixtures of multiple active ingredients in product formulations or those in the applicator's tank. In the case of the product formulations of active ingredients (that is, a registered product containing more than one active ingredient), each active ingredient is subject to an individual risk assessment for regulatory decision regarding the active ingredient on a particular use site. If effects data are available for a formulated product containing more than one active ingredient, they may be used qualitatively or quantitatively[5] [6].

There are no product LD50 values, with associated 95% Confidence Intervals (CIs) available for acephate.

As discussed in USEPA (2000) a quantitative component-based evaluation of mixture toxicity requires data of appropriate quality for each component of a mixture. In this mixture evaluation an LD50 with associated 95% CI is needed for the formulated product. The same quality of data is also required for each component of the mixture. Given that the formulated products for acephate do not have LD50 data available it is not possible to undertake a quantitative or qualitative analysis for potential interactive effects. However, because the active ingredients are not expected to have similar mechanisms of action, metabolites, or toxicokinetic behavior, it is reasonable to conclude that an assumption of dose-addition would be inappropriate. Consequently, an assessment based on the toxicity of acephate is the only reasonable approach that employs the available data to address the potential acute risks of the formulated products.

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[5] Overview of the Ecological Risk Assessment Process in the Office of Pesticide Programs, Environmental Protection Agency (January 2004) (Overview Document).

[6] Memorandum to Office of Prevention, Pesticides and Toxic Substance, US EPA conveying an evaluation by the U.S. Fish and Wildlife Service and National Marine Fisheries Service of an approach to assessing the ecological risks of pesticide products (January 2004).

ACEPHATE PRODUCTS [7]

PRODUCT/TRADE NAME	EPA Reg.No.	% Acephate	PRODUCT		ADJUSTED FOR ACTIVE INGREDIENT	
			LD 50[8] (mg/kg)	CI (mg/kg)	LD50 (mg/kg)	CI (mg/kg)
Isotox insect killer formula iv	239-2595	8	No Data	No Data	No Data	No Data
Ortho systemic rose & floral spray	239-2476	0.25	No Data	No Data	No Data	No Data
Orthenex Insect & Disease	239-2594	4	No Data	No Data	No Data	No Data
Whitmire tc 136	499-441	1.5	1850	No Data	No CI Data	No CI Data

[7] From registrant submitted data to support registration. Compiled by Office of Pesticide Programs Health Effects Division.

Appendix I. Fate Properities

Abiotic Hydrolysis

Acephate was hydrolytically stable in pH 5 and 7 aqueous buffer solutions (92.97% and 87.68% of the applied radioactivity remained as parent compound after 31 days). Minor degradates (formed at <10% of the applied) in the pH 5 and 7 solutions were: DMPT (formed by hydrolysis of the P-N bond); RE-17245 (formed by hydrolysis of the O-methyl-P bond); and methamidophos (formed by hydrolysis of the N-C bond). In pH 9 aqueous buffer solution, [O-methyl- ^{14}C]acephate degraded with a first-order half-life of 18 days (r^2= 0.98); [S-methyl -^{14}C]acephate appeared to exhibit similar hydrolysis behavior. At pH 9, the major degradate (formed at > 30% of the applied) was DMPT. Additional degradates were formed depending on which methyl group was radiolabelled; in the [O-methyl-^{14}C]acephate treated system, the only other major degradate was RE-18420 (formed by hydrolysis of the P-S bond); in the [S-methyl-^{14}C]acephate treated system, the only other degradate was methyl disulfide, apparently formed from the dimerization of the methyl mercaptan formed by hydrolysis of the P-S bond. Degradates were apparently stable at the pH at which they were formed.

Photodegradation in Water

Acephate, at 8.94 ppm, was photolytically stable in sterile pH 7 phosphate buffer solution that was irradiated for 35 days under natural sunlight. In sterile buffer in the presence of a photosensitizer (1% acetone), acephate, at 9.35 ppm, degraded with a dark-control-corrected half-life of 39.6 days in sterile pH 7 aqueous buffer solution that was irradiated for 31 days under natural sunlight. Two of the three degradates detected in the irradiated and dark control samples without photosensitizer (DMPT, 3.6%; RE-17245, 4.6%; and methamidophos, 1.6% of the applied in the irradiated solutions) were observed in greater amounts in the irradiated solutions with photosensitizer (40.6%, 2.5% and 8.6% of the applied, respectively). In addition to the three degradates listed above, methyl disulfide was also detected only in the dark control solutions at 2.3% (at day 35) and < 1.6% (at days 26 and 31) of the applied without and with photosensitizer, respectively.

Photolysis on Soil

In a supplemental study, acephate, when applied at a nominal application rate of 1 lb/A, was photolytically stable on Crevasse sandy loam soil that was irradiated with natural sunlight in Richmond, CA, for up to 10 days. Acephate dissipated more rapidly in dark control samples than in irradiated samples, likely due to greater moisture content and greater microbial activity. The major degradate following 10 days of incubation was CO_2, which accounted for 28.2% and 44.4% of the nominal application, respectively, in irradiated and dark control soils; organic volatiles were detected at 1.5% and 5.2%, respectively. However, low material balances after 3 days of irradiation may have been partially due to unrecovered $^{14}CO_2$ trapped in the tubing used to connect the test vessels to the volatile traps. The minor degradate methamidophos was detected in both irradiated and dark control soils, at maximums of 5.3% (day 2) and 8.4% (day 3) of the nominal application, respectively, and decreased thereafter. Unidentified extractable radioactivity and nonextractable ^{14}C soil residues were present less than 10% of the nominal application.

Photodegradation in Air

Based on the vapor pressure of acephate (pure active: 1.7 x 10^{-6} mm Hg/Torr [40390601]) and its calculated Henry's constant (5.1 x 10^{-13} atm mole /m^3), it is not expected that acephate will volatilize from either soil or water in significant amounts. Therefore it is not expected that there will be sufficient residues of acephate in air for photodegradation in air to be a significant route of dissipation.

Aerobic Soil Metabolism

Acephate degraded in aerobic soils with half-lives of generally < 3 days. The loss of acephate is due to microbial metabolism, which occurs faster under aerobic as opposed to anaerobic conditions. Methamidophos is the primary nonvolatile intermediate degradate which is rapidly degraded to CO_2 as the terminal metabolite. In a preliminary study, acephate (at concentrations of 1 or 10 ppm) is rapidly lost from a wide variety of soils (eight soils - 3 clays, loam, loamy sand, sandy clay loam, silty clay loam, muck) when incubated at 24ºC at field capacity open to the air (volatiles not trapped and degradates other than methamidophos were not identified). In all cases, half-lives in mineral soils were <3 days at 10 ppm and < 1.5 days at 1 ppm. Half-lives in an Ocoee muck soil (pH 5.3, 68% organic matter) were 6 days at 1 ppm and 13 days at 10 ppm. Average maximum concentrations of methamidophos were approximately 10% of the applied. In sterile Norwalk silty clay loam and Greenville clay (incubation conditions not specified), after 4 days, approximately 90-100% of the applied remained as acephate, compared to approximately 20 % in the non sterile. The effect of varying moisture contents (5 and 15%) was tested with the Hanford loamy sand treated with 20 ppm acephate; volatiles were not trapped. Degradation was more rapid at 15% (4 days) than at 5% (7 days). Definitive studies were conducted using Fresno loam (pH 5.7, 1.3% organic matter) Mt. Holly sandy clay loam (pH 5.6, 2.4% organic matter), and Norwalk silty clay loam (pH 6.2, 4.1% organic matter) treated with acephate at 1 ppm and incubated at field capacity for up to 6 days in flowthrough flasks. Effluent air was trapped in methyl cellusolve and methyl cellusolve plus ethanolamine. Methanol extracts of soil samples were analyzed by TLC for acephate, methamidophos, and DMPT on days 1 and 2; there was no analysis at 6 days posttreatment. After 6 days incubation, 54, 76, and 86% of the applied radioactivity was evolved as CO_2 in the loam, sandy clay loam, and silty clay loam soils, respectively. Apparent half-lives for acephate in the soils were <2 days in loam and <1 day in the other two soils, which is consistent with the results in the preliminary study. Methamidophos was formed at up to 23 % of the applied in Fresno loam after 2 days; it was < 10 % at both sampling times in the other two. DMPT was not detected at either sampling interval. After 6 days, 21, 15, and 17% of the applied was not extractable from the loam, sandy clay loam, and silty clay loam soils, respectively.

Anaerobic Aquatic Metabolism

[S-methyl-^{14}C]Acephate degraded with a first-order half-life of 6.6 days ($r^2 = 0.998$; degradation constant of 0.1045 day^{-1}) in anaerobic flooded clay sediment. The initial pH of the system was 7.0, increasing to pH 7.9 by the final sampling interval (day 20). The major degradates were [^{14}C]volatiles which accounted for 64.5% of the applied at 20 days posttreatment. Radiolabeled $^{14}CO_2$ was a maximum of 32.9% of the applied radioactivity at 10 days posttreatment and was 17.7% at 20 days posttreatment. Radiolabeled $^{14}CH_4$ was present at 1.1% of the applied radioactivity at 3 days posttreatment and accounted for 46.8% of the applied at 20 days posttreatment. In the water phase, the parent compound was 84.6% of the applied radioactivity at 0 days posttreatment, decreased to 38.8% of the applied by 7 days posttreatment and was 10.1% at 20 days posttreatment. The minor degradate methamidophos was present in the water phase at 0.5% of the applied radioactivity at 0 days posttreatment, increased to a maximum of 5.0% of the applied by 7 days posttreatment and was 1.8% at 20 days posttreatment. The minor degradates DMPT and SMPT were present in the water at a combined maximum of 2.9% of the applied at 7 days posttreatment. In the sediment extracts, parent compound was initially present at 8.4% of the applied radioactivity, increased to a maximum of 9.6% of the applied by 3 days posttreatment and then decreased to 1.8% by 20 days posttreatment. The degradates methamidophos, DMPT, and SMPT never exceeded 1% of the applied in the sediment.

Aerobic Aquatic Metabolism

No acceptable studies for the aerobic aquatic metabolism of acephate are available. However, information of marginal value was found in the scientific literature. Pond water and sediments and creek water and sediments from a forested area in British Columbia were treated with acephate at 1 ppm and incubated at 9ºC in flasks plugged with glass wool. In the absence of sediments, recoveries of acephate from treated pond water were >80% after 42 days incubation, and the pH of the pond water increased from 7.5 to 8.0 after 42 days. In the presence of pond bottom sediments, acephate was less persistent, with recovery at 42 days of 16.7% in the water and 4.8% in the sediment. In creek water (pH 7.0), acephate recoveries after 50 days incubation were approximately 45%; in the presence of creek bottom sediments, acephate was less persistent, with recovery at 50 days of 25.15% in the water and 2.3% in the sediment. Autoclaving of creek water and creek water:sediment mixtures slowed degradation. At no time was methamidophos present at > 1.6%. Because the incubations were conducted at 9ºC, rather than the recommended range of 18-30ºC, and because volatiles were not trapped, the results should be considered supplemental information only.

Bioaccumulation in Fish

Acephate residues did not bioaccumulate in the edible tissues or viscera of bluegill sunfish (*Lepomis macrochirus*) continuously exposed to 0.007 or 0.7 ppm acephate for 35 days. The average bioconcentration factor in edible tissues during the study was 10X and decreased during the 14-day depuration period.

Terrestrial Field Dissipation

Acephate (Orthene Tobacco Insect Spray, 75% WP) dissipated with an observed half-life of 1-3 days (calculated 1.72 days; r^2=0.99) in the upper 5 cm of a field plot of silt loam soil planted to tobacco in Greenville, Mississippi, after six foliar applications (6- to 9-day intervals) of acephate at 0.75 lb ai/A per application. Average acephate concentrations in the upper 5 cm of soil declined from 0.33 ppm immediately after the sixth application to 0.08 ppm at 3 days and to <0.02 ppm (detection limit) at 7 days. Average acephate concentrations were <0.05 ppm in the 5- to 10-cm depth and <0.02 ppm in soil deeper than 10 cm at all sampling intervals; no residues were detected in soil deeper than 45 cm. The maximum average acephate concentration in the upper 5 cm was 1.09 ppm immediately after the first foliar application; acephate did not accumulate with repeated foliar applications. Methamidophos, the only degradate measured, dissipated with a calculated half-life of 0.2 days in the 0- to 5-cm soil depth; average methamidophos concentrations declined from 0.07 ppm immediately after the sixth application of acephate to 0.02 ppm at 3 days and <0.01 ppm (detection limit) at 7 days. Average methamidophos concentrations were <0.03 ppm in the 5- to 10-cm depth and <0.01 ppm in soil deeper than 10 cm at all sampling intervals. The maximum average methamidophos concentration (0.11 ppm) was detected in the upper 5 cm of soil immediately after the fourth foliar application. During the study, air temperatures ranged from 59 to 90ºF. Rainfall totaled 1.62 inches between the first and second foliar treatments, 0.60 inches between the second and third, 1.85 inches between the third and fourth, 0.0 inches between the fourth and fifth, 1.1 inches between the fifth and sixth, and 0.0 inches during the 7 days following the sixth treatment.

Acephate (Orthene 75 S, 75% WP) dissipated with an observed half-life of <3 days (calculated 1.96 days; r^2=0.92) in the upper 5 cm of a field plot of loam soil planted to soybeans in Dallas Center, Iowa, after six preemergence applications (7-day intervals) of acephate at 1.0 lb ai/A per application. Average acephate concentrations in the upper 5 cm of soil were 0.12 ppm immediately after the sixth application, 0.24 ppm at 1 day, 0.05 ppm at 3 days, and <0.02 ppm (detection limit) at 7 days. The maximum average acephate concentration in the upper 5 cm was 0.84 ppm immediately after the third application. Average acephate concentrations in soil deeper than 5 cm were <0.12 ppm; no residues were detected in soil deeper than 45 cm. Acephate did not accumulate with repeated applications. Average concentrations of methamidophos, the only degradate measured, were <0.08 ppm in the upper 5 cm of soil; no residues were detected (<0.01 ppm, detection limit) in soil deeper than 5 cm. During the study, air temperatures ranged from 54 to 100ºF. Rainfall totaled 0.05 inches during the first and second preemergence application, 0.65 inches between the second and third, 1.80 inches between the third and fourth, 0.00 inches between the fourth and fifth, 5.05 inches between the fifth and sixth, and 0.60 inches during the 7 days following the sixth application.

Acephate (Orthene 75 S, 75% WP) dissipated with an observed half-life of 1-3 days (calculated 1.65 days; r^2=0.99) in the upper 5 cm of a field plot of silt loam soil planted to bell peppers in Fresno, California, after eight foliar applications (3- to 7-day intervals) of acephate at 1.0 lb ai/A per application. Average acephate concentrations in the upper 5 cm of soil declined from 0.99 ppm immediately after the eighth application to 0.47 ppm at 3 days and to <0.02 ppm (detection limit) at 7 days. The maximum average acephate concentration in the 5- to 10-cm depth was 0.24 ppm immediately after the eighth foliar application; after 1 day, average acephate concentrations were <0.04 ppm. In general, average acephate concentrations in soil deeper than 10 cm were <0.05 ppm. Acephate did not accumulate with repeated foliar applications. Methamidophos, the only degradate measured, dissipated with a calculated half-life of 0.3 days in the 0- to 5-cm soil depth; average methamidophos concentrations were 0.07 ppm immediately after the eighth application of acephate, 0.09 ppm at 1 day, 0.04 ppm at 4 days, and <0.01 ppm (detection limit) at 7 days. Average methamidophos concentrations were <0.03 ppm in the 5- to 10-cm depth and <0.01 ppm in the soil deeper than 10 cm at all sampling intervals. During the study, air temperatures ranged from 62 to 114ºF. No rainfall occurred during the entire study.

Based on the results of the three terrestrial field dissipation studies listed above, it appears that, following multiple applications of 1 lb ai/A, acephate dissipates with a half-life of 3 days or less and does not leach. Its degradate methamidophos was never present at greater than 0.11 ppm in the top 5 cm of soil and was not detected below a depth of 10 cm.

The following study was not acceptable because soil samples were not taken and analyzed to an adequate depth to define the extent of leaching. The maximum depth sampled was 30 cm, generally because a layer of clay hard pan at soil depths of 30- to 35-cm prevented sampling without the use of specialized equipment. Since acephate residues were detected at the 25- to 30- cm soil depth, soil samples were not taken at an adequate depth to define the extent of leaching. The registrant stated that due to this limitation in sampling procedures, the study provided as supplemental data only.

Acephate (Orthene 75 S, 75% WP) dissipated with an observed half-life of 1-3 days (calculated 1.95 days; r^2=0.91) in the upper 5 cm of a field plot of sand soil planted to cauliflower in Ocoee, Florida, after six ground applications (7-day intervals) of acephate at 1.0 lb ai/A per application. Average acephate concentrations in the upper 5 cm of soil declined from 1.617 ppm immediately after the sixth application to 0.143 ppm at 3 days; after 7 days, residues were 0.027 ppm (detection limit of 0.02 ppm). The maximum average acephate concentration in the upper 5 cm was 2.653 ppm immediately after the second application. Average acephate concentrations in the 5- to 10-cm soil depth were 0.047 ppm immediately after the sixth application, 0.150 ppm at 1 day and 0.080 ppm at 3 days following the last application; after 7 days, residues were nondetectable. Acephate concentrations in the 10- to 30-cm soil depths were nondetectable immediately after the sixth application, 0.063-0.220 ppm at 1 and 3 days posttreatment, and were nondetectable after 7 days. Acephate did not accumulate with repeated ground applications. Methamidophos, the only degradate measured, dissipated with a calculated half-life of 0.3 days in the 0- to 5-cm soil depth; average methamidophos concentrations declined from 0.317 ppm immediately after the sixth application of acephate to 0.173 ppm at 1 day, 0.043 ppm at 3 days, and <0.01 ppm (detection limit) at 7 days. Average methamidophos concentrations were 0.033 ppm in the 5- to 30-cm soil depths at all sampling intervals. The maximum average methamidophos concentration (0.320 ppm) was detected in the upper 5 cm of soil immediately after the fourth application. Methamidophos accumulated slightly with repeated ground applications. During the study, air temperatures ranged from 38 to 85ºF. Rainfall and irrigation totaled 0.63 inches between the first the second treatments, 1.21 inches between the second and third, 1.72 inches between the third and fourth, 0.15 inches between the fourth and fifth, 0.33 inches between the fifth and sixth, and 8.09 inches during the 7 days following the last application.

Appendix J. Usage Information

Table J1. Average Annual Acephate Usage in California, from 2002-2005.

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
Alameda	12.2	45	17.4	Acres	46
	0.5	3	3,250.0	Square feet	3
	331.7	826	-	(blank)	-
Alameda Total	344.4	874	3,267.4		49
Amador	0.2	13	-	(blank)	-
Amador Total	0.2	13	-		-
Butte	172.9	16	196.3	Acres	16
	0.5	8	31,500.0	Square feet	8
	40.3	189	-	(blank)	-
Butte Total	213.7	213	31,696.3		24
Calaveras	0.0	2	625.0	Square feet	2
	0.0	4	-	(blank)	-
Calaveras Total	0.0	6	625.0		2
Colusa	1,432.4	131	1,828.0	Acres	131
	0.7	19		(blank)	-
Colusa Total	1,433.1	150	1,828.0		131
Contra Costa	46.6	545	118.4	Acres	545
	0.3	12	10,222.5	Square feet	12
	614.7	712	-	(blank)	-
Contra Costa Total	661.6	1,269	10,340.9		557
Del Norte	13.5	31	19.0	Acres	31
	18.1	86	559,781.3	Square feet	86

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
Del Norte Total	31.7	117	559,800.3		117
El Dorado	0.4	3	2.4	Acres	3
	0.0	1	122.3	Misc. unit	1
	0.3	9	10,100.0	Square feet	9
	8.6	88	-	(blank)	-
El Dorado Total	9.3	101	10,224.7		13
Fresno	34,127.5	3,456	38,746.0	Acres	3,456
	171.8	596	-	(blank)	-
Fresno Total	34,299.3	4,052	38,746.0		3,456
Glenn	799.4	87	963.8	Acres	87
	2.7	47	-	(blank)	-
Glenn Total	802.1	134	963.8		87
Humboldt	17.3	51	60.7	Acres	51
	0.0	2	4.5	Misc. unit	2
	29.6	23	208,310.0	Square feet	23
	21.4	44	-	(blank)	-
Humboldt Total	68.4	120	208,375.2		76
Imperial	13,983.3	1,789	20,625.9	Acres	1,789
	37.4	68		(blank)	-
Imperial Total	14,020.7	1,857	20,625.9		1,789
Inyo	0.6	4	-	(blank)	-
Inyo Total	0.6	4	-		-
Kern	3,758.7	361	5,254.1	Acres	361
	511.8	8	20,317.5	Misc. unit	8
	0.3			Square	3

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
		3	14,950.0	feet	
	8,881.0	26	6,433.3	Tons	26
	1,037.4	138	-	(blank)	-
Kern Total	14,189.2	536	46,954.8		398
Kings	701.6	44	917.8	Acres	44
	5,885.3	20	1,411.6	Tons	20
	29.1	159	-	(blank)	-
Kings Total	6,615.9	223	2,329.4		64
Lake	7.5	43	-	(blank)	-
Lake Total	7.5	43	-		-
Lassen	60.8	7	82.5	Acres	7
	0.0	6	-	(blank)	-
Lassen Total	60.8	13	82.5		7
Los Angeles	791.0	1,903	879.2	Acres	1,903
	28.3	208	118,640.5	Misc. unit	208
	37.4	172	762,145.0	Square feet	172
	1,917.1	1,693		(blank)	-
Los Angeles Total	2,773.7	3,976	881,664.7		2,283
Madera	1,191.9	246	1,461.9	Acres	246
	13.6	170		(blank)	-
Madera Total	1,205.5	416	1,461.9		246
Marin	0.7	24	4,305.0	Square feet	24
	217.8	308		(blank)	-
Marin Total	218.5	332	4,305.0		24
Mariposa	2.6	39	-	(blank)	-

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
Mariposa Total	2.6	39	-		-
Mendocino	1.2	7	2.0	Acres	7
	7.9	103	139,368.8	Square feet	103
	4.7	53	-	(blank)	-
Mendocino Total	13.8	163	139,370.8		110
Merced	3,656.0	310	4,273.5	Acres	310
	35.9	81	-	(blank)	-
Merced Total	3,691.9	391	4,273.5		310
Modoc	412.8	33	446.0	Acres	33
Modoc Total	412.8	33	446.0		33
Mono	2.5	3	-	(blank)	-
Mono Total	2.5	3	-		-
Monterey	60,931.2	23,941	69,710.9	Acres	23,941
	0.3	7	3,075.0	Misc. unit	7
	7.7	2	15.9	Pounds	2
	256.4	879	7,338,183.5	Square feet	881
	762.7	415	-	(blank)	-
Monterey Total	61,958.3	25,244	7,410,985.3		24,831
Napa	0.2	3	20,000.0	Square feet	3
	81.1	212	-	(blank)	-
Napa Total	81.3	215	20,000.0		3
Nevada	13.7	51	-	(blank)	-
Nevada Total	13.7	51	-		-
Orange	1,369.2	1,515	1,144.1	Acres	1,515
	0.4			Misc. unit	2

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
		2	1,500.0		
	134.5	581	4,154,825.0	Square feet	581
	670.6	1,644	-	(blank)	-
Orange Total	2,174.7	3,742	4,157,469.1		2,098
Placer	41.7	172	53.0	Acres	172
	0.6	7	10,987.5	Square feet	7
	102.5	231		(blank)	-
Placer Total	144.8	410	11,040.5		179
Plumas	57.7	22	-	(blank)	-
Plumas Total	57.7	22	-		-
Riverside	5,026.9	1,848	7,380.0	Acres	1,848
	5.6	15	585,746.5	Misc. unit	15
	25.1	138	798,415.3	Square feet	138
	1,132.8	744	-	(blank)	-
Riverside Total	6,190.4	2,745	1,391,541.7		2,001
Sacramento	159.4	213	310.0	Acres	213
	0.6	15	3,789.3	Misc. unit	15
	0.1	3	2,375.0	Square feet	3
	168.3	371	-	(blank)	-
Sacramento Total	328.4	602	6,474.2		231
San Benito	4,493.1	1,528	5,453.3	Acres	1,528
	0.0	4	575.0	Misc. unit	4
	70.7	123	1,336,425.0	Square feet	123
	22.2	135		(blank)	-
San Benito Total	4,586.0	1,790	1,342,453.3		1,655

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
San Bernardino	361.9	526	297.4	Acres	526
	0.1	1	0.5	Misc. unit	1
	10.1	64	318,485.0	Square feet	64
	85.1	403		(blank)	-
San Bernardino Total	457.2	994	318,782.9		591
San Diego	2,640.8	7,045	3,510.5	Acres	7,045
	3.9	49	48,820.0	Misc. unit	49
	310.0	1,848	11,521,464.3	Square feet	1,848
	1,489.7	1,430		(blank)	-
San Diego Total	4,444.4	10,372	11,573,794.8		8,942
San Francisco	2,070.8	433		(blank)	-
San Francisco Total	2,070.8	433			-
San Joaquin	3,130.9	545	3,311.3	Acres	545
	25.2	218	-	(blank)	-
San Joaquin Total	3,156.1	763	3,311.3		545
San Luis Obispo	4,211.3	2,847	4,887.8	Acres	2,847
	8.7	142	924,460.3	Square feet	142
	94.1	424	-	(blank)	-
San Luis Obispo Total	4,314.0	3,413	929,348.0		2,989
San Mateo	383.9	715	258.5	Acres	715
	0.0	1	1,000.0	Misc. unit	1
	115.2	609	3,637,057.5	Square feet	609
	289.4	701		(blank)	-
San Mateo Total	788.6	2,026	3,638,316.0		1,325
Santa Barbara	10,576.2			Acres	6,878

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
		6,877	12,082.9		
	0.8	8	30,425.0	Misc. unit	8
	305.8	1,056	19,334,256.3	Square feet	1,056
	131.1	374	-	(blank)	-
Santa Barbara Total	11,013.9	8,315	19,376,764.2		7,942
Santa Clara	1,950.1	1,219	2,589.7	Acres	1,219
	27.9	45	434,626.7	Misc. unit	45
	115.2	376	2,951,597.5	Square feet	376
	1,153.4	1,041	-	(blank)	-
Santa Clara Total	3,246.6	2,681	3,388,813.8		1,640
Santa Cruz	2,194.0	1,225	2,516.6	Acres	1,225
	1.4	4	5,175.0	Misc. unit	4
	223.3	353	4,032,845.5	Square feet	353
	69.2	159	-	(blank)	-
Santa Cruz Total	2,487.8	1,741	4,040,537.1		1,582
Shasta	257.7	18	338.7	Acres	18
	36.8	246	-	(blank)	-
Shasta Total	294.5	264	338.7		18
Sierra	25.6	15		(blank)	-
Sierra Total	25.6	15			-
Siskiyou	651.5	59	689.3	Acres	59
	0.3	3	14,060.0	Square feet	3
Siskiyou Total	651.8	62	14,749.3		62
Solano	692.7	305	1,110.8	Acres	305
	49.4	303	-	(blank)	-

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
Solano Total	742.1	608	1,110.8		305
Sonoma	213.5	243	147.8	Acres	243
	60.0	328	1,235,223.5	Square feet	328
	122.6	341		(blank)	-
Sonoma Total	396.1	912	1,235,371.3		571
Stanislaus	4,724.1	846	5,375.8	Acres	846
	114.8	183	-	(blank)	-
Stanislaus Total	4,838.9	1,029	5,375.8		846
Sutter	2,789.2	201	3,311.6	Acres	201
	8.6	65		(blank)	-
Sutter Total	2,797.7	266	3,311.6		201
Tehama	101.3	10	131.5	Acres	10
	0.0	3	999.8	Misc. unit	3
	3.1	65	-	(blank)	-
Tehama Total	104.4	78	1,131.3		13
Tulare	1,585.8	736	3,360.5	Acres	736
	44.5	236	-	(blank)	-
Tulare Total	1,630.3	972	3,360.5		736
Tuolumne	0.2	10	19.3	Acres	10
	6.0	24	-	(blank)	-
Tuolumne Total	6.2	34	19.3		10
Ventura	8,092.3	4,277	11,060.3	Acres	4,277
	2.1	17	32,750.3	Misc. unit	17
	3.6	36	670,350.0	Square feet	36
	2,796.4			(blank)	-

County	Average Annual Pounds Applied	Number Records Used to Calculated Average Annual Pounds	Average Annual Area Treated	Unit Area Treated	Number Records Used to Calculated Average Annual Area Treated
		584	-		
Ventura Total	10,894.5	4,914	714,160.6		4,330
Yolo	115.1	16	142.2	Acres	16
	1.3	48	56,385.0	Square feet	48
	37.3	263	-	(blank)	-
Yolo Total	153.6	327	56,527.2		64
Yuba	3.3	46	-	(blank)	-
Yuba Total	3.3	46	-		-
Grand Total	211,133.5	90,164	61,612,470.5		73,486

Table J2. Average Annual Acephate Usage, as reported for California PUR Database, presented by crop.

Site Name	Average Annual Pounds Applied	Average Annual Area Treated	Unit Area Treated
ALFALFA	15.4	20.5	Acres
ALMOND	19.0	35.8	Acres
BARLEY	33.9	35.0	Acres
BEAN, DRIED	9,739.6	11,233.7	Acres
BEAN, SUCCULENT	4,773.8	5,501.5	Acres

Site Name	Average Annual Pounds Applied	Average Annual Area Treated	Unit Area Treated
BEAN, UNSPECIFIED	1,895.2	2,306.9	Acres
BERMUDAGRASS	120.9	141.2	Acres
BLACKBERRY	3.0	4.0	Acres
BOK CHOY	2.1	4.0	Acres
BROCCOLI	35.1	40.8	Acres
BRUSSELS SPROUT	0.9	1.3	Acres
CABBAGE	2.4	3.1	Acres
CARROT	0.3	0.5	Acres
CAULIFLOWER	1,661.8	1,791.7	Acres
CELERY	15,438.3	17,407.4	Acres
CHERRY	0.8	1.0	Acres
CHINESE GREENS	2.8	4.9	Acres
CHRISTMAS TREE	1.2	2.5	Acres
CITRUS	93.3	126.3	Acres
COMMODITY FUMIGATION	0.5	-	(blank)
CORN, HUMAN CONSUMPTION	9.7	20.4	Acres
CORN, HUMAN CONSUMPTION	0.4	5,700.0	Square feet
COTTON	34,937.7	45,458.2	Acres
COTTON	511.3	2,587.5	Misc. unit
COTTON	14,766.4	7,844.9	Tons
FOREST, TIMBERLAND	0.2	0.6	Acres
FUMIGATION, OTHER	0.1	0.2	Acres
FUMIGATION, OTHER	0.1	14,250.0	Square feet
GARLIC	5.6	7.5	Acres
GRAPE, WINE	11.9	68.6	Acres

Site Name	Average Annual Pounds Applied	Average Annual Area Treated	Unit Area Treated
GRAPEFRUIT	35.2	58.1	Acres
LANDSCAPE MAINTENANCE	5,037.7	-	(blank)
LANDSCAPE MAINTENANCE	0.6	1.6	Acres
LEMON	375.7	300.4	Acres
LETTUCE, HEAD	83,696.1	97,293.7	Acres
LETTUCE, HEAD	0.0	250.0	Square feet
LETTUCE, LEAF	201.0	232.2	Acres
MINT	1,369.6	1,534.9	Acres
NECTARINE	0.6	0.8	Acres
N-GRNHS FLOWER	1,263.8	1,142.0	Acres
N-GRNHS FLOWER	1.0	1,484.4	Misc. unit
N-GRNHS FLOWER	556.6	15,730,581.5	Square feet
N-GRNHS PLANTS IN CONTAINERS	0.5	-	(blank)
N-GRNHS PLANTS IN CONTAINERS	1,307.2	1,273.8	Acres
N-GRNHS PLANTS IN CONTAINERS	19.5	127,565.5	Misc. unit
N-GRNHS PLANTS IN CONTAINERS	516.7	18,149,500.5	Square feet
N-GRNHS TRANSPLANTS	0.0	-	(blank)
N-GRNHS TRANSPLANTS	220.1	338.5	Acres
N-GRNHS TRANSPLANTS	0.0	970.0	Misc. unit
N-GRNHS TRANSPLANTS	75.4	2,098,062.3	Square feet
N-OUTDR FLOWER	0.0	-	(blank)
N-OUTDR FLOWER	3,948.1	5,786.4	Acres
N-OUTDR FLOWER	6.2	3,369.5	Misc. unit
N-OUTDR FLOWER	7.7	15.9	Pounds
N-OUTDR FLOWER	33.0	1,506,205.0	Square feet

Site Name	Average Annual Pounds Applied	Average Annual Area Treated	Unit Area Treated
N-OUTDR PLANTS IN CONTAINERS	0.0	-	(blank)
N-OUTDR PLANTS IN CONTAINERS	7,381.2	10,042.0	Acres
N-OUTDR PLANTS IN CONTAINERS	20.1	714,885.0	Misc. unit
N-OUTDR PLANTS IN CONTAINERS	289.1	7,485,631.8	Square feet
N-OUTDR TRANSPLANTS	2,353.6	2,938.3	Acres
N-OUTDR TRANSPLANTS	25.1	436,705.8	Misc. unit
N-OUTDR TRANSPLANTS	264.5	15,088,672.5	Square feet
ORANGE	575.4	1,427.6	Acres
PASTURELAND	5.6	10.0	Acres
PEACH	7.0	15.3	Acres
PEAS	6.1	6.9	Acres
PEPPER, FRUITING	5,703.8	7,163.9	Acres
PEPPER, SPICE	162.3	206.7	Acres
PEPPER, SPICE	0.1	10,000.0	Square feet
PISTACHIO	129.5	208.1	Acres
PLUM	0.4	1.3	Acres
PUBLIC HEALTH	4.8	-	(blank)
REGULATORY PEST CONTROL	0.0	-	(blank)
RESEARCH COMMODITY	41.8	-	(blank)
RESEARCH COMMODITY	8.2	9.1	Acres
RESEARCH COMMODITY	0.6	10,100.0	Square feet
RIGHTS OF WAY	100.5	-	(blank)
RIGHTS OF WAY	6.6	6.4	Acres
SMALL FRUITS/BERRY	0.1	3,000.0	Square feet
SORGHUM/MILO	1.5	9.5	Acres

Site Name	Average Annual Pounds Applied	Average Annual Area Treated	Unit Area Treated
SPINACH	0.5	0.2	Acres
STRUCTURAL PEST CONTROL	10,979.2	-	(blank)
SWISS CHARD	0.7	0.4	Acres
TANGELO	19.6	66.8	Acres
TANGERINE	237.5	602.9	Acres
TOMATO	0.4	0.5	Acres
UNCULTIVATED AG	32.8	51.0	Acres
UNCULTIVATED NON-AG	0.1	17.5	Acres
VERTEBRATE CONTROL	0.9	-	(blank)
VERTEBRATE CONTROL	13.7	120.6	Acres
WALNUT	0.2	0.3	Acres
WATERMELON	3.8	3.8	Acres
Grand Total	211,133.5		

Appendix K

Acephate

Use List

The following use list is derived from label use information. It is used as a basis for terrestrial and aquatic pesticide use area determination.

Table 1 Use list from labels

Category	Use
Agriculture	bean-dried, bean-succulent, bean-unspecified, bok choy, broccoli, cauliflower, celery, cotton, garlic, letttuce-head, lettuce-leaf, mint, pepper-fruiting, pepper-spice, uncultivated ag
Orchards/vineyards	almond, grapefruit, lemon, orange, pistachio, tangelo, tangerine
Pasture	bermudagrass, pastureland
Non-agriculture (mapped) *i.e.* other	N-greenhouse flower, N-greenhouse plants in containers, N-greenhouse transplants, N-outdoor flower
Non-agriculture (not mapped)	landscape maintenance, rights of way, structural pest control, public health, research commodity, uncultivated non-ag, vertebrate control

Terrestrial Use Determination

Sources and Methods

Base mapping layers for the terrestrial analysis component were obtained from the National Land-cover Dataset (NLCD 2001) for the majority of land use types and the California GAP data (6/98) for the orchards and vineyard uses. The NLCD is a recently released national land use dataset and the GAP is from the Biogeography Lab from UCLA-Santa Barbara. These raster files were converted to vector and used in the analysis. Table 2 shows the land-cover sources used.

Table 2 Land-cover data sources

Land-cover Data Sources			
Layer name	**Base source**	**Description**	**non-NASS**
Cultivated Crops	NLCD	82: Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.	No
Developed, High Intensity	NLCD	24: Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover.	Yes
Developed, Low Intensity	NLCD	22: Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of	Yes

Land-cover Data Sources			
Layer name	**Base source**	**Description**	**non-NASS**
		total cover. These areas most commonly include single-family housing units.	
Developed, Medium Intensity	NLCD	23: Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.	Yes
Developed, Open Space	NLCD	21: Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.	Yes
Forest	NLCD	Union of 41,42,43: Deciduous, evergreen and mixed. Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover.	Yes
Open Water	NLCD	11: All areas of open water, generally with less than 25% cover of vegetation or soil.	Yes
Orchards and vineyards	CA GAP	A union of 11210, 11211 and 11212. This is the only CA GAP reference.	No
Pasture/Hay	NLCD	81: Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.	No
Wetlands	NLCD	Union of 90, 95: Woody wetlands and emergent herbaceous.	Yes

U.S. Department of Agriculture's National Agriculture Statistics Service (NASS) census dataset, 2002 was used to determine whether a crop was grown in a particular county. This census dataset provides survey information over five years on agricultural practices and is used mainly for cultivated or agriculture crops. Chemical labeled uses were matched to NASS uses; an agriculture use match would result in a mapped area for one or more counties. For uses that are not agricultural, the use is assumed to occur in every county where that particular land-cover occurs within California (*i.e.* a 'forestry' labeled use is assumed to potentially occur in all California counties where NLCD indicates there is forest land-cover).

The 'Initial Area of Concern' represents the use type and its occurrence in the NASS or NLCD datasets. These are the areas where the pesticide has potential to be applied. The 'Action Area' represents the 'Initial Area of Concern' plus a buffer distance. There may not always be a buffer distance in which case the 'Action Area' is the same as the 'Initial Area of Concern'. The overlap of the 'Action Area' with CRLF habitat areas is named 'Overlapping Area' and is the target of spatial analysis. The ratio of Overlapping Area to CRLF habitat area is reported for each of eight Recovery Units (RU1 to RU8).

There are three types of CRLF habitat areas considered in this assessment: Critical Habitat (CH); Core Areas; and California Natural Diversity Database (CNDDB) occurrence sections (EPA Region 9). Critical habitat areas were obtained from the U.S.

Fish and Wildlife Service's (USFWS) final designation of critical habitat for the CRLF (USFWS 2006). Core areas were obtained from USFWS's Recovery Plan for the CRLF (USFWS 2002). The occurrence sections represent an EPA-derived subset of occurrences noted in the CNDDB. They are generalized by the Meridian Range and Township Section (MTRS) one square mile units so that individual habitat areas are obfuscated. As such, only occurrence section counts are provided and not the area potentially affected.

Table 3 Terrestrial spatial summary results for acephate uses with 2,913-ft buffer.

Measure	**RU1**	**RU2**	**RU3**	**RU4**	**RU5**	**RU6**	**RU7**	**RU8**	**Total**
Initial Area of Concern (no buffer)									67,491 sq km
Established species range area (sq km)	3654	2742	1323	3279	3650	5306	4917	3326	28,197
Overlapping area (sq km)	1615	1855	983	2323	2918	4243	3576	2662	20,175
Percent area affected	*44*	*68*	*74*	*71*	*80*	*80*	*73*	*80*	*72*
# Occurrence Sections	9	3	64	270	272	108	89	24	865[1]

[1]*26 occurrence sections occur outside of Recovery Units.*

Aquatic Action Area Determination

The aquatic analysis uses a downstream dilution model to determine the downstream extent of exposure in streams and rivers. The downstream component, combined with the initial area of concern, define the aquatic action area. The downstream extent includes the area where the EEC could potentially be above levels that would exceed the most sensitive LOC. The model calculates two values, the dilution factor (DF) and the threshold Percent Cropped Area (PCA). The dilution factor (DF) is the maximum RQ/LOC, and the threshold PCA is the inverse value represented as a percent.

The dilution model uses the NHDPlus data set (http://www.horizon-systems.com/nhdplus/) as the framework for the downstream analysis. The NHDPlus includes several pieces of information that can be used to analyze downstream effects. For each stream reach in the hydrography network, the data provide a tally of the total area in each NLCD land cover class for the upstream cumulative area contributing to the given stream reach. Using the cumulative land cover data provided by the NHDPlus, an aggregated use class is created based on the classes listed in Table 4. A cumulative PCA is calculated for each stream reach based on the aggregate use class (divided by the total upstream contribution area).

The dilution model traverses downstream from each stream segment within the initial area of concern. At each downstream node, the threshold PCA is compared to the aggregate cumulative PCA. If the cumulative PCA exceeds the threshold then the stream segment is included in the downstream extent. The model continues traversing downstream until the cumulative PCA no longer exceeds the threshold. The additional stream length by the downstream analysis is presented in Table 5.

Table 4 Aquatic spatial quantitative results for acephate use areas.

Measure	**Total**
Total California stream kilometers	332,962
Total stream kilometers in initial area of concern	152,901
Total stream kilometers added downstream	52
Total stream kilometers in final action area	152,953

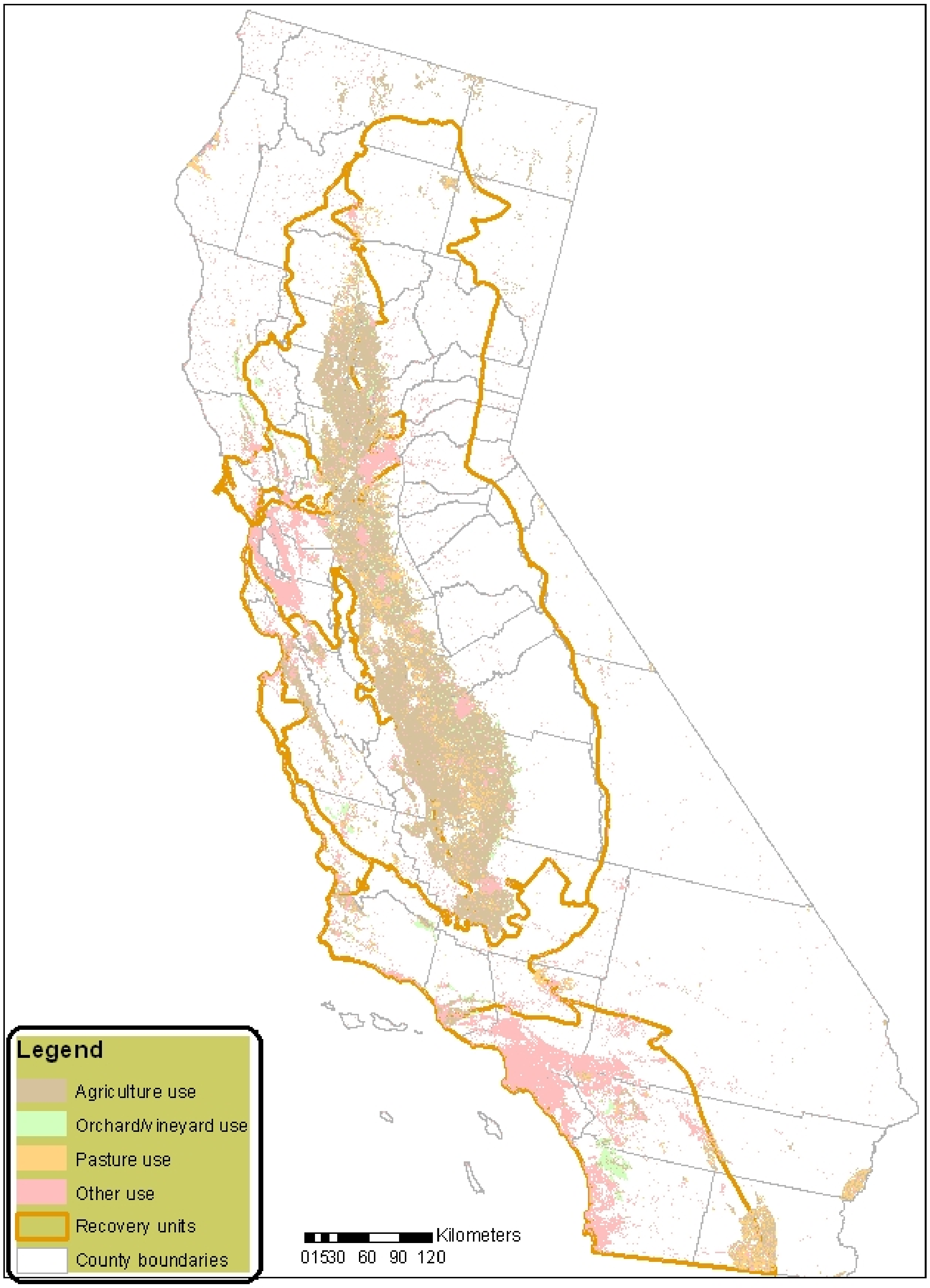
A Note on Limitations and Constraints of Tabular and Geospatial Sources

The geographic data sets used in this analysis are limited with respect to their accuracy and timeliness. The NASS Census of Agriculture (NASS 2002) contains adjusted survey data collected prior to 2002. Small use sites, and minor uses (e.g., specialty crops) tend to be underrepresented in this dataset. The National Land Cover Dataset (NLCD 2001) represents the best comprehensive collection of national land use and land cover information for the United States representing a range of years from 1994 – 1998. Because the NLCD does not explicitly include a class to represent orchard and vineyard landcover, California Gap Analysis Project data (CaGAP 1998) were overlaid with the NCLD and used to identify these areas.

Hydrographic data are from the NHDPlus dataset (http://www.horizon-systems.com/nhdplus/). NHDPlus contains the most current and accurate nationwide representation of hydrologic data. In some isolated instances, there are, however, errors in the data including missing or disconnected stream segments and incorrect assignment of flow direction. Spatial data describing the recovery zones and core areas are from the US Fish and Wildlife Service. The data depicting survey sections in which the species has been found in past surveys is from the California Natural Diversity Database (http://www.dfg.ca.gov/bdb/html/cnddb.html).

The relatively coarse spatial scale of these datasets precludes use of the data for highly localized studies, therefore, tabular information presented here is limited to the scale of individual Recovery Units. Additionally, some labeled uses are not possible to map precisely due to the lack of appropriate spatial data in NLCD on the location of these areas. To account for these uncertainties, the spatial analysis presented here is conservative, and may overestimate the areal extent of actual pesticide use in California.

Acephate Use



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

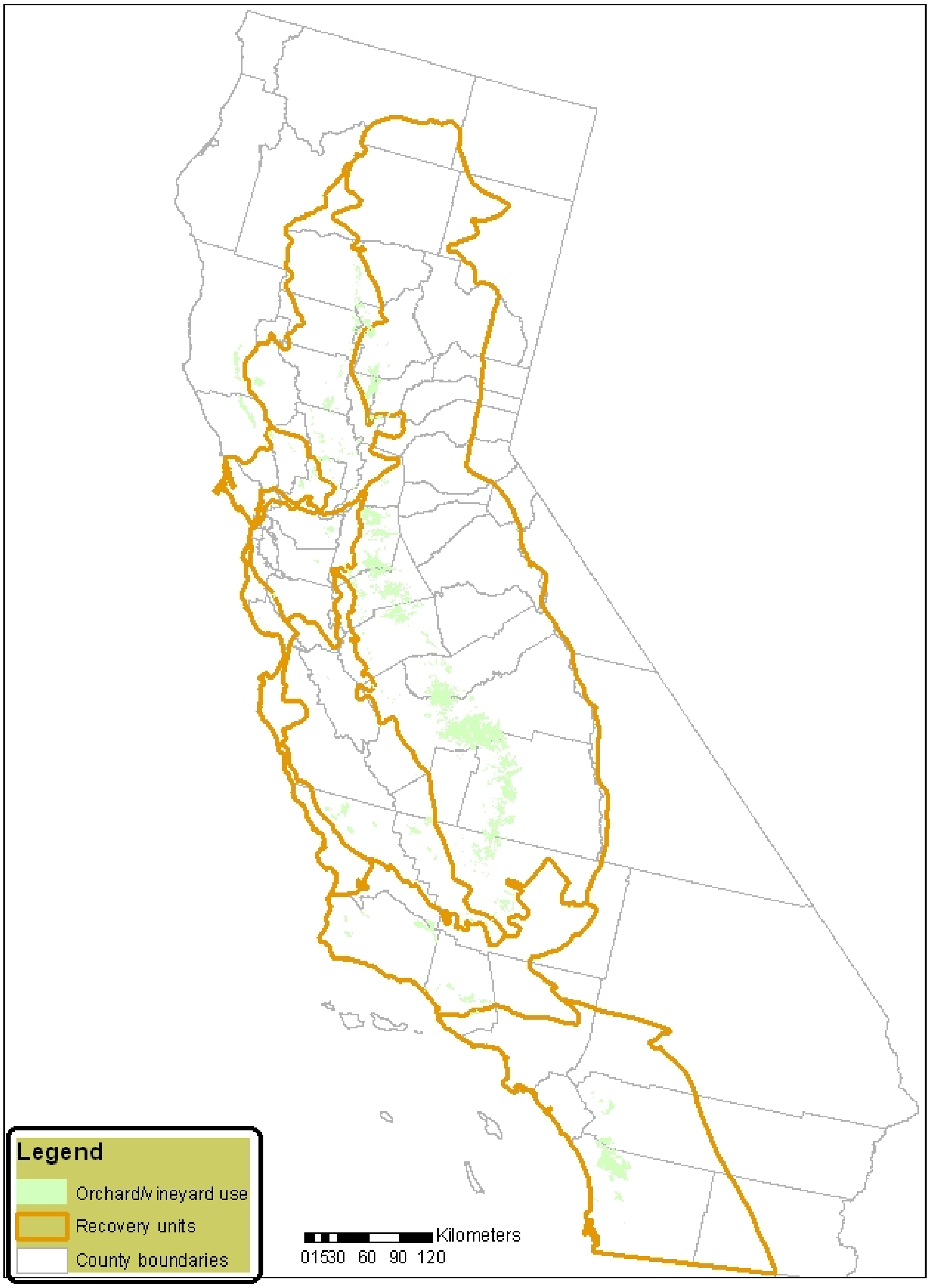
Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June XX, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

Acephate - Agriculture Use

Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June XX, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

Acephate - Orchard/Vineyard Use



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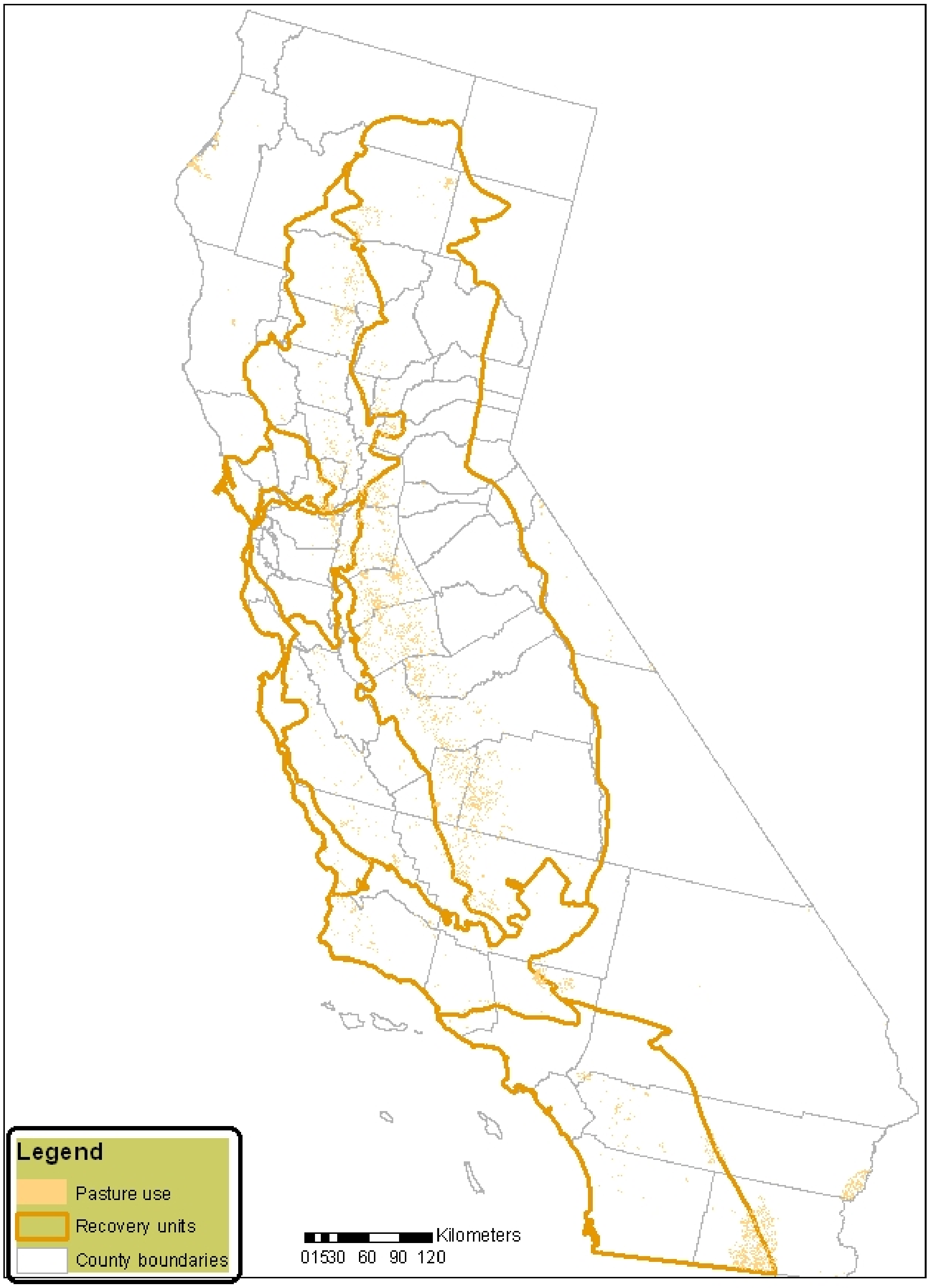
Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June XX, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

Acephate - Pasture Use



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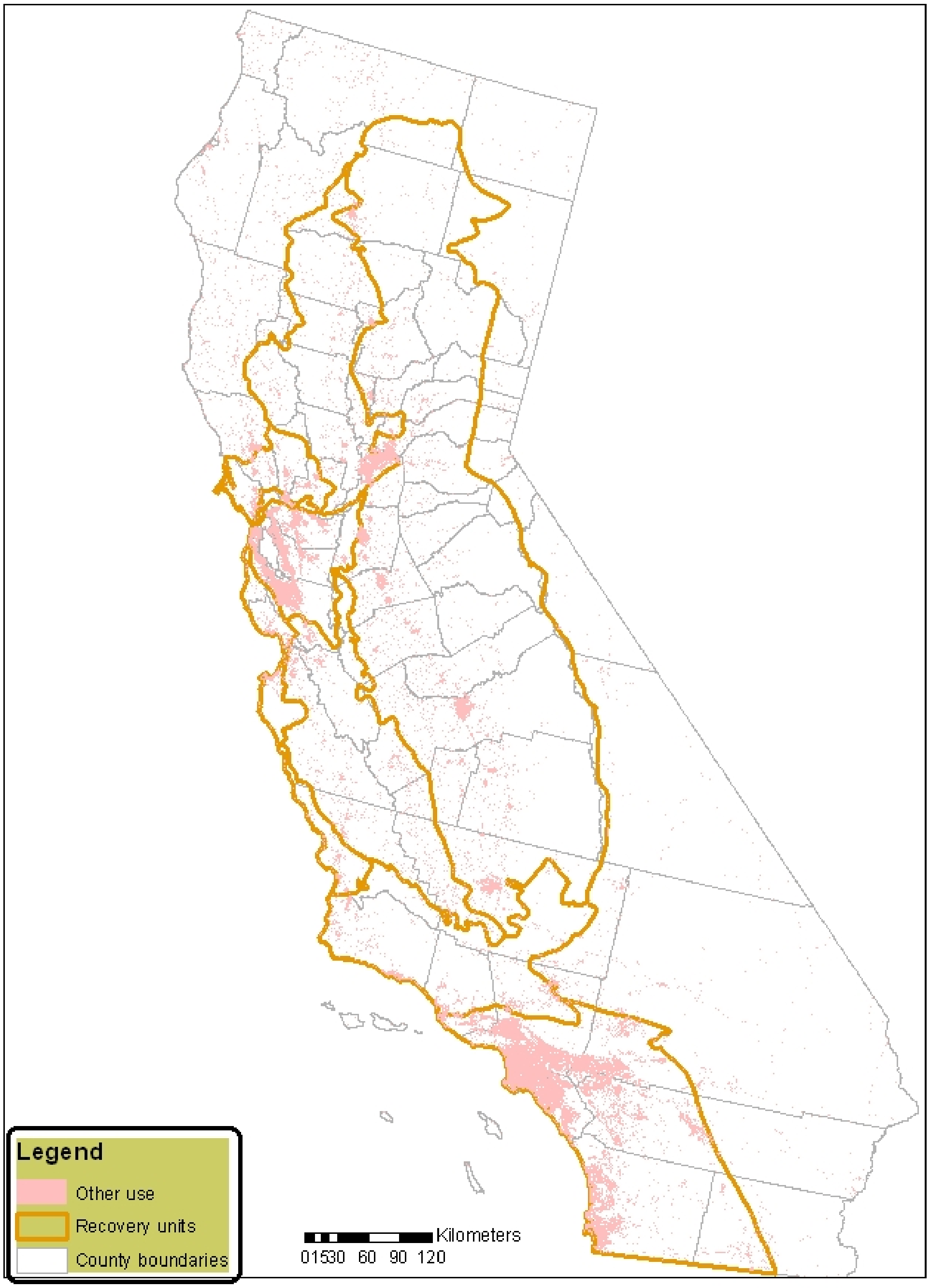
Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June XX, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

Acephate - Other Use



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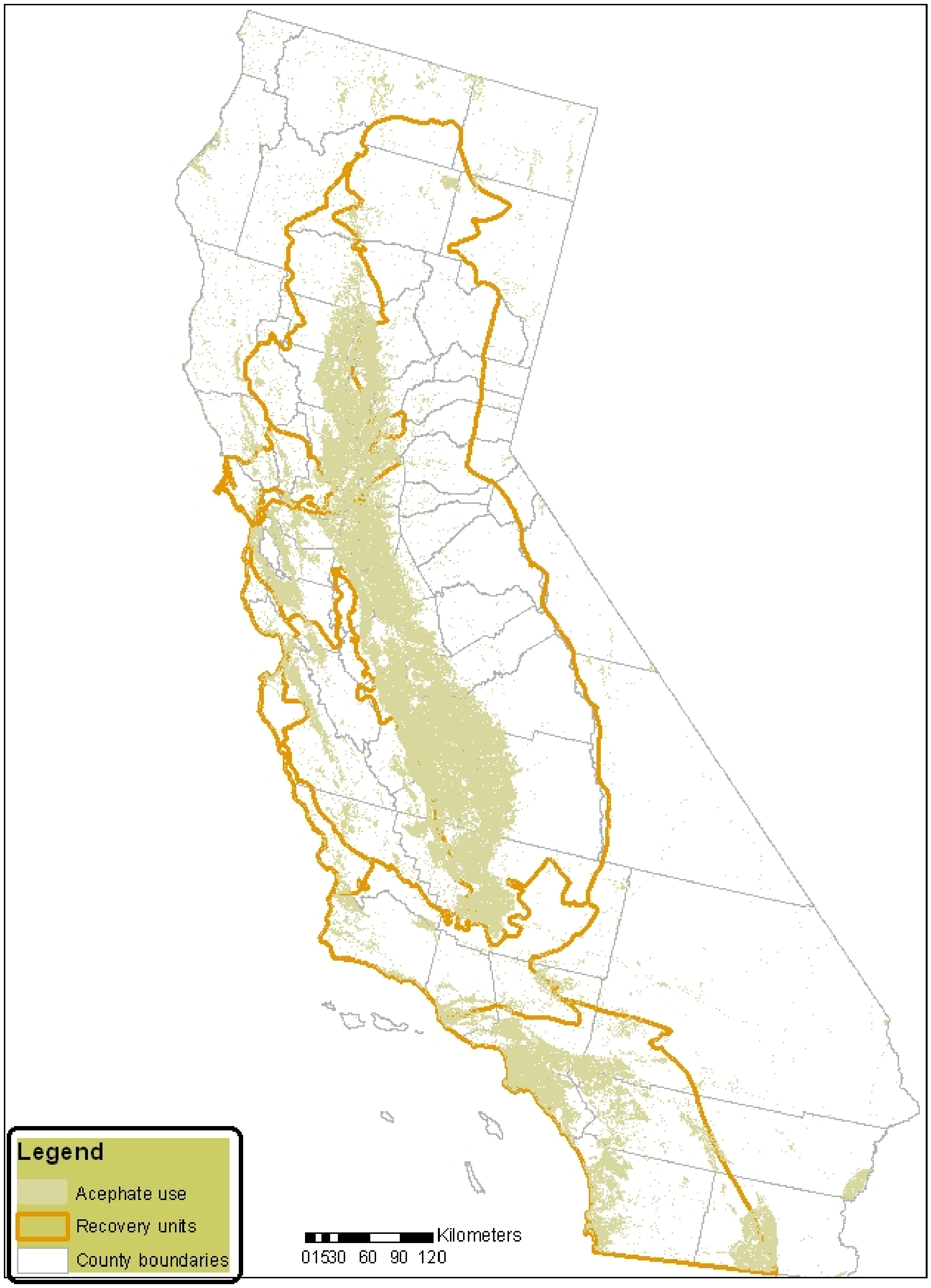
Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June XX, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

Acephate Use



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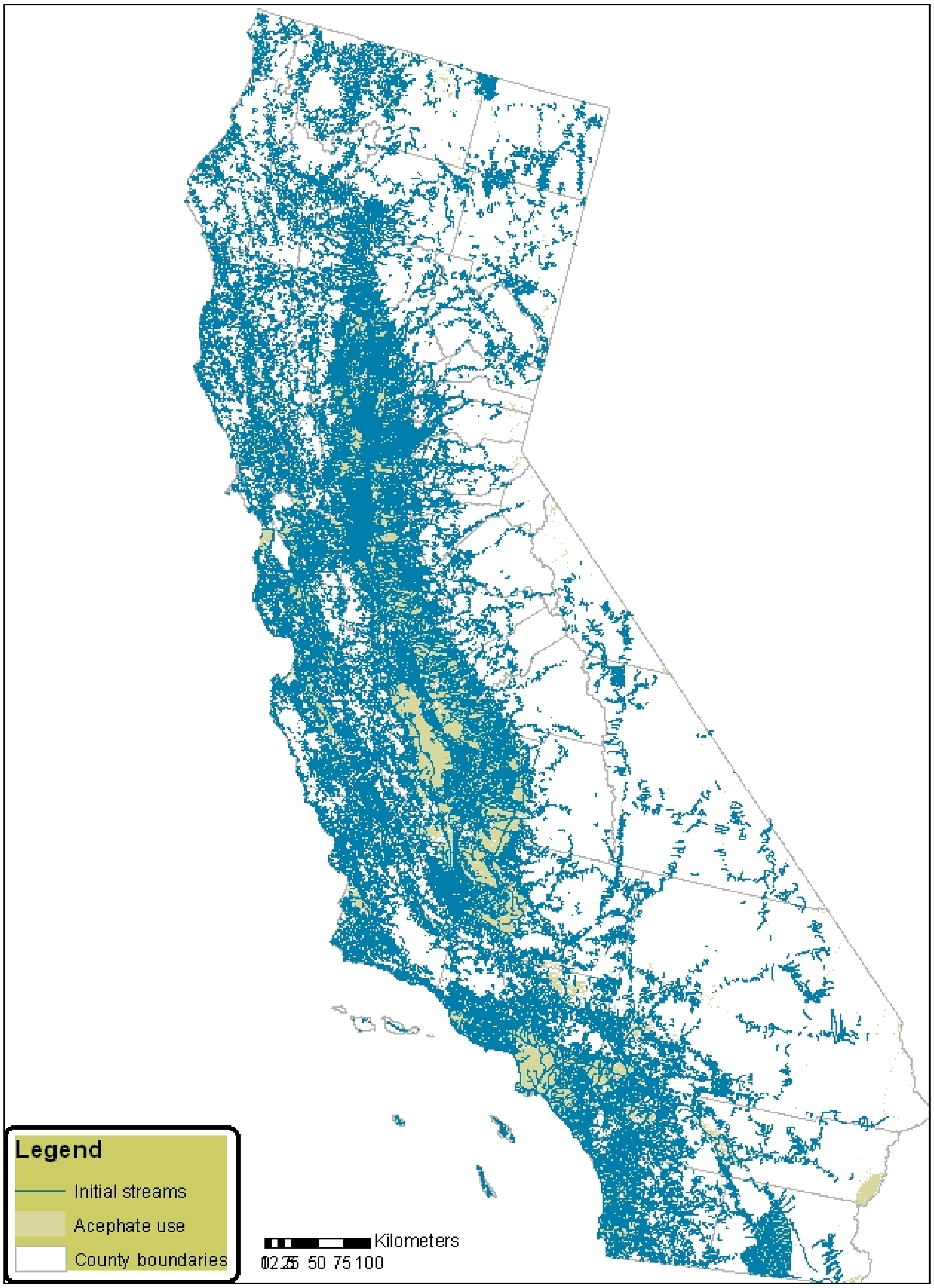
Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June XX, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

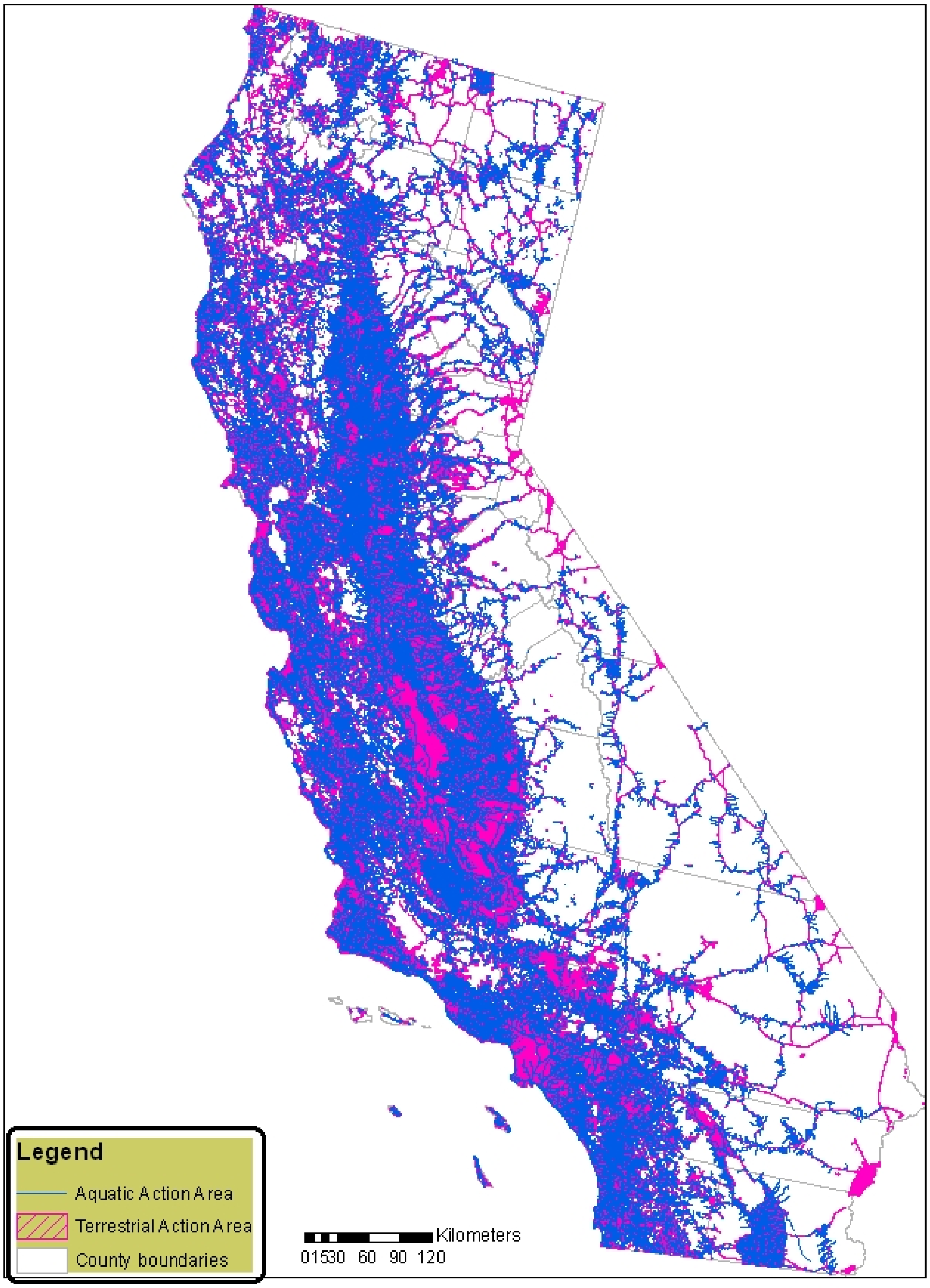
Acephate Initial Area of Concern



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

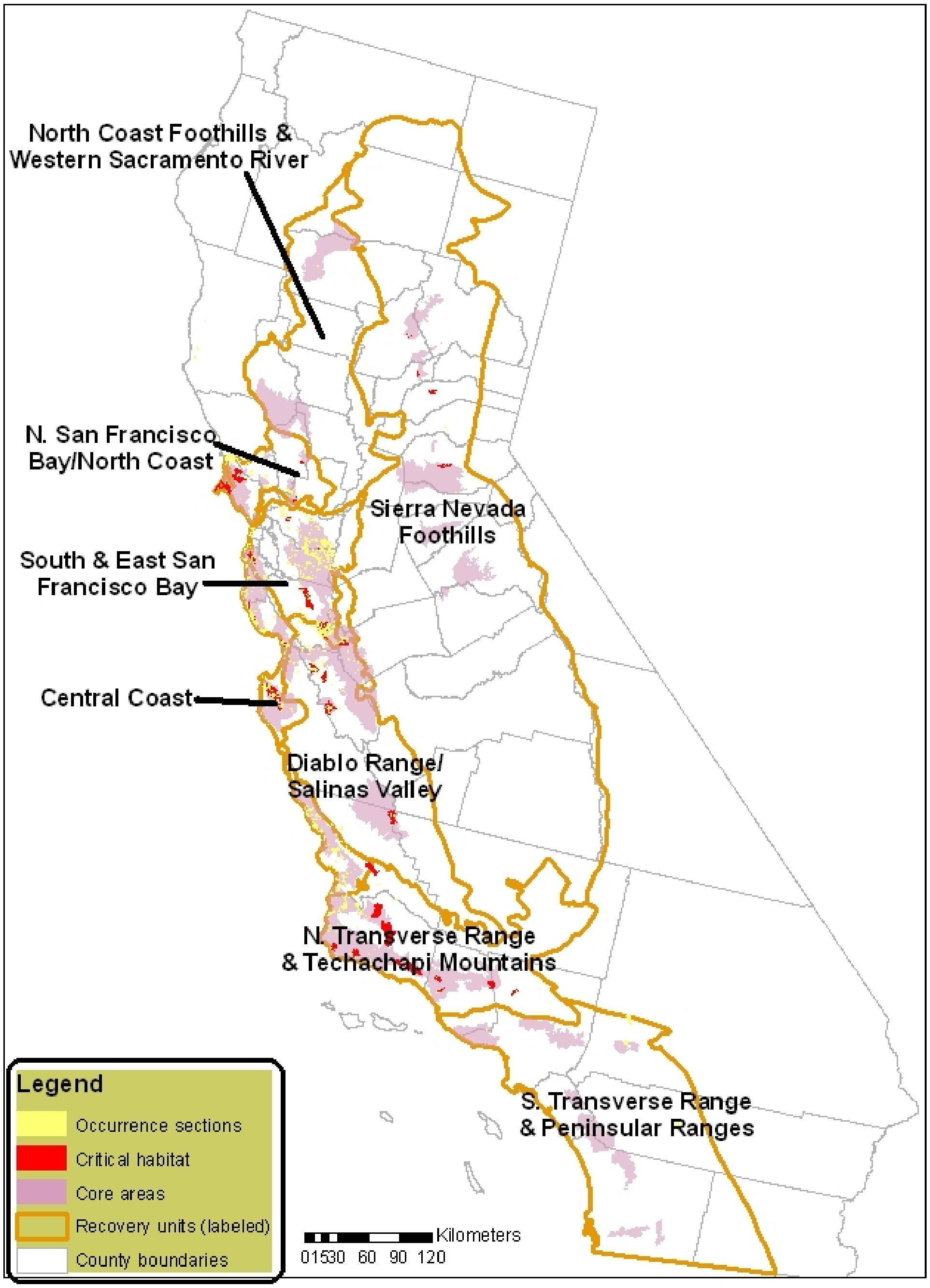
Acephate Action Area



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June XX, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

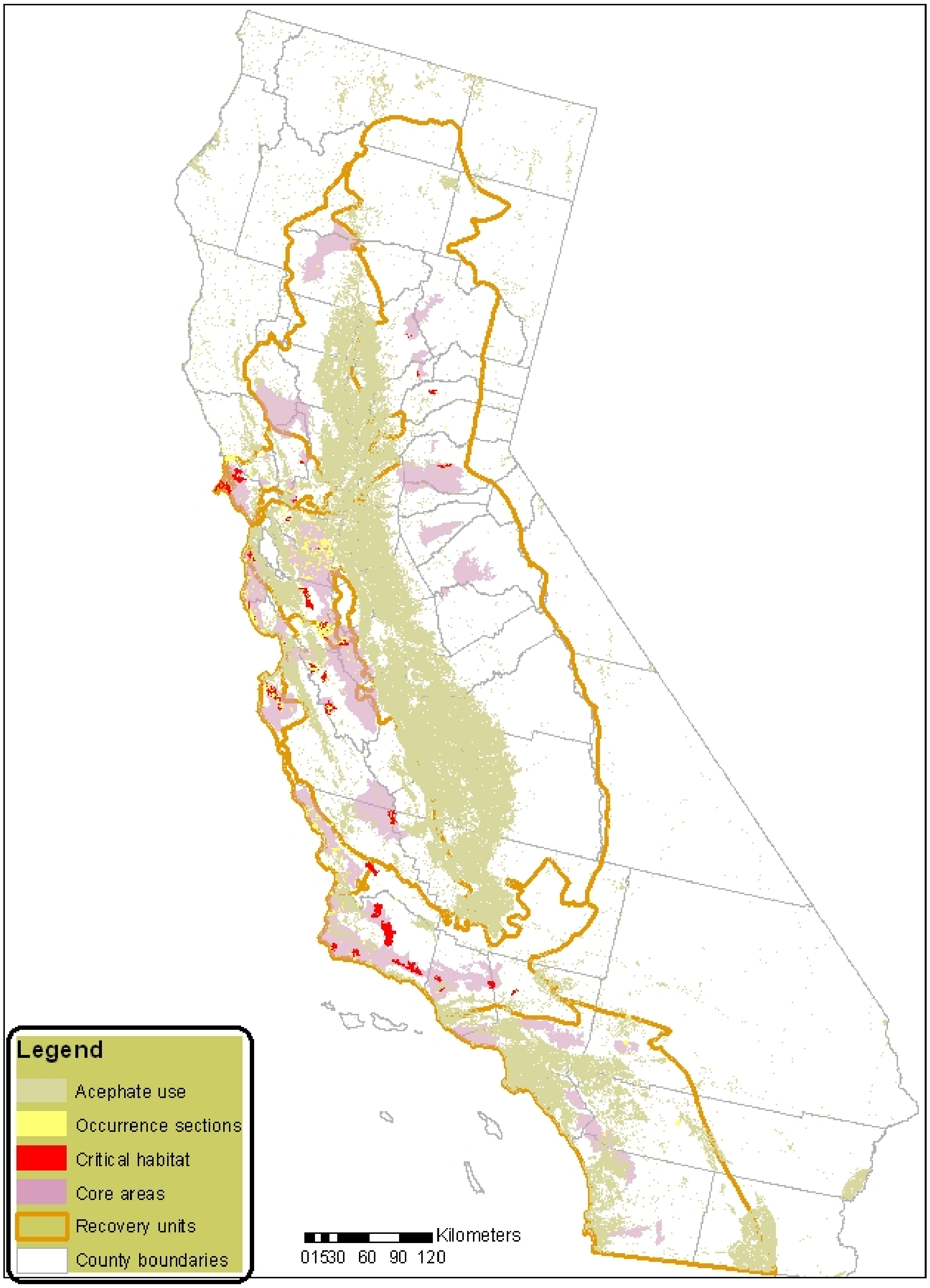
CRLF Habitat Areas



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 15, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

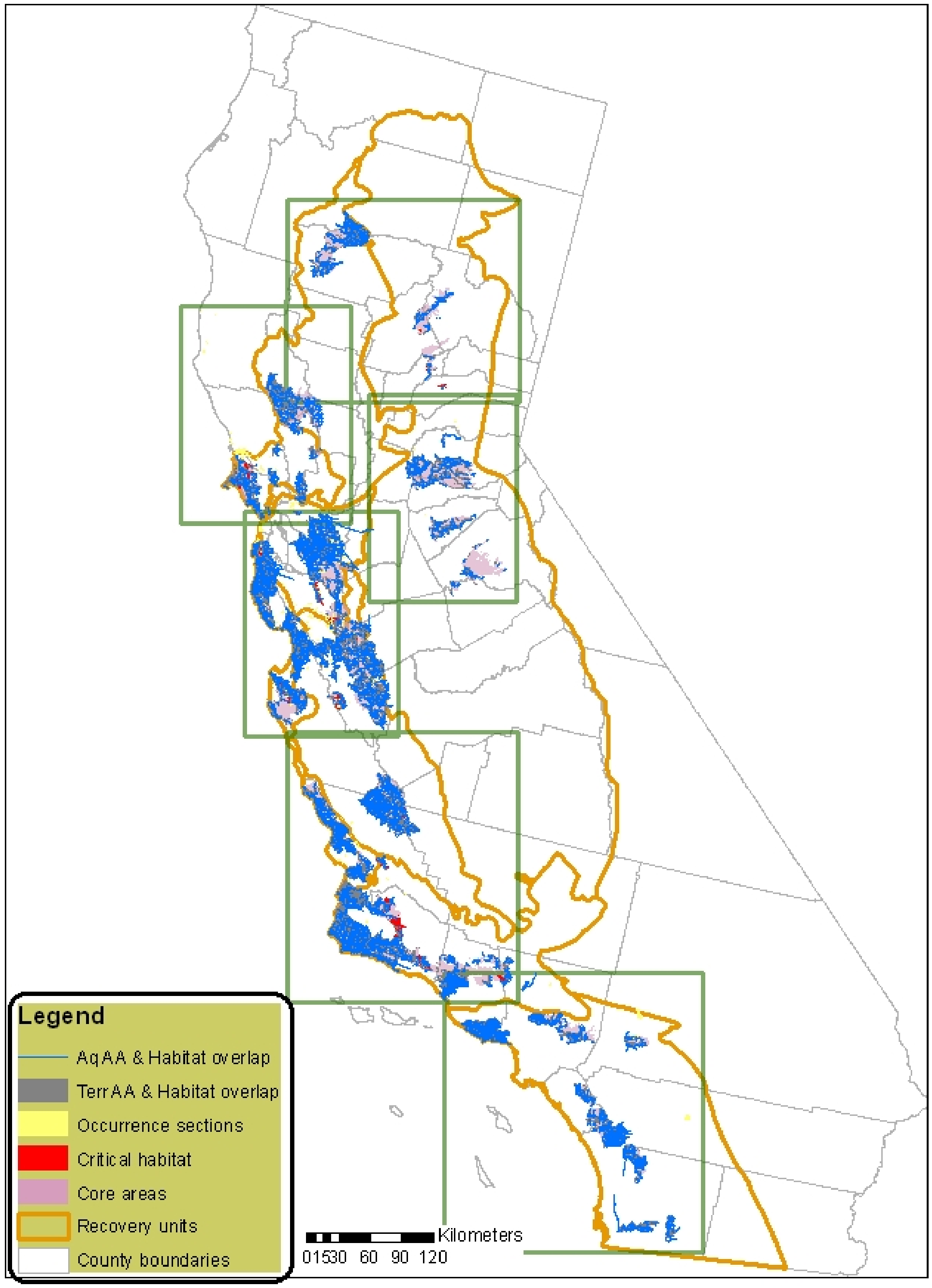
Acephate Use & CRLF Habitat



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June XX, 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

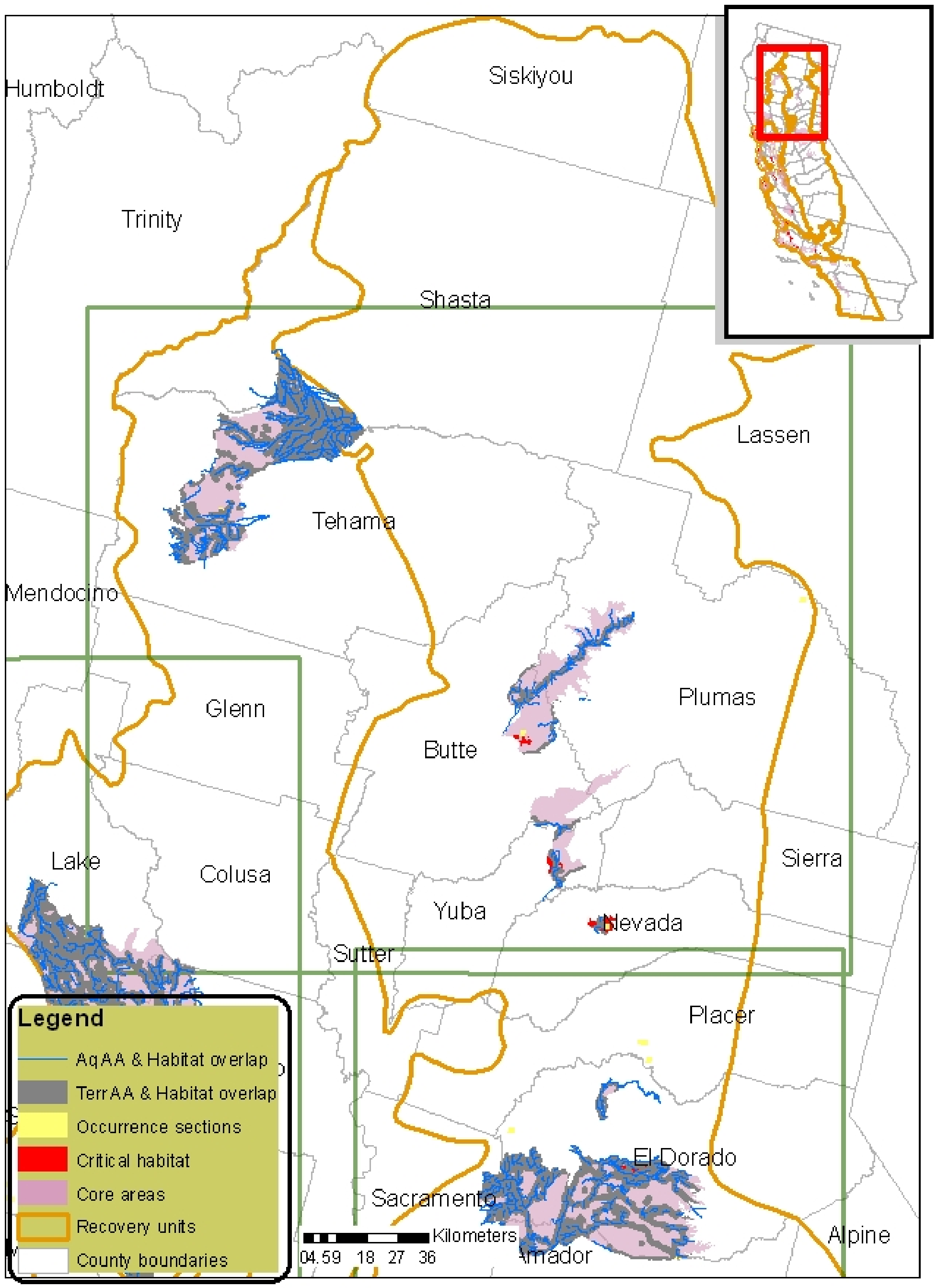
Action Area & CRLF Habitat Overlap



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

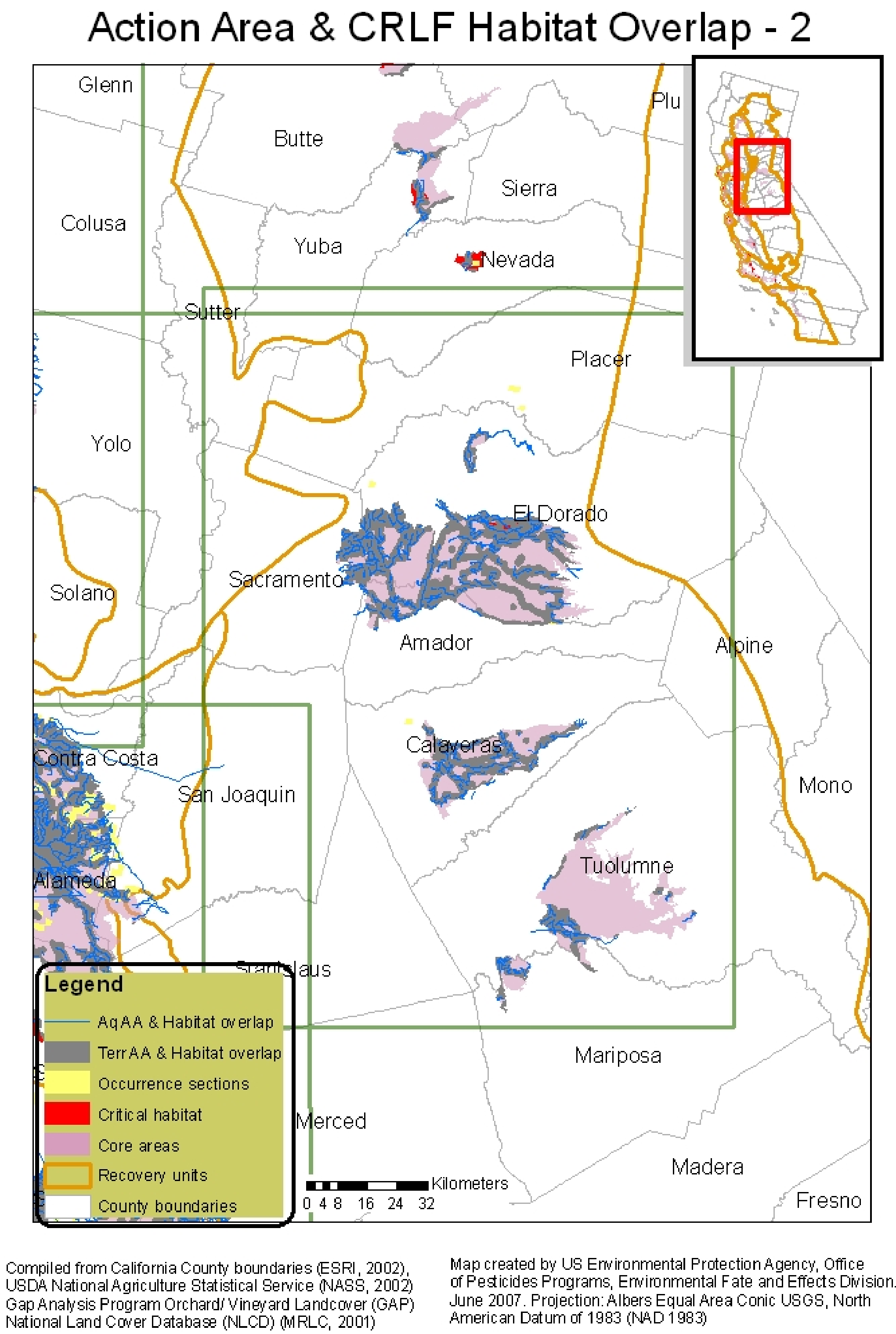
Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

Action Area & CRLF Habitat Overlap - 1

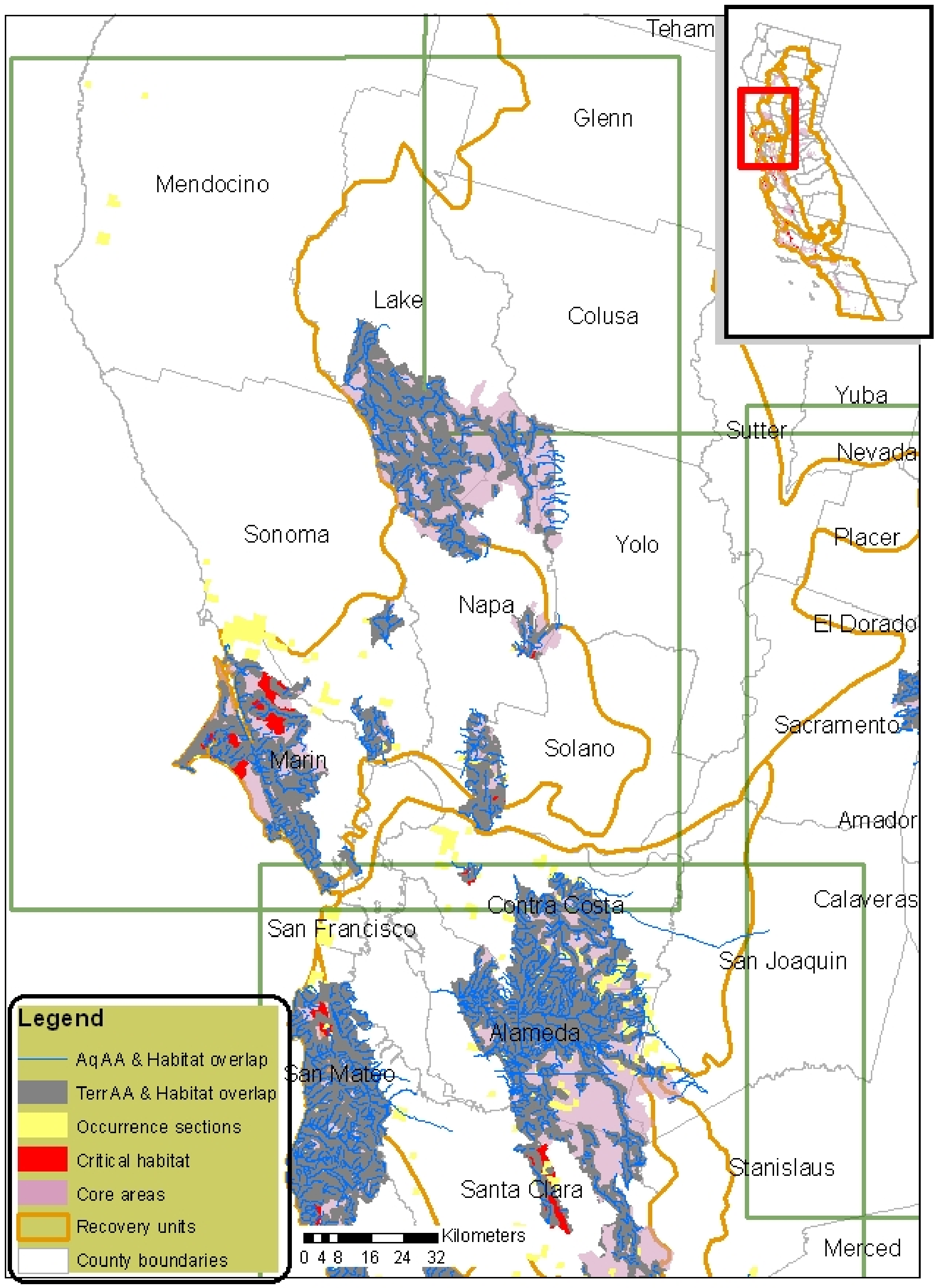


Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)


Action Area & CRLF Habitat Overlap - 2
Glenn
Butte
Plu
Sierra
Colusa
Yuba
Nevada
Sutter
Placer
Yolo
El Dorado
Sacramento
Solano
Amador
Alpine
Calaveras
Contra Costa
San Joaquin
Mono
Tuolumne
Alameda
Stanislaus
Mariposa
Merced
Madera
Fresno
Legend
Aq AA & Habitat overlap
Terr AA & Habitat overlap
Occurrence sections
Critical habitat
Core areas
Recovery units
County boundaries
Kilometers
0 4 8 16 24 32
Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)
Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

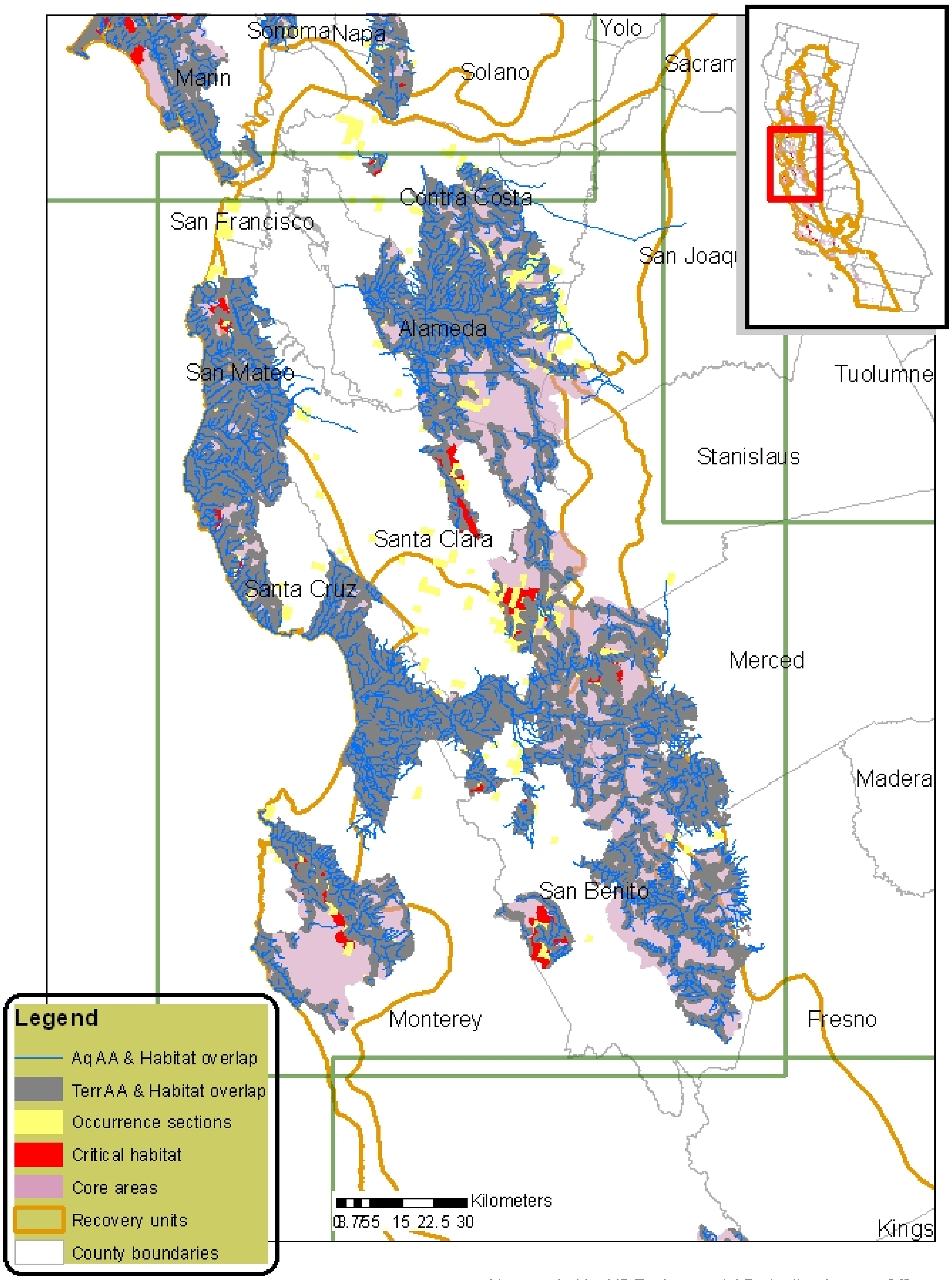
Action Area & CRLF Habitat Overlap - 3



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

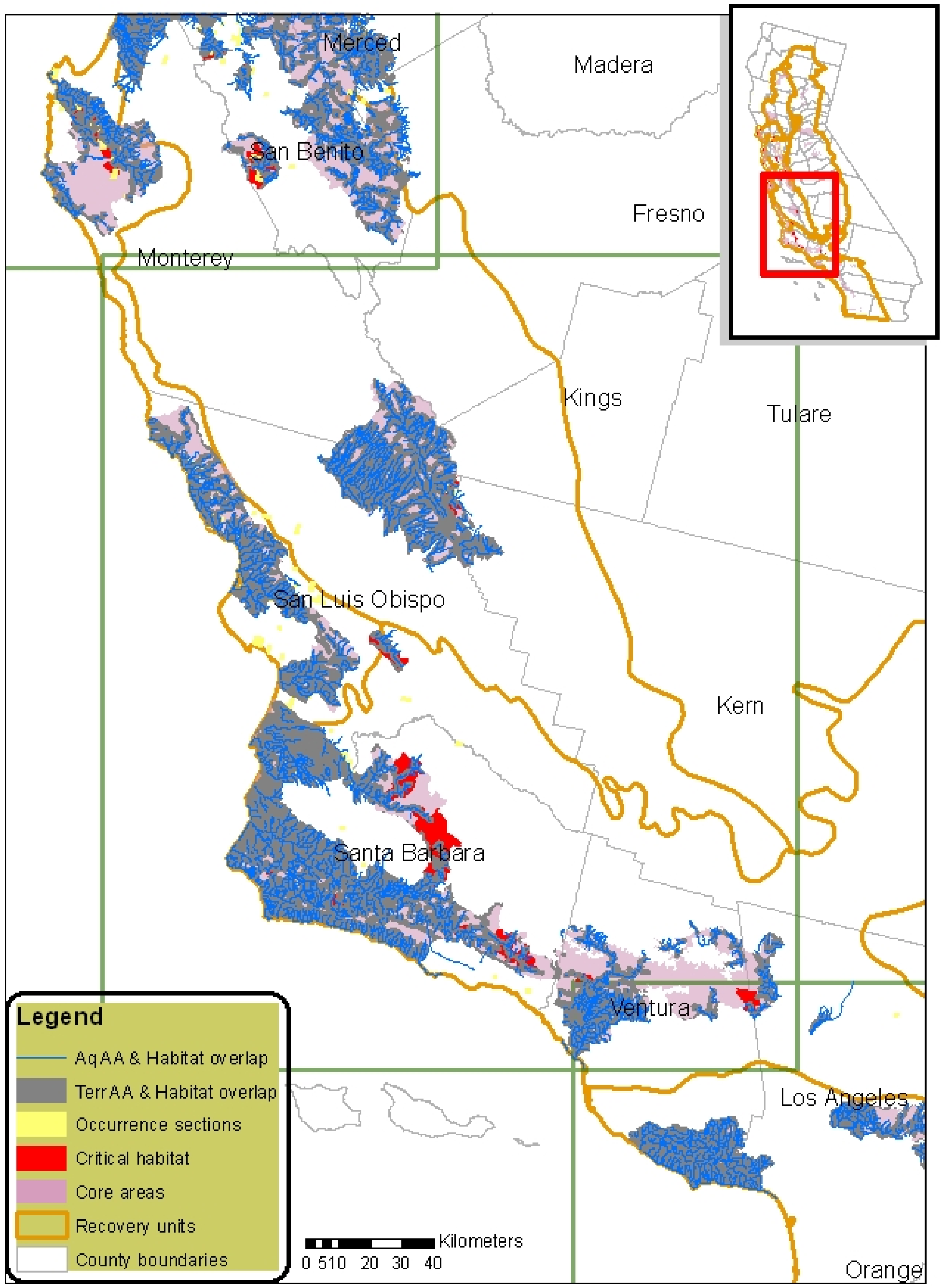
Action Area & CRLF Habitat Overlap - 4



Compiled from California County boundaries (ESRI, 2002), USDA National Agricultural Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

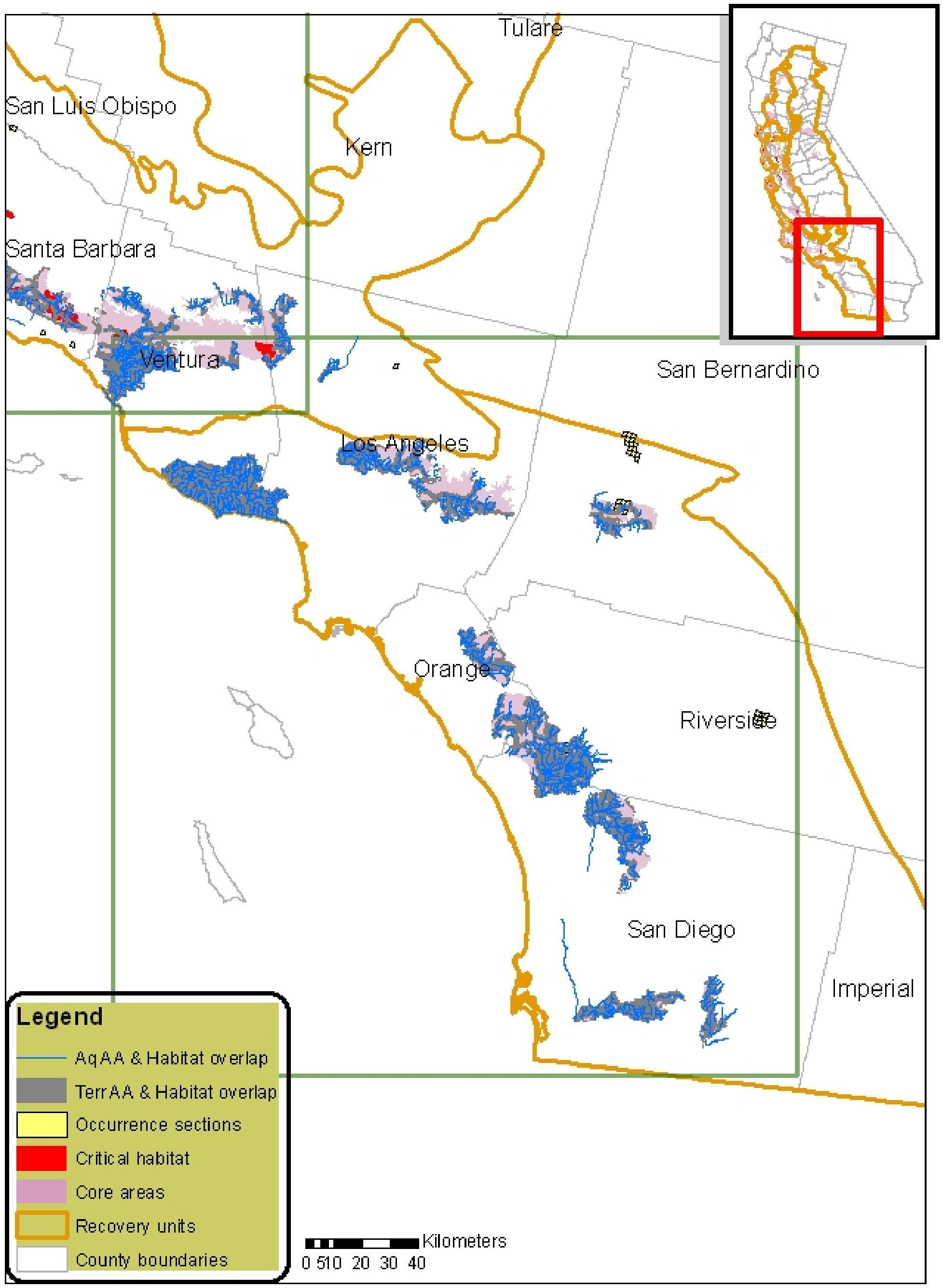
Action Area & CRLF Habitat Overlap - 5



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

Action Area & CRLF Habitat Overlap - 6



Compiled from California County boundaries (ESRI, 2002), USDA National Agriculture Statistical Service (NASS, 2002) Gap Analysis Program Orchard/ Vineyard Landcover (GAP) National Land Cover Database (NLCD) (MRLC, 2001)

Map created by US Environmental Protection Agency, Office of Pesticides Programs, Environmental Fate and Effects Division. June 2007. Projection: Albers Equal Area Conic USGS, North American Datum of 1983 (NAD 1983)

Appendix L

ASSESSING TERRESTRIAL INVERTEBRATE EXPOSURE TO PESTICIDES:

In addition to the normal uncertainties associated with using one surrogate species to represent all members within its taxa (*e.g.*, using a rat to represent 'mammals'), here are some things to consider when using, or considering to use, T-REX and bee contact studies to estimate exposure to terrestrial invertebrates – **CAUTION:** This is ***NOT*** an exhaustive list.

Is contact expected to be the most sensitive route of exposure (*e.g.*, if the most toxic route of exposure is through ingestion, what can a bee contact study tell you? Are more appropriate data, *e.g.*, dietary data, available from ECOTOX)?

Is the chemical expected to be equally toxic to all insect life stages (*e.g.*, if the chemical affects molting, larvae may be particularly sensitive to it, while adults may not be affected by the chemical at all).

Is there some specific reason(s) – based on its mode of action or available data - to suspect that some insect taxa may be more sensitive to a chemical than bees?

Is the toxicity from a dab of the chemical on the thorax of a bee representative of the toxicity due to a more uniform distribution of the chemical over the exposed parts of the entire insect?

And related to this, how representative is a bee to insects with large surface areas per volume (*e.g.*, butterflies and moths)?

Method to estimate terrestrial insect exposure:

For terrestrial invertebrates, normally the only submitted data we have are LD_{50} values for honeybees based on acute contact (a dab of the chemical on the thorax of a honeybee); sometimes we have LD_{50} values from an oral dose of the chemical. Occasionally we may have open literature (ECOTOX) data for dietary exposure, *etc*., for different insect species.

One potential way to estimate exposure (modified from methods originally in Metolachlor salmonid assessment) is:

1) Estimate residue concentrations on fruits/seeds/pods/large insects using T-REX (version 1.2.3) for the particular use(s) being assessed (the EEC values are reported in 'ppm', which is equal to 'µg a.i./g of insect'). The EEC for fruits/seeds/pods/**large insects** should be from one of the non-body-weight-adjusted tables, that is, from a "dietary"-based table in TREX output. To bound the risk, use the broadleaf plant/small

insect EEC from a dietary table. The resulting RQ should be approximately 9 times as high, assuming the same body weight and LD50 data.

If no other toxicity data are available for insects, use honey bees as a surrogate for terrestrial insects; otherwise use most sensitive terrestrial insect.

Estimate the residue for a bee (µg a.i./bee) using an adult honey bee weight of 0.128 g (i.e., multiply the EEC for seeds and pods in T-REX by ‘0.128'). Which equals the exposure in µg a.i./bee.

If toxicity data are available from more sensitive non-bee insect species, use the weight for an individual of that species (in grams) as the multiplier.

Another way to think about it:

Based upon an average fresh weight per honey bee of 128 milligrams, the LD_{50} of honey bees (:g/bee) can be multiplied by 7.8 to determine the ppm toxicity. (Mayer, D. & C. Johansen. 1990. *Pollinator Protection: A Bee & Pesticide Handbook.*Wicwas Press. Cheshire, Conn. p. 161)

µg/g = ppm

µg/bee = µg/128 mg = µg/0.128 g = 7.8 µg/g = 7.8 ppm

To convert ppm to µg/bee, the ppm value would be divided by 7.8.